Association of Firearm and Tool Mark Examiners

49th Annual Training Seminar
June 3-8, 2018 - Charleston Civic Center
Charleston, West Virginia
The BRS 101-48A is our premiere base model.

Team Fabrication is a recognized leader in the manufacturing of Bullet Recovery Systems, under its former Emark brand name, with over 20 years experience in fabrication. Our Bullet Recovery Systems have been sold and installed internationally. Each high quality stainless steel unit is hand crafted by our experienced fabricators to your specifications. We can customize our Bullet Recovery Systems to meet any client size or needs.

- Rated for commercial ammunition with muzzle velocities up to 3,500 FPS, corresponding energy of 5,250 foot-pounds and bullet weights of 300 grain.
- Industrial water pump and filtration system with timer.
- Electro mechanical lid opens and closes to prevent water spillage during usage.
- Tank unit size 101” L x 48” H x 34” W fits through standard 36” doors for easy installation.
- Constructed of high quality heavy duty stainless steel for maximum safety and to prevent rust and corrosion.
- Illuminated water tank.
- Suction wand for easy bullet recovery and general housekeeping.
- Firing port can be positioned on either end of the tank according to customer needs.
- 5 year Limited Warranty.

BRS 101-48A Equipment Options
- On Site Custom Fabrication.
- Remote Firing Stand.
- Casing Catcher.
- Pharmaceutical Grade Filter Exhaust.
- Exhaust Fan for in room exhaust system.
- Fire Port Security Device to prevent unauthorized use.
- Electronic Water Make Up Control automatically adjusts water level inside tank.
<table>
<thead>
<tr>
<th>Table of Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFTE Remembers</td>
<td>4</td>
</tr>
<tr>
<td>Welcome to Charleston!</td>
<td>6</td>
</tr>
<tr>
<td>Important Information</td>
<td>7</td>
</tr>
<tr>
<td>Marriott Town Center Floor Plan</td>
<td>9</td>
</tr>
<tr>
<td>Charleston Civic Center Floor Plan</td>
<td>10</td>
</tr>
<tr>
<td>Exhibitor Booth Assignments</td>
<td>11</td>
</tr>
<tr>
<td>Exhibitor Information</td>
<td>13</td>
</tr>
<tr>
<td>Week at a Glance</td>
<td>19</td>
</tr>
<tr>
<td>Sunday’s Schedule of Events</td>
<td>21</td>
</tr>
<tr>
<td>Monday’s Schedule of Events</td>
<td>23</td>
</tr>
<tr>
<td>Tuesday’s Schedule of Events</td>
<td>29</td>
</tr>
<tr>
<td>Wednesday’s Schedule of Events</td>
<td>41</td>
</tr>
<tr>
<td>Thursday’s Schedule of Events</td>
<td>59</td>
</tr>
<tr>
<td>Friday’s Schedule of Events</td>
<td>71</td>
</tr>
<tr>
<td>Poster Session Information</td>
<td>72</td>
</tr>
<tr>
<td>Workshop Descriptions &amp; Schedule</td>
<td>74</td>
</tr>
<tr>
<td>Raffle and Door Prize Items</td>
<td>91</td>
</tr>
<tr>
<td>Friends and Family</td>
<td>93</td>
</tr>
<tr>
<td>Charleston Favorites</td>
<td>96</td>
</tr>
<tr>
<td>AFTE Scholarship Fund</td>
<td>97</td>
</tr>
<tr>
<td>Challenge Coin History</td>
<td>98</td>
</tr>
<tr>
<td>2018 AFTE Banquet Night Information</td>
<td>99</td>
</tr>
<tr>
<td>2019 AFTE Information</td>
<td>100</td>
</tr>
</tbody>
</table>
Donald Gunnell

Don was a 2nd generation Chicago Police Officer, joining the Department in 1955, retiring in 1984. He walked the beat in the Austin District, was on the Task Force, a motorcycle division that was predecessor to the modern day Tactical Units, the Marine & Police Scuba Diving Unit and in 1960 was assigned to the Crime Laboratory. From 1960 to 1972, Don served in the Mobile Unit as a Crime Scene Investigator. He handled well over 1000 homicides and worked on such notorious cases as the Speck Case, the Pera and Scwander Case, one of the first instances of bio-terrorism in the US, and many of the Organized Crime assassinations of the 60's. From 1968 through 1972, Don was the Chief Training Officer for the Mobile Unit. He trained over 200 officers, from all over the world, in death investigation. In 1972, Don was assigned to the Firearms Identification Unit where he continued to excel in his profession. He was a Distinguished Member of the Association of Firearms and Toolmark Examiner (AFTE) and assisted in the development of the AFTE Glossary, the first scientific dictionary of specific terms utilized within the discipline.

Upon his retirement from the Chicago Police Department, Don began his second career with the Illinois State Police. He was responsible for setting up and opening the Firearms Identification Section in the new Southern Illinois Forensic Science Center located in Carbondale. Don was involved in many of the major cases in Southern Illinois from 1986 till his retirement from the State Police in 1995.

Even after his retirement from the Illinois State Police, Don remained active in Law Enforcement. He served as an Auxiliary Police Officer and Training Officer for the Carterville Police Department; a contractual Forensic Firearms Examiner for the Northern Illinois Regional Police Laboratory; and as recently as last year a member of the Williamson County Cold Case Squad.

Don was known throughout Illinois, the nation and internationally as a devoted, hard working, professional whose passion for law enforcement and justice moved him to train and mentor hundreds in the fields of police work and forensic science. He was a faithful husband, an exciting father, and a loving grandfather. He will be missed by many.
AFTE Remembers

Steve Norris

Steve looked back on a number of favorite memories. They included a close knit family; a no-hitter he threw in baseball; camping as a boy; coming to Jesus as Savior and Lord; playing with his best friend and sister, Robin; playing trombone in the East High band; DECA in high school; playing baseball and softball; 4 years in the U.S. Marine Corps as a trainer on the shooting range; hunting elk and deer; fishing; being the firearms examiner for the state of Wyoming; raising his three sons; being a Cub Scout leader; playing guitar on a worship team for children with his mother; learning a new trade involving construction and siding buildings; and growing in his faith and knowledge of his Savior.

Paul Leon Dragan

Paul Leon "PJ" Dragan. Beloved husband of Elaine Botz. Dearest father of Kristin L. Saussele. Loving grandfather of Kate. Dear brother of Elaine (Lorenzo) Clark and Marilyn Sawaya. Also survived by many loving brothers in law, sisters in law, nieces, nephews, friends, and his cherished 4-Legged Companion, VeeGee. Paul was also a wonderfully loving foster parent.
The AFTE 2018 Host Committee would like to welcome you to the beautiful city of Charleston! The 49th annual training seminar is being held at the Charleston Civic Center which is right across the street from both hotels being utilized this year. We are very excited about our technical session especially our Key Note Speaker that has worked forensic cases around the world and right here in West Virginia. There are forty-five workshops/manufacturer tours offered this year in which the host committee worked hard to bring you a variety of courses and ones that have never been offered before. We hope you enjoy the various daytime and evening social activities we have planned and that you get to explore our wonderful city and state during the week.

Since there are only four Firearm and Toolmark Examiners in the state of West Virginia, our host committee is comprised of people from various laboratories across the United States. They all have worked very hard to bring you an outstanding program that is both informative and fun for all of you. If you see one of them in a green tee shirt or black polo during the week be sure to give them a pat on the back!

We would like to thank all of our attendees, exhibitors, instructors, friends, and family that are joining us this week. We would also like to thank all of the individuals, volunteers, organizations, and businesses that have supported and sponsored the AFTE 2018 meeting. A big thank you goes to the West Virginia State Police, Charleston Visitor’s Bureau, and the Central West Virginia Convention & Visitors Bureau for their incredible support during the past two years.

If you have any questions during your stay in Charleston, please do not hesitate to contact any of the host committee members.

Please remember that name badges must be worn in order to gain admittance to the technical session, workshops, poster session, BYOS event, exhibit hall, and social functions (these also have required wrist bands).

2018 Host Committee Members

Chair
Calissa Carper – West Virginia State Police

Members
Blake Reta – West Virginia State Police
Kristina Cheung – Prince George’s PD
Ryan Christopher – West Virginia State Police
Matthew Clements – Kentucky State Police
Philip Cochran – West Virginia State Police
Jessica Copeland – Kentucky State Police
Dwight Deskins – Kentucky State Police
Jill Dupre – Houston Forensic Science Center
Mallory Foster – Texas DPS
Wendy Gibson – Virginia DFS
Jeff Goudeau – Louisiana State Police Crime Lab
Laura Hollenbeck – Virginia DFS
Michelle Hunsinger – Monroe County Crime Lab
Scott McVeigh – Prince George’s PD
Chris Monturo – Miami Valley Regional Crime Lab
Erica Pattie – Columbus Police Crime Lab
Jaimie Smith – Prince George’s PD
Tim Spears – Indianapolis Marion Cty. Crime Lab
Stuart Swope – West Virginia State Police
Joseph Young – Prince George’s PD
Xiaoyu Alan Zheng - NIST
Jori Farquharson – Washington State Patrol
Mike Coakley - Independent
AFTE 2018 Locations

- The AFTE 2018 Training Seminar takes place in both the Marriott Town Center Hotel as well as the Charleston Civic Center
  - All technical sessions will occur in the Charleston Civic Center
  - Workshops are split between the Civic Center and the Marriott Town Center Hotel
  - Please double check where each AFTE event is held
- There is free wireless internet access in the hotel lobby and guest rooms
- There is no wireless internet access in any of the meeting spaces

While in the Meeting

Continuing Education Units (CEU) for Recertification
The AFTE 2018 Technical Session consists of 22 hours and 15 minutes of presentations. If you are attending a workshop or an event on Tuesday, Wednesday, and/or Thursday, and are not attending the Technical Session, you will need to subtract those hours from the total for documentation for Recertification. An additional 2 hours will be provided for those that attend the Bring Your Own Slides event Monday night.

Daily Total Hours:
Monday – 2 Hrs 25 Min
Poster Session – 1 Hr
BYOS – 2 Hrs
Tuesday – 6 Hrs
Wednesday – 6 Hrs 40 Min
Thursday – 4 Hrs 10 Min

Total CEUs: 22 Hrs 15 Min

*Disclaimer: The views and opinions expressed by the presenters, and those providing comments on the presentations are theirs alone, and do not necessarily reflect the views, opinions, or positions of the Association of Firearm and Tool Mark Examiners.

While Out on the Town

Charleston is a great city, but it is still a city! Please be smart and remember to be aware of your surroundings. Please consider the following when you are out and about on the town:
- Remove your name badges when you are not attending AFTE functions
- Travel with groups and stay in well-lit main thoroughfares
- Avoid carrying a purse when possible and do not display cash in public
- Capitol Street is a great place to hang out, but do not go there by yourself!
- If you’ve been drinking, please consider taking a taxi, Uber, Lyft, or the hotel Shuttles:
  - Marriott Hotel Shuttle (Free) 5:30 am – 11:00 pm
  - Holiday Inn Shuttle (Free) By Appointment Only. Hotel shuttle may also be used for service in the downtown area.
- Take care of each other!

Important Numbers
Marriott Hotel (304) 345-6500
Holiday Inn (304) 545-7096
Charleston PD (non-emergency) (304) 348-6470
Main events of AFTE 2018 will be held at two separate locations. The technical sessions, exhibitors, and a portion of the workshops will be held in the Charleston Civic Center across the street from both hotels.
A number of the **Workshops** will be held at the Marriott Town Center hotel on the 2\(^{nd}\) floor. Please check your workshop locations carefully.

The **Sunday Welcome Reception** will be held at the indoor/outdoor pavilion on the 3\(^{rd}\) floor of the hotel from 6-8 pm.

The **Bring Your Own Slides Presentations** will be held Monday night from 8-10 pm on the 2\(^{nd}\) floor (Salons A,B,C).
Early registration Saturday will be at the Marriott 2nd Floor Foyer 4-6 pm.

Registration Sunday through Friday will be at the Civic Center Quarrier St. Lobby.
Exhibitors are located in the North Hall of the Civic Center. Booths will be open during the following hours:

- **Monday:** 7:15 a.m. to 6:30 p.m.
- **Tuesday and Wednesday:** 7:15 a.m. to 5:00 p.m.
- **Thursday:** 7:15 a.m. to 12:00 p.m.

*Breakfast, AM/PM breaks, and the Poster Session will be held in the Exhibit Hall*

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accutrans</td>
<td>107</td>
</tr>
<tr>
<td>Alicona Corporation</td>
<td>407</td>
</tr>
<tr>
<td>ATF – NIBIN Branch</td>
<td>601</td>
</tr>
<tr>
<td>Baltimore Precision Instruments</td>
<td>511</td>
</tr>
<tr>
<td>Cadre Forensics</td>
<td>603</td>
</tr>
<tr>
<td>CartWinPro</td>
<td>410</td>
</tr>
<tr>
<td>Collaborative Testing Services - CTS</td>
<td>306</td>
</tr>
<tr>
<td>CTL Scientific Supply</td>
<td>602</td>
</tr>
<tr>
<td>Center for Statistics &amp; Applications in Forensic Evidence</td>
<td>307</td>
</tr>
<tr>
<td>Cybernational Inc.</td>
<td>600</td>
</tr>
<tr>
<td>FARO</td>
<td>409</td>
</tr>
<tr>
<td>Forensic Pieces</td>
<td>105</td>
</tr>
<tr>
<td>Forensics Source</td>
<td>106</td>
</tr>
<tr>
<td>Foster &amp; Freeman USA</td>
<td>509</td>
</tr>
<tr>
<td>GunLearn – International Firearm Specialist Academy</td>
<td>311</td>
</tr>
<tr>
<td>Hirox-USA, Inc.</td>
<td>109</td>
</tr>
<tr>
<td>JusticeTrax</td>
<td>112</td>
</tr>
<tr>
<td>Leeds Forensic Systems, Inc - Evofinder</td>
<td>405</td>
</tr>
<tr>
<td>Leica Microsystems</td>
<td>312</td>
</tr>
<tr>
<td>Marshall University</td>
<td>108</td>
</tr>
<tr>
<td>Exhibitor</td>
<td>Booth #</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Range Systems</td>
<td>406</td>
</tr>
<tr>
<td>Savage Range Systems</td>
<td>310</td>
</tr>
<tr>
<td>Sensofar Metrology</td>
<td>305</td>
</tr>
<tr>
<td>Team Fabrication</td>
<td>411-412</td>
</tr>
<tr>
<td>Ultra-Electronics Forensic Technology</td>
<td>100</td>
</tr>
<tr>
<td>Unitron</td>
<td>512</td>
</tr>
<tr>
<td>Vigilant Solutions</td>
<td>110</td>
</tr>
</tbody>
</table>
Accutrans
JoAnn DiPrete
235 Ascot Parkway
Cuyahoga Falls, OH 44223
Phone: 330-916-7070
www.accutransusa.com
Joann@accutransusa.com

Alicona Corporation
Brad Etter & Kunal Gokhale
1261 Humbracht Circle, Suite G
Bartlett, IL 60103
Phone: 630-372-9900
www.alicona.com
Alicona.us@alicona.com

ATF – NIBIN Branch
Sharon Buchanan, John Jacobson
99 New York Avenue NE
Washington, DC 20226
Phone: 202-648-7171
www.atf.gov
Sharon.Buchanan@atf.gov

Baltimore Precision Instruments
Joseph Sinclair
8603 Old Harford Road
Baltimore, MD 21234
Phone: 410-248-1234
www.baltipi.com
Joe@baltipi.com

Cadre Forensics
Ryan Lilien, Todd Weller, Eric Meschke and David Stella
420 W Huron St; Suite 204
Chicago, IL 60654
Phone: 508-443-1275
www.cadreforensics.com
forensics@cadreforensics.com
CartWinPro  
Axel Manthei, Elke Manthei  
Albrecht-Nutzel-Weg 29  
Kaufering 86916, Germany  
Phone: +49-8191-66704  
Fax: +49-8191-973326  
www.cartwinpro.com  
info@cartwinpro.com  

Collaborative Testing Services Inc.  
Richard Hockensmith  
P.O. Box 650820  
Sterling, VA 20165-0820  
Phone: 571-434-1925  
www.ctsforensics.com  
info@cts-interlab.com  

CSAFE  
Heike Hofmann and Alicia Carriquiry  
195 Durham Center  
613 Morrill Road  
Ames, IA 50011  
Phone: 515-294-7278  
www.forensicstats.org  
csafe@iastate.edu  

CTL Scientific Supply  
Henry Medollo & Evan Thompson  
1016-3 Grand Blvd.  
Deer Park, NY 11729  
Phone: 631-242-4249  
www.ctlscientific.com  
hmedollo@ctlscientific.com  

CyberNational, Inc.  
Karen Montgomery, Chris Berger and Sam Reid  
1512 Sarah Court  
Murfreesboro, TN 37129  
Phone: 615-893-1099  
Fax: 615-895-2133  
www.cyber-national.com  
Karen@cyber-national.com
Faro
*Paul Gregory, Russell Boynton and Dennis Sweet*

250 Technology Park
Lake Mary, FL 32746
Phone: 407-562-5189 x1228
www.faro.com
Jeanine.charity@faro.com

Forensic Pieces
*Jan Johnson*

4400 Bayou Blvd., Suite 30A
Pensacola, FL 32503
Phone: 850-332-0141
www.forensicpieces.com
forensicpieces@aol.com

Forensics Source
*Allen Miller*

13386 International Parkway
Jacksonville, FL 32218
Phone: 904-741-1765
Fax: 904-741-5407
www.forensicsource.com
Allen.Miller@safariland.com

Foster & Freeman
*Jason Cole, Rebecca Walls and Roberto King*

46030 Manekin Plaza, #170
Sterling, VA 20166
Phone: 888-445-5048
Fax: 888-445-5049
www.fosterfreeman.com
usoffice@fosterfreeman.com

Hirox-USA, Inc.
*Christian L. Munoz*

100 Commerce Way
Hackensack, NJ 07601
Phone: 201-342-2600
www.hirox-usa.com
info@hirox-usa.com
International Firearm Specialist Academy
Daniel O’Kelly & Pam Quicksall
P.O. Box 338
Lake Dallas, TX 75065
Phone: 813-422-4674
www.GunLearn.com
info@GunLearn.com

JusticeTrax
Jason Pressly
1 W. Main Street
Mesa, AZ 85201
Phone: 480-222-8921
www.justicetrax.com
sales@justicetrax.com

Leeds Forensic Systems, Inc. Evofinder
Kevin Boulay & Jake Kurth
17300 Medina Road, Suite 600
Minneapolis, MN 55447
Phone: 763-546-8575
www.leedsmicro.com
sales@leedsmicro.com

Leica Microsystems
Alan Paris
1700 Leider Lane
Buffalo Grove, IL 60089
Phone: 800-248-0123
www.leica-microsystems.com
info@leica-microsystems.com

Marshall University
Dr. Catherine G Rushton
1401 Forensic Science Dr.
Huntington, WV 25701
Phone: 304-691-8929
www.marshall.edu/forensics
rushton1@marshall.edu
Range Systems
Brandon LaBelle
5121 Winnetka Avenue North Suite 225
New Hope, MN 55428
Phone: 763-533-9200
Cell: 612-443-2202
www.BulletRecovery.com
brandonl@rangesystems.com

Savage Range Systems
Allan Offringa
100 Springdale Road
Westfield, MA 01085
Phone: 413-642-4174
www.savagerangesystems.com
info@savagerangesystems.com

Sensofar Metrology
Cristina Cadevall, Tom Tremmel, Adam Clark, and Adam Platteis
Parc Audiovisual de Catalunya
Ctra. BV-1274, KM 1
08225 Terrassa (Barcelona), SPAIN
Phone: +34 937 00 14 92
www.sensofar.com
mollon@sensofar.com

Team Fabrication, Inc.
Neil Hopkins
1055 Davis Road
West Falls, NY 14170
Phone: 716-539-1914
Fax: 716-655-0426
www.BulletRecovery.com
info@bulletrecovery.com

Ultra-Electronics Forensic Technology
Stacy Stern, Brandon Huntley, James Needles, Andrew Boyle, Michel Paradis, Danny Roberge, Alain Beauchamp, Joe Zorola, Sabrina Benzid, Mira Carreiro, Tim Heaney, Paul Murphy
5757 Cavendish Blvd., Suite 200
Côte St-Luc, Québec
Canada H4W 2W8
Phone: 514-489-4247
www.ultra-forensictechnology.com
events@ultra-ft.com
The AFTE 2018 Host Committee would like to thank all of our vendors for participating in this year’s training seminar. You all are an invaluable tool for examiners and we could not succeed without your support.
<table>
<thead>
<tr>
<th>Day</th>
<th>Events</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saturday</strong> June 2</td>
<td>Registration (Marriott Hotel 2nd Floor)</td>
<td>4:00 pm – 6:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, WVSP, Marriott</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Setup – Civic Center</td>
<td>8:00 pm – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Welcome Reception – Marriott “The Pavilion”</td>
<td>12:00 pm – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6:00 pm – 8:00 pm</td>
</tr>
<tr>
<td><strong>Sunday</strong> June 3</td>
<td>Registration – Civic Center Quarry St. Lobby</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, WVSP, Marriott</td>
<td>8:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Setup – Civic Center</td>
<td>12:00 pm – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Welcome Reception – Marriott “The Pavilion”</td>
<td>6:00 pm – 8:00 pm</td>
</tr>
<tr>
<td></td>
<td>Breakfast – Civic Center</td>
<td>7:00 am – 8:00 am</td>
</tr>
<tr>
<td></td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Hours – Civic Center</td>
<td>7:15 am – 6:30 pm</td>
</tr>
<tr>
<td></td>
<td>Morning Technical Session – Civic Center</td>
<td>8:00 am – 12:15 pm</td>
</tr>
<tr>
<td></td>
<td>Lunch Break</td>
<td>12:15 pm – 1:30 pm</td>
</tr>
<tr>
<td></td>
<td>Business Meeting – Civic Center</td>
<td>1:30 pm – 4:15 pm</td>
</tr>
<tr>
<td></td>
<td>Poster Session/Vendor Cocktail Reception - CC</td>
<td>4:30 pm – 6:30 pm</td>
</tr>
<tr>
<td></td>
<td>Bring Your Own Slides – Marriott 2nd Floor</td>
<td>8:00 pm – 10:00 pm</td>
</tr>
<tr>
<td><strong>Monday</strong> June 4</td>
<td>Breakfast – Civic Center</td>
<td>7:00 am – 8:00 am</td>
</tr>
<tr>
<td></td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Hours – Civic Center</td>
<td>7:15 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Morning Technical Session – Civic Center</td>
<td>8:00 am – 12:15 pm</td>
</tr>
<tr>
<td></td>
<td>Lunch Break</td>
<td>12:15 pm – 1:30 pm</td>
</tr>
<tr>
<td></td>
<td>Afternoon Technical Session – Civic Center</td>
<td>1:30 pm – 5:30 pm</td>
</tr>
<tr>
<td></td>
<td>Rafting/Zip Lining Excursion Trip – ACE Bus</td>
<td>11:30 am – Until</td>
</tr>
<tr>
<td></td>
<td>Goddard Night at the Ball Park</td>
<td>6:30 pm – Until</td>
</tr>
<tr>
<td><strong>Tuesday</strong> June 5</td>
<td>Breakfast – Civic Center</td>
<td>7:00 am – 8:00 am</td>
</tr>
<tr>
<td></td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Hours – Civic Center</td>
<td>7:15 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, WVSP</td>
<td>8:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Morning Technical Session – Civic Center</td>
<td>8:00 am – 12:15 pm</td>
</tr>
<tr>
<td></td>
<td>Lunch Break</td>
<td>12:15 pm – 1:30 pm</td>
</tr>
<tr>
<td></td>
<td>Afternoon Technical Session – Civic Center</td>
<td>1:30 pm – 5:30 pm</td>
</tr>
<tr>
<td></td>
<td>Hamby Pig Roast on the Riverfront</td>
<td>8:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Goddard Night at the Ball Park</td>
<td>6:30 pm – 9:30 pm</td>
</tr>
<tr>
<td><strong>Wednesday</strong> June 6</td>
<td>Breakfast – Civic Center</td>
<td>7:00 am – 8:00 am</td>
</tr>
<tr>
<td></td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Hours – Civic Center</td>
<td>7:15 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, WVSP, Tour</td>
<td>8:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Morning Technical Session – Civic Center</td>
<td>8:00 am – 12:15 pm</td>
</tr>
<tr>
<td></td>
<td>Lunch Break</td>
<td>12:15 pm – 1:30 pm</td>
</tr>
<tr>
<td></td>
<td>Afternoon Technical Session – Civic Center</td>
<td>1:30 pm – 5:30 pm</td>
</tr>
<tr>
<td></td>
<td>Hamby Pig Roast on the Riverfront</td>
<td>6:30 pm – 9:30 pm</td>
</tr>
<tr>
<td><strong>Thursday</strong> June 7</td>
<td>Breakfast – Civic Center</td>
<td>7:00 am – 8:00 am</td>
</tr>
<tr>
<td></td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Exhibitor Hours – Civic Center</td>
<td>7:15 am – 12:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, Tour</td>
<td>8:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Morning Technical Session – Civic Center</td>
<td>8:00 am – 12:00 pm</td>
</tr>
<tr>
<td></td>
<td>Lunch Break</td>
<td>12:05 pm – 1:30 pm</td>
</tr>
<tr>
<td></td>
<td>Afternoon Technical Session – Civic Center</td>
<td>1:30 pm – 2:30 pm</td>
</tr>
<tr>
<td></td>
<td>Raffle Drawing – Civic Center</td>
<td>2:30 pm – 3:30 pm</td>
</tr>
<tr>
<td></td>
<td>Cocktail Hour – Civic Center (Clendenin Lobby)</td>
<td>5:30 pm – 6:30 pm</td>
</tr>
<tr>
<td></td>
<td>Banquet and After Party – The Clay Center</td>
<td>6:30 pm – Midnight</td>
</tr>
<tr>
<td><strong>Friday</strong> June 8</td>
<td>Registration – Civic Center</td>
<td>7:00 am – 5:00 pm</td>
</tr>
<tr>
<td></td>
<td>Workshops – Civic Center, Marriott, WVSP, Tours</td>
<td>8:00 am – 5:00 pm</td>
</tr>
</tbody>
</table>

**Weeklong Activities**

- First Time Attendee Bingo & Photo Contest

**NOTE:** Lunches will not be covered by the Host Committee or Sponsors except for certain workshops. The only dinner included with registration is the Thursday night banquet.
Bullet Recovery System

- Available in a 60” or 48” High Tank.
- ¼” to ¾” thick Stainless Steel Tank
- Stainless commercial grade water pump
- High performance cartridge filter
- Heavy gauge stainless automated lid
- User Adjustable Safety Platform/Walkway
- HEPA Air Filtration System

5-year vessel and 2-year, no-hassle parts warranty.

Our Bullet Recovery System has been engineered to provide the highest degree of safety, durability and convenience. No other system comes close in features, performance and value. Offering 28% to 50% greater protection and strength than 3/16” thick tanks. The system will fully contain water under all firing conditions.

RETRIEV-ALL

SAVE YOUR FIRING RANGE - USE THE RETRIEV-ALL.

- Solid steel frame and tube.
- Inexpensive sand as the stop medium.
- Center pivot height adjustment.
- Vented / Extended shooting port.
- Can be used as a Clearing Device as well.

38” long x 18” wide x 36” tall.

Portable Remote Firing Cart

Adjusts within seconds to any size firearm, from 50 BMG to pocket Derringer.

Brass Catcher -Lg >>>

Use with the RETRIEV-ALL, Bullet Tank, Ballistic Box, and the Range.

Ballistic Cotton Box

Ease of retrieval for bullets or brass is the hallmark of this system

Witness Protection Shield >>>

Principally designed as a remote firing protection shield and/or test fire viewing shield.

FOR USE IN FIRING RANGE OR WITH YOUR WATER TANK

Front Panel 48” wide x 72” tall.
## Schedule of Events

**Sunday, June 3**

### Registration

7 am – 8 pm   Civic Center Quarrier St. Lobby

### Workshops (pages 74 – 78)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am – 5:00 pm</td>
<td><strong>Recognizing 80% Lowers (Pistol &amp; Rifle Platforms) in Casework</strong></td>
<td>Civic Center Parlor D / WVSP Range</td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td><strong>Distance Determination: An Overview</strong></td>
<td>WVSP Forensic LAB</td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td><strong>Implementation of 3D Technology, Analysis, and Statistics for FA/TM Examinations</strong></td>
<td>Civic Center Parlor A</td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td><strong>Metallurgy for the Non-Metallurgist for Firearm and Ammunition Producers and Users</strong></td>
<td>Marriott Blue Ridge</td>
</tr>
<tr>
<td>8:00 am – 12:00 pm</td>
<td><strong>Accutrans: Lifting Techniques From Difficult Surfaces &amp; Toolmarks</strong></td>
<td>Civic Center Parlor C</td>
</tr>
<tr>
<td>8:00 am – 12:00 pm</td>
<td><strong>Machining for the Firearm Examiner</strong></td>
<td>Marriott Salon C</td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Slide Fire Familiarization</strong></td>
<td>WVSP Range</td>
</tr>
<tr>
<td>1:00 pm – 4:00 pm</td>
<td><strong>Quantofix Nitrite Workshop</strong></td>
<td>Civic Center Parlor D</td>
</tr>
<tr>
<td>1:00 pm – 4:00 pm</td>
<td><strong>Matchpoint Tips &amp; Tricks for IBIS-TRAX HD3D</strong></td>
<td>Civic Center Parlor C</td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Hi-Point Firearms Armorer Course</strong></td>
<td>Marriott Kanawha</td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Courtroom Testimony: A Practical Approach From A Firearm Examiner and Prosecutor's Point of View</strong></td>
<td>Civic Center Parlor B</td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Subclass Characteristics</strong></td>
<td>Marriott Salon C</td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Understanding the Math of Bullet Path Analysis</strong></td>
<td>Marriott Appalachian / Cumberland</td>
</tr>
</tbody>
</table>
Welcome Reception
Join us Sunday night for this year’s AFTE Welcome Reception. This is a great opportunity to catch up with friends and network with other Firearm and Toolmark Examiners. Beverages and hors d’oeuvres will be provided.

Location: Charleston Marriott Town Center – 3rd Floor Pavilion
Time: 6:00 pm – 8:00 pm

Sponsored by:

Photo Contest
Thanks to all of you who submitted a photo for this year’s photo contest. Please take a moment and vote on your favorite photos in the Technical Session (Civic Center South Hall). Votes need to be submitted by Lunch on Thursday. The winners will be announced Thursday night at the banquet.

2017 Best Overall: Jordan Greene

This Year’s Photo Contest is Sponsored by:

Prizes:
Forensic Photo: $50
Best General Photo: $50
Best Overall Photo: $100
Schedule of Events

Monday, June 4

Registration
7 am – 5 pm      Civic Center (Quarrier St. Lobby)

Continental Breakfast
7 am – 8 am      Civic Center North Hall (Exhibitor)

Technical Session

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>Color Guard, West Virginia State Police</td>
<td></td>
</tr>
<tr>
<td>8:10 am</td>
<td>Welcome to AFTE 2018!</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Colonel J. L. Cahill, WV State Police Superintendent</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td>Announcements – Calissa Carper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhibitor Introductions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFTE President Introduction</td>
<td></td>
</tr>
<tr>
<td>8:45 am</td>
<td>Welcome from Lannie Emanuel, AFTE President</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acknowledgement of Past Presidents, Dinosaurs, 1st Time Attendees, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>International Members</td>
<td></td>
</tr>
<tr>
<td>9:00 am</td>
<td>Recognition of Passed Members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Historical Committee</td>
<td></td>
</tr>
<tr>
<td>9:10 am</td>
<td>Keynote: Bone Imprints as Evidence in Homicide Investigations</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Dr. Douglas W. Owsley Ph.D</td>
<td></td>
</tr>
<tr>
<td>10:10 am</td>
<td>AFTE 2019 Announcement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ryan Kent</td>
<td></td>
</tr>
<tr>
<td>10:25 am</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:05 am</td>
<td>OSAC Update</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Todd Weller</td>
<td></td>
</tr>
<tr>
<td>11:25 am</td>
<td>AAFS – Academy Standards Board Update</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Greg Laskowski</td>
<td></td>
</tr>
<tr>
<td>11:45 am</td>
<td>Generating Complete 3D Surface Models for Virtual Preservation of the</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>President John F. Kennedy Assassination Ballistics Artifacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Robert Thompson, Michael Stocker, Thomas B. Renegar,</td>
<td></td>
</tr>
</tbody>
</table>

Location: Civic Center South Hall

Moderator: Rebecca Smith
Michigan State Police
<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:15 pm</td>
<td>Lunch Break</td>
<td></td>
</tr>
<tr>
<td>1:15 pm</td>
<td>Announcements and Door Prizes</td>
<td></td>
</tr>
<tr>
<td>1:30 pm</td>
<td><strong>AFTE Business Meeting</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFTE President and Board of Directors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Civic Center South Hall – Technical Session Area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attendance is encouraged! (Cash Prizes Will be Given!)</td>
<td></td>
</tr>
<tr>
<td>4:30 pm – 6:30 pm</td>
<td><strong>Poster Session / Reception</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Civic Center North Hall – Exhibitor Area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Beverages and Hors d’Oeuvres Will be Provided</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poster Session Abstracts on page 74-75</td>
<td></td>
</tr>
<tr>
<td>8:00 pm – 10:00 pm</td>
<td><strong>Bring Your Own Slides</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marriott Salons A, B, and C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Come join Mike Haag and Dan Alessio as they host this year’s BYOS event. For the first time ever, attendees will receive 2 extra CEU’s but it’s still the same INFORMAL style everyone loves! These short presentations are a great opportunity to present an interesting case study! Presentation times are limited to eight minutes, with two additional minutes for questions, concerns, or maybe new ideas about the presentation/research.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There will be a mini cupcake station and limited host bar during this event.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If you would like to sign up to present at this event – Please see the Registration Desk Sunday or Monday to sign up. Spots will go quick!</td>
<td></td>
</tr>
</tbody>
</table>

---

**BECOME A CERTIFIED FIREARM SPECIALIST**

**ONLINE COURSES NOW AVAILABLE!**

- Our live seminars are accepted for IAI certification.

**Safety**

Nothing is left to chance. One misstep can mean disaster. Learn the safe practices and methods of handling and clearing all firearm designs commonly encountered by law enforcement.

**Accuracy**

No more mistakes. Each year 600,000 crime-guns and countless ammunition is recovered. Even a 1% error rate means 6,000 guns are improperly ID’d, allowing for lost prosecutions, jobs, licenses, and credibility.

**Competence**

Never be confused again. Understand and explain the ID, classification and mechanical operation of all firearm types and ammunition beyond the level necessary during cross examination.

**International Firearm Specialist Academy**

**www.GunLearn.com**

**GUNLEARN.COM** (813) 422-4674

Info@GunLearn.com
Keynote: Bone Imprints as Evidence in Homicide Investigations
Douglas W. Owsley, Ph.D. - Forensic Anthropologist, National Museum of Natural History, Smithsonian Institution

Abstract: Tools and weapons can leave marks and impressions in human bones that can reveal the cause of death or how a body was manipulated postmortem. In this case oriented discussion based on adjudicated cases from Virginia and West Virginia, knives, saws, axes, hammers, wrenches and shovels provide examples illustrating what can be learned through forensic anthropological analysis.

Biography: Dr. Owsley received his Bachelor of Science degree in Zoology from the University of Wyoming in 1973 and his PhD in Physical Anthropology from the University of Tennessee in 1978. In 1987, Dr. Owsley joined the Smithsonian’s National Museum of Natural History as a curator, and has served since 1990 as the Division Head for Physical Anthropology. Dr. Owsley is engaged in forensic anthropology case work, assisting state and federal law enforcement agencies. Cases have included Jeffrey Dahmer’s first victim, recovery and identification of Waco Branch Davidian compound members, the 9-11 Pentagon Plane crash, and exhumation and identification of war dead from the former Yugoslavia. His bioarchaeological and osteological research concerns include: ancient American skeletons like Kennewick Man and the peopling of the New World; demography and health of 17th-century colonists; Civil War military remains including the crew of the *H.L. Hunley* submarine; iron coffin burials; and analyses of activity patterns, health and diseases of American Indian populations from the Plains and Southwest. His current research is focused on human skeletal remains from the 17th-century Chesapeake region of Virginia and Maryland. The results of this research were presented to the public in an exhibition at the Smithsonian’s Museum of Natural History entitled “Written in Bone: Forensic Files of the 17th-Century Chesapeake.” Dr. Owsley was co-curator of the exhibition which opened February 7, 2009, and continued through January 6, 2014.

Email: owsleyd@si.edu
OSAC Firearms and Toolmark Subcommittee Update
Todd Weller - Weller Forensics

Abstract: This presentation will provide the AFTE membership with a progress update for the Organization of Scientific Area Committees (OSAC) Firearms and Toolmarks Subcommittee. We will cover membership changes, progress on the current standards in development and provide a road map for future work.

Biography: Todd has been a Criminalist for over 18 years. He worked for the Oakland Police Department for over 16 years and now is in private practice. He has performed casework in drug analysis, DNA, crime scenes, and for the past ten years has worked in the firearms identification specialty. He graduated from the National Firearms Examiner Academy (NFEA) in 2009 and has had the pleasure of returning to the NFEA as an instructor. Todd has a B.A. in biochemistry/molecular biology from Dartmouth College and a M.S. in forensic science from the University of California, Davis. Finally, Todd is the current Chair of the OSAC Firearms and Toolmarks Subcommittee after having served as Vice Chair for three years.

Email: toddweller@wellerforensics.com

Update on Academy Standards Board Firearms and Tool Mark Consensus Body
Gregory Laskowski - Criminalistics Services International, LLC

Abstract: This presentation is to inform the audience that the American Academy of Forensic Sciences has created a standards development organization (SDO) known as the Academy Standards Board. Of particular interest to AFTE and its members is the formation of the Firearm and Tool Marks Consensus Body. This consensus body is made up of subject matter experts in the field, academics, producers, consumer groups, and parties of general interest.

The FATM Consensus Body can accept proposals for standards from individuals or groups or develop their own. Standards proposed, developed, and published must adhere to ANSI guidelines. A public review process is mandatory for any guideline or standard developed for publishing.

The ASB FATM Consensus Body is a means to ensure that guidelines and standards in this discipline are produced and published meeting the expectations of the scientific and legal communities.

Biography: Gregory Laskowski, BS, MPA, DABC
Mr. Laskowski retired from the Kern County District Attorney Forensic Science Division in Bakersfield, California. He has over thirty years of experience as a forensic scientist. Currently, he is an Adjunct Professor of Forensic Science at California State University Bakersfield in addition to Oklahoma State University. Additionally, he is the president of Criminalistics Services International, LLC a forensic science education and consulting firm. Mr. Laskowski is active in several professional organizations, including being a Distinguished Member in the Association of Firearms and Toolmark Examiners.

Email: lgreg307@outlook.com
Generating Complete 3D Surface Models for Virtual Preservation of the President John F. Kennedy Assassination Ballistic Artifacts

Michael Stoker, Robert Thompson, and T. Brian Renegar – NIST

Abstract: As the Nation’s record keeper, the National Archives and Records Administration (NARA) is responsible for preserving the records and artifacts that were part of President John F. Kennedy’s assassination investigations. The National Institute of Standards and Technology (NIST) has a long history of developing and producing the technology required to preserve priceless documents such as the Declaration of Independence, the Constitution and the Bill of Rights. This history combined with NIST’s expertise in areal surface topography measurement placed us in a unique position to assist NARA in preserving the assassination ballistic artifacts, and in doing so facilitating easier access to the public.

In collaboration with NARA, NIST completed the development of three-dimensional (3D) models of the bullet and bullet fragments. A state-of-the-art focus-variation microscope was used to measure the 3D topography and color information of overlapping patches on the surfaces. The measurements were then combined into 3D models of the entire bullet surfaces. It is NARA’s goal to make these data sets available online to the public for interactive virtual inspection.

Biographies: Michael T. Stocker is a Physical Scientist with the Surface and Nanostructure Metrology Group at the National Institute of Standards and Technology (NIST). He has been with the group since 2001 and has worked on various optics related projects for the semiconductor industry, fuel cell industry and toolmark forensics. Mr. Stocker has extensive experience in optical methodologies including scatterfield and bright field microscopy, scatterometry, ellipsometry and areal surface topography measurements. He is currently a Technical Advisor for AFTE.

Robert M. Thompson is a Senior Forensic Science Research Manager with the Special Programs Office-Forensic Science Programs in the National Institute for Standards and Technology (NIST). He has over 37 years of experience as a Forensic Scientist and Criminalist. Mr. Thompson is a Fellow of the American Academy of Forensic Sciences and a Distinguished Member of the AFTE.

T. Brian Renegar is a Physical Science Technician in the Surface and Nanostructure Metrology Group of the Engineering Physics Division at NIST. He performs measurements and calibrations in the fields of surface metrology and ballistic identifications. He currently serves as Chair of the American Society of Mechanical Engineers B46 Committee on the Classification and Designation of Surface Qualities.

Additional Research contributors:
• Xiaoyu Alan Zheng and Dr. Johannes A. Soons – National Institute of Standards and Technology

Email: Michael.stocker@nist.gov
Poster Session Event
Exhibitor Reception
Civic Center North Hall with Exhibitors
4:30 pm – 6:30 pm

The Poster Session allows for a more personalized experience during the seminar. Enjoy beverages and hors d’oeuvres while discussing case studies and research projects with the poster authors and mingling with our exhibitors to see the field’s state of the art products and training aids.

Hors d’oeuvres will be provided and a host bar will be available for a limited time.

Please see pages 74-75 for poster abstracts and authors.

Thank you to our sponsor:

Team Fabrication
Bullet Recovery Systems
1055 Davis Road • West Falls, New York 14170
Phone: (716) 655-4038 • Fax: (716) 655-5833
Website: www.teamfabrication.com

Exhibitor Open Mic Night

Monday 4:30 – 6:30 pm in the Civic Center’s North Hall
*During the Poster Session

Please join us at this Brand New event featuring exhibitors presenting product demonstrations on stage. Exhibitors will also be present in their booths during this event to answer any questions you may have, so please make sure you stop by to see the latest technology or products they have to offer!

Be sure to check out the schedule below for specific exhibitor show times on stage:

4:40 pm – Alicona
4:50 pm – Cadre Forensics
5:00 pm – CartWinPro
5:10 pm – Faro
5:20 pm – Foster + Freeman
5:30 pm – International Firearm Specialist Academy
5:40 pm – Leeds Forensic Systems
5:50 pm – Savage Range Systems
6:00 pm – Vigilant Solutions
6:10 pm - Ultra Electronics Forensic Technology Inc.
### Schedule of Events

**Tuesday, June 5**

#### Registration
7 am – 5 pm  
Civic Center (Quarrier St. Lobby)

#### Continental Breakfast
7 am – 8 am  
Civic Center Exhibitor Hall

#### Technical Session

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Location</th>
<th>Moderator: Ally Anderson, Durham PD</th>
</tr>
</thead>
</table>
| 8:00 am    | Announcements / Door Prizes  
Host Committee                  | Civic Center South Hall  | Jaco Swanepoel  
San Francisco PD                |
| 8:15 am    | The "Lipstick" Round: An Evaluation of Total Synthetic Jacketed Bullets;  
A New Lead-free Primer and Their Effects on Firearms Identification  
Nathan Von Rentzell             |                          |                                     |
| 9:15 am    | What’s New in Ammunition  
George Kass                     |                          |                                     |
| 9:35 am    | Distance Determinations Using Quantofix Nitrite Sheets  
Jill Kurzenberger              |                          |                                     |
| 10:05 am   | Seventy Year-Old Prototype of Sub-Machine Gun with Unusual Mechanism  
Paul Giverts                   |                          |                                     |
| 10:20 am   | Break                       |                          |                                     |
| 11:00 am   | Subclass Characteristics on Fired Bullets  
Omar Felix                     |                          |                                     |
| 11:40 am   | Two Bullets, One Gunshot Wound, The limited Universe, and Squibs  
Michael Haag                   |                          |                                     |
| 12:10 pm   | Lunch                       |                          |                                     |
| 1:15 pm    | Door Prizes / Announcements  
Host Committee                  |                          |                                     |
| 1:30 pm    | Recent Advances in Virtual Microscopy  
Ryan Lilien                    |                          |                                     |
| 2:10 pm    | The Influence of Different Acquisition Methods on 3D Surface Measurements of Bullet Striations  
Martin Baiker-Sorensen          |                          |                                     |
# Workshops (pages 79 – 80)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am – 5:00 pm</td>
<td>Ruger LCP/LCP II Armorer Course</td>
<td>Civic Center Parlor B</td>
<td></td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td>Glock Gen 5 Armorer Course</td>
<td>Civic Center Parlor C</td>
<td></td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td>Springfield Armory 1911 Armorer Course</td>
<td>Civic Center Parlor A</td>
<td></td>
</tr>
<tr>
<td>8:00 am – 12:00 pm</td>
<td>Paradigm Shift in Expert Witness Testimony</td>
<td>Civic Center Parlor D</td>
<td></td>
</tr>
<tr>
<td>1:00 pm – 4:00 pm</td>
<td>LWRCI: AR Platform Function Overview &amp; Manufacturing Overview</td>
<td>Civic Center Parlor D</td>
<td></td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td>The Use of Metal Detectors for the Recovery of Metallic Evidence: Your Evidence is Only a Beep Away</td>
<td>WVSP Range (Meet in Marriott’s Hawk’s Nest at 12:30pm)</td>
<td></td>
</tr>
</tbody>
</table>
The “Lipstick Round”: The Effects of American Eagle Syntech™ Ammunition on Firearms Examinations

Nathan Von Rentzell – Denver Police Department Crime Laboratory

Abstract: Syntech™ range ammunition possesses two key features: 1) A lead-free primer that replaces the toxic lead stynphate with tetracene and bismuth trioxide and 2) a polymer-coated bullet. The lead bullets of this ammunition are encapsulated in a red, proprietary polymer coating, termed “Total Synthetic Jacket (TSJ),” designed to prevent metal-on-metal contact in the bore of the firearm. The purported benefits of this polymer jacket include a cleaner barrel with minimal fouling, reduced friction for cooler shooting, and reduced lead exposure. This study evaluates the effects of Syntech™ ammunition on the various aspects of forensic examination, particularly firearms identification, trace analysis, and gunshot residue (GSR) analysis.

In a comparison of unknowns, firearm examiners examined copper-jacketed bullets and TSJ bullets fired from four different conventional and polygonally rifled 9mm Luger barrels. “Known match” comparisons of TSJ bullets fired from each barrel were then conducted. In addressing the effects of Syntech™’s lead-free primer on GSR collection, three Syntech™ cartridges were consecutively hand-fired from a 9mm Luger pistol. GSR evidence was then collected from the examiner, and a primer sample was taken from one of the associated cartridge cases. These samples were analyzed using a scanning electron microscope. Syntech™ bullet jacketing material was examined for the potential to leave trace evidence in barrels and on targets. Syntech™ cartridges were fired into targets at varying distances, followed by similar shots fired with traditional cartridges. Sodium rhodizonate was used to test for the presence of lead on each target.

Examiners were able to make class-based eliminations when comparing the full metal jacket (FMJ) bullets to TSJ bullets. All comparisons between Syntech™ bullets to each other yielded inconclusive results. It was determined that the TSJ material on Syntech™ bullets hinders the quality of striae in land and groove impressions. Flakes of the polymer jacket were observed on the targets as well as in the water tank, but no trace material was recovered from the firearm bores. Despite the combination of a lead-free primer and polymer coated bullet, the TSJ targets still yielded positive Sodium Rhodizonate test results. However, these results were lesser than the FMJ targets and faded rapidly. Under microscopic examination, fired Syntech™ bullets exhibited multiple types of pitting in the TSJ material, which may serve as an investigative aid. The trace report for the Syntech™ outer coating samples indicated that the material is a type of plastic, consistent with the polymer polyethylene terephthalate (PET). When analyzing the primer, bismuth was found to be the primary element in the Catalyst primer. Trace amounts of lead, barium, and antimony were found in the GSR kits results, but much smaller amounts than the bismuth and may have been present in the firearm from previous firings with lead styphnate primers.

The synthetic jacket hinders bullet comparisons and makes TSJ-TSJ identifications unlikely due to a lack of reproducible toolmarks, but class-based eliminations may be possible. The TSJ material is unlikely to be recovered from firearm bores, but may be collected from target material and surrounding area that were near the firearm discharge. Positive Sodium Rhodizonate test results are possible with this ammunition, but are likely to diminish rapidly and thus photography/videography immediately following HCl application is urged. The presence of bismuth in GSR may be indicative of Catalyst-containing ammunition.

Biography: Nathan Von Rentzell holds a Bachelor of Science in Biology with an emphasis in Forensic Science. He first worked as a NIBIN technician at the Denver Police Department Crime Laboratory and then began working there as a firearms examiner trainee in March of 2016. He is a recent graduate of the 2017 National Firearms Examiner Academy and this year’s NFEA research project presenter.

Email: Nathan.VonRentzell@denvergov.org
What’s New in Ammunition
George Kass – Forensic Ammunition Service

Abstract: Review of new companies involved in making or marketing ammunition, components or air gun pellets. This will include handgun, rifle, shotgun and air guns. New products displayed at the 2018 "Shooting, Hunting Outdoor Sports" (SHOT) Show held in Las Vegas January 2018 will be discussed.

Email: forammo@aol.com

Distance Determination Utilizing Quantofix Nitrite Sheets
Jill Kurzenberger – Albuquerque Police Department

Abstract: Can manufactured nitrite testing sheets be used in place of the Modified Griess test for accurate results in distance determination testing?

The purpose of this study is to determine the composition of the nitrite sheets, demonstrate their nitrite specificity, explore their quantitative properties, evaluate the performance of this product in comparison to traditional methods used in distance determination testing (Modified Griess and Marshall’s Reagent), and demonstrate the effect that blood has on the tests.

GC/MS testing of the nitrite sheets was conducted to determine the chemical composition of the sheets. In addition, several witness panels were prepared using multiple gun and ammunition combinations at various distances and developed using the Modified Griess test, Marshall’s Reagent, and the manufactured nitrite sheets; the results were compared. Witness panels soaked in human blood were also tested to determine what, if any, affect blood has on the results.

The manufactured nitrite sheets produce a vibrant, magenta colored nitrite pattern when used in distance determination testing. Only water and heat need to be applied to the GSR pattern for the sheets to react with the nitrites to develop an accurate and clear nitrite pattern on the testing sheets. This eliminates the need for the chemicals utilized in the Modified Griess test, as well as the treated photograph paper used in both the Modified Griess test as well as the Marshall’s Reagent.

Biography: Jill Kurzenberger is a Firearm and Tool Mark Examiner at the Albuquerque Police Department in Albuquerque, NM. Jill began her career in Albuquerque in 2016. She is a 2017 graduate of the National Firearm Examiner Academy.

Email: jkurzenberger@cabq.gov
Seventy year-old Prototype of Sub-machine Gun with an Unusual Mechanism

Pavel Giverts – Israel Police

Abstract: For ballistic firearms examiner it is very important to be familiar with different mechanical schemes and mechanisms. The variety of these schemes is not very large. Most of the schemes of semi-automatic pistols were developed at the end of the 19th to the beginning of the 20th centuries. In the 30s – 50s of the 20th century the era of sub-machine guns and assault rifles started. Most of the constructions and schemes developed at this period are still used today. Changes were made chiefly in the materials used and in the manufacturing process, whereas, in most new weapons only minor improvements in the mechanical scheme were made. For different reasons, most of the interesting schemes with new and original solutions never came to mass-production and remained only as prototypes. (Even specialists in the field know very little about them.)

This presentation describes the construction of the sub-machine gun designed about seventy years ago. Even though the mechanism is very simple, its construction is based on an original scheme. This scheme is very different from others usually used for this group of weapons. The presentation discusses the construction of this weapon, compares its mechanism to the ones used today and to another forgotten weapons. I will speak about the designer’s reasons for developing this weapon, its mechanism and operation. The forensic aspects of the construction will also be discussed.

The goal of the presentation is to show this original mechanical construction to the society of forensic firearm examiners. Even though this weapon was never produced, the simplicity of this scheme makes its “reinvention” quite possible and it may come in casework as a homemade or manufactured weapon.

Biography: Pavel Giverts has worked as a Firearms Examiner for the Israel Police since 1999. He has a B.Sc. in mechanical engineering from Ukrainian University and M.Sc. degree in mechanical engineering from Ben-Gurion University in Israel.

Email: pavel.giverts@gmail.com
Subclass Characteristics on Fired Bullets
Omar Felix – Palm Beach County Sheriff’s Office

Abstract: This study is the first in a multifaceted, long-term evaluation of decision making and judgment when it comes to making a conclusion in forensic firearms identification. The two-phase study aims to determine how a firearms examiner responds when examining fired bullets that display potential subclass characteristics. In phase 1, all participants were asked to conclude whether or not a set of fired bullets were fired from the same unknown firearm. In phase 2, the same participants were separated into a control and experimental group. Without the participants knowledge, the same fired bullets were returned to the participant for evaluation. In addition to the same fired bullets, the experimental group was supplied a barrel cast for evaluation. Based on the results, a follow up survey was conducted to determine the current state of training and attitude towards subclass characteristics.

Biography: Omar Felix has been a firearms examiner with the Palm Beach County Sheriffs Office in West Palm Beach, Florida since 2007. Prior to this he was a firearms examiner with the Florida Department of Law Enforcements Crime Laboratory in Orlando for seven years.

Email: felixo@pbso.org

Two Bullets, One Gunshot Wound, the Limited Universe, and Squibs
Michael Haag – Albuquerque Police Department

Abstract: This case presentation involves a single homicide, G2 Research’s R.I.P.® ammunition, Cor-Bon’s Pow’R Ball ammunition, squib ammunition, two bullets with one entrance gunshot wound to the head, and interior ballistic deformation. The investigation began as simple firearm identification work, and evolved into a reconstruction based on the limited universe of physical evidence and gunshot wounds. Empirical testing of hypotheses involved the destruction of several Glock 40 Smith & Wesson caliber pistols in order to reproduce observed interior ballistic deformation on projectiles recovered at autopsy.

Biography: Michael Haag is a private consultant owning his own company, Forensic Science Consultants, and Senior Forensic Scientist with the Albuquerque Police Department supervising APD’s Firearm and Tool Mark Section, Chemistry Section, and Blood/Breath Alcohol Section. He is also a member of APD’s Major Crime Scene Team. He has been active in the field of forensics for about 20 years, and earned a bachelor’s of science degree in chemistry with a math / physics minor. While his primary area of expertise is shooting incident reconstruction, he is also a firearm and tool mark examiner. Mike is a Distinguished Member of the Association of Firearm and Tool Mark Examiners (AFTE) and past Member of the Year.

Email: mhaag@cabq.gov
Recent Advances in Virtual Comparison Microscopy
Dr. Ryan Lilien – Cadre Research Labs

Abstract: Several different 3D scanning technologies are capable of representing a one-to-one geometric mapping between the scanned digital surface and the actual physical surface. These technologies can exchange data using an agreed-upon file format called X3P (XML 3D surface Profile). The examination and comparison of these digital representations of surface topographies is referred to as Virtual Comparison Microscopy (VCM). VCM offers many novel uses to the forensic examiner. These include new abilities in remote data sharing/collaboration, visualization, access to historic cartridge cases, creating annotations, conducting verifications, and implementing proficiency testing. Before its use within the crime lab the technology will need to be internally validated and practitioners will need to be trained in its use. Some labs have already completed this process and a handful of labs are starting to experiment with VCM. Simultaneously, standards committees are beginning to create standards and guidelines for the use of VCM. There is no doubt that over the next few years VCM will play an increasingly significant role within the discipline of firearm and toolmark examination.

The presentation will introduce the concept of VCM, review the requirements of VCM, and describe our recent work developing software, hardware, and training materials to support VCM’s use within the crime laboratory. For example, we will describe our remote-viewer software which enables an examiner seated at one computer (e.g., at their desk) to remotely visualize 3D surface topographies stored on a second computer (e.g., the scanning workstation). This remote viewing feature can make consultation and blind verification accessible to labs of any size. After summarizing recent validation studies we will discuss potential uses of VCM and how it can both expedite and improve the quality of the examination process.

The talk will also describe a new VCM proficiency test being developed in collaboration with CTS and will invite participation in a new 2018 VCM study being conducted in collaboration with the Canadian RCMP.

Biography: Mr. Lilien’s research expertise focuses on the use of advanced scientific computing and statistical models to solve interdisciplinary research problems. Ryan earned an MD/Ph.D. from Dartmouth Medical School and Dartmouth’s Department of Computer Science. He has received research funding from the Gates Foundation, NIJ, NIST, and Canada’s National Sciences and Engineering Research Council. He is now located in Chicago and serves as Cadre Research’s head of research and development. Ryan leads development of the TopMatch-3D High-Capacity system (a 3D imaging and analysis system for firearm forensics and virtual microscopy). Ryan is also currently a member of NIST’s Organization of Scientific Area Committees (OSAC) Subcommittee on Firearms & Toolmarks.

Additional research contributors:
- Pierre Duez, MSE., Eric Meschke, MS. - Cadre Research
- Todd Weller, MS. - Cadre Research, Weller Forensics

Email: ryan.lilien@cadreresearch.com
The Influence of Different Acquisition Methods on 3D Surface Measurements of Bullet Striations

Dr. Martin Baiker-Soerensen – Netherlands Forensic Institute

Abstract: In casework, tool and firearm marks are typically compared using 2D optical comparison microscopy and oblique light, which requires the forensic examiner to adjust the lighting conditions, for example the illumination angle, manually. This may lead to variation of the appearance of structural details, like striations in the mark, between different examiners. In combination with the fact that structural details are lost in shadow areas, this may lead to variation in the outcome of an examination. In addition, it is difficult to study a curved mark area at a high magnification with 2D microscopy. Using 3D surface topography provides a way to acquire tool and firearm marks more objectively, as it allows measuring the true depth information of a large area of a flat or curved mark with high resolution and does not require oblique illumination.

Several 3D surface acquisition techniques are available on the market that are suitable for measuring tool and firearm marks, for example confocal microscopy, infinite focus microscopy or the photometric stereo method. As each technique is different and each machine requires a human operator, the influence of the imaging technique as well as the machine operator on surface measurements of tool and firearm marks has to be studied.

In total, 90 bullets (Remington UMC FMJ, copper jacket) were fired with 10 consecutively manufactured Beretta 92F/FS barrels (9 mm) at the National Institute of Standards and Technology (NIST) and subsequently shipped to several labs, the Federal Bureau of Investigation (US), the Netherlands Forensic Institute (NL), the John Jay College of Criminal Justice (US) and Sensofar Metrology (Spain). At each of these labs, 3D surface data of the striations in the bullet LEAs (land engraved areas) was acquired using either confocal microscopy (NIST: NanoFocus iSurf, FBI: Sensofar S neox, Sensofar: S neox) or focus variation microscopy (NFI: Alicona IFM SL, John Jay: Alicona IFM GS, Sensofar: S neox). All data was gathered at the Netherlands Forensic Institute and pre-processed using Scratch, an in-house developed graphical user interface for automated comparison of tool and firearm marks. Subsequently, Scratch was used to determine objective similarity scores (cross-correlation) between known matching (KM) and known non-matching (KNM) striated marks. Finally, the score distributions were used to assess differences between the acquisition methods and laboratories.

Preliminary results show that in general surface measurements of striated bullet marks are highly reproducible, despite being acquired by different operators with different technologies in different laboratories. There are differences though in the accuracy of the techniques, particularly for fine structural details. In addition, the results show that the KM and the KNM score distributions are well separated.

With this study we show that surface data of bullet striations can be measured accurately and reproducibly with different acquisition techniques and operators and therefore provide support for the objectivity of 3D surface measurements. In addition, the clear separation of the KM and KNM similarity score distributions shows that the graphical user interface Scratch can be used to support the forensic firearm and tool mark examiner with a quantitative assessment of the strength of the evidence.

Biography: Martin Baiker obtained a PhD in Medical Image Processing and Analysis from the Leiden University Medical Center in Leiden, The Netherlands, and joined the Netherlands Forensic Institute in 2011 as a scientific researcher. His work focuses at objective acquisition and comparison of striated and impression marks of tools and firearms and the subsequent objective determination of the evidential strength.

Additional research contributors:

- Erich D. Smith, Earl Gliem, and Jennifer Stephenson, - Firearms/Toolmarks Unit, Federal Bureau of Investigation;
- Dr. Cristina Cadell and Neus Vintró - Sensofar;
- Dr. Nicholas D.K. Petraco, Brady Huang, Yu Chia Chen, En Tni Lin and Victor Lin - Department of Sciences at the John Jay college of Criminal Justice;
- Xiaoyu Alan Zheng - Engineering Physics Division at the National Institute of Standards and Technology (NIST).

Email: m.baiker@nfi.minvenj.nl
Validation of Automatic Matching of Bullet Striation Marks
Heike Hofmann – Center for Statistics and Applications in Forensic Evidence (CSAFE), Iowa State University

Abstract: Automatic matching algorithms are only as good as the data that they are trained on. Unfortunately most of the data that is available for training algorithms based on 3D scans are available through NIST’s Ballistics Toolmark Research Database. This means that most automatic methods are only training on the ten barrels from Hamby’s famous study. So the questions remains; how well are these algorithms performing when they are applied to bullets that are not part of the Hamby set, have different calibers, were shot from different brand and makes of handguns.

Last year, at AFTE in Denver, the Center for Statistics and Applications in Forensic Evidence (CSAFE) presented a method for automatic matching of bullet striation marks. We asked practitioners to help with validating the automated matching algorithm. Over the last year we got a chance to work with forensic centers and police departments all over the country. This has given us much insight into how well the matching algorithm is working and what kind of limitations we are encountering.

Our findings are encouraging and seem to match experiences from practitioners; some brands of handguns are more challenging than others to match. Coated bullets are not really suited for matching and polygonal rifling is, at the moment, too challenging for the algorithm because of the lack of well-defined lands. What is important is that all these findings are backed up by scores quantifying the strength of a match (or lack there of).

Biography: Heike Hofmann is a professor Statistics at Iowa State University and a Fellow of the American Statistical Association. She is affiliated with CSAFE where she has been working on automatic matching of bullet striation marks.

Additional research contributors:
• Alicia Carriquiry - Center for Statistics and Applications in Forensic Evidence (CSAFE), Iowa State University

Email: hofmann@iastate.edu
Firearm and Toolmark Identification - Hypothesis Testing and Validation
Ronald Nichols - Nichols Forensic Science Consulting

Abstract: Firearm and toolmark identification is based on two basic premises. The first is that tools will produce different toolmarks. The second is that a trained and qualified examiner will be able to distinguish among these differences to reliably render common source identifications. Historically, research into the potential for toolmarks to be identified back to the tool from which they were produced could not examine the first premise without the intervention of an examiner. This is how Balthazard and Goddard, among others, approached early work with respect to fired bullets and cartridge cases. Later research, into the latter part of the 20th century, followed a similar approach. While not ideal, it was the only approach available and, as such, has resulted in criticisms that the research was flawed because of the seeming circularity of the methodology. This criticism has also extended to the AFTE Theory of Identification.

This presentation will discuss summaries of research that has focused on each of these premises individually. First to be addressed will be machine-based studies that have demonstrated that different tools will produce different toolmarks and that the same tool will produce similar toolmarks independent of a human examiner needing to make that determination. Second to be addressed will be validation studies that have demonstrated that examiners can sufficiently assess similarities and differences in toolmarks to reliably render common source determinations. While earlier studies may not have been ideal in their approach, these later studies help to affirm that the earlier research does hold value in supporting the scientific reliability of firearm and toolmark identification.

Biography: Mr. Nichols is a Distinguished Member of AFTE and past recipient of the Steve Molnar Key Person of the Year Award and the Member of the Year Award. He has 34 years of experience in forensic science, 27 as a court qualified firearm and toolmark examiner. He is also the author of the soon to be published Firearm and Toolmark Identification: The Scientific Reliability of the Forensic Science by Elsevier. He provides extensive training and consultation through Nichols Forensic Science Consulting.

Email: nicholsfsc@gmail.com
"Proof of Fire/Force of Fire" Chamber Marks in Semi-Automatics
Jaco M. Swanepoel - San Francisco Police Department Crime Laboratory

Abstract: This presentation is a review of chamber marks; specifically chamber marks that are the result of firing (obturation) and simultaneous extraction. Ultimately, an evaluation of chamber marks that can be described as being indicative of being “proof of fire/force of fire” marks.

Can "proof of fire/force of fire" chamber marks be identified and defined through the visible characteristics as found on the fired cartridge cases when microscopically compared to each other and can the source of the “proof of fire/force of fire” chamber marks be identified on the chamber wall by microscopical comparison of the Accutrans® silicone casts made of the originating firearm’s chamber wall?

Several different firearms were test fired and the chambers of the firearms were cast using Accutrans® silicone casting material. The fired cartridge cases, including test fires from different brands/manufacturers, and the silicone chamber casts were microscopically evaluated for visible chamber marks. The silicone chamber casts were also inter-compared to each other to get a better understanding of the variety of possible marks that are found on the chamber wall and which of those marks are ultimately carried over to the cycled, the fired and the fired and extracted cartridges and or cartridge cases. The chamber marks found on the cartridges and the fired cartridge cases were also microscopically reviewed to determine if they originated from feeding and or cycling only, or originate from contact between the fired cartridge case and the chamber wall during obturation and/or obturation and extraction. The silicone chamber casts were also compared to the fired cartridge cases to get a better understanding of what the eventual chamber marks visible on the fired cartridge cases actually look like on the originating chamber wall.

Clear chamber marks were found on the fired cartridge cases and some of these chamber marks can be classified or described as "proof of fire/force of fire" chamber marks. Additionally, these chamber marks are noticeable on the silicone casts of the originating chamber. Interesting differences were noted in the transition of chamber marks from the original mark found on the chamber wall to what the mark looks like on the fired cartridge case. Ultimately, noticeable marks are visible on the fired cartridge cases that can be described as marks indicative of “proof of fire/force of fire” chamber marks. Although a variety of marks can be found on the cycled, fired and fired and extracted cartridges and cartridge cases clear “proof of fire/force of fire” chamber marks exist that can be described and or defined.

Biography: Jaco Swanepoel is a Criminalist with the San Francisco Police Department Firearms Unit and specializes in firearm and toolmark and shoe impression examinations. Mr. Swanepoel joined the South African Police Services in 1988 and joined the South Africa Police Services Criminal Record Center in 1989 after graduation from the Police College. Mr. Swanepoel performed duties as a forensic crime scene investigator, police photographer and fingerprint expert. In 1999 Mr. Swanepoel joined the South African Police Services Forensic Science Laboratory Ballistic Unit and performed duties related to firearms and toolmark examinations and forensic photography. Mr. Swanepoel immigrated to the United States in 2005 and joined Forensic Analytical Sciences, a private forensic laboratory in the Bay Area. While at Forensic Analytical Sciences Mr. Swanepoel performed duties in fingerprint, shoe impression, tire impression, crime scene reconstruction and firearms and toolmark examinations. Mr Swanepoel has qualified to testify as an expert the courts of South Africa, California, Alaska, Nevada, Arizona and Florida.

Email: jacobus.swanepoel@sfgov.org
Goddard Night at the Ball Park
Appalachian Power Park
601 Morris Street
Charleston, WV 25301
6:30 p.m. to 10:00 p.m.

Cost: $35

*Bus will pick up in front of Civic Center on Clendenin Street
(Facing Mall / Panera Bread)  
Pick-up Times: 6:30 – 7:00 pm
Buses from the ball park back to the Civic Center will run from 8:00pm - Until

Enjoy the Pittsburgh Pirates Class A affiliated minor league baseball team, the West Virginia Power, located only 10 blocks away from the Marriott Hotel – transportation via bus will be provided. The Power will be hosting the Kansas City Royals Class A team, the Lexington Legends. Included for $35 is one (1) game ticket, and all you can eat and drink fountain drinks, draft beers, and wines on AFTE’s very own Private Deck.

Food options include:
Hot Dogs
Quarter Pounder Hamburgers
Bratwursts
Bush’s Baked Beans
Chili
Coleslaw
Popcorn
Peanuts

If you did not include this event in your original registration, come see us at the registration desk to purchase a ticket by Monday 5pm.
## Schedule of Events

**Wednesday, June 6**

### Registration
- **7 am – 5 pm** Civic Center (Quarrier St. Lobby)

### Continental Breakfast
- **7 am – 8 am** Civic Center Exhibitor Hall

### Technical Session

**Location:** Civic Center South Hall  
**Moderator:** Michael Lee  
Michigan State Police

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td><strong>Announcements / Door Prizes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Host Committee</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td><strong>Bullet Deflection Through Soft Tissue Simulants</strong></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Erwin Mattijssen</td>
<td></td>
</tr>
<tr>
<td>8:45 am</td>
<td><strong>Talking Bullets</strong></td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Luke Haag</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td><strong>Evaluation of Tissue Simulants through CT Scanning in Wound Ballistics</strong></td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Nick Tsiatis</td>
<td></td>
</tr>
<tr>
<td>9:40 am</td>
<td><strong>The Murder of a Schoolmarm: An Historic Shooting Incident Reconstruction</strong></td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Alexander Jason / Steve Hensley</td>
<td></td>
</tr>
<tr>
<td>10:10 am</td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:40 am</td>
<td><strong>Correlation of Victim’s Wounds and Impact Sites by Energy Evaluation</strong></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Axel Manthai</td>
<td></td>
</tr>
<tr>
<td>11:10 am</td>
<td><strong>A Gun Too Far: A Shooting Incident Reconstruction</strong></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Alexander Jason</td>
<td></td>
</tr>
<tr>
<td>11:40 am</td>
<td><strong>Case Study – The Forensic Analysis of a 3D Printed Firearm</strong></td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Benjamin Sampson</td>
<td></td>
</tr>
<tr>
<td>12:10 pm</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>1:15 pm</td>
<td><strong>Announcements / Door Prizes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Host Committee</td>
<td></td>
</tr>
</tbody>
</table>

**Moderator: Carolyn Martinez – Corpus Christi PD**

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm</td>
<td><strong>Imada DS2-44 Digital Force Gauge: Trigger Pull Measurements and Associated Uncertainty of Measurement</strong></td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Cary Alvarez Bacha</td>
<td></td>
</tr>
<tr>
<td>2:10 pm</td>
<td><strong>Determining the Angle of Impact from the Analysis of Bullets Following Perforation of Glass</strong></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Roger Jeffreys</td>
<td></td>
</tr>
</tbody>
</table>
**Time** | **Presenter** | **Title** | **Page**
---|---|---|---
2:25 pm | A Two-Step Approach to Assess Weight of Evidence in Firearm and Toolmark Examinations | Alicia Carriquiry
2:55 pm | New Bullet and Cartridge Case 3D Measurements Tools | Cristina Cadevall
3:10 pm | Break - Sponsored By: |  
3:40 pm | Suicide or Homicide? That is the Question | Zach Kotas
4:25 pm | Objective Bullet Identification | Danny Roberge
4:45 pm | A Evaluation of Recent Daubert / Frye / PCAST Challenges to Firearm and Tool Mark Identification: An Update | James Hamby
5:00 pm | A Re-Examination of Open Case Files in China | Zhifei Zhou
5:15 pm | End of Program
6:30 pm | Hamby Pig Roast at Haddad Riverfront

**Workshops (pages 81 – 83)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
</table>
| 6:00 am – 5:00 pm | Hi-Point Firearms Manufacturer Tour
Tour (Meet in Marriott’s Hawk’s Nest at 6:00 am) |
| 8:00 am – 5:00 pm | CZ-USA P-10 Armorer Course
Civic Center Parlor A |
| 8:00 am – 5:00 pm | Trajectory of Vehicles: Rods, Strings and Lasers
WVSP Range (Meet in Marriott’s Hawk’s Nest at 7:30 am) |
| 8:00 am – 12:00 pm | Redefining Possibilities: The Development of Latent Fingermarks from Cartridge Casings and Metals Using a Novel Vapor Phase Technique and Foster & Freeman Specialist Lighting Equipment for GSR and Bloodstains
Civic Center Parlor C |
| 12:00 pm – 1:30 pm | FTI / ATF NIBIN Luncheon
Civic Center Parlor B |
| 1:00 pm – 5:00 pm | Using Ultra-Violet & Infrared Photography for the Discovery and Documentation of Invisible Evidence
Civic Center Parlor D |
| 1:00 pm – 5:00 pm | Why 2D Images Offer Expedited Lead Generation for a Comprehensive Ballistic Analysis Program
Civic Center Parlor C |
Bullet Deflection Through Soft Tissue Simulants
Erwin J.A.T. Mattijssen – Netherlands Forensic Institute

Abstract: When reconstructing a shooting incident scene where a person was hit, assumptions must sometimes be made about the degree of bullet deflection in order to correctly reconstruct the bullet trajectory. To get information about the deflection of various bullet types, soft tissue simulants can be used. The results of three recent studies looking at bullet deflection while perforating soft tissue simulants for pistol and rifle bullets, will be presented. In all, approximately 1,100 shots were fired in the three studies. The effects of variables such as caliber, wound channel length and angle of incidence will be discussed.

Shots were fired, with both pistol and rifle calibers, at blocks of ballistic gelatin representing human soft tissue. The blocks were placed at shooting distances of 2 and 10 m for pistol and rifle calibers, respectively. Blocks in various thicknesses were used, resulting in channel lengths of 5, 10, 15, 20 and 25 cm for pistol calibers and of 7.5, 15 and 22.5 cm for rifle calibers. For all calibers, shots were fired at rectangular blocks; the pistol calibers shots were also fired at triangular blocks, resulting in both 90° and 45° incidence and exit angles. For the pistol calibers the shots were fired with .32 Auto, 9mm Luger and .45 Auto FMJ bullets. For the rifle calibers the shots were with 5.56x45 mm SS109 and 7.62x39 mm FMJ bullets.

Both studies were preceded by a study where the influence on bullet deflection of the sides of a block and channels from previous shots were studied. The y and z coordinates of the bullet defects resulting from the perforated bullets were measured on a witness panel placed 2 m behind the gelatin blocks. These coordinates were related to the bullet defects resulting from direct shots without a block of gelatin. By doing this, the absolute deflection angle was calculated for each shot. These results were used to calculate the means and standard deviations for bullet deflection. This was done for each combination of caliber and channel length.

The results demonstrate that bullet deflection was influenced by the length of the “wound channel” through soft tissue simulants. For pistol calibers, bullet deflection was small to virtually absent with channel lengths of 5 and 10 cm. With channel lengths of 15, 20 and 25 cm, there was a clear increase in deflection and/or a more erratic deflection behavior with most shots. For rifle calibers, bullet deflection was less than 1° with 7.5 cm channel length. For the longer channel lengths, bullet instability set in and subsequently, deflection was much larger. The rifle bullets started to fracture after channel lengths of 15 cm.

Biography: Erwin J.A.T. Mattijssen has been working as a forensic firearms examiner at the Netherlands Forensic Institute since 2010. Since 2013, he also works as coordinator and lecturer for the course ‘Observer Based Techniques’ within the MSc program ‘Forensic Science’ at the University of Amsterdam. In 2015 he started his PhD project, focusing on the human factor in forensic science, in collaboration with the Radboud University Nijmegen and Leiden University in the Netherlands.

Additional research contributors:
- Wim Kerkhoff, Annabel Bolck, Ivo Alberink, and Rob Hermsen – Netherlands Forensic Institute

Email: e.mattijssen@nfi.minvenj.nl
Talking Bullets

Abstract: The potential importance and reconstructive value of trace evidence embedded in, or adhering to fired bullets will be presented through actual case examples in which such material was the most important finding, and resulted in the resolution of one or more disputed issues in each shooting.

Examples will include embedded particles of glass, paint, mineral material, wood, asphalt, bone, tissue, hairs and clothing fibers. The recognition and identity of such trace evidence can be more important than the customary association of a fired bullet from a gunshot victim or shooting scene with a particular firearm. Such adhering or embedded material may be overlooked or even considered a hindrance to identification efforts by the firearms examiner. It is absolutely critical that firearms note and document the presence of any trace evidence on submitted bullets and determine what importance, if any, it might have in the context of the incident.

Characterization of these materials may require the participation of other crime laboratory scientists and the use of special microscopes, infrared spectrophotometers and/or the DNA section.

Biography: Lucien C. “Luke” Haag is a former Criminalist and Technical Director of the Phoenix Crime Laboratory [1965-1982] with over 50 years of experience in the field of criminalistics and forensic firearm examinations. Presently he is an independent forensic consultant with his own company, Forensic Science Services, Inc. in Carefree, Arizona. Luke Haag has a Bachelor of Science degree in chemistry from the University of California at Berkeley with subsequent forensic training at California State University at Long Beach, Indiana University, Arizona State University, McCrone Research Institute, the FBI Laboratory and FBI Forensic Training Facility at Quantico, VA. He is a Distinguished Member and past-president of AFTE, a Distinguished Member of the California Association of Criminalists, a member of the Southwest Association of Forensic Scientists, a Fellow in the American Academy of Forensic Sciences and a past board member of the International Wound Ballistics Association.

Email: haagfssi@aol.com
Evaluation of Tissue Simulants through CT Scanning in Wound Ballistics
Nikolaos E. Tsiatis – Forensic Science Division of Hellenic Police / Firearms & Tool mark Section

Abstract: In forensic pathology, it is very important to understand the injurious effects on the human body by the type of bullet associated with the victim’s gunshot wounds and be able to record this through wound documentation and measurement at the time of autopsy, which could greatly assist any subsequent efforts to reconstruct the shooting. Such an understanding can be derived through experimental shots into a suitable tissue simulant with the ammunition and bullet type(s) involved. The aim of this topic is an approach to present the relationship between the data that correlates the type of bullet with the resulting wound it causes when it perforates the human body.

Experimental shootings on special materials similar to the human body are presented; ballistic gelatin and ballistic soap. Different types of projectiles with full metal jacketed (FMJ) and hollow-point (HP) bullets were used. After shooting, the blocks were scanned with a multi-slice Philips Brilliance 64 computed tomograph scanner and data was collected by using ‘.dicom’ images. Analysis through CT scanning provides an opportunity to observe and calculate the characteristics of wound channels as they relate to the specific different projectiles. It also compares their effectiveness. Among the benefits is the calculation of the density of the specific target materials used which results in more accurate measurements that allow depictions to be stored in a ‘.dicom’ format or as ‘.jpeg’ files. The data can then be recalled in the future for comparisons between them or for further analysis. A final advantage arises from the fact that through 3D digital images of CT scanning, the total path length, deflection and the final resting point of the bullet can be observed with great accuracy. The measured volumes of the temporary cavities in ballistic soap determined by 3D CT technology represent the amount of kinetic energy that is transferred into the human body, which in turn can often be associated with the traumatic results. There is proportionality between the kinetic energy deposited in the block and the volume of the resultant cavity in it. The application of computed tomography to the measurement of the temporary cavity in tissue simulants renders our objective easier and our results more accurate.

Our results show that a highly accurate numerical analysis of the temporary cavities produced by experimental shootings is only possible using the 3D digital imaging capabilities of CT scanning in ballistic soap, while with ballistic gelatin, only the permanent wound track can be observed and measured with accuracy. Density of the gelatin blocks was measured at 1.036 g/cc, with SD 0.01 and the density of the ballistic soap blocks at 1.12 g/cc (slightly higher), with SD 0.006. FMJ bullets completely perforated the full length of the blocks from both materials. Conversely, the HP bullets were captured in all blocks and had mushroomed, producing shorter path lengths for the denser ballistic soap. Deviation of the bullets’ initial paths, while moving through the blocks, varied from approximately 1°-4°.

Ballistic gelatin and ballistic soap, which simulate the soft tissues of the human body, have both been found to be useful in the wound ballistics studies and were used through experimental shootings to model and approximate the behavior of bullets striking and penetrating the soft tissues of the human body and their actual performance at measured impact velocities. Even though the characteristics of these ballistic media differ, beneficial conclusions can be observed and derived from the results of such shootings. A properly prepared ballistic gelatin has become the recognized standard as a soft tissue simulant. The terminal ballistic behavior and penetration of the bullets used in this medium, very closely approximate what happens in living muscle tissue.

Biography: Nick Tsiatis joined the Hellenic Police in 1995 and has been serving in the Forensic Science Division / Firearms Section, since 2001. Mr. Tsiatis has a M.Sc. in Applied Physics and is a Ph.D. candidate related in wound ballistics in the Department of Forensic Medicine and Toxicology, School of Medicine, University of Athens. He has been a Distinguished AFTE member since 2016.

Email: tsiatisnick@yahoo.gr
The Murder of a Schoolmarm: An Historic Shooting Incident Reconstruction
Alexander Jason and Stephen Hensley – ANITE Group

Abstract: The local schoolmarm was fatally shot as she attempted to unlock the one-room schoolhouse early one morning. The weapon was a shotgun. The fatal wounds were in the left side of her head where pellets had penetrated. There were also pellet strikes on the school house door which was behind her. There were no witnesses but one key piece of evidence was a shotgun wadding found between a nearby tree and the school house. The wadding was a small section of paper which, after an investigation by the local sheriff, incriminated a young man who was charged with murder. A basic shooting reconstruction was performed by placing a broom straw into one of the perforation holes in the schoolhouse door. The straw pointed back towards a location near a tree where footprints were found in the dirt which also implicated the suspect. The presenter obtained the historical official records of the trial and the details of this incident which made possible a review of the investigation and the trial testimony which was handwritten in the courtroom. The trial resulted in the defendant being found guilty and sentenced to death by hanging. This presentation will show how the trajectory reconstruction was performed and how the paper wadding was used to convict the suspect. A video demonstration and re-enactment will be utilized to demonstrate the operation of the double barrel black powder shotgun used in the incident and how the paper wadding was identified to the suspect.

Biography: Alexander Jason is Certified as a Senior Crime Scene Analyst and Certified in Forensic Photography and Digital Imaging. He has been a Technical Advisor to AFTE for more than 25 years. Mr. Jason is also a Fellow of the American Academy of Forensic Science, a member of the International Association for Identification, and the International Association of Blood Pattern Analysis. He works as an independent forensic consultant in both criminal and civil cases.

Email: ajason@alexanderjason.com
Correlation of the Victim’s Wounds and Impact Sites by Energy Evaluation
Axel Manthei – Bavarian State Crime Laboratory

Abstract: In a shooting reconstruction case there were three impact sites in a room. The victim suffered three gunshot “through and through” wounds. Two of which were connected to each other. The question was whether or not a correlation between the victim’s wounds and the impact sites could be established to aid the shooting reconstruction. Test shots were fired with and without a tissue simulant at the scene into the same floor structure. Different energy levels result in different deformation of the impact site and the bullet. The deformation of the bullets and the destruction on the impact sites were evaluated and compared to the evidence present. The comparison of the test and evidence together with additional evidence enabled us to correlate the victim’s wounds with the impact marks and allowed a shooting reconstruction. Under certain circumstances comparative tests and evaluating the residual energy of bullets can correlate impact marks to penetrating wounds.

Biography: Biography: Mr. Manthei holds an engineering degree in firearms design and ballistics. He was employed as research and development engineer with the firearms manufacturer UMAREX for 6 years. Since 1988 he has worked as a firearm examiner in the Munich Crime Laboratory. He also is a court certified firearm examiner in Austria and owns his own company which produces the well-known Ammunition Database CartWinPro. Axel is a Distinguished member of AFTE and an accomplished target pistol shooter on an international level.

Email: info@cartwinpro.com

A Gun Too Far: A Shooting Reconstruction
Alexander Jason – ANITE Group

Abstract: A woman was found fatally shot, it was either a homicide or a suicide: Did she shoot herself or was she shot by someone? This issue required experimental testing and modeling. The primary physical evidence at the scene was both the presence and absence of gunshot residue, a shooting distance determination, and blood spatter. This was a case that required an analytical shooting reconstruction to determine what was and was not possible.

This case went to trial and the full shooting incident reconstruction was presented to inform the jury the impossibility of the woman using the particular handgun to shoot herself. Once of the principle evidence items used by both prosecution and defense in the criminal trial was the absence of gunshot residue on the suspect and on the blanket which covered the victim. An important part of the reconstruction was to understand and communicate the significance of the gunshot residue evidence to the jury. Additional evidence was evaluated by used of a human model to simulate the victim’s ability to hold the firearm.

Biography: Alexander Jason is Certified as a Senior Crime Scene Analyst and Certified in Forensic Photography and Digital Imaging. He has been a Technical Advisor to AFTE for more than 25 years. Jason is also a Fellow of the American Academy of Forensic Science, a member of the International Association for Identification, and the International Association of Blood Pattern Analysis. He works as an independent forensic consultant in both criminal and civil cases.

Email: ajason@alexanderjason.com
Case Study – The Forensic Analysis of a 3D Printed Firearm
Benjamin Sampson – Centre of Forensic Sciences (CFS) Toronto

Abstract: This presentation will include information on the process of 3D printing of firearms, mechanical assessments and include information about forensic testing results from a case and from an earlier research project. Firearms that are capable of repeated firing commercial ammunition can be printed on 3D printers. Variation of printing techniques or design alterations, such as using 100% infill, can strengthen printed barrels. Traditional forensic analysis techniques can be used to examine 3D printed firearms.

In 2015 a study was conducted at the Centre of Forensic Sciences in Toronto, Ontario to determine whether commercial ammunition could be fired from a Liberator model 3D printed gun. Multiple firearms versions of the Liberator pistol were printed in different calibers and test fired. Test fired bullets and cartridge cases were recovered and examined microscopically. Results of the study demonstrated that a 3D printed gun with a metal firing pin, such as the Liberator, is compatible with a range of commercial ammunition, such as .22 Long Rifle, .25 Auto and .32 Smith & Wesson. There was a transfer of marks from the interior of plastic barrels onto the bearing surfaces of lead bullets. However, microscopic comparison of lead bullets demonstrated that bullets could not be identified as having been fired from a specific barrel/firearm produced by this type of 3D printer. Test fired cartridge cases exhibited a range of characteristics, such as bulging, head deformities, and rupture. This was due to variability in the printed dimensions of the chamber. The ammunition did not fit the chamber correctly and may be due to limitations with respect to the printer’s consistency in reproducing accurate dimensions.

Recently, a case submission of components that comprised a 3D printed firearm was received in the laboratory. The parts were identified as being from a Songbird model single shot pistol frame and associated barrels. Testing included trace (handler) DNA, Gun Shot Residue, and polymer composition analysis. These examinations were conducted prior to the firearms mechanical assessment and testing. During test firing, repeated shots were achieved when the pistol was test fired. The velocity of the bullets was measured using a chronograph. Subsequent to the examination of this case, a pistol of the same model was printed and evaluated in the laboratory. The stereolithography (STL) files were downloaded from Github. GrabCAD print was used to print the files using 100% infill on a Stratasys μPrint SE plus 3D printer. The barrel was drilled out using a 5/16 drill bit and an airsoft inner barrel (~ 6 mm in diameter) was glued in place with PL Premium polyurethane construction adhesive. Elastic bands were used to provide hammer tension and a common nail (cut to size) was used as a firing pin. The resulting 3D printed firearm is capable of the repeated discharge of cartridges.

Commercial ammunition can be used to test fire 3D printed firearms. When .22 Long Rifle caliber ammunition was test fired, bullets achieved velocities ranging from 359 feet per second (109 meters per second) to 397 feet per second (121 meters per second). Printing techniques and materials influences the durability of a 3D printed firearm. Traditional forensic testing techniques, such as comparative microscopy, can be applied to the examination of 3D printed firearms. There is a transfer of marks to lead bullets fired through polymer barrels, however microscopic comparison results were inconclusive.

Commercial ammunition can be fired in firearms manufactured using 3D printers. Printing techniques or design alterations can increase the durability of 3D printed firearms. It is possible to apply traditional forensic testing techniques to the examination of 3D printed firearms.

Biography: Mr. Sampson is a forensic scientist in the Firearms & Toolmarks Unit at the Centre of Forensic Sciences (CFS) in Toronto, Canada. He holds a Bachelor of Science (B.Sc.) in “Mathematics” & “Physics” from the University of the Western Cape and a Bachelor of Technology (B.Tech.) in the “Investigation of Crime” and “Police Management” from the University of South Africa – both in Cape Town, South Africa. Ben has been a Firearms Examiner for more than 18 years; 6 years in Cape Town, South Africa and 12 years in Toronto, Canada.

Email: benjamin.sampson@ontario.ca
Imada DS2-44 Digital Force Gauge: Trigger Pull Measurements and Associated Uncertainty of Measurements

Carey Alvarez Bacha - Harris County Institute of Forensic Sciences Quality Management

Abstract: The Harris County Institute of Forensic Sciences (HCIFS) Firearms Identification Laboratory (FIL) replaced their Chatillon® brand mechanical spring gauges with the Imada DS2-44 digital force gauge for use in conducting trigger pull measurements of firearms submitted as evidence. The Imada DS2-44 digital force gauge was implemented to provide more reproducible and precise trigger pull measurements and valuable reviewable data.

This presentation will outline the validation of the IMADA DS2-44 digital force gauge. The validation study included ten firearms laboratory personnel conducting ten force gauge measurements on fourteen firearms/actions. This data was used to calculate the minimum force, maximum force, mean force, standard deviation, and coefficient of variation (%CV) for each firearm/action. The single action rifle, single action shotgun, single action pistol, double action pistol, single action revolver, and double action revolver, with the largest %CV were determined from this data and referred to as worst case scenario firearms/actions. The results from the validation study showed significant differences between study participants in mean force gauge readings for each firearm. Potential factors contributing to the variation in force gauge readings between study participants will be addressed. Three additional firearms laboratory personnel then conducted ten force gauge measurements on the six worst case scenario firearms/actions. The combined data from all thirteen firearm laboratory personnel was used to calculate the trigger pull uncertainty of measurement for the main firearm types/actions, including single action rifle, single action shotgun, single action pistol, double action pistol, single action revolver, and double action revolver.

This presentation will address the advantages and disadvantages of the method utilized by the HCIFS FIL to calculate and report trigger pull uncertainty of measurement, as compared to alternative methods.

Biography: Ms. Alvarez Bacha joined the Aurora Police Department Crime Laboratory Firearm and Toolmark Section as a Contract Examiner in January 2018. Prior to this, she was employed as a Firearms Examiner with the Harris County Institute of Forensic Sciences Firearms Identification Laboratory. Carey recently received her Firearms certification through the Association of Firearm and Toolmark Examiners, is a member of the AFTE Editorial Committee and Training Manual Subcommittee. Additionally, she is an affiliate member of the Organization of Scientific Area Committees (OSAC) Firearm and Toolmark Subcommittee.

Additional research contributor:
• Dimika Cavelier, Harris County Institute of Forensic Sciences Quality Management

Email: Carey.AlvarezBacha@ifs.hctx.net
Determining the Angle of Impact from the Analysis of Bullets Following Perforation of Glass

Roger Jefferys - West Virginia University Institute of Technology

Abstract: This presentation will help attendees understand how applying different methodologies in analyzing a bullet(s) can assist investigators in determining the position of a suspect(s) in the reconstruction of a shooting incident. In particular, situations where a bullet(s) has perforated a glass target. It will provide a quantitative measure to analyzing and interpreting bullet evidence for future use in the courtroom.

When two objects come into contact with one another, there is a potential for the transfer of material between those objects. The transfer of material to bullets is an underexploited area of trace evidence as limited research exists that provides a quantitative measure to the results of the transfer. The goal of this research was to develop statistical models to aid investigators in the reconstruction of a shooting incident. Specifically, the determination of the direction of fire from the angle of impact of a bullet was addressed by assessing the deformation of the bullet and the transfer of glass onto the bullet.

Four aspects of bullet deformation after perforation of a glass target were studied during the research: (1) the shape of the bullet holes, (2) the side view of bullet deformation, (3) the frontal view of bullet deformation, and (4) the distribution of glass onto the bullets. A Ruger® SR9® 9mm pistol was used to fire 100 cartridges at individual glass targets at angles of 45°, 50°, 60°, 75°, and 90° using Winchester® 115 grain 9mm Luger full metal jacket factory ammunition and reloaded lead round nose ammunition. The reloaded ammunition consisted of 115 grain Missouri Bullet Company bullets, 4.1 grains of Hodgdon® Titegroup powder, and Sellier & Bellot® 4,4 small pistol boxer primers. The following methodologies were employed for image capture and analysis: (1) focus stacking using Zerene Stacker to generate high-quality images of the frontal view of the bullet, (2) analysis of the bullet holes in the glass targets using HemoSpat, and (3) analysis of bullet deformation and distribution of glass onto the bullets using ImageJ. Regression modeling and principal component analysis were performed on the data.

The research found that examining bullet holes in glass is not a viable method for determining angle of impact. It also found that the side view deformation of full metal jacket bullets can be used to distinguish between some impact angles, for example, 90° and 65°, but cannot be used for lead round nose bullets. Furthermore, the front view deformation and distribution of glass on full metal jacket bullets can be used to distinguish between some impact angles, for example, 75° and 50°, but cannot be used for lead round nose bullets.

Biography: Mr. Jefferys is a Visiting Professor of Forensic Investigation at West Virginia University Institute of Technology in Beckley, WV. He graduated from West Virginia University with his M.S. in Forensic and Investigative Science in 2016. He was a recipient of the 2015 AFTE Scholarship.

Email: rjeffery@mail.wvu.edu
A Two-step Approach for Assessing Weight of Evidence in Firearm and Toolmark Examinations

Dr. Alicia Carriquiry - Center for Statistics and Applications in Forensic Evidence (CSAFE), Iowa State University

Abstract: Firearm and toolmark examiners rely on largely subjective assessments to answer questions of common source; “could these two cartridge cases or bullets have been fired from the same gun?”; or a specific source, “could this be the gun used in the commission of this crime”? The decision is typically expressed in a categorical manner: inclusion or exclusion. On occasion, the examiner cannot reach a conclusive determination.

One drawback with this type of categorical assessment is the following: even if the examiner establishes conclusively that striations on two breech faces (or bullets) are indistinguishable, this does not imply that they have a common source. Examiners invoke the principles of uniqueness and reproducibility of striations, but increasingly, judges and jurors have begun to expect a quantitative assessment of the chance that the same gun did indeed fire the two rounds.

The new 3D technologies for imaging bullets, breech faces and other surfaces enable the type of quantitative assessment that can help examiners when evaluating toolmark and firearm evidence. High-resolution 3D microscopes can measure the location and depth of striation with accuracy in the order of microns. This information can then be fed into algorithms such as bulletr (CSAFE; Hare et al., 2017) or the CMC method (NIST; e.g., Song et al., 2014) to compute a similarity score between the two items that are being compared. In general, a high value of the score would indicate that the striations are indistinguishable. A score by itself, however, still does not address the question of weight of the evidence. To determine whether a certain degree of similarity (as reflected in the score) is suggestive of same source, we must have something to which we can compare the score we computed in a specific case. Therefore, the second step is to compare the score against two reference score distributions:

- The distribution of scores that we are likely to observe when comparing items that do not have a common source (e.g., bullets that were not fired by the same gun).
- The distribution of the scores that we are likely to observe when comparing two items that have a common source (e.g., bullets that were fired by the same gun).

We talk about a distribution of scores among known non-mated (KNM) samples and among known mated (KM) samples. If the similarity score is discriminating enough, then the two distributions will not overlap or will overlap slightly, so that when we compute a similarity score in the course of casework, it will be clear whether the value of the score is typical relative to the distribution of KM or KNM sample. As illustration, suppose that the magenta and then blue distributions of scores for KNM and KM pairs, respectively, were obtained by comparing many pair of bullets. Now suppose that for a particular comparison in a case, the examiner computes a similarity score between a bullet recovered from the crime scene and a test shot obtained from the suspect’s gun, and gets a score of 10. The score is shown as a solid gray line in the figure. To compute the weight of the evidence the examiner could compute a score-based likelihood ratio (SLR) as the height of each of the two curves at the value 10. In this example, the SLR would be about 160, which is interpreted as follows: it is 160 times more likely to observe a similarity score equal to 10 if the two bullets were fired from the same gun than if they were fired from different guns.

The question is how to construct the distributions of scores among KNM and KM pairs. In particular, what do we mean by “non-mated” pairs of bullets or tools, or cartridge cases? At first glance, one might think that each possible combination of gun and ammunition type might require its own reference distribution of scores. At CSAFE, we have begun to explore whether gun/ammunition combinations can be clustered into “homogeneous” categories, to limit the number of reference score databases that need to be assembled.

Biography: Dr. Alicia Carriquiry is Distinguished Professor of Liberal Arts and Sciences and Professor of Statistics at Iowa State University. She also holds the President’s Chair in Statistics and is Director of the Center for Statistics and Applications in Forensic Evidence (CSAFE), a NIST Center of Excellence. Dr. Carriquiry is an elected member of the National Academy of Medicine, and a Fellow of the AAAS. She is also an elected member of the International Statistical Institute, a Fellow of the American Statistical Association, a Fellow of the Institute of Mathematical Statistics, and a Fellow of the International Society for Bayesian Analysis. She has published over 130 peer-reviewed articles and has mentored (or is in the process of mentoring) 21 doctoral students in statistics.

Email: alicia@iastate.edu
New Bullet and Cartridge Case 3D Measurements Tools
Dr. Cristina Cadevall - Sensofar

Abstract: Three-dimensional measurements of bullet and cartridge case surfaces enable 3D virtual microscopy, where the examiner views and manipulates the 3D representation of measured objects using a software application. This technology can complement traditional examination by providing qualitative information to assist the examiner with routine casework. Additionally it is possible to establish/develop objective quantifiable mathematical comparisons between any two measured surfaces, which can supplement subjective conclusions from firearms examiners.

3D optical profilers are an open alternative to closed 3D ballistic identification systems. Measurements can be saved in x3p format defined by the Open Forensics Metrology consortium to allow free exchange and comparison of 3D measurements obtained by different instruments at different labs. Different 3D techniques can be used depending on the surface characteristics. According to our experience, Confocal Continuous is the preferred method for bullet identification and Confocal Fusion has the best performance for cartridge case measurements. But other techniques such as Confocal, Focus Variation and Coherence Scanning Interferometry are available.

3D optical profilers are general-purpose systems solving hundreds of applications in research and industry. It is a demand of the firearms examiners community to automate 3D optical profiler measurements around cylindrical surfaces to take more advantage of the advanced inspection and analysis capabilities of this kind of instruments.

Sensofar presents new tools for automatic bullet and cartridge case 3D measurements. The Five Axis and Four Axis modules for S neox combine a high-accuracy rotational module with advanced inspection and analysis capabilities. This enables automatic 3D surface measurements at defined positions around a cylindrical object such as bullets and cartridge cases. It also enables full 3D surface measurements.

With these modules S neox integrates several special acquisition modes designed to complement and exploit the capabilities of the motion system. Manual mode measures individual field-of-views (FOVs) with high-accuracy positioning, while Grid mode can capture individual FOVs at several different (lateral) positions. Finally, 3D mode is an automated procedure to obtain a 3D topography in STL or point cloud file format. Both formats are supported by many 3D software analysis platforms.

The above automation modules have been used for the measurements of a variety of bullets and cartridge cases. For example we have measured 30 bullets (Remington UMC FMJ, copper jacket) fired with 10 consecutively manufactured Beretta 92F/FS barrels (9 mm) at the National Institute of Standards and Technology (NIST) using Continuous Confocal and Focus Variation techniques to contribute in their study of the influence of different operators and acquisition methods on 3D surface measurements of bullet striations. The captured topographies can be manipulated in a virtual environment allowing the examiners to visually compare them and determine if the cartridge cases were fired with the same gun. They can also be used for objective comparison as will be demonstrated with results of several studies of test fires sets. In contrast with existing ballistic identification systems, optical profilers offer an open platform for firearms and toolmarks expert’s investigations.

Biography: Cristina Cadevall received her Ph.D in Optical Engineering from the Technical University of Catalonia in 2007. Since 1996, she has worked at CD6 as R&D Engineer. She is Software Manager at Sensofar Tech SL since its foundation in 2001, a partner since 2004 and VP of Software since 2017. Her research interests include optical metrology, image processing and computing sciences. Since 2010 she has been developing the use of three-dimensional (3D) topographical analysis in firearms analysis.

Additional research contributors: Roger Artigas, Carlos Bermudez, Manuel Moya, and Neus Vintró, Sensofar Tech SL

Email: cadevall@sensofar.com
Suicide or Homicide? That is the Question
Zachary Kotas – Denver Police Department

Abstract: A 911 call was placed by a distraught husband. He claimed to return home to find his wife suffering from a self-inflicted shotgun wound to the chest. As the investigation continued, more and more inconsistencies were discovered. The wound path, size of the shotgun, position of the body, shotgun and shotgun shell were all red flags.

Extensive forensic testing was utilized to help determine the chain of events. DNA, GSR and Firearm examinations proved the husband’s statements were suspicious. From the results of the analysis, the husband was formally charged with 1st degree Homicide.

The Firearm and Toolmark unit was asked to perform a number of examinations on the evidence in this case. Microscopic examination and comparison of the shotgun shell proved the shotgun recovered did fire the shotgun shell recovered at the scene. A distance determination was conducted on the victim’s shirt. Additional testing was conducted using the shotgun recovered at the scene in order to determine when the action will open and extract and eject a fired shotgun shell. Various tests were designed to attempt to accommodate different scenarios.

Investigative work, forensic analysis by multiple disciplines and hard work by the District Attorney’s office resulted in a successful prosecution of this case.

Biography: Zachary Kotas is a forensic scientist, Firearm and Toolmark examiner, with the Denver Police Department Crime Laboratory. He has been with this section for 10 years and also holds the position of NIBIN coordinator. He has instructed Forensic Science courses at the college level as an adjunct professor. Additionally, he regularly teaches Denver Police Department officers and employees. He is a graduate of the NFEA and has been published in the AFTE Journal multiple times.

Email: zachary.kotas@denvergov.org
Objective Bullet Identification
Dr. Danny Roberge - Ultra Electronics Forensic Technology

Abstract: Beyond the search for potential matches, the technology behind an automated ballistic identification system can be applied to the ultimate goal of objective identification. Searching vast databases provides a ranked list of candidates, mostly useful for police investigations. Objective identification is a distinct approach that provides meaningful scores associated with probability measures (false match rates and likelihood ratios) that can reinforce the legal admissibility of expert conclusions.

Two successful and complementary schools of thought coexist in the firearm examination community: pattern matching and consecutive matching striae (CMS) counting analysis. Our hypothesis is that pattern matching and line counting algorithms based on high resolution 3D measurements provide complementary information for automated objective bullet identification.

We analyzed the matching performance of a realistic set consisting of 3D high resolution images from 136 conventionally rifled firearms (all 9 mm 6 right) of various makes and models representative of the population of seized weapons in North America. More than 400 bullets, in groups of 2 to 5 known matches, were acquired with IBIS BULLETTRAX. Before any computations were performed, every known match pair was inspected using a 3D virtual microscope, and was labeled as visually matching or not.

We used two newly developed identification scores to segregate non-matches from visually confirmed matches: one is a linear combination of two pattern matching measures in the public domain and one is a line counting score for peaks and valleys.

Displaying the two scores on a 2-dimensional graph allows us to define a discriminative line which corresponds to a false match rate of 1/10000. A linear combination of the pattern matching score and the line counting score yields a more abstract score. A likelihood ratio function is computed as the ratio of the non-matches and matches probability densities of the resulting score. The study also shows that a large number of non-match scores (several tens of thousands or more) is required for proper extrapolation of the non-match distribution for the high score regime not sampled by experimental data. Such extrapolation is key to computing likelihood ratio estimates.

A new visual tool for bullet pair comparison shows the strength and complementarity of the pattern matching and line counting algorithms. Its ease of interpretation and performance makes it practical for proficiency tests and case work in forensic laboratories. This approach to objective identification can also be valuable in validation studies to support firearm forensics.

Biography: Danny Roberge completed a PhD in optical pattern recognition in 1995. He is a senior scientist in the Research Team at Ultra Electronics Forensic Technology since 2000. He has developed and implemented algorithms related to automated surface capture and correlation of ballistic images in IBIS.

Email: danny.roberge@ultra-ft.com
An Evaluation of Recent Daubert / Frye / PCAST Challenges to Firearm and Tool Mark Identification: An Update  
Dr. James Hamby – International Forensic Science Laboratory & Training Centre

Abstract: Over the past several years the defense bar has been using the NAS Report (2008) "Ballistics", the NAS Report (2009) "A Path Forward", and now the more recent PCAST Report (2016) "Ensuring Scientific Validity of Feature-Comparison Evidence" in an attempt to have the courts disallow firearm or tool mark evidence.

These challenges have included self-styled "defense experts" who either state that what we do doesn't work or that it only works when they examine the evidence.

This presentation will provide information on how you can prepare for these challenges to our field.

Biography: Dr. James Hamby is an examiner with over 44 years experience and was initially trained at the US Army Crime Laboratory. Jim has worked in several laboratories and is a past-President of AFTE.

Email: jimhamby14@aol.com
A Re-examination of Open Case Files in China
Zhifei Zhou - Institute of Forensic Science, Ministry of Public Security of China

Abstract: In September of 2016 we embarked on a project organized under the aegis of Criminal Investigation Department Ministry of Public Security of China. The aim of the project was to re-examine and re-correlate the open case files (stored firearm evidences from unsolved crimes) and to compare and inspect the technologies for ballistics identification system in state of art. For this purpose, the newest IBIS system and newest Evofinder, which integrated with the new algorithm and module for non-standard bullets, were used separately for open case files.

1911 evidences, which included 452 fired bullets and 1,459 cartridges cases, were submitted to our laboratory by local police departments from fourteen provinces (and autonomous regions) of China. This evidence, nearly half of which were fired from homemade guns, was microscopically pre-examined and indexed into a list of objects by its attributes, such as ammunition types, calibers etc. Thus, each of the objects was recorded into the IBIS system and Evofinder system respectively and correlated with the others automatically and visually. The project ended in September of 2017 with the main results presented below:

1) All the evidence, including 31 deformed bullets, 69 damaged bullets and 13 fragment bullets were successfully acquired and correlated; 2) As the non-standard bullets varied considerably in striations in the open case files, a certain regulation for acquiring non-standard bullets had been established by us to correspond to the new algorithm; 3) 26 pairs of evidence from open case files were matched through automatic correlation and onscreen examination, which would be evaluated and provided actionable investigative leads in closing the unsolved cases; 4) 12 (46.2%) of matched evidence cartridge cases were fired from non-standard guns; 5) With a limited number of objects, a full evaluation and analysis of comparison between the two automated ballistic identification systems was hard to be determined, since they were operating with such a great performance that all the matched evidence ranked in top of correlation lists; nevertheless, we had relatively observed and recorded the advantages between them in different procedures like images acquisition, automatic correlation and visually comparison.

After the project, the acquisition and correlation for non-standard bullets had been properly verified. Therefore, the newest IBIS system and newest Evofinder have shown a great potential of usage to deal with the non-standard guns in China. We suggested the open case files should be investigated following up on updating ballistic imaging technologies and hence the automated ballistic identification systems should be introduced into forensic laboratories.

Biography: Mr. Zhou has worked for the Institute of Forensic Science, Ministry of Public Security of China (IFSC) since 2013. He is a research assistant responsible for firearms examinations, scientific research, information construction and the reference collection.

Email: zhouzhifei@cifs.gov.cn
Hamby Roast on the Riverfront
Haddad Riverfront Park
6:30 pm – 9:30 pm

Cost: $25

If you did not include this event in your original registration, please come see us at the registration table by Monday 5pm to see if there are tickets still available.

Join us at the Haddad Riverfront Park for our very first Hamby Night featuring live music, dinner, drinks, and a moonshine tasting. Food for the event will be BBQ (pork or chicken), two (2) sides, and two (2) drink tickets (beer, soft drinks, or bottled water). The moonshine tasting will be put on by West Virginia's very own Hatfield and McCoy moonshine distillery. You won’t want to miss this 2018 AFTE event!

- 5 Blocks of walking from Marriott. Bus and shuttle service will be available and will pick up in front of the Civic Center on Clendenin Street (Facing Mall / Panera Bread)
Tom Deeb/Hi-Point Firearms First-Time Attendee Assistance Program

In remembrance of Tom Deeb, Hi-Point Firearms sponsors five first time attendees each year to attend AFTE’s Annual Training Seminar. Owner Mike Strassel also provides first time AFTE attendees with great court demonstrative aids such as cut away barrels, bullets, and cartridge cases. The AFTE 2018 Host Committee would like to thank Hi-Point Firearms and owner Mike Strassel for their continued support of AFTE.
# Schedule of Events

Thursday, June 7

**Registration**
7 am – 3:30 pm  
Civic Center (Quarrier St. Lobby)

**Continental Breakfast**
7 am – 8 am  
Civic Center Exhibitor Hall

## Technical Session

**Location:** Civic Center South Hall  
**Moderator:** Amanda Gibson  
Kansas Bureau of Investigation

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td><strong>Announcements / Door Prizes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Host Committee</td>
<td></td>
</tr>
<tr>
<td>8:15 am</td>
<td><strong>Case Study: Rubber Buckshot Tissue Penetration Ability</strong></td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Brian Smelser, Dijana Coric</td>
<td></td>
</tr>
<tr>
<td>8:45 am</td>
<td><strong>Proposed Congruent Matching Features (CMF) Method for Ballistics</strong></td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Identification with Sub-Class Characteristics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>John Song</td>
<td></td>
</tr>
<tr>
<td>9:15 am</td>
<td><strong>Finite Element Modeling and Analysis of Breech Face and Firing Pin</strong></td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Impressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>James Hamilton</td>
<td></td>
</tr>
<tr>
<td>9:35 am</td>
<td><strong>The Persistence of Firearm Residues After Being Subjected to</strong></td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Influencing Factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Angus Newton</td>
<td></td>
</tr>
<tr>
<td>10:00 am</td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30 am</td>
<td><strong>The Effect of Primer Hardness on IBIS Correlation Scores</strong></td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Eric Law</td>
<td></td>
</tr>
<tr>
<td>10:50 am</td>
<td><strong>A Penny for Your Thoughts: Jennings Firearm Strategically Operated</strong></td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>with a Penny</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shaun Jaikissoon</td>
<td></td>
</tr>
<tr>
<td>11:05 pm</td>
<td><strong>Fracture Examination Research and Generalization of Examinations</strong></td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>John R. Vanderkolk</td>
<td></td>
</tr>
<tr>
<td>11:35 pm</td>
<td><strong>Objective Comparison of Striated Toolmarks from Ten Consecutively</strong></td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Manufactured Cold Chisels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Robert Thompson</td>
<td></td>
</tr>
</tbody>
</table>
Workshops (pages 84 – 86)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am – 5:00 pm</td>
<td><strong>Ruger AR556 Rifle Armorer Course</strong></td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Civic Center Parlor A</td>
<td></td>
</tr>
<tr>
<td>8:00 am – 10:00 am</td>
<td><strong>How to Identify “Other” Firearms</strong></td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Civic Center Parlor C</td>
<td></td>
</tr>
<tr>
<td>8:00 am – 10:00 am</td>
<td><strong>Marshall University Robert C. Byrd Institute Advanced Manufacturing Technology Center Tour</strong></td>
<td></td>
</tr>
<tr>
<td>10:00 am – 12:00 pm</td>
<td><strong>Tour (Meet in Marriott Hawk’s Nest at 7:30 am and 9:45 am)</strong></td>
<td></td>
</tr>
<tr>
<td>9:00 am – 12:00 pm</td>
<td><strong>Quantitative Measurement &amp; Automated Bullet Comparison Using High-Resolution Optical 3D Surface Metrology</strong></td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>Civic Center Parlor D</td>
<td></td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Barrel Manufacturing</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Civic Center Parlor C</td>
<td></td>
</tr>
<tr>
<td>1:00 pm – 5:00 pm</td>
<td><strong>Automated Comparison of 3D Renderings for Bullets and Cartridge Cases, and Supplementation of Microscopic Sample Examination – Eovfinder</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Civic Center Parlor B</td>
<td></td>
</tr>
</tbody>
</table>
Case Study: Rubber Buckshot Tissue Penetration Ability
Brian Smelser, Dijana Coric – Washington State Patrol Crime Laboratory

Abstract: The author was asked to determine whether 12 Gauge RIO brand rubber buckshot was able to penetrate ballistic gelatin, a tissue simulant, at a muzzle-to-target distance of approximately forty yards (the approximate distance between the suspect and victim at the time of the shooting). According to the detective and multiple police statements, on November 14th, 2015, the suspect indicated that the victim and his friends were trespassing on his property on their ATVs. The suspect proceeded to retrieve his 12 Gauge Mossberg model 500A pump action shotgun and fired two warning shots using RIO brand rubber buckshot (marketed as less lethal ammunition). One pellet penetrated the victim’s thigh; this pellet could not be removed for medical reasons. The victim was wearing four layers of clothing; none of the clothing was collected. The fired shotgun shells could not be located at the crime scene to verify what type of ammunition was fired. The detective had reason to presume that the suspect was not firing less lethal ammunition, i.e. rubber buckshot, instead that he was firing lethal ammunition such as lead buckshot.

Testing was conducted at the shooting range and several high speed videos were taken. The Mossberg 500A shotgun was used to fire 12 Gauge RIO brand rubber buckshot at cardboard and denim-covered ballistic gelatin at various distances to determine the penetration/perforation capability of the rubber buckshot. For compatibility purposes, the same experimentation was then repeated using 12 Gauge Federal 00 buckshot. The 10% ballistic ordinance gelatin was mixed using standard practices and calibrated using a BB. During testing, the gelatin was not temperature controlled.

At approximately eight yards, all fifteen rubber pellets perforated cardboard with an approximate pattern diameter of twenty-four inches. At approximately forty yards, only four out of the thirty rubber pellets (two shots were taken) impacted the cardboard, none of the four pellets perforated the cardboard. At approximately eight yards, all nine lead pellets perforated the cardboard with an approximate five inch diameter pattern. At approximately forty yards, six lead pellets perforated cardboard with an approximate twenty inch diameter pattern (only six of the nine lead pellets impacted the cardboard target). At approximately eight yards, two rubber pellets perforated the layer of denim, but there was no penetration of the ballistic gelatin (only six of the fifteen rubber pellets impacted the denim-covered gelatin). At approximately twenty yards, only one out of the fifteen rubber pellets impacted the denim-covered gelatin. The one rubber pellet impacted the target, creating a dent/impression on both the denim and ballistic gelatin, and then bounced off. At approximately twenty yards, only two out of the fifteen rubber pellets impacted the bare ballistic gelatin (no denim layer covering). One of the rubber pellets bounced off the ballistic gelatin and the other penetrated the ballistic gelatin approximately ¼ of an inch (most likely due to the warmer temperature of the ballistic gelatin). At approximately eight yards, six lead pellets perforated the layer of denim and penetrated at least thirteen inches of gelatin (only six of the nine lead pellets impacted the denim-covered gelatin). Testing at twenty yards using the Federal 00 buck shot ammunition was not conducted at this time.

Obtaining data for rubber buckshot into gelatin from forty yards away was not feasible due to the erratic and wider pattern distribution of the rubber pellets. That being said, as a projectile travels downrange it will gradually decelerate, therefore if the rubber pellets could not penetrate the ballistic gelatin at approximately eight yards, the author is able to draw the conclusion that they would not penetrate ballistic gelatin at approximately forty yards. In conclusion, the 12 Gauge RIO brand rubber buckshot pellets did not penetrate/perforate the cardboard at approximately forty yards or the denim-covered ballistic gelatin at approximately eight yards.

Biography: Brian Smelser is a Distinguished member of AFTE. He has worked for the Washington State Patrol Crime Laboratory in DNA, Crime Scene, and Firearms.

Ms. Coric is a Firearm/Toolmark Examiner for the Washington State Patrol Crime Laboratory in Seattle. She received a Bachelor’s of Science at Louisiana Tech University, and a Master’s of Science in Forensic Science at Marshall University. She is a currently a provisional AFTE member.

Email: dijana.coric@wsp.wa.gov
Proposed Congruent Matching Features (CMF) Method for Ballistics Identifications with Sub-class Characteristics

Dr. John Song – National Institute of Standards and Technology

Abstract: The parts of a firearm that make forcible contact with a bullet or cartridge case create toolmarks on their surface, resulting in “ballistics signatures” that can be used for firearm evidence identification. The most useful characteristics of these signatures are the topography and distribution pattern of the surface peaks and valleys, since they represent the most forcible contact with the most significant surface features of the firearm. Based on the congruent Matching Cells (CMC) method developed at NIST for firearm identification and error rate estimation, a Congruent Matching Features (CMF) method is proposed for ballistics identification by quantifying the topography similarity of the peak and valley features and the congruency of their distribution patterns. The CMF method shows promise in addressing the challenges of sub-class characteristics while significantly improving comparison speed.

We apply a robust, band-pass, Gaussian filter to attenuate surface features with extremely short (noise) and long (form) spatial wavelengths which are not useful for identification. Next, we extract feature blobs on the filtered surface to represent major peak and valley regions on a “feature map”, using an optimized Truncation Height (Th) and Maximal Stable Extremal Regions (MSER) method [2]. The compared binary feature maps are registered using a Global Search Score (GSS) – a sum-of-product of the feature image points (pixels) at their maximum registration position. After registration, a congruency evaluation and a correlation coefficient threshold are applied to identify the Congruent Matching Features (CMFs). Three parameters, 1) GSS, 2) Number of overlapping features, and 3) Ratio of feature overlap area to feature area, are used to quantify the topography similarity of features, their pattern congruency, and the weight of the CMFs of the image pair. A decision boundary for multi-parameter classification is determined by the Support Vector Machines (SVM) method.

We apply a robust, band-pass, Gaussian filter to attenuate surface features with extremely short (noise) and long (form) spatial wavelengths which are not useful for identification. Next, we extract feature blobs on the filtered surface to represent major peak and valley regions on a “feature map”, using an optimized Truncation Height (Th) and Maximal Stable Extremal Regions (MSER) method [2]. The compared binary feature maps are registered using a Global Search Score (GSS) – a sum-of-product of the feature image points (pixels) at their maximum registration position. After registration, a congruency evaluation and a correlation coefficient threshold are applied to identify the Congruent Matching Features (CMFs). Three parameters, 1) GSS, 2) Number of overlapping features, and 3) Ratio of feature overlap area to feature area, are used to quantify the topography similarity of features, their pattern congruency, and the weight of the CMFs of the image pair. A decision boundary for multi-parameter classification is determined by the Support Vector Machines (SVM) method.

One set of breech face impressions with granular characteristics and one set of firing pin impressions with strong circular sub-class characteristics were used for initial testing of the CMF method. The CMF scores for known matching (KM) and known non-matching (KNM) comparisons showed significant separation for both datasets. To evaluate a fast search method using GSS, we used four sets of breech face impressions (two sets were with granular characteristics, another two sets were with striated characteristics) and one set of firing pin impressions (some were with circular sub-class characteristics). For the four breech face datasets, all the GSS scores of the KM image pairs are larger than the GSS scores of the KNM image pairs. We obtained a similar result for the firing pin dataset, except for two images representing poor impressions that yielded KM scores which were lower than the highest KNM scores.

The proposed CMF method with multi-parameter correlation scores and advanced classification is a promising addition to previously developed congruent matching methods such as CMC, especially for ballistics signatures with sub-class characteristics. The developed fast, global, registration method and its GSS score show promise to enhance search results of large image databases.

Biography: The authors are members of the Project Team on Forensic Topography and Surface Metrology at NIST. J. Song and J.A. Soons are from the Engineering Physics Division (EPD); R. M.Thompson is from the Special Program Office (SPO); Z. Chen and W. Chu are guest researchers.

Email: song@nist.gov
Finite Element Modeling and Analysis of Breech Face and Firing Pin Impressions
James Hamilton – West Virginia University

Abstract: During the discharge of a firearm, the pressure generated by the expanding gasses forces the walls of the casing against the surrounding chamber. Since these gasses flow back into the primer pocket, this force also acts on the inside of the primer. This force presses it against the breech of the firearm resulting in the generation of impressions. These impressions are used extensively in the investigation of firearm related crimes. However, their variability and the factors that affect it are not widely researched. A multitude of factors can play a role in their variability, one being the variability and uniformity of the aforementioned force generated during firing.

The variability in force across the primer face may be affected by the ability of the gasses to flow into the primer cup. The gas flow can be obstructed by materials such as the anvil that is present inside the primer resulting in a non-uniform distribution of force between the breech of the firearm and the face of the primer. Areas of higher force could result in better impression development where areas of lower force may result in poor or no impression development. Orientation of the anvil or imperfections from the manufacturing process in the primer could play a role in which portions of the breech face are subjected to the areas of high or low pressures. These differences could create variation in the development of impressions between cartridges fired from the same firearm.

A second variable affecting the generation of impressions on a primer face is the pressure developed during firing. Variance in this pressure between cartridges can result in a difference in force with which the primer is pressed against the breech. Cartridges which undergo higher pressures would be expected to develop more prominent impression whereas lower pressure cartridges would generate less prominent impressions. Variation in these pressures between two fired cartridge casings fired from the same firearm may result in differences in impression development between them leading an examiner to believe they were fired from two separate firearms.

The results of a previous research project showed that cartridges generating similar chamber pressures gave higher IBIS correlation scores whereas cartridges with larger differences in their generated pressure showed lower IBIS correlation scores.

The primary objective of this research project is to further investigate the role pressure differences play on impression development as well as develop a finite element model to simulate the pressure generation and distribution across a primer face. Models will also be created to simulate the generation of breech face and firing pin impressions during firing and experimental data will be collected to determine their accuracy. This will allow for the determination of whether or not the pressure distribution and magnitude on a primer face affects the development of breech face markings and if certain areas of the primer face are more susceptible to variation than others.

Biography: James Hamilton received a BS, MS and is currently pursuing a PhD in Forensic and Investigative Science at West Virginia University. His research interests focus primarily on the development of breech face and firing pin impression evidence and the variables that affect them.

Email: jhamil12@mix.wvu.edu
The Study of the Persistence of Firearm Propellant Residues around Bullet Entry Holes after Being Subjected to Influencing Factors

Angus Newton – Auckland Laboratory of ESR, New Zealand

Abstract: Firearms examiners are frequently asked to provide an estimate on the distance between the muzzle of the firearm suspected to have been used and the target surface, at the time the shot was fired. To achieve this, the firearm residue pattern around the bullet entry hole is examined and compared with examples prepared at various distances using the same firearm and ammunition combination. Difficulties in providing estimates can occur when circumstances have meant changes to the residue pattern might have happened between the time of the shot being fired and the laboratory examination taking place. Changes in the residue pattern might be expected to occur if the victim has moved or bled significantly after the incident, or if the victim has died outside and significant rainfall has occurred before investigators can protect the scene environment. Uncertainties exist around the amount of change that might be expected and there is currently minimal research to provide information to support the examiner’s interpretation. This talk will present the results of a recently completed research project that aimed to fill the knowledge gap around the persistence of propellant particles on different surfaces after being subjected to different influencing factors. Two different commonly encountered calibers were chosen (.22LR and 9mm Luger) and fired from pistols to provide caseworkers with research examples from which to draw upon. Different propellant types within each caliber were also selected to study the influence of different morphologies on the persistence. Potentially influencing factors such as movement, bleeding and precipitation were studied in the research.

Blood and its subsequent removal had the greatest effect on particle loss, while rain had a lesser effect. During the movement experiment, a higher degree of loss was associated with increased time and speed. Results indicate that reliable distance estimates shouldn’t be affected if rain or movement has occurred, but care should be taken if blood was present on a garment and has been removed for visualization of the gunshot residues.

Biography: Angus Newton has been working in forensics for 21 years which includes 10 years as a trained firearms and toolmark examiner with the Auckland laboratory of ESR in New Zealand. He has previously published research findings in many scientific journals including the AFTE Journal. His one and only previous AFTE training symposium attendance was in 2010 at Henderson, Nevada.

Additional Research Contributor: Heather McClelland

Email: Angus.Newton@esr.cri.nz
The Effect of Primer Hardness on IBIS correlation Scores
Eric Law - West Virginia University

Abstract: When a suspect firearm is test fired to collect cartridge cases for comparison to a questioned cartridge case recovered at a crime scene, ammunition similar to that of the crime scene cartridge case is typically chosen. The ammunition selection is important because different brands utilize different primers, and the hardness of these primers may affect the reproduction of breech face and firing pin marks. Selection of the same ammunition, and therefore a similar primer hardness, should lead to consistent mark reproduction between the test fires and crime scene cartridge case(s). The degree of effect between same and different primer comparisons has not been studied before in terms of IBIS correlation scores.

A Ruger SR9 in 9 mm Luger was used for all test fires for this study. Twenty-five cartridges were hand loaded with each of four primer brands for a total of 100 cartridges. The primer brands selected were Federal, Remington, TulAmmo, and Sellier & Bellot. Each cartridge was fired and the cartridge cases were collected. The cartridge cases were all entered into an IBIS Heritage System and cross-correlated. The data from IBIS were extracted into Microsoft Excel spreadsheets for data analysis. Primer hardness was measured for each primer brand. Five unfired primers from each brand were soaked in water for 24 hours to deactivate them. After drying, the anvils and explosive materials were removed. The primers were then placed on a stand and a Lee Hardness Test Kit was used to create an indentation on the surface of each unfired primer. The primers were then imaged under a stereomicroscope, and the indentation diameters were measured in ImageJ. From this measurement the mean Brinell Hardness for each primer brand was calculated. Federal primers were found to be the softest primer of the four tested, while those of Sellier & Bellot were the hardest.

Plots were created based on IBIS correlation scores to evaluate the separation between known match and known non-match cartridge cases for same primer and different primer comparisons. Better separation and higher IBIS scores were observed in all same primer comparisons. In different primer comparisons, there were instances where good separation was seen for firing pin scores but not breech face scores. This study confirms, although based on a small sample size and four primer brands, that when known, firearm examiners should continue to use ammunition for test firing that is the same as that of the crime scene cartridge case to obtain the best separation of match and non-match cartridge cases. In database searching, if a previously entered cartridge case contains a hard primer and the current cartridge case in question contains a soft primer, the effect of this hardness difference on the correlation score needs to be considered.

Biography: Eric Law received a BS, MS, and is currently pursuing a PhD in the Department of Forensic and Investigative Science at West Virginia University. His research interests focus primarily on firearm evidence interpretation.

Email: elaw2@mix.wvu.edu
A Penny for Your Thoughts: Jennings Firearm Strategically Operated with a Penny
Shaun Jaikissoon – New York Police Department

Abstract: In the absence of the right-side grip plate, electrical tape was used to secure a penny in place over the cam and trigger bar of the Jennings J-22 pistol. The penny secured by the tape provides the lateral pressure needed to maintain engagement of the cam and the trigger bar. This remedy allows for the successful discharge of a cartridge.

Although, received in a condition which is considered “not as designed,” this arrangement of the penny and the electrical tape resulted in this Jennings, Model J-22 to be deemed operable as received. It should be noted that other combinations of various objects could be substituted for this type of arrangement as long as they apply sufficient pressure on the cam and trigger bar assembly.

Biography: Shaun Jaikissoon, from Queens New York, is a graduate of John Jay College of Criminal Justice, with an a Bachelor’s of Science in Criminal Justice. Shaun joined the NYPD in 2002 where he became a sworn Police Officer. During his time as a Police Officer, Shaun fought crime and prevented terrorism in NYC. In 2008, Shaun was assigned to the NYPD’s Forensic Investigations Division - Police Laboratory, an ANAB accredited testing laboratory. As a Detective in the laboratory’s Firearms Analysis Section, he serves as an examiner and trainer.

Email: Shaun.Jaikissoon@nypd.org

Fracture Examination Research and Generalization of Examinations
John R. Vanderkolk - Indiana State Police

Abstract: Fracture examination is common among many disciplines in forensic comparative science. Adding a quantitative measuring technique for supporting a conclusion should benefit forensic comparative science, especially as challenges are being made by critics. The many forensic comparative science disciplines share many aspects within the examination process. These commonalities should be considered as quantitative techniques are being developed to support a conclusion, no matter the conclusion and no matter the specific discipline or examination within that discipline.

Explanations will be given as to how many forensic comparative science disciplines can be conducted while using a common set of terms, examination process, and conclusions. The research performed by studying and measuring fractured metal edges (knives) over the past few years at Iowa State University will be presented. This research used a traditional forensic comparative examination process in conjunction with spectral analyses of 3-dimension fractured surface topography measurements to determine whether the measurements could support fractured surface pair conclusions.

The resulting forensic comparative examinations and the spectral analyses of fractured knife base and tip measurements and calculations correctly discriminated among known ground truth fractured knife base/tip pairs and non-pairs. Microscopic measurements and analyses can be used to support traditional conclusions in fracture examination and should be considered for a wide variety of forensic comparative science discipline conclusions.

This research was supported by the National Institute of Justice award No. 2015-DN-BX-K056.

Biography: Mr. Vanderkolk is the Laboratory Manager at the Indiana State Police (ISP) Laboratory, Fort Wayne. He was trained in latent print, shoe and tire print, firearm and tool mark, and fracture examinations. He is a member of the Organization of Scientific Areas Committee - Physics/Patterns SAC, the editorial board of the Journal of Forensic Identification, a distinguished and life member of the International Association for Identification (IAI), was a member of the Scientific Working Group for Friction Ridge Analysis, Study, and Technology (SWGFAST), the NIST/NIJ sponsored Expert Working Group on Human Factors in Latent Print Analysis, and the IAI’s Standardization II Committee.

Additional Research Contributors: Dr. Ashraf Bastawros, Dr. Barbara Lograsso, Dr. Ranjan Maitra – Iowa State University

Email: vanderkolkjohn@yahoo.com
Objective Comparison of Striated Toolmarks from Ten Consecutively Manufactured Cold Chisels

Robert M. Thompson – National Institute of Standards and Technology

Abstract: In the forensic science specialty of toolmark identification (which includes firearm identification), “toolmarks” are the result of a harder surface acting upon a softer surface, usually but not exclusively metal alloys. The method for toolmark comparison relies on an objective side-by-side evaluation of the agreement by comparison microscopy. However, the opinion of “sufficient agreement” for conclusion to identify of tool source is subjective in nature, relying on the education, training, and experience of the examiner.

The first extensive study focusing on quantifying matching patterns of toolmark stria was performed by Biasotti in 1959 [1]. His work demonstrated that consecutive matching stria groups were diagnostic for a quantitative measurement of similarity when two striated toolmarks are microscopically compared, now termed Quantitative Consecutive Matching Stria (QCMS). Known matching (KM) and known non-matching (KNM) rifling land impressions on fired bullets were compared and the consecutive matching stria were counted. In non-matching comparisons, small QCMS numbers were observed, demonstrating the quantity of agreement observed by chance, understanding that agreement sufficient for identification must exceed that quantity. The minimum number of QCMS that was necessary for an accurate conclusion of firearm source was empirically determined. The QCMS method is still currently used by many examiners to quantify the agreement in striated toolmark comparisons [2-7].

Optical 3D systems are emerging as objective methods in forensic toolmark measurement and comparisons. These adapted instruments are useful due to the increasing computational power of modern computers and control systems tasked to handle High Definition 3D data [8-17].

This is the first scientific investigation to employ consecutively manufactured tools (chisels) to produce striated toolmarks whose contour profiles were measured by; 1) contact stylus profilometry; 2) non-contact 3D optical profilometry employing focus variation instrumentation; and 3) the QCMS method. Striated toolmarks were made pairwise in a controlled manner from 10 consecutively manufactured cold chisel blades. Comparison tests between toolmarks made in this manner have the best potential for producing microscopic agreement between two or more different tool sources, resulting in false positive identification. The striated toolmark profiles were measured using contact stylus 2D profilometry and non-contact optical 3D profilometry. Profile similarity and differences of known matching (KM) and known non-matching (KNM) toolmarks were compared using two mathematical methods; “Cross-Correlation Function Maximum” (CCFMAX) and the recently developed “Congruent Matching Profile Segments” (CMPS).

Both 2D and 3D acquired profile comparisons show a wide separation between KM and KNM CCF score distributions when the full-length profile comparisons were made. Similarly, large separations of KM and KNM score distributions were also the result of segmented profile comparisons performed by CMPS. Replicas of the KM and KNM chisel toolmarks were also compared using comparison microscopy, and the similarity and differences were measured by the QCMS method. Results of these comparisons also demonstrate a wide separation of distributions between the QCMS “runs” in KM and KNM toolmark comparisons, and no KNM comparisons exceeded three consecutive matching stria. The score distributions were also examined in a subjective statistical manner for their theoretical estimations of matching probability and demonstrate an exceedingly rare probability of sufficient agreement that would result in false positive identifications.

The results support the use of quantitative methods of profile comparisons for the discrimination of matching and non-matching striated toolmarks. Both contact and non-contact methods of profilometry are useful in later mathematical comparison and score methods. However, in actual casework, the non-contact methods would be more acceptable because the contact stylus method may introduce stylus marks onto the evidence toolmarks, and therefore change the original evidence features. Additionally, the full profile comparison method in the CCFMAX method is not as applicable to casework because the vast majority of striated toolmarks on evidence items or collected at crime scenes exhibit partial toolmarks from the full tool-working surface. The CMPS method shows the best promise for an objective comparison method and is better designed to compare much smaller profile segments of the striated toolmark profile to typically larger reference profiles. The evaluation of the toolmark peak frequency could also be employed to select optimum profile segment widths for the toolmarks to be compared.

Biography: Robert M. Thompson is a Senior Forensic Science Research Manager with the Special Programs Office-Forensic Sciences at the National Institute for Standards and Technology (NIST) for 9 years. He has over 38 years of experience as a Forensic Scientist and Criminalist. He is certified in Criminalistics by the American Board of Criminalistics (ABC) and is a past Chair and current member of the AFTE Certification Program Committee. Prior to joining NIST, Mr. Thompson was a Senior Firearms and Toolmark Examiner for the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Forensic Science Laboratories, and a Forensic Scientist and Criminalist in crime laboratories with the Washoe County Sheriff’s Department (Reno, Nevada), Oregon State Police, and the Genelex Corporation (Seattle, Washington).

Email: robert.m.thompson@nist.gov
An Evaluation of Test Materials for Knife Marks on Cartilage

Renee Hudson and Brian Smelser – Washington State Patrol Crime Laboratory

Abstract: Cartilage, the flexible connective tissue matrix located in the nose, ears, in-between joints, and at the ends of ribs, is a common substrate for tool marks in cases involving stab wounds. For the author, it is common practice to travel to the medical examiner’s office to cast tool marks in cartilage. Once casts from the evidence tool marks have been obtained it is then necessary to create test marks using the suspected tool(s). There are many types of test media available and this project evaluates the potential of four types of test media to be used as a test material for comparisons of knife marks on cartilage.

Four knives with different class characteristics were used to create stab wounds into test media. The knives included a Kershaw brand single edged knife (hand sharpened), a Browning brand single edged knife (factory sharpened), a Kershaw brand double edged dagger (hand sharpened) and a Farberware single edged fully serrated knife. The following test materials were evaluated: clear vinyl tubing, dip-pak, and tire wall rubber. These knives were also used to make marks in pork cartilage.

Each knife was stabbed into the respective test materials to create the tool marks. After creating all of the tests, the tool marks were then cast using ForensicSil. After curing, the casts from each test material were microscopically compared to the casts from the pork cartilage.

Each testing material had reproducible fine striated detail for comparisons. The vinyl tubing, dip-pak and tire wall rubber all exhibited more striated marks than the pork cartilage.

There are many options when it comes to test material for replicating knife marks on cartilage. Each test media has its own advantages and disadvantages.

Biography: Renee Hudson is a firearm/tool mark examiner for the Washington State Patrol Crime Laboratory. She has her Bachelors of Science in Chemistry and is a Provisional AFTE member.

Brian Smelser is a Distinguished member of AFTE. He has worked for the Washington State Patrol Crime Laboratory in DNA, Crime Scene, and Firearms.

Email: Renee.Hudson@wsp.wa.gov
The SAAMI/ANSI Firearm Drop Test Mat, Process, Protocol and Procurement
Randy Bimson - Sporting Arms and Ammunition Manufacturers’ Institute

Abstract: The SAAMI Drop Test Mat is the major equipment component of the Firearm Drop Test as defined by the ANSI/SAAMI standard Z299.5-2016, Section 5. The ANSI/SAAMI Z299.5 Section 5 Drop Test is the model on which many other recognized drop test protocols are based upon including the National Institute of Justice Standard 0112.03, Section 5.7. Many forensic laboratories refer to Z299.5-2016, Section 5 when required to adjudicate the function of a firearm in question.

Effective January 2018 SAAMI has engaged a new vendor/supplier of the required mat material, establishing new ordering processes and product order codes.

This presentation will familiarize and provide AFTE members a working understanding of the SAAMI organization; the firearm drop test as defined under the ANSI/SAAMI standard Z299.5-2016; the periodic performance conformance testing protocol; and the order process for procuring drop test mats.

This Voluntary Industry Performance Standard provides the firearm designer and manufacturer with recommendations for test procedures to evaluate new designs of rifles, shotguns and handguns as they are defined by the Federal Gun Control Act of 1968. The test parameters simulate certain conditions where the firearm is subjected to abusive mishandling to demonstrate the ability of the firearm to withstand this abuse without discharging.

This Standard does not apply to muzzle loading and black powder firearms of any type. The requirements of this Standard are not appropriate for firearms primarily intended for formal target shooting, and therefore this Standard does not apply to firearms whose trigger pull is designed to be less than three pounds (1.36 kg).

Biography: Randy G. Bimson, Director of Technical Affairs, Sporting Arms and Ammunition Manufacturers’ Institute (SAAMI)

Email: rbimson@saami.org
Consecutive Manufactured/Sub-Class Firearm Exercise

This inclusive kit includes a multitude of consecutive manufactured bullets and cartridge cases for research, proficiency, competency, or training purposes. The fired bullets and cartridge cases are delivered separated and labeled (based on the manufacturer and position in the manufacturing sequence), but the individual bullets and cartridge cases are not marked. The trainer/QA can mark the samples with random identifiers for testing purposes. Also included are 10 consecutively manufactured bunters, barrel casts, and breechface casts.

Machining for the Firearm Examiner

Precision Forensic has developed a training set designed to provide firearm examiners with a strong foundation in the understanding of the machining process associated with firearm and tool manufacturing.

The set includes a CD with a detailed PowerPoint presentation which includes descriptive notes for each slide elaborating on the machining process. The consecutively machined samples demonstrate the types of marks from the various processes and associated potential for subclass.

Forensic Firearm Examiner Training Module

This module consists of 35 samples and 17 exercises designed to encourage firearm examiners to think outside the box with challenging samples. All of the scenarios have been derived from actual casework and are designed to broaden the introspect of analysis. This module goes further than a simple proficiency test in that there is a greater challenge and expectation of research on the part of the examiner to document their results.

Barrel Modification Set

This set includes actual shotgun barrels modified in the most common methods used in shortening barrels encountered in crime laboratory. The cutting methods include: hacksaw, band saw, lathe, abrasive wheel, and pipe cutter. Also included with the sample set is a pamphlet with detailed description of the cutting method and photos of the modifications. Common features observed in the modification of gun barrels will help examiners in providing detailed documentation which is essential in case notes.
## Schedule of Events

### Friday, June 8

### Registration
7 am – 5 pm  
Civic Center (Quarrier St. Lobby)

### Workshops (pages 87 – 90)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
</table>
| 8:00 am – 5:00 pm | **Bullets Through Glass**  
WVSP Range *(Meet in Marriott’s Hawk’s Nest at 7:30 am)* |
| 8:00 am – 5:00 pm | **ANAB ISO/IEC 17025:2005 Forensic Science Testing Accreditation**  
Requirements as it applies to Firearms Identification  
Civic Center Parlor D |
| 8:00 am – 5:00 pm | **Benelli Nova Shotgun Armorer Course**  
Civic Center Parlor A |
| 8:00 am – 10:00 am | **Forensic Double Casting**  
Marriott Blue Ridge |
| 8:00 am – 12:00 pm | **Ammunition & The Firearms Examiner**  
Marriott Allegheny |
| 8:00 am – 12:00 pm | **Serial Number Restoration and Barcode Deciphering**  
Marriott Appalachian / Cumberland |
| 8:00 am – 12:00 pm | **Ammunition Identification**  
Civic Center Parlor C |
| 8:00 am – 10:00 pm | **Douglas Barrels Manufacturing Tour**  
Tour *(Meet in Marriott Hawk’s Nest at 7:30 am and 9:15 am)* |
| 9:00 am – 5:00 pm | **Warwood Tool Company Manufacturing Tour**  
Tour *(Meet in Marriott Hawk’s Nest at 8:30 am)* |
| 8:00 am – 12:00 pm 1:00 pm – 5:00 pm | **Class Characteristics of Toolmarks in Bone and Cartilage**  
Marriott Kanawha |
The First 48: How the HFSC Achieved a 48 Hour Turnaround Time on NIBIN Fired Evidence
Kimberly Zeller, Houston Forensic Science Center, KZeller@houstonforensicscience.org
This poster addresses challenges, successes, organization, and lessons learned during the process of developing the work flow time line.

The President John F. Kennedy Assassination Ballistic Artifacts – Interactive
Thomas Renegar, NIST, Thomas.renegar@nist.gov
The National Archives and Records Administration requested characterization of the surface topography of the artifacts by NIST. Measured images were combined into complete 3D models of the bullet artifacts. Attendees will be able to view and manipulate 3D models. Details will be presented in the technical session prior to the poster session.

The Affect a Silencer Has on Muzzle-to-Target Range Determination
Robert Johnson, student, Johnson.ra15@gmail.com
This research shows the effect a silencer has on a 9mm Glock model 17. Results show that it may be possible to determine a muzzle-to-target range for crimes committed using a firearm with an attached silencer even if no silencer is recovered. This is possible if only the diameter and vaporous lead deposits are used.

3D Printed Firearm Comparison
Mohammad AlShamsi, Dubai Police, Malshami2323@hotmail.com
3D printed firearm comparison as well as the factors that might affect the examination and firearm control in this field. The Liberator design was printed using ABS plastic, a screw was used as the firing pin. Fired cartridge cases were recovered and compared.

Split Second Decision – Is It Real or Is It Fake?
Andrew Winter, Middlesex County Prosecutor’s Office, Andrew.winter@co.middlesex.nj.us
Blank guns can appear remarkably realistic. In this research project, we examined two blank firing guns and two authentic firearms using a sound meter and high speed photography. Their similarity was assessed both superficially and when being fired.

Assessing the Potential for Secondary Transfer of Gunshot Residue to Bystanders
Peter Diaczuk, Penn State University, pud65@psu.edu
This study explores realistic situations in which primer residues may be transferred from objects near the discharge of a firearm to bystanders (secondary transfer). Four mock indoor shooting scenarios were designed such that a firearm was discharged near one of four different surfaces. A “bystander” then had casual contact with the surfaces, was sampled for primer residue and the sample stubs were analyzed with SEM-EDS for the presence of lead / barium / antimony.

A Study Regarding Land and Groove Impression Measurements
Blake Reta, West Virginia State Police Forensic Laboratory, Blake.n.reta@wvsp.gov
The problem of the wide range of variances or uncertainty of measurement used when entering land and groove impression measurement data into GRC file is addressed. Discussion of multiple methods used by agencies and their successes at producing the correct make and model. A statistical approach was utilized in an attempt to determine an acceptable uncertainty of measurement.

“Auto-Fire” Cobray PM-11
Kristina Cheung, Prince George’s County Police Dept., kmcheung@co.pg.md.us
A case was submitted with a Cobray PM-11 pistol that wouldn’t function at first due to debris. The firearm was missing a few non-essential parts and had several alterations. The definition of full auto doesn’t quite fit this firearm since the trigger didn’t need to be pulled due to slam firing.
**Poster Abstracts**

**Posters will be on display the remainder of the week**

**Anatomy of a “Ghost Gun”**
Scott McVeigh and Jaimie Smith, Prince George’s County Police Dept., scmcveigh@co.pg.md.us

The goal of this poster was to construct a functional and reliable “ghost gun” of Glock 19 (Gen 3) format/design spending the least amount of money possible on the 3 most expensive parts. Assembly of selected parts posed no significant difficulties to researchers. The pistol was successfully fired and found to be reliable.

**Subclass Characteristics in Springfield Armory XDS-45 Semi-Automatic Pistols**
Dawn LaPorte, Harris County Institute of Forensic Sciences, Dawn.laporte@ifs.hctx.net

Subclass characteristics were observed on a Springfield Armory XDS-45 pistol as well as fired evidence later determined to be from an XDS-45. Examination of many test fired cartridge cases indicates that although not a common occurrence, the manufacturing process of XDS-45 models has potential for subclass markings.

**Practical Cartridge Case Pattern Analysis Using UAV Imaging**
Adam Hartley, independent Examiner, adamjhartley@gmail.com

By using orthogonal imaging from a UAV (drone) several aspects of cartridge case pattern analysis can easily be recorded, analyzed and presented. Images and video were taken of a test, crime scene, and placed trajectory rods then overlaid. Accurate scene and experiment documentation photos and video can be used for easier and more accurate shooter placement.

**Las Vegas Oct. 1 Mass Shooting Event – SWAT Sniper Ammo Testing**
Roy Wilcox, Las Vegas Metropolitan Police Dept., J15651W@lvmpd.com

After the Mandalay Bay shooting event the police department decided it should consider which ammunition and rifle combinations would result in the least likely collateral damage scenarios to guests housed in neighboring rooms. Different bullet sizes within 223 Remington and 308 Winchester calibers were fired from AR-15 and AR-10 platforms. Bullet impact, penetration and terminal ballistic integrity were compared.

**Kinetic Energy Variability Due to Airgun Pellet Selection**
Natalie Gardiner, Eurofins Forensic Services, natalie.gardiner@lgcgroup.com

Many different brands, designs and shapes of pellets were selected and test fired in 1 air rifle. Study showed the amount and variability in kinetic energy produced from the same airgun by simply changing the ammunition.

**Adapting the Chumbley Score to Matching Bullet Striation Marks**
Ganesh Krishnan, CSAFE Student, ganeshk@iastate.edu

This investigation aims to identify the error rates for matching of bullet striations, especially how different parameters of the algorithm affect error rates. We conducted same source matching of bullet land using the adjusted Chumbley Method of scans provided by NIST. Using the adjusted chumbley method we concluded the error rates are higher for bullets than for screwdriver toolmarks, for which the method was first developed.

**Methods for Automatic Groove Identification in 3D Bullet Land Scans**
Keigan Rice, CSAFE student, ricek@iastate.edu

An automated method based on fitting a robust linear model to the curve of a bullet land was used to identify groove locations. These automatically identified locations were compared to manually identified locations in order to assess the accuracy. The use of robust linear models appears to be a step in the right direction to reduce some of the most problematic misidentifications that occur using current methods.
Workshops

Sunday, June 3, 2018

Recognizing 80% Lowers (Pistol & Rifle Platforms) in Casework

Instructors: Jaime Smith, Max Kingery, Edward Gesser, William Swift - Prince George's County Police/FEU/ATF
Course Cost: $100
Time: 8:00 am – 5:00 pm
Location: Civic Center Parlor D / WVSP Range

This workshop will provide information on the 80% lower receivers for both pistols and rifle platforms. It will include legal information/ramifications, recognizing an 80% lower in casework, available manufacturers, different methods of manufacture, advantages/disadvantages to different methods of manufacture, the process of converting an 80% lower to a fully functioning firearm, equipment necessary to achieve a functioning firearm, a cost comparison to purchasing a functioning firearm, and potential reasons to purchase this type of firearm. During the workshop, examples of the receivers at different stages throughout the manufacturing process will be available, as well as videos explaining how it was done. Finally, there will be a practical hands-on assembly and test firing the assembled firearms at a range.

**Law Enforcement or Government Employees Only. Students must bring hearing and eye protection.


Instructors: Xiaoyu Zheng, Thomas B. Renegar, Michael Stocker, Johannes Soons, Nicholas Petraco, Ryan Lilien, and Erich Smith
Course Cost: $55
Time: 8:00 am – 5:00 pm
Location: Civic Center Parlor A

This full day workshop provides foundational knowledge and real world applications of emerging research, tools and automated technologies for firearm and toolmark analysis. National Institute of Standards and Technology (NIST) will provide an overview of the direction and methodologies currently being employed in FA/TM research as well as future roles in which the technology can be utilized. A case study will be presented on how the FBI Laboratory Firearms/Toolmarks Unit (FTU) has been evaluating 3D technologies, validation, incorporation into casework, and mapping out challenges that laboratories could face with implementation. Attendees will also have an opportunity to participate in several CTS style tests using virtual comparison microscopy to learn about its utility in every day casework. Topics Include:

- Intro and Technology Landscape
- 3D Measurement Principles
- Measurement Quality
- Computer-aided Firearm and Toolmark Identification
- Statistical Framework
- Virtual Microscopy (VM)
- FBI FTU Validation and Implementation of VM into Casework
Distance Determination: An Overview

Instructors: Adam Grooms, Erica Lawton - Alabama Department of Forensic Sciences  
Course Cost: $100  
Time: 8:00 am – 5:00 pm (Meet at 7:30 am in Marriott Hawk’s Nest)  
Location: WVSP Forensic Lab

This workshop is designed to give the student an overview of different aspects related to the examination process in distance determination cases. Utilizing a combination of lecture, case examples, and practical exercises, participants will be exposed to the visual, chemical, and instrumental methods that are used during the examination process. Topics covered will include: history, proper case notes, visual and chemical analysis, incorporation of instrumental processes, conclusions and results, unique situations, uncertainty of measurement, and courtroom testimony. **Lunch will be provided to students.

Metallurgy for the Non-Metallurgist for Firearm and Ammunition Producers and Users

Instructors: Dana J. Medlin, Ph.D., P.E. / Frederick E. Schmidt, Ph.D., P.E.  
Course Cost: $75  
Time: 8:00 am – 5:00 pm  
Location: Marriott Blue Ridge

This course will cover the general aspects of metallurgy with specific application to firearms and ammunitions. Some of the general topics that will be covered include:

- A brief history of metals from the first development of metals for use as weapons thousands of years ago to the modern era will be given.
- A basic explanation of the distinctive physical and mechanical properties that make metals exceptional materials for firearm and ammunition applications.
- A comprehensive review of the national and international alloy designation systems used to identify metals.
- A general overview of basic physical metallurgy theory and applying these theories to appropriate alloy manufacturing and heat treatment methods.
- Explain how metals are formed into engineering components with specific reference to firearms and ammunitions.
- Heat treatment terminology, methods and best practices for firearm components.
- A basic overview of physical and mechanical test methods to determine critical properties of metals, as well as a discussion concerning typical standard test methods.
- Explain the basis for the selection process of different alloys for specific applications.

Machining for the Firearm Examiner

Instructors: Chris Monturo – Miami Valley Regional Crime Lab  
Course Cost: $75  
Time: 8:00 am – 12:00 pm  
Location: Marriott Salon C

This workshop is designed to provide students with detailed information and examples of the various machining processes used to manufacture firearm components. An emphasis on the effect of the cutting tool interaction with the work piece will be defined and demonstrated. In addition to discussion of the individual characteristics produced by the machining process, the potential for subclass will be explored along with examples. **Take home machining samples will be distributed to students for further examination.
Accutrans: Lifting Techniques From Difficult Surfaces & Toolmarks

Instructors: JoAnn DiPrete – Accutrans USA
Course Cost: $45
Time: 8:00 am – 12:00 pm
Location: Civic Center Parlor C

AccuTrans Casting Material has been specially developed for forensic applications. The high tear-resistance and the ideal recovery after deformation of over 99.8% are the keys to a precise impression result. AccuTrans is so precise it can capture the ink depth of a dollar bill, making it a logical choice for forensic investigators. This class is encouraged for crime scene investigators processing scenes as well as forensic analysts processing items in the laboratory.

** Students will have the opportunity to cast 5 consecutively manufactured barrels to take home for further analysis.

Slide Fire Familiarization

Instructors: Joseph M. Young, Edward Gesser – Prince George’s County Police
Course Cost: $65
Time: 1:00 pm – 5:00 pm (Meet at 12:30 pm in Marriott Hawk’s Nest)
Location: WVSP Range

In light of recent events, this familiarization course is being offered to afford FA/TM examiners the chance to become acquainted with the Slide Fire system to include function, installation, operation (live fire) and comparison to fully automatic assault rifles.

** Students are encouraged to bring eye and hearing protection.

Matchpoint Tips & Tricks for IBIS-TRAX HD3D

Instructors: Andrew Boyle – Ultra Electronics Forensic Techniques
Course Cost: $35
Time: 1:00 pm – 4:00 pm
Location: Civic Center Parlor C

The following workshop will go over the vast variety of tools and options available within your Matchpoint HD3D workstation with a special emphasis on real-world workflows for screening cartridge case and bullet images effectively.
Hi-Point Firearms Armorer Course

Instructors: Brian Smelser – Washington State Patrol, Chris Monturo – Miami Valey Regional Crime Lab
Course Cost: $55
Time: 1:00 pm – 5:00 pm
Location: Marriott Kanawha

This course will discuss the Hi-Point product line as well as assembly/disassembly, serial number system, and the manufacturing processes utilized by the company. There will be a hands-on portion of the course using actual Hi-Point firearms.

** US Citizens ONLY.

Courtroom Testimony: A Practical Approach From A Firearm Examiner and Prosecutor's Point of View

Instructors: Jeff Goudeau – Louisiana State Police Crime Lab, Jonathon Church – Prince George’s County State’s Attorney’s Office
Course Cost: $45
Time: 1:00 pm – 5:00 pm
Location: Civic Center Parlor B

One of the most challenging things for an examiner, and one area where often on-the-job training is the only training, is courtroom testimony. This half day workshop will focus on assisting examiners with improving their communication and testimonial skills. This interactive workshop will make use of specific cases with a critical examination of how questions were answered during testimony and ways in which examiners can improve upon these answers and explanations. The workshop will also focus on ways an examiner can testify in a way that is believable and understandable to a jury or a judge. Communication skills and testimony tips will be given in order to better prepare a firearm examiner to be successful in court.

Subclass Characteristics

Instructors: Nancy McCombs – California DOJ Fresno
Course Cost: $45
Time: 1:00 pm – 5:00 pm
Location: Marriott Salon C

This workshop will introduce students to methods of recognizing potential subclass characteristics. A wide variety of firearm and tool mark manufacturing processes will be evaluated for subclass carry-over potential. Participants will discuss lab practices with an emphasis in documenting potential subclass characteristics in casework.

Understanding the Math of Bullet Path Analysis

Instructors: Matthew Noedel – Nodel Scientific
Course Cost: $65
Time: 1:00 pm – 5:00 pm
Location: Marriott Appalachian / Cumberland

This 1/2 day workshop will focus on the use of trigonometric formulas to document and solve horizontal and vertical aspects of bullet path analysis. In some circumstances, use of traditional trajectory rods, lasers or other techniques to determine bullet paths may not be feasible. Using the location and position of primary and secondary impact points (measured by hand or other techniques), students will learn how to apply the formulas to solve the appropriate angles and then use these values in scene reconstruction. A lecture followed by practical hands on examination of simulated bullet paths will be used to teach these principles. Students are encouraged to bring a 16' tape measure, scientific calculator, cameras and note taking material.

** Students should bring scientific calculator (or phone app), camera, and note taking material.
Quantofix Nitrite Workshop

Instructors: Evan Thompson, Jill Kurzenberger
Course Cost: $45
Time: 1:00 pm – 4:00 pm
Location: Civic Center Parlor D

This course will discuss the Hi-Point product line as well as assembly/disassembly, serial number system. Several problems exist with the currently employed Modified Griess Test:

• The limited availability of glossy photographic paper
• The ever-changing chemistry of the emulsion layer on inkjet photo paper
• The preparation time required to treat the paper(s)
• The exposure to the chemicals necessary to prepare the paper(s)

A solution to each of these points has been successfully tested for detecting the presence of nitrites: a new pre-treated, ready-to-use paper called QUANTOFIX® Nitrite Sheets. QUANTOFIX® Nitrite sheets will be utilized by attendees to test to the presence of nitrites, produced by gun fire, on white cotton twill cloth, denim cloth, printed cloth, sheet metal (car), painted drywall (inside structure material) and wood (siding). Additionally, attendees will be given hands on training utilizing commercially available test strips for detecting the presence of lead and copper residues on the above listed items. Attendees will need to provide their own USB flash drive.

NOTE: Students must bring a USB flash drive for downloading course material and the manufacturing processes utilized by the company. There will be a hands-on portion of the course using actual Hi-Point firearms.
Tuesday, June 5, 2018

Ruger LCP/LCP II Armorer Course

**Instructors:** Bob Wood – Ruger Firearms  
**Course Cost:** $75  
**Time:** 8:00 am – 5:00 pm  
**Location:** Civic Center Parlor B

The Ruger LCP/LCP II Armorer Course will cover all armorer aspects of the Ruger LCP including: familiarization, nomenclature, disassembly, reassembly, function, troubleshooting and inspection. While previous armorer experience is not necessary, it is helpful.

**US Citizens ONLY. Students must bring safety glasses and a flashlight.

Glock Gen 5 Pistol Armorer Course

**Instructors:** Ben Rios – Glock Firearms  
**Course Cost:** $150  
**Time:** 8:00 am – 5:00 pm  
**Location:** Civic Center Parlor C

This one day course (8 hours) will cover the maintenance and service of the Gen 5 pistol and previous Generations. Upon successful completion and payment of the course, each student will receive a 3 year Certified Armorer Certification.

**U.S. Citizens ONLY. Students must bring safety glasses.

Has Anyone Seen My Paradigm Shift?: Witness Testimony For The Next ??? Years

**Instructors:** Ron Smith - President of Ron Smith and Associates, Inc.  
**Course Cost:** $45  
**Time:** 8:00 am – 12:00 pm  
**Location:** Civic Center Parlor D

We used to ask "Who Moved My Cheese?"; now it is more scientifically called a "Paradigm Shift". The problem for operational forensic laboratories is when it comes to providing testimony in courts of law, we don't even know if we are supposed to be "experts", "technicians" or some new title none of us have even heard yet. The courts have been encouraged not to use the term "expert" since it seems to be showing too much favoritism and in this ever changing environment lab directors are supposed to somehow know how to teach their staff on who to be and what to say. Not only are we confused as to our identity on the witness stand but also how much we can, or should, say in support of our own conclusions. Say too much and you get criticized. Say too little and the jury doesn't fully understand the probative value of your examinations. This four hour (very interactive) workshop will address these issues and many more regarding the current status of providing solid forensic testimony in courts of law and how we can keep our staff up to speed in today's rapidly changing courtroom environment.
**LWRCI: AR Platform Function Overview & Manufacturing Overview**

**Instructors:** Joseph Martin, Joe Devens - LWRCI  
**Course Cost:** $65  
**Time:** 1:00 pm – 4:00 pm  
**Location:** Civic Center Parlor D

Located in Maryland, LWRCI, a manufacturer of high-end AR-platform rifles of both short-stroke piston design as well as direct impingement design, will bring hi-definition video footage from inside their facilities to showcase all of their machining processes, which includes hammer forged barrels that are made in-house. LWRCI is bringing the manufacturer tour directly to you, but from the comforts of your viewing chair. This workshop will also include an abbreviated AR-platform armorer’s course using specially created cutaway rifles. An open Q&A session with one of the company’s design engineers and an LE sales/service representative will round out the workshop.

**U.S. Citizens ONLY.**

**The Use of Metal Detectors for the Recovery of Metallic Evidence: Your Evidence is Only a Beep Away**

**Instructors:** King C. Brown, Dawn Watkins, Jan Johnson - Forensic Pieces  
**Course Cost:** $45  
**Time:** 1:00 pm – 5:00 pm (Meet at 12:30 pm in Marriott Hawk’s Nest)  
**Location:** WVSP Range

- Have you ever tried to recover metallic evidence with a metal detector you have never really practiced with?  
- Have you ever had to testify in court about your knowledge and expertise with the use of a metal detector?  
- How does a metal detector work?  
- What types of metals does it detect?

We will give you some fantastic information on the use of a metal detector and provide you with a hands-on practice application & techniques to help you recover those difficult to find forensic pieces of evidence, such as cartridge cases and bullets. This will be a hands-on workshop. This workshop also includes gridding and mapping of your metallic evidence search. Class is for forensic professionals, law enforcement, and crime scene technicians, with skill ranges of beginner to advanced.

**Metal detectors provided. Students should bring note taking materials.**

**Springfield Armory 1911 Armorer Course**

**Instructors:** Gary J Monreal – Team One Network  
**Course Cost:** $185  
**Time:** 8:00 am – 5:00 pm  
**Location:** Civic Center Parlor A

Team One Network conducts Springfield Armory Armorer Courses on behalf of Springfield Armory. This course is structured to provide each student with a practical understanding of the advanced features that make the Springfield Armory family of firearms unique. Certifications are valid for three (3) years. Topics covered: nomenclature, operator use, cycle of functioning, field & detail stripping, care & cleaning, troubleshooting, preventive & corrective maintenance

**U.S. Citizens ONLY. Students must bring safety glasses.**
Hi-Point Firearms Manufacturer Tour

Instructors: Mike Strassel – Hi-Point Firearms
Course Cost: $120
Time: 6:00 am – 5:00 pm (Meet at 6:00 am in Marriott Hawk’s Nest)
Location: Tour

Hi-Point Firearms is a firearm manufacturer located in Mansfield, OH, and has been a friend to AFTE for many years. They specialize in making affordable and reliable pistols and carbines using polymer and zinc alloys. The tour will show the full firearm manufacturing process, including how the frame, slide, and barrel are made.

** Lunch will be provided for students. U.S. Citizens ONLY. Students must bring safety glasses. 

CZ-USA P-10 Armorer Course

Instructors: Gary J. Monreal, David Brancato - Team One Network
Course Cost: $185
Time: 8:00 am – 5:00 pm
Location: Civic Center Parlor A

Team One Network is authorized by CZ-USA to conduct certified armorers courses that will meet the needs and demands of forensic and law enforcement agencies. Upon completion of this training, participants will have a working knowledge and understanding of the CZ-USA firearm. This class is structured to provide participants with “hands-on” practical skills and theory on the cycle of function for the CZ-USA firearm(s) covered. Upon successful completion of this course, the student will be able to: describe and use proper nomenclature, explain and demonstrate operator use, explain the cycle of functioning, field & detail strip the weapon system, care for and properly clean the weapon system, troubleshoot malfunctions of the weapon system and perform preventive & corrective maintenance.

** Lunch will be provided for students. U.S. Citizens ONLY. Students must bring safety glasses.

Using Ultra-Violet & Infrared Photography for the Discovery and Documentation of Invisible Evidence

Instructors: King C. Brown - West Palm Beach Police Department
Course Cost: $55
Time: 1:00 pm – 5:00 pm
Location: Civic Center Parlor D

As technology evolves, the importance of capturing forensic evidence becomes more and more important to the case solvability. New advances in Ultra-violet and Infrared photography have brought invisible evidence to the forefront of the investigation. This workshop will delve into Ultra-violet and Infrared spectrum of photography, gunshot residue, blood stains and other types of the alternate wave length photography. Several of the latest technology cameras will be on hand for student interaction.
Trajectory of Vehicles: Rods, Strings and Lasers

Instructors: Jan Johnson - Forensic Pieces, Jeff Goudeau - Louisiana State Police
Course Cost: $100
Time: 8:00 am – 5:00 pm (Meet at 7:30 am in Marriott Hawk's Nest)
Location: WVSP Range

This workshop will introduce techniques required to analyze shooting trajectory evidence recovered in vehicles that are involved in shooting related incidents. Proper trajectory analysis of firearm related evidence recovered in vehicles is critical to analyzing every piece of the puzzle and for attempting to determine the approximate positions of victims, witnesses, and suspects, as well as the chronologic sequence of events. This workshop will provide the forensic practitioner with hands-on experience by practicing trajectory reconstruction techniques in mock crime scene vehicles containing shooting incident evidence. Workshop attendees will work to recover all the forensic pieces, formulate a reasonable shooting reconstruction solution, and solve the puzzle using a variety of trajectory analysis related equipment, such as lasers coupled with special photographic techniques, along with other apparatuses. This workshop is geared toward crime scene technicians, investigators, detectives, medical examiners and/or ME investigators, laboratory analysts, and other forensic practitioners associated with crime scene investigations.

** Lunch will be provided for students. Students should bring a camera, tripod, and note taking materials if wanting to document the exercises.

Why 2D Images Offer Expedited Lead Generation for a Comprehensive Ballistic Analysis Program

Instructors: Mark Basoa - Vigilant Solutions, James Gannalo - Stria Consulting Group
Course Cost: $35
Time: 1:00 pm – 5:00 pm
Location: Civic Center Parlor C

Presentation of a study conducted over the course of 3 months where experienced Firearm/Toolmark Examiners evaluated a 2D image capture device and associated analytical software comparing cartridge cases. Particular focus paid to the ability to immediately identify caliber, class/individual characteristics, unique firearms, and potential links to other cartridge cases. The hardware and technology were examined with the specific goal of assessing overall impact of expedited lead generation in near-real time to law enforcement agencies with either existing ballistic analysis programs or no current ballistic program.

AFTE NIBIN Users Group Round-Table Meeting

Instructors: TBD – Forensic Technology
Course Cost: $0
Time: 12:00 pm – 1:30 pm
Location: Civic Center Parlor B

Hosted by ATF and Ultra Electronics Forensic Technology, the AFTE NIBIN Users Group Round-Table Meeting is a round-table style discussion where attendees can provide feedback, ask questions, and discuss NIBIN program-related issues. There will also be brief presentations from ATF on NIBIN program updates and Forensic Technology regarding technological matters.

** Attendees must be active NIBIN Users or direct supervisors to personnel who complete IBIS acquisitions and/or correlation reviews. Lunch will be provided for attendees.
Redefining Possibilities: The Development of Latent Fingermarks from Cartridge Casings and Metals Using a Novel Vapour Phase Technique and Foster & Freeman Specialist Lighting Equipment for GSR and Bloodstains

**Instructors:** Dr. Roberto King - Foster and Freeman USA

**Course Cost:** $45

**Time:** 8:00 am – 12:00 pm

**Location:** Civic Center Parlor C

This workshop will begin by providing participants with background theory to a novel chemical fuming process that has been shown to offer significant advantages over traditional latent fingermark enhancement processes across a range of metallic substrates (copper, brass, stainless steel, etc). The unique ability of this process to recover fingerprint ridge patterns when none of the latent fingermark residue actually remains on the substrate (i.e. the surface has been wiped clean, washed, submerged in water, heated, or a combination of these) will also be explored and practical examples illustrated and demonstrated in real-time. Fingermark recovery from fired ammunition casings will also be discussed in detail, with demonstrations being extended not only to enhancing the fingerprints using this fuming process, but also with reference to the imaging of this troublesome substrate type: cylindrical surface unwrapping using a peripheral imaging stage. The use of specialist lighting and imaging tools for this type of evidence, as well as other traditionally difficult evidence such as gun-shot residue and blood particularly located on dark backgrounds will be explored and participants will get the opportunity to look at evidence both in the visible and invisible spectrum. Participants will also get the opportunity to utilize the specialist lighting and imaging tools for live crime scene and laboratory search in the near-infrared range to locate such evidence.

**Participants may bring some samples of their own for treatment/imaging.**
Thursday, June 7, 2018

Marshall University Robert C. Byrd Institute Advanced Manufacturing Technology Center Tour

**Instructors:** Arley Carpenter - Marshall University RCBI  
**Course Cost:** $75  
**Time:** 8:00 am – 10:00 am, 10:00 am – 12:00 pm  
**Location:** Tour (Meet at 7:30 am and 9:45 am in Marriott Hawk’s Nest)

The Robert C. Byrd Institute (RCBI) Advanced Manufacturing Technology Center is a state of the art manufacturing facility located on the South Charleston, WV campus of Marshall University. The center provides their facility and equipment for companies working in the metals, transportation, and energy industries who may need additional manufacturing assistance. The RCBI Center also has state of the art 3D printing capabilities, including both polymer and metal. The tour will include a showcase of the various manufacturing methods they house, as well as a demonstration of the 3D printing capabilities. Manufacturing methods include CNC machining, turning, milling, and abrasive water jet machining.

**Students must bring safety glasses.**

**How to Identify "Other" Firearms**

**Instructors:** Daniel Okelly – GunLearn  
**Course Cost:** $35  
**Time:** 8:00 am – 10:00 am  
**Location:** Civic Center Parlor C

The most confusing category of firearms is the classification of those referred to by ATF as an "Other". These are both fire-able and unfire-able firearms which are neither rifles, shotguns, pistols, or revolvers. They are not to be confused with "Any Other Weapons" as regulated by the NFA. They do include items which may be purchased from any dealer, and may be as simple as virgin frames/receivers, and some not so simple, fire-able firearms. Guns in this category were relatively unknown, but are extremely popular with the gun public within the last few years. The lack of understanding of this group of guns causes plenty of confusion for law enforcement, as to their legality, and the legality of the modifications of them which are also very popular. There are also contradictions within ATF’s rulings which govern these. This class clarifies the above issues, and gives the attendee the ability to recognize these firearms, differentiate between them and others which are commonly confused with them, and to recognize the modifications which are legal vs. illegal.

**Barrel Manufacturing**

**Instructors:** Allan Offringa  
**Course Cost:** $45  
**Time:** 1:00 pm – 5:00 pm  
**Location:** Civic Center Parlor C

From raw material to finished barrel, what an examiner needs to know about the tools and the marks they leave.
Quantitative Measurement and Automated Bullet Comparison Using High-Resolution Optical 3D Surface Metrology

**Instructors:** Cristina Cadevall, Sensofar Tech, Erich D. Smith, FBI, Tom Tremmel & Adam Clark, Productivity Quality, Inc.

**Course Cost:** $35

**Time:** 9:00 am – 12:00 pm

**Location:** Civic Center Parlor D

Three-dimensional measurements of bullet and cartridge case surfaces enable 3D virtual microscopy, where the examiner views and manipulates the 3D representation of measured objects using a software application. This technology can complement traditional examination by providing qualitative information to assist the examiner with routine casework.

Additionally it is possible to establish/develop objective quantifiable mathematical comparisons between any two measured surfaces, which can supplement subjective firearms examiner conclusions.

The course will have two parts:

- Introduction to the use of 3D surface measurements on firearms identification: Virtual Microscopy & Objective Identification
- Hands on (attendees will be divided in three groups working in parallel)
- 3D surface measurements (a system will be available)
- Virtual Microscopy (an analysis workstation will be available)
- Objective Identification (an analysis workstation will be available)

Automated Comparison of 3D Renderings for Bullets and Cartridge Cases, and Supplementation of Microscopic Sample Examination - Evofinder Workshop by Leeds

**Instructors:** Neal Schrode, Kevin Boulay - LEEDS Forensics System, Inc.

**Course Cost:** $35

**Time:** 1:00 pm – 5:00 pm

**Location:** Civic Center Parlor B

3D images of bullets and cartridges can be used for creating a database of evidence samples that allows for rapid, automated comparison between samples throughout the entire database. This technology also allows for pre-screening samples prior to examination on the microscope. This year, Leeds will be hosting a workshop to discuss and demonstrate how 3D imaging systems can scan, store, compare, and display sample representations for comparison of bullets and cartridge cases to expedite the examination workflow of samples in the laboratory, and provide the ability to match samples from different crimes, allowing for the association of previously un-related crimes to aid in the judicial system. This workshop will involve a presentation of the Evofinder systems technology, how the system works on deformed bullets, and will contain a hands-on portion for scanning bullets and ammunition into the Evofinder to show how the system makes correlations and can provide for direct sample comparison. The workshop will include a Q&A session as well as an opportunity to provide feedback. Please note that the first half of this workshop will be instructional, with the second half as a hands-on use of the Evofinder.

** It is encouraged that you bring your own samples for use with the hands-on portion of the workshop.
Ruger AR556 Rifle Armorer Course

Instructors:  David Brancato, Gary J. Monreal - Team One Network
Course Cost:  $185
Time:  8:00 am – 5:00 pm
Location:  Civic Center Parlor A

Sturm, Ruger & Company Inc. conducts Armorer Training Programs through Team One Network for the purpose of training Law Enforcement and Military Personnel in the inspection, diagnosing, and servicing of Ruger firearms in accordance with factory standards. Upon successful completion of a course of instruction, the student will be: trained in the proper disassembly and reassembly of the firearms and their sub-assemblies, trained in the preventative maintenance and inspection procedures applicable to each firearm type, trained to diagnose reported field problems relating to each firearm type and trained to service and repair each firearm type to include the adjustment of existing components and/or the installation of new components.

** U.S. Citizens ONLY. Students must bring safety glasses.

Introducing the LCF3-Motorized Firearms Comparison Microscope, designed with two 9”x7” stages with 3-axis motion which can be operated by various controllers, including an optional 3D navigation mouse. The large stages easily mount Leeds Universal holders & are ideal for analysis of large pieces of evidence.

The Evofinder® Automated Ballistic Identification System is a 3D scanning device of bullets and cartridge casings for examination, comparison, and correlation services within existing databases.

To see a demo of the LCF3 manual vs. motorized stages, or the Evofinder®, please visit booth #405.
Friday, June 8, 2018

**Douglas Barrels Manufacturing Tour 1**

**Instructors:** Douglas Barrels, Inc.  
**Course Cost:** $65  
**Time:** 8:00 am – 10:00 am  
**Location:** Tour (Meet at 7:30 am in Marriott Hawk’s Nest)

Douglas Barrels, Inc. is a small custom rifle barrel manufacturer located in Cross Lanes, West Virginia. Using high quality stainless and chromoly steel, they make button rifled barrels for use in a wide range of activities including hunting, benchrest shooting and long distance shooting. This tour will showcase the full barrel-making process from a barrel blank to a fully turned rifle barrel ready for mounting.

**Students should bring safety glasses.**

**Douglas Barrels Manufacturing Tour 2**

**Instructors:** Douglas Barrels, Inc.  
**Course Cost:** $65  
**Time:** 9:30 am – 11:30 am  
**Location:** Tour (Meet at 9:15 am in Marriott Hawk’s Nest)

Douglas Barrels, Inc. is a small custom rifle barrel manufacturer located in Cross Lanes, West Virginia. Using high quality stainless and chromoly steel, they make button rifled barrels for use in a wide range of activities including hunting, benchrest shooting and long distance shooting. This tour will showcase the full barrel-making process from a barrel blank to a fully turned rifle barrel ready for mounting.

**Students should bring safety glasses.**

**Forensic Double Casting**

**Instructors:** Paul Murphy - Ultra-Electronics Forensic Techniques  
**Course Cost:** $45  
**Time:** 8 am – 10 am  
**Location:** Marriott Blue Ridge

Forensic Double Casting is a technique used to make microscopic accurate resin replicas of fired bullets and cartridge cases (evidence and/or test fires). The technique is becoming an increasingly common way of exchanging ballistic information across interstate and international borders leaving the integrity and chain of custody of the originals intact. The technique also has an application in certain tool mark cases. This 2 hour workshop demonstrates the equipment and techniques required and their results.

**Ammunition & The Firearms Examiner**

**Instructors:** George Kass - Forensic Ammunition  
**Course Cost:** $35  
**Time:** 8 am – 12 pm  
**Location:** Marriott Allegheny

A comprehensive discussion about cartridge/component development from muzzleloaders through modern day. Also included is a section regarding descriptive terms and techniques applicable to the examiner's report writing. Finally, an interesting discussion about unusual ammunition components.
Serial Number Restoration and Barcode Deciphering

Instructors: Jodi Marsanopoli - ATF National Laboratory  
Course Cost: $55  
Time: 8:00 am – 12:00 pm  
Location: Marriott Appalachian / Cumberland

The Bureau of Alcohol, Tobacco, Firearms and Explosives will present a 4 hour workshop on the restoration of obliterated serial numbers using the method of magnetic particle inspection (Magnaflux). The workshop will include lecture, demonstration and hands on practical exercises. This workshop will also review the manual decryption process of partially obliterated barcodes and provide the method of interpreting the barcode characters. Registrants need to bring lab coat and protective eyewear to the class.

** Students must bring lab coats and protective eyewear.

Ammunition Identification

Instructors: Axel Manthei – CartWinPro  
Course Cost: $35  
Time: 8:00 am – 12:00 pm  
Location: Civic Center Parlor C

A common task for the firearm examiner is to identify the origin of a cartridge by the head stamp. A head stamp can be more than just the usual letters and numbers. It can contain abbreviations in foreign languages and Arabic numbers as well as symbols. But beyond this, the arrangement of the information on the head stamp might be of importance. Special or meaningful codes such as dates, OEM manufacturers, and others may also be hidden on the headstamp amongst the more obvious information.

There are many caliber designations, and the difference in measurements can differ only by fractions of an inch. The determination of the correct caliber is, in many cases, easy by reading the headstamp. However, in some cases, even with readable information on the case head, it can be a difficult task. Demonstration will show how CartWinPro is applied in these cases. Color Codes will be discussed as an important means to describe the nature of the cartridge and they may also be of importance in determining if the cartridge should not be fired in a particular type of range. Coding is usually standardized within a country or an organization, but may have a completely different meaning if it is from another source. Color codes are not only encountered on the bullet itself, but also in other locations such as the primer annulus, head stamp, or case mouth. Combinations of these codes may also be used to designate the type of cartridge.

Class Characteristics of Toolmarks in Bone and Cartilage (AM)

Instructors: Brian Smelser - Washington State Patrol  
Course Cost: $55  
Time: 8:00 am – 12:00 pm  
Location: Marriott Kanawha

Dismemberment and other toolmark cases related to bodies occur regularly and sometimes we are asked about the types of saws, if they were hand or power tools, and other questions. Often, we haven’t taken the time to make cuts in bone to see what those class characteristics are. During this workshop, we will look at class characteristics of saws (and other tools), their marks in bone, and knives in cartilage. We will look at casting and preserving the toolmarks, discussing issues related to different types of substrates of the toolmark, and attendees will prepare tests for comparison purposes.
Class Characteristics of Toolmarks in Bone and Cartilage (PM)

**Instructors:** Brian Smelser - Washington State Patrol  
**Course Cost:** $55  
**Time:** 1:00 pm – 5:00 pm  
**Location:** Marriott Kanawha

Dismemberment and other toolmark cases related to bodies occur regularly and sometimes we are asked about the types of saws, if they were hand or power tools, and other questions. Often, we haven’t taken the time to make cuts in bone to see what those class characteristics are. During this workshop, we will look at class characteristics of saws (and other tools), their marks in bone, and knives in cartilage. We will look at casting and preserving the toolmarks, discussing issues related to different types of substrates of the toolmark, and attendees will prepare tests for comparison purposes.

Warwood Tool Company Manufacturing Tour

**Instructors:** Warwood Tool Company  
**Course Cost:** $130  
**Time:** 9:00 am – 5:00 pm *(Meet at 8:30 am in Marriott Hawk’s Nest)*  
**Location:** Tour

Warwood Tool Company specializes in making various hand tools that are commonly used in the mining, railway maintenance and construction industries such as hammers, pry bars and pick axes. The company was founded in 1854 in Ohio, but moved to Wheeling, West Virginia in the early 1900s where it stands today. Warwood prides itself in making products that are 100% American sourced and manufactured. This tour will showcase drop forging, grinding and other manufacturing processes.

*Lunch will be provided for students. Students must bring safety glasses, a hard hat is required for the tour but will be provided to students by the host committee.

Bullets Through Glass

**Instructors:** Lucien C. (Luke) Haag  
**Course Cost:** $100  
**Time:** 8:00 am – 5:00 pm *(Meet at 7:30 am in Marriott Hawk’s Nest)*  
**Location:** WVSP Range

One day workshop with lecture and live fire. Casework can involve situations in which bullets have struck and perforated one of three types of glass: single strength plate glass, tempered glass or 2-layered laminated glass. The behavior of each type of glass to bullet impact, the nature and form of damage suffered by the bullet, velocity loss and bullet deflection are all potentially important factors in any effort to reconstruct shootings involving each of these types of glass. This workshop will address the ballistic events during projectile perforation and the aftermath associated with each of these three types of glass.

**Lunch will be provided for students. Students must bring hearing and eye protection.
Benelli Nova Shotgun Armorer Course

Instructors: David Brancato, Gary J. Monreal - Team One Network
Course Cost: $185
Time: 8:00 am – 5:00 pm
Location: Civic Center Parlor A

Benelli shotgun Armorer courses are designed for law enforcement/military personnel who are responsible for Benelli shotgun preventative maintenance, checks and service (PMCS). Each course is structured to provide each student with a practical understanding of the advanced features that make Benelli shotguns unique. These courses provide complete and detailed answers to specific questions concerning the weapon’s mechanical functioning, operational procedure, field stripping and armorer detailed stripping, inspection(s), troubleshooting, and corrective actions/maintenance. Topics that will be covered are: nomenclature, operator use, cycle of functioning, field & detail stripping, care & cleaning, troubleshooting and preventive & corrective maintenance.

** U.S. Citizens ONLY. Students must bring safety glasses.

ANAB ISO/IEC 17025 Forensic Science Testing Accreditation Requirements as it applies to Firearms Identification

Instructors: Laurel Farrell - ANAB, Julie Knapp - Colorado Bureau of Investigation
Course Cost: $65
Time: 8:00 am – 5:00 pm
Location: Civic Center Parlor D

This workshop will guide examiners on how they can prepare their laboratory for assessments based on the ANAB ISO/IEC 17025 based Forensic Science Testing Laboratories requirements. The workshop will review requirements specifically applicable to this discipline to help participants focus on required changes for laboratories transitioning from the ASCLD/LAB program. Topics will include measurements made by this discipline, measurement traceability and measurement uncertainty. For requirements discussed, the workshop will address how these changes specifically affect the firearm and toolmark community and provide some options/recommendations from practitioners for conformance.
<table>
<thead>
<tr>
<th><strong>Donated By</strong></th>
<th><strong>Item</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Albanese Confectionary</td>
<td>Gift basket</td>
</tr>
<tr>
<td>Alpha Guardian</td>
<td>2 GunVault SpeedVault Biometric safes and 2 GunVault MiniVault safes</td>
</tr>
<tr>
<td>GunVault</td>
<td></td>
</tr>
<tr>
<td>Birchwood Casey</td>
<td>Universal Handgun Cleaning Kits, Universal Rifle Cleaning Kits, Synthetic gun oil pen dual applicators, Shoot-n-c combo packs</td>
</tr>
<tr>
<td>Blue Book Publications</td>
<td>6 copies of the 37th edition of the Blue Book of Gun Values</td>
</tr>
<tr>
<td>Boker</td>
<td>3 Knives (1 Damascus, 2 regular folding blades)</td>
</tr>
<tr>
<td>Burris</td>
<td>2x 50% off coupons</td>
</tr>
<tr>
<td>AFTE Host Committee</td>
<td>Youth package Daisy Red Ryder BB gun, can of BB's, youth shooting glasses, Shoot n C targets</td>
</tr>
<tr>
<td>Collaborative Testing</td>
<td>“Package 1”: 1 – Tundra 45 (ice blue); 1 – Beverage Holder; 1 – YETI Ice 4lb; 1 – Rambler Lowball; 1 – Rambler 20 oz; 1 – Rambler 30 oz; 1 – Rambler 18 oz Bottle; 1 – Rambler 36 oz Bottle; 2 complimentary hats and decals &amp; &quot;Individual Item&quot;: 1 - Roadie 20 (ice blue)</td>
</tr>
<tr>
<td>Services, Inc. (CTS)</td>
<td></td>
</tr>
<tr>
<td>Cybernational</td>
<td>2 S&amp;W M&amp;P 380 Auto Bodyguard pistols with Hogue grips (His and Hers)</td>
</tr>
<tr>
<td>DAC Technologies</td>
<td>AR gun cleaning kits and Punch sets</td>
</tr>
<tr>
<td>Group International Inc.</td>
<td></td>
</tr>
<tr>
<td>GunSkins</td>
<td>AR-15, Pistol, and AK-47</td>
</tr>
<tr>
<td>Herb Derr</td>
<td>WV Custom made Damascus Steel knife</td>
</tr>
<tr>
<td>Hi-Point Firearms</td>
<td>Model 995 - 9mm Carbine</td>
</tr>
<tr>
<td>Hornady</td>
<td>1 range bag, 1 license plate cover, 1 soft pistol case, 1 17&quot; clock, 1 buck knife, 1 tin sign</td>
</tr>
<tr>
<td>International Forensic</td>
<td>Ruger Firearm, Hi-Point Firearm, Colt Government Model Firearm, and textbooks</td>
</tr>
<tr>
<td>Science Laboratory and</td>
<td></td>
</tr>
<tr>
<td>Training Centre</td>
<td></td>
</tr>
<tr>
<td>AFTE Host Committee</td>
<td>1 Range Bag, 1 range kit with eyes and ears, 1 hat , 1 tumbler, one 1 glock pistol parts tray.</td>
</tr>
<tr>
<td>Kahr Arms</td>
<td>Spyderco Knives</td>
</tr>
<tr>
<td>LaserLyte</td>
<td>Bore Sight .22-.50, Lyte Ryder Laser GUN SIGHT TRAINER UNIVERSAL RAIL MOUNT, Laser Rumble Tyme™ Kit</td>
</tr>
<tr>
<td>Lauer Weaponry</td>
<td>DuraBlue kit</td>
</tr>
<tr>
<td>Lee Precision, Inc.</td>
<td>Modern Reloading 2nd Edition BOOK</td>
</tr>
<tr>
<td>LWRCI</td>
<td>AR Upper Receiver 6.8 SPC</td>
</tr>
<tr>
<td>Donated By</td>
<td>Item</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mike Haag</td>
<td>Shooting Incident Reconstruction, Second Edition</td>
</tr>
<tr>
<td>Numzaan Safaris</td>
<td>70/30 - 5 day South Africa Hunt for 2</td>
</tr>
<tr>
<td>Precision Forensic Testing</td>
<td>5 custom made AR lowers with AFTE logo and AFTE serial numbers</td>
</tr>
<tr>
<td>Ruger</td>
<td>10/22 Takedown Lite rifle, model 21152</td>
</tr>
<tr>
<td>Savage Range Systems</td>
<td>Forensic Buddy</td>
</tr>
<tr>
<td>Starline Brass</td>
<td>$50 Gift Certificates for Unprimed Brass</td>
</tr>
<tr>
<td>Tactical AR500 Targets</td>
<td>Steel Gong Targets</td>
</tr>
<tr>
<td>Trijicon</td>
<td>Trijicon® MRO-C-2200003 Scope</td>
</tr>
<tr>
<td>Triple K Manufacturing</td>
<td>5 Copies of Triple K Encyclopedia and Reference Guide for Autoloading Firearms</td>
</tr>
<tr>
<td>Unitron / Accu-Scope</td>
<td>Waterproof 10x25 Binoculars</td>
</tr>
<tr>
<td>WV Law Enforcement Distributors</td>
<td>Smith and Wesson M&amp;P40 with 3 Magazines</td>
</tr>
</tbody>
</table>

And So Much More....
Ace Adventure Resort Trip
Tuesday, June 5th
Transportation will be included to and from the ACE Adventure Resort where you can participate in 1 of 4 options: Whitewater Rafting, Zip Lining, Outdoor Water Park, or Bus Trip to Resort. Participants will load onto buses from the Marriott hotel to travel down to ACE for the afternoon. Activities will finish up around 6:00pm and travel back to Charleston. Participants may elect to drive down themselves and meet the bus group. We hope that you enjoy beautiful West Virginia on this fun excursion trip!
*Please Meet in the Marriott Hotel’s Hawk Nest Room on the First Floor at 11:20 AM to leave on bus.

For more information regarding Ace Adventure visit [https://aceraft.com/](https://aceraft.com/), the company will take other bookings for AFTE if you are staying in Charleston for an extra couple of days!

**Capitol Market – 0.7 miles away**
Capitol Market is a charming, restored, turn-of-the-century freight station from the 1800’s. The Capitol Market promotes and sells the products from West Virginia farmers, growers, and specialty retailers. The indoor market features a variety of specialty shops, a tempting selection of lunch options, tasty treats and indulgences, literary delights, a healthy sampling of West Virginia specialties...everything from fresh simple food fare to gourmet pleasures and a fine Italian restaurant. [http://capitolmarket.net/](http://capitolmarket.net/)

*15 minute walk or can take the hotel shuttle, or cab/UBER.
WV State Capitol Complex – 2.5 miles away

Guided

State Capitol
As West Virginia’s capital city, Charleston’s biggest attraction is the state Capitol. The state Capitol was constructed in three stages, between 1924 - 1932, and dedicated on the state's 69th birthday on June 20, 1932. Its dome is modeled after the U.S. Capitol dome, though it’s actually five feet taller, and is gilded in 23½ carat gold.

Governor’s Mansion
Completed in 1925, this home has welcomed national and global dignitaries, ambassadors, public officials and corporate leaders. Notable features are the reception foyer’s glistening checkerboard floor made with black Belgium and white Tennessee marble, the drawing room wall panels decoratively painted using a trompe l’oeil (literal translation is “trick of the eye”) technique to create the illusion of raised center panels and panel gram molding, and the ballroom's classic white marble mantel, from an old Irish castle.

Culture Center and State Museum
Located on the state Capitol grounds, the Culture Center includes the interactive West Virginia State Museum, archives, two libraries and the state theater.

*Self guided tours can be taken at the State Capitol and State Museum.
*30 minute guided tours of the State Capitol and Governor’s Mansion are available by reservation. Please call 304-558-4839 to book your reservation. Tour hours are Monday through Friday 9:00am – 3:00pm. Tours are FREE of charge.

*Can take the hotel shuttle, or cab/UBER.
Clay Center – 0.7 miles away

The Clay Center for the Arts & Sciences, a 240,000 square foot structure, houses performing arts, visual arts and sciences under one roof – one of the few of its kind in the country. The facility is home to the Clay Center’s Avampato Discovery Museum, the Juliet Art Museum and the Maier Foundation Performance Hall, home of the West Virginia Symphony Orchestra.

The Avampato Discovery Children’s Museum houses two floors of hands-on discovery exhibits featuring more than 12,000 square feet of non-stop fun. Exhibits include the Inventor’s Lab, WaterWorks, The Maier Foundation Music Studio, and Healthy Me. Check out real life exploration in My Town and climb to new heights on Ashton’s Climbing Sculpture!

The Digital Dome offers planetarium shows using state-of-the-art technology in the Clay Center’s newly renovated Digital Dome. Watch the cosmos come to life with live looks at the night sky combined with new shows that will open your eyes to the science of the stars.

https://www.theclaycenter.org/

Live on the Levee at Haddad Riverfront Park – 0.5 miles away

Moses Live on the Levee is an outdoor concert series presented by the City of Charleston, WV located at the Haddad Riverfront Park. Live on the Levee will take place every Friday afternoon from May 26, 2017 – September 1, 2017. Music starts at 6:30pm with the headliner starting at 7:30pm. Entry starts at 5:00pm and will end around 9:30pm. Domestic Beer and Wine will be on sale as well as multiple food vendors. Admission to this fantastic event is free of charge! http://liveontheleveecharleston.com/

*10 minute walk or can take hotel shuttle, cab/UBER.
Charleston Favorites

Downtown
Restaurants – Pies & Pints, Black Sheep Burrito and Brews, The Block Wine Cellar, Noah’s Restaurant and Lounge, Sam’s Uptown Café, Ichiban Pan Asian Cuisine, Ellen’s Ice Cream, Sahara Restaurant, Rock City Cake Company, Recovery Sport’s Grill, Tidewater Grill, Celsius, Adelphia Sports Bar and Grille, Super Weenie
Shops – Oddbird Emporium, Heidi Dylan, Ivor’s Trunk, Taylor Books, Tony the Tailor, Peanut Shoppe, Stray Dog Antiques
Bars – Adelphia, Recovery, The Boulevard Tavern, The Copper Pint, Vino’s, Sam’s Uptown Café, Bar 101

Warehouse District – Near the Ball Park
Restaurants – Paterno’s at the Park, Bricks and Barrels, Capitol Market
Lunch Restaurants – The Fish Market (The Big Fish Sandwich), Johnnie’s Meat Market, The Purple Onion, and Soho’s
Shops – West Virginia Market, Holl’s Chocolates, and The Wine Shop all inside the Capitol Market

East End District – Near Capitol and Governor’s Mansion
Restaurants – Tricky Fish, BlueGrass Kitchen, Starling’s Café, Little India

West Side District – Under the Interstate
Restaurants – Mi Cocina de Amor, GonzoBurger
Shops – KinShip Goods, Base Camp Printing Company, Elk City Records

Bridge Road District – Across the Kanawha River
Restaurants – South Hills Market and Café, Lola’s Pizza, Bridge Road Bistro, Café Romeo
Shops – Ecletics, Geraniums, Eggplant, Ooh La Lucy, Yarid’s Shoes

Other Local Favorite Right on the River – The Barge Restaurant Bar and Grille *Yes a boat on the river!

See the Restaurant Guide in your Welcome Bag for more information!
AFTE Scholarship Endowment Fund (ASEF)

Dear AFTE Colleagues, A few years ago, some individuals approached our Board of Directors (BOD) and requested they consider establishing an endowment fund to ensure that scholarship funds continue to be available in the future. The BOD established the AFTE SCHOLARSHIP ENDOWMENT FUND (ASEF) - where monies would be deposited and the interest used to provide scholarships - to deserving students from around the world. To date, several individuals have donated approximately $45,000 towards this fund.

Since 2001, AFTE has provided some 36 $2,000 scholarships to students from the following countries: Australia (1), Canada (1), India (1), New Zealand (1), United Kingdom (2), United States (29) and the West Indies (1). Many of these scholarship recipients are active today in the field of forensic science – including our field of firearm and toolmark identification.

I propose that we continue to grow the ASEF fund – potentially to $500,000 – where we could then use the interest to provide scholarships in perpetuity. If everyone donated $500 to the ASEF, we could meet this goal. I recognize that not everyone will give that amount – some will give less, some will give $500, and some will give an even greater amount. If you decide to give monies for the ASEF, you can designate and honor someone – perhaps your training officer, a family member, a member of AFTE that has touched you, etc.

The ASEF has a number of donor levels which include Contributors, Sponsor, Patron and Benefactor. If you have already contributed, you can certainly add to your original contribution.

My wife (a retired forensic scientist) and I are offering to provide a 15% matching fee for the first $100,000 that is donated to the ASEF. For example, you donate $500 and that becomes $575, $1,000 which becomes $1,150, etc. If you can’t afford to donate $500 at one time, you can make payments until you reach your goal for whatever amount you desire. (If there are other individuals who would like to provide matching fees that would be excellent)

For further information concerning the ASEF, go to www.afte.org (under Resources) and check on Scholarship information. For additional information, contact Erin Mulligan, Scholarship Chair, via email at aftescholarship@gmail.com or AFTE Treasurer Melissa Oberg at the Indiana State Police Laboratory, 550 West 16th Street, Indianapolis, IN 46202. Donations can be made using PayPal (on the AFTE webpage) or by Mail-In donations using your check, money order or bank draft (ASEF Donation Form available on the AFTE Webpage).

Wouldn’t it be great to build the fund to $500,000 by our 50th Anniversary in 2019 (500K by 50). So please consider making a donation to the ASEF. Read the information on our website for more information.

Thank you and fraternally yours, Jim Hamby
Excerpt Taken from “A Brief History of Challenge Coins” by Rob Lammie (Mental Floss Article) Sept. 26, 2012
For full article please go to: http://mentalfloss.com/article/12630/brief-history-challenge-coins

“There are many examples of traditions that build camaraderie in the military, but few are as well-respected as the practice of carrying a challenge coin—a small medallion or token that signifies a person is a member of an organization. Even though challenge coins have broken into the civilian population, they’re still a bit of a mystery for those outside the armed forces.

Challenge Coin Origins
It's nearly impossible to definitively know why and where the tradition of challenge coins began. One thing is certain: Coins and military service go back a lot farther than our modern age. One of the earliest known examples of an enlisted soldier being monetarily rewarded for valor took place in Ancient Rome. If a soldier performed well in battle that day, he would receive his typical day's pay, and a separate coin as a bonus. Some accounts say that the coin was specially minted with a mark of the legion from which it came, prompting some men to hold on to their coins as a memento, rather than spend them on women and wine.

The First Official Challenge Coin…Maybe
Although no one is certain how challenge coins came to be, one story dates back to World War I, when a wealthy officer had bronze medallions struck with the flying squadron’s insignia to give to his men. Shortly after, one of the young flying aces was shot down over Germany and captured. The Germans took everything on his person except the small leather pouch he wore around his neck that happened to contain his medallion. The pilot escaped and made his way to France. But the French believed he was a spy, and sentenced him to execution. In an effort to prove his identity, the pilot presented the medallion. A French soldier happened to recognize the insignia and the execution was delayed. The French confirmed his identity and sent him back to his unit. One of the earliest challenge coins was minted by Colonel “Buffalo Bill” Quinn, 17th Infantry Regiment, who had them made for his men during the Korean War. The coin features a buffalo on one side as a nod to its creator, and the Regiment’s insignia on the other side. A hole was drilled in the top so the men could wear it around their necks, instead of in a leather pouch.

The Challenge
Stories say that the challenge began in Germany after World War II. Americans stationed there took up the local tradition of conducting “pfennig checks.” The pfennig was the lowest denomination of coin in Germany, and if you didn’t have one when a check was called, you were stuck buying the beers. This evolved from a pfennig to a unit’s medallion, and members would “challenge” each other by slamming a medallion down on the bar. If any member present didn’t have his medallion, he had to buy a drink for the challenger and for anyone else that had their coin. If all the other members had their medallions, the challenger had to buy everyone drinks.”

AFTE 2018 Challenge Coins
In your welcome bags, you will find the AFTE 2018 Challenge coin. We encourage you to carry these with you at all times – keep it in your pocket, in your wallet, in your badge holder, in your shoe, or however you see fit. These coins represent not just a part of history, but also show that you are a part of this meeting and organization. Be warned, however, if a challenge is initiated you must produce your AFTE 2018 Challenge coin. If you are challenged and are unable to respond, you must buy a round of drinks for the group. If everyone responds, then the challenger must buy a round of drinks for the group. If you have any questions, please feel free to ask an AFTE 2018 Committee Member. GOOD LUCK!
AFTE 2018 Thursday Night Banquet

Get ready for a night to remember at AFTE! This year’s banquet will be located at Charleston’s Clay Center for the Arts and Sciences.

Attendees will meet for Cocktail Hour at the Civic Center’s Clendenin Lobby from 5:30 – 6:30pm (on Clendenin Street facing the Mall/Panera Bread). During this time there will be an open bar where attendees can gather and watch pictures from the week’s conference. Attendees will load onto shuttle buses that will run every 15 minutes to be taken over to the Clay Center. Don’t worry if you are on the first shuttle over there is an open bar at the Clay Center as well!

*Shuttle ride is only 5 minutes!!

The last shuttle will leave at 6:30pm from the Civic Center so please be sure to be there by this time if you do not attend the Cocktail Hour.

Shuttle service will then be available again until Midnight for a constant loop back to the hotel for those wishing to return at any time during this time frame.

At the Clay Center:

Dinner will be served at 6:45pm

Banquet program starts at 8:00pm

After Party with Dancing, Dessert, and Beverages from 9:00pm – Midnight

*The museum’s wonderful Juliet Art Museum will also be open from 9:00pm – Midnight for attendees to enjoy!

We hope you’ve enjoyed Charleston and can’t wait to see you in Nashville!
AFTE 2019
Nashville, TN
50th Annual Training Seminar
May 26th – May 31st, 2019

Gaylord Opryland Resort & Convention Center
2800 Opryland Drive Nashville, TN 37214

Ground Transportation: The Gaylord Opryland Resort & Convention Center offers daily round-trip shuttle service to and from the Nashville International Airport. The cost for the shuttle is $25/person for attendees.

Hotel Room Rate: The Marriott Hotel is offering single/double occupancy rooms at the prevailing government per diem (currently $170/night) + 17.75% tax. This rate will be honored 3 days prior and post the conference (5/23-6/3). When making reservations please remember to identify yourself as an attendee of the AFTE 2019 training seminar. Efforts should be made to make room reservations by Wednesday, May 1st, 2019.

Guest Parking: The Gaylord Opryland offers self-parking or valet. A discount of $5.00 will be applied to self-parking for all attendees.

Guest Amenities & Services: All rooms come with flat screen televisions, mini-refrigerators, WiFi, coffee and tea maker, designated complimentary in-room beverages, pillow-top mattresses, executive desk with chair, 24 hour room service and access to the fitness center.

Attractions and Activities: The Gaylord Opryland is located minutes from the Nashville International Airport and downtown Music City. While you can find shopping and dining right under the hotel roof, you’ll also want to explore nearby attractions including the Grand Ole Opry, Opry Mills, the Country Music Hall of Fame and the General Jackson Showboat. During your getaway, make an appointment at Relâche Spa & Salon, or gather your group for an outing at Gaylord Springs Golf Links. The hotel’s indoor and outdoor pools and 9 acres of lush, indoor gardens and cascading waterfalls will impress all visitors. Expect an extraordinary experience at Gaylord Opryland & Convention Center!

Find us on Facebook at AFTE Nashville 2019  Contact: afte2019@gmail.com