



Association of Firearm and Tool Mark Examiners



47th Annual Training Seminar
May 29th – June 3rd 2016 – Hilton New Orleans Riverside, New Orleans, Louisiana

Giving you the tools to investigate & solve gun crime



- **IBIS® TRAX-HD3D™**, the most advanced 3D automated ballistic identification system
- **Projectina VisionX**, the next generation in comparison microscopes
- **IBIS® Hit Viewer**, to streamline your hit confirmations



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Using an Infrared Crime Scene Imaging Kit



INTRODUCING Infrared Crime Scene Imaging

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Crime-lite® Infrared Crime Scene Imaging Kits are a unique range of products that reveal this previously hidden evidence by extending the search beyond the limits of human vision.

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Bullet Recovery System



FEATURES >>>

- Available in a **60" or 48" High Tank.**
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- High performance cartridge filter
- Heavy gauge stainless automated lid
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CERTIFIED
50 BMG**



Portable Shooting Lab

OPTIONS >>>

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HEPA Air Filtration System
Remote Firing Fixture

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Air Spring Isolation
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Brass Catcher



CyberNational is the only company providing a 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.



<<< Portable Remote Firing Cart



Ballistic Cotton Box >>>

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

NEW



<<< RETRIEV-ALL

Principally designed as a **Brass and Shell Retrieval System** for any weapon ranging from pocket Derringer to 50 BMG.
38" long x 18" wide x 36" tall.



Brass Catcher >>>

5 FT wide x 6 FT tall x 3 FT



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In Memoriam



Past-President (#2) and Emeritus member, Charles R. Meyers, 89, of Lansing, North Carolina, passed away peacefully on October 9, 2015 with his family at his side.

He served honorably in the US Navy in WWII and was then recalled for service in the Korean War.

Charlie joined the Michigan State Police from Detroit in March 1948 and served at Gaylord, Ypsilanti, Center Line, East Lansing, Training Division and East Lansing Crime Lab. He retired as Captain of the Michigan State Police Forensic Science Division in July 1973, after a twenty-five year career.

Charlie then began a five year teaching career for Delta College as a professor in their Law Enforcement Program. He then worked for and retired from the Florida Department of Law Enforcement at the Florida State Crime Lab, after

12 years. Charlie has had a hand in training numerous current distinguished members of AFTE.

Since 1989 he served as an independent consultant, writing and lecturing extensively regarding Forensic Science. He authored 4 books in Forensic Science, including "Silent Evidence: Cases from Forensic Science." Charlie stayed very active in the forensic community with his continued contributions, even submitting a post to the 2015 AFTE training seminar.

He was also a retired fellow of the American Academy of Forensic Sciences and a Kentucky Colonel.

He had a great love for sports and the outdoors including fishing and his beloved Michigan Wolverine football.



Richard "Van" Van Roberts, recently of Forsyth, Georgia, born March 14, 1947, died January 3, 2016.

He was a veteran of the United States Navy, serving during Vietnam; he retired from the United States Army Criminal Investigation Division Laboratory, with twenty two years of service and also retired after nineteen years of service from the Department of Forensic Science Western Laboratory, Roanoke, Virginia. He was a member of Hanging Rock Lions Club and a member of Fellowship Community Church in Salem, Virginia.

Van was a member of the AFTE Reader-Report Committee from 1980 – 1982.

Richard was remembered by his fellow co-workers as reserved and somewhat quiet that hid a very sharp intellect and an amazing wit.



Robert "Bob" Frazier, AFTE Emeritus Member, died peacefully after a protracted illness on June 23, 2015.

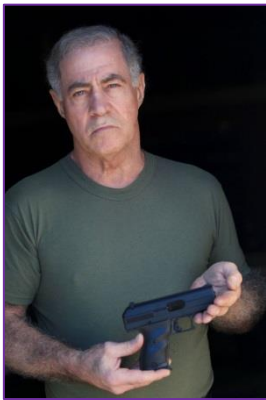
Bob grew up way out West and continued his love of the outdoor life well into his Nineties, hunting and fishing. Despite living in the desert of Idaho, he was a Sea Scout and after he retired he often talked of buying a sailboat and sailing around the world by himself.

He worked his way through the university system, joined the FBI in the early '40's and left them in 1975 after a career in which he had a prominent role in many major events of the time - the assassinations of Robert and John Kennedy, Martin Luther King and the disappearance of Leon Jablonski.

After retiring from the FBI, Bob continued his forensic career with the Northern Lab of the Virginia Department of Forensic Science from 1981 until retiring again in 1990; after which time he continued his forensic career as an independent examiner.

Bob married an Indiana girl from a large family and they loved each other for over 50 years. He raised 4 sons and passed on his passions for hunting, shooting and fishing and camping to each of them. He also taught us his value system - be honest, be faithful, work hard, enjoy life and appreciate a good joke and a card game.

He was not as physically active in the past few years but his mind remained sharp and he surfed the net, emailed family and friends, SKYPED his sons and relatives, loved his grandkids and great grandkids and enjoyed his "Italian Spring Water."



Tom Deeb, 66, recently of Denton, Texas, born September 26, 1949 in Mishawaka, Indiana died suddenly on March 21, 2016 with his long-time partner, Janice Jennings by his side.

Tom was a long-time technical advisor and major supporter of the law enforcement community and specifically the Association of Firearms and Tool Mark Examiners. Tom was extremely involved with the AFTE training seminars for over ten years by providing financial assistance for first time attendees, providing Hi-Point armorer courses, offering Hi-Point manufacturing plant tours, training DVDs, assisting in numerous validation studies and providing training props; the plastic bullet and cartridge cases with interchangeable primers that many examiners currently use in court testimony.

In 1993, he founded the Hi-Point Firearms manufacturing plant in Mansfield, Ohio. His mission was to provide firearms for the "blue-collar working people." In 2015, American Rifleman featured Tom in an article showcasing his technical knowledge of the manufacturing and operation of firearms, which was articulated in a clear and clever manner.

Tom was very generous of his time and financial support to all members of the law enforcement community and other forensic organizations. After 9/11, he donated \$50,000 to the victims.

Tom honorably served his country during the Vietnam War as a member of the U.S. Air Force.

Many of the firearms and toolmark community will remember Tom as prolific entrepreneur & mentor with a caring and generous personality, unique sense of humor who shared many hours at AFTE meetings shooting pool, playing darts, enjoying a beer and passionately discussing firearms.



Association of Firearm and Tool Mark Examiners 2016 Host Committee 47th Annual Training Seminar May 29 – June 3, 2016



The AFTE 2016 Host Committee would like to welcome you all to our wonderful city of New Orleans for the 47th Annual AFTE Training Seminar at the Hilton New Orleans Riverside Hotel! We hope you enjoy the technical session and workshops, as well as the various evening and daytime activities we have planned. We encourage you to find time during your week with us to explore our beautiful city of New Orleans.

Our committee is comprised of people from many laboratories from all over the United States. They have all worked hard to provide a training seminar that is both informative and fun for you.

We would like to thank all of our attendees, exhibitors, friends, and family that are joining us this week. We would also like to thank all the individuals, volunteers, organizations, and businesses that helped support and sponsor our AFTE 2016 meeting. Without their support, this meeting could not have happened!

The AFTE 2016 Committee would like to give a special thanks to our laboratories and directors who supported all the AFTE 2016 Host Committee members, including the hometown agency heads:

Colonel Mike Edmonson – Louisiana State Police
Sheriff Newell Norman – Jefferson Parish Sheriff's Office
Chief Michael Harrison – New Orleans Police Department

Again, thank you, not only for your continued support of our meeting, but also for your continued support of the forensic sciences.

If you have any questions during your stay in New Orleans, 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, the poster session, the exhibit hall, and social functions.

2016 Host Committee Members

Chair

Jeff Goudeau – Louisiana State Police

Members

Cheryl Swearingen – Louisiana State Police

Charles Watson – Louisiana State Police

Patrick Lane – Louisiana State Police

Tim Scanlan – Jefferson Parish Sheriff's Office

Alexis Rivera – Jefferson Parish Sheriff's Office

Jennifer Gelston – Utah Bureau of Forensic Services

Justin Bechaver – Utah Bureau of Forensic Services

Chelsee Richardson – West Baton Rouge Parish Sheriff's Office

Adam Grooms – Alabama Department of Forensic Science

Michelle Cuenco – Alabama Department of Forensic Science

Jessica Winn – California DOJ BFS Fresno Laboratory

Erica Lawton – Broward Sheriff's Office Fort Lauderdale

Michelle Olinde – Louisiana State Police

Kristi Ellington – Louisiana State Police

Jené Rauch – Jefferson Parish Sheriff's Office

Emily Barrois – Jefferson Parish Sheriff's Office

Linda Tran – Jefferson Parish Sheriff's Office

Sean McElrath – New Orleans Police Department

Bryon McIntire – Mississippi Forensics Laboratory

Rusty Day – Baton Rouge Police Department

Stephanie Dees – Houston Forensic Science Center

Jay Stuart – Albuquerque Police Department

Jori Farquharson – Washington State Patrol

Calissa Carper – West Virginia State Police

Mike Coakley – Independent

While in the Hotel

- The AFTE 2016 Training Seminar takes place entirely on the third floor of the hotel. If in doubt, go to the third floor!
- There is free wireless internet access in the 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 2016 Technical Session consists of 20 hours of presentations. If you are attending a workshop or an event on Tuesday, Wednesday, or Thursday, and are not attending the Technical Session, you will need to subtract those hours from the total for documentation for Recertification.

Daily Total Hours:

Monday – 2 hour 55 minutes

Tuesday – 6 hours 40 minutes

Wednesday – 6 hours 35 minutes

Thursday – 3 hours 50 minutes

****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

While New Orleans is a fun city, please remember to be safe while you're enjoying the sights and sounds of our beautiful city. Here are some safety tips to consider:

- Remove name badges and convention wear when not attending functions.
- Travel along main thoroughfares and keep in well-lit populated areas.
- Avoid carrying a purse when possible. Do not display large amounts of cash in public places.
- If you have been drinking, consider taking a taxi, Uber, or Lyft.
- Always go with a group when touring, especially to the cemeteries.
- Do not participate in shell games and beware of hustlers offering shoe shines or betting they can "tell you where you got them shoes."

Important phone numbers:

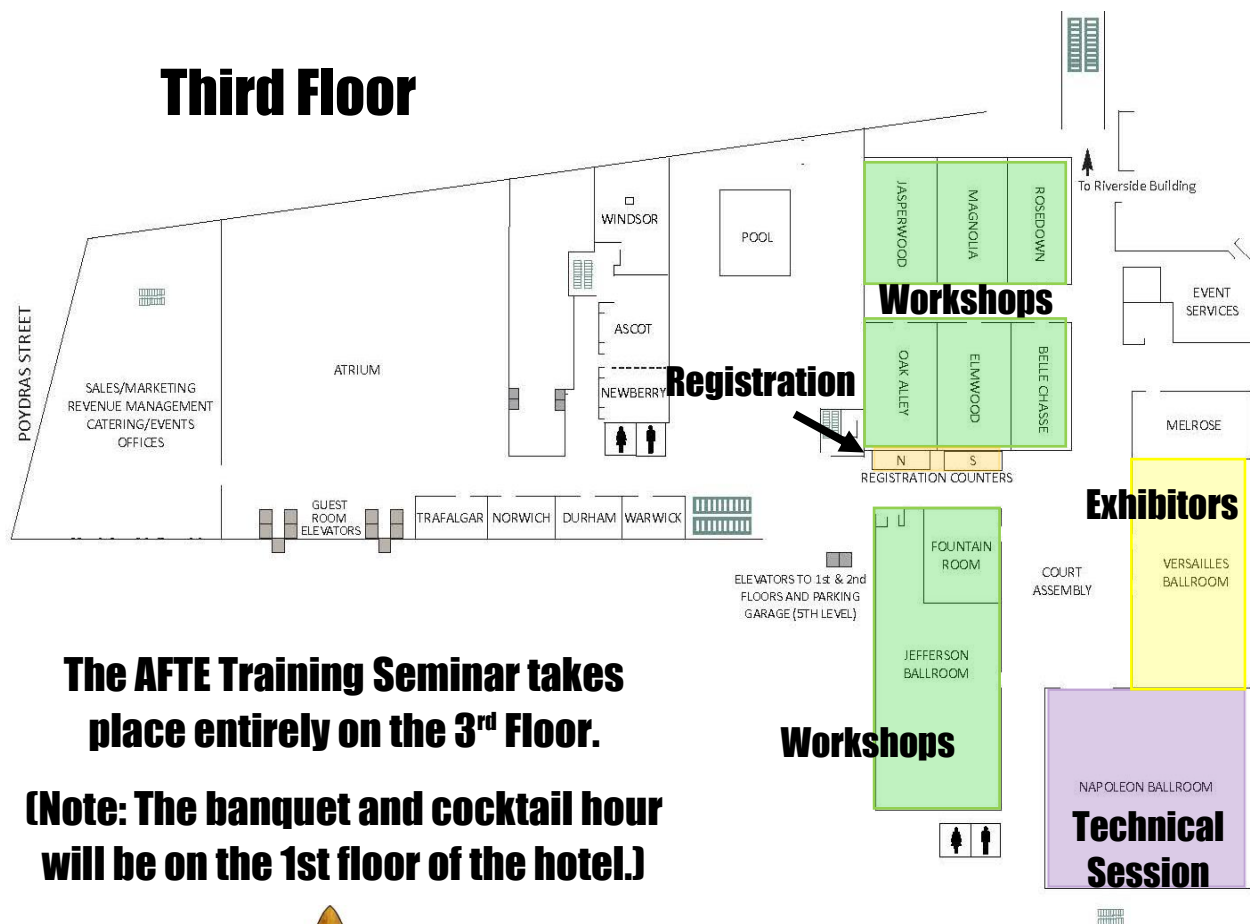
Public Safety Rangers – (504) 415-1730

Police (Non-emergency) – (504) 821-2222

Taxi Cab Bureau – (504) 658-7130

****Please see the pamphlet provided in your welcome bag for more information or speak with a committee member or hotel staff member for more information.***

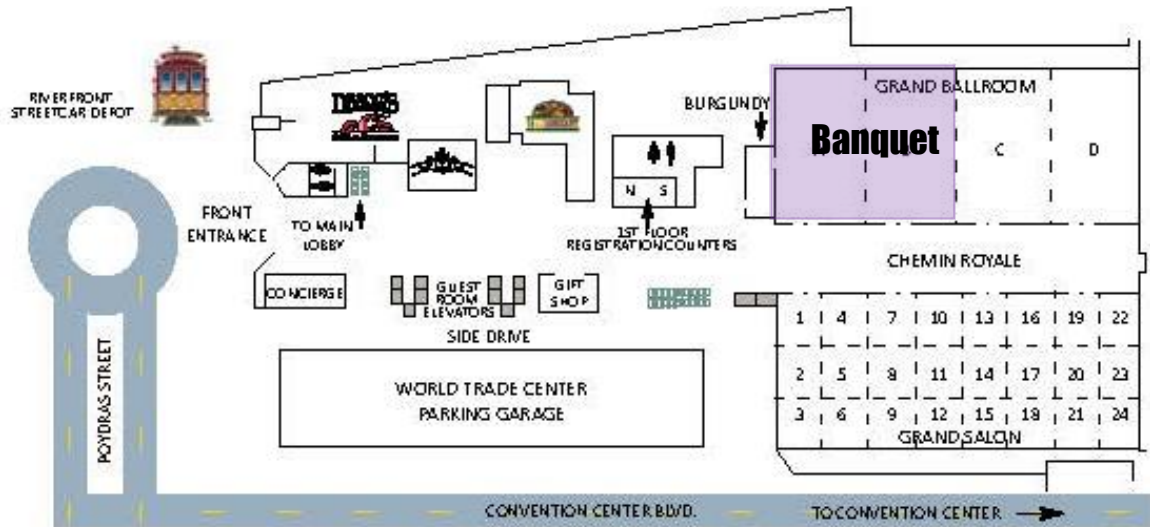
Third Floor



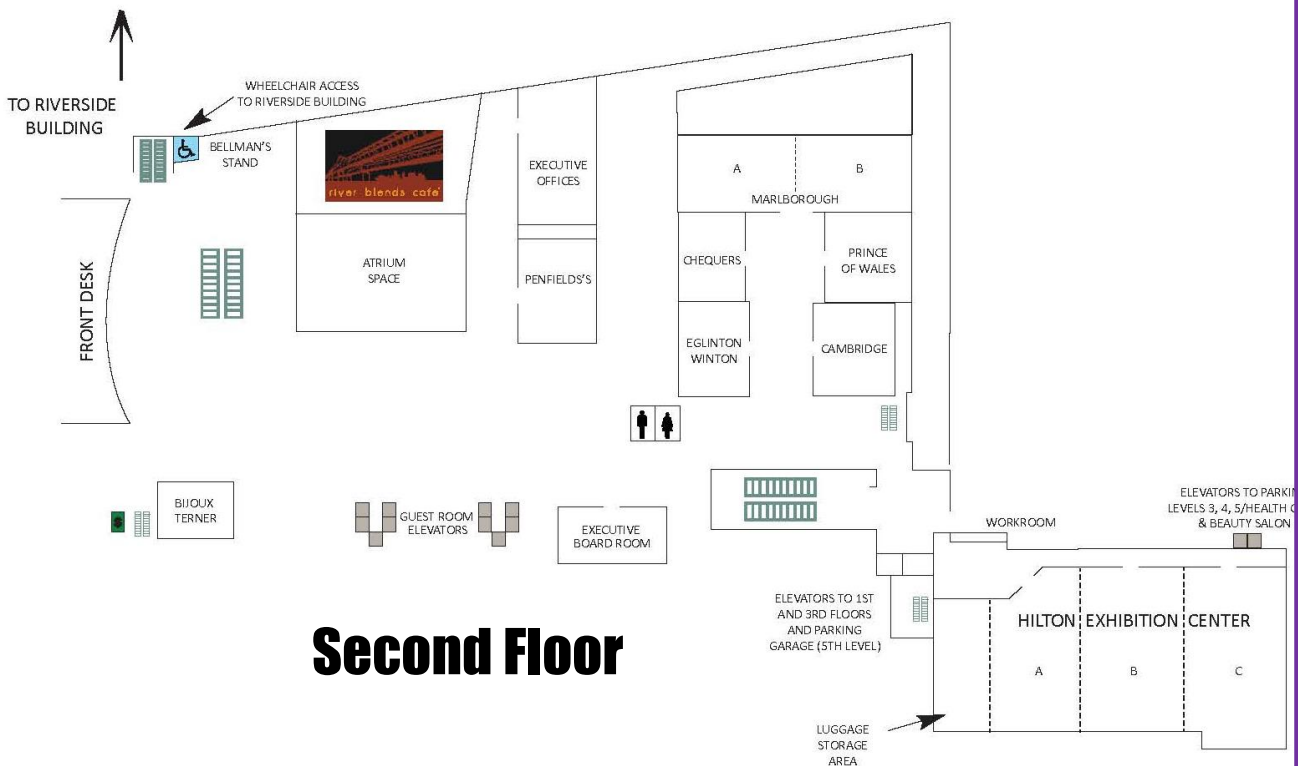
The AFTE Training Seminar takes place entirely on the 3rd Floor.

(Note: The banquet and cocktail hour will be on the 1st floor of the hotel.)





First Floor



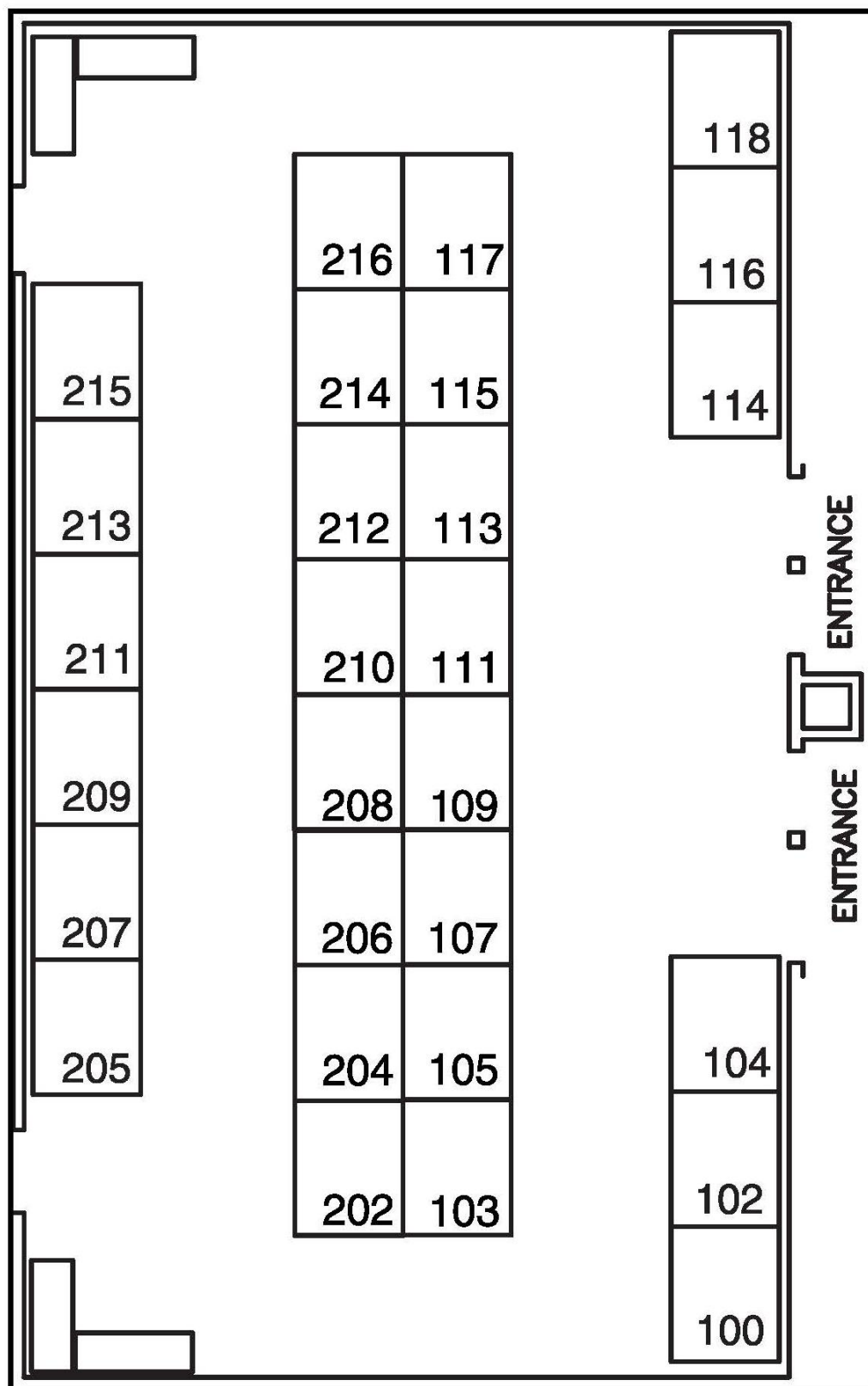
Second Floor

Exhibitors

Exhibitors are located in the Versailles Ballroom of the hotel. Booths will be opened during the following hours:

Monday through Wednesday: 7:30 a.m. to 5:00 p.m.

Thursday: 7:30 a.m. to noon



Exhibitor	Booth #
Alicona Corporation	100
ATF – NIBIN Branch	107
CartWinPro	109
CyberNational, Inc.	113 & 115
Forensics Source	103
Ultra-Electronics Forensic Technology	114 & 116
Foster & Freeman	111
IDS, Inc.	211
International Firearm Specialist Academy	208
JusticeTrax	209
Leeds Forensic Systems, Inc.	104 & 102
Leica Geosystems	202
Leica Microsystems	212
Mideo Systems, Inc.	215
Savage Range Systems, Inc.	214
ScannBI Technology, USA	210
SDI School of Firearms Technology	216
Sensofar, LLC	117
Shotcaller, Inc.	118
SOHO Network Solutions, Inc.	204
Team Fabrication, Inc.	105
UNITRON / ACCU-SCOPE	207
Vashaw Scientific, Inc.	213
Weapon Clear, LLC	206

**Please see pages 79 through 83 for vendor information.*

Week at a Glance

Saturday, May 28	Registration	5 p.m. – 7 p.m.
Sunday, May 29	Registration	7 a.m. – 5 p.m.
	Workshops	8 a.m. – 5 p.m.
	Exhibitor Set Up	Noon – 5 p.m.
	Welcome Reception & Cajun Dancing at Mulates	6 p.m. – 9 p.m.
Monday, May 30	Continental Breakfast	7 a.m. – 8 a.m.
	Registration	7 a.m. – 5 p.m.
	Exhibitor Hours	7:30 a.m. – 5 p.m.
	Technical Session	8 a.m. – 12:30 p.m.
	Lunch Break	12:30 p.m. – 2 p.m.
	Business Meeting	2 p.m. – 5 p.m.
	Poster Session	6 p.m. – 7 p.m.
	Slides with Swamp Monster (BYOS)	7 p.m. – 8:30 p.m.
Tuesday, May 31	Continental Breakfast	7 a.m. – 8 a.m.
	Registration	7 a.m. – 5 p.m.
	Exhibitor Hours	7:30 a.m. – 5 p.m.
	Armorer's Course	8 a.m. – 5 p.m.
	Technical Session	8 a.m. – Noon
	Lunch Break	Noon – 1:30 p.m.
	Technical Session	1:30 p.m. – 5:30 p.m.
	Swamp Airboat Tour	2:45 p.m. – 6:30 p.m.
	NFEA Night on FAT Tuesday at Huck Finn's	6 p.m. – Until
Wednesday, June 1	Continental Breakfast	7 a.m. – 8 a.m.
	Registration	7 a.m. – 5 p.m.
	Exhibitor Hours	7:30 a.m. – 5 p.m.
	Armorer's Course	8 a.m. – 5 p.m.
	Technical Session	8 a.m. – 11:20 a.m.
	Lunch Break	11:20 a.m. – 12:55 p.m.
	Afternoon Workshops	1:00 p.m. – 5 p.m.
	Technical Session	12:55 p.m. – 5:30 p.m.
	AFTE Crawfish Boil at the Spanish Plaza	5:30 p.m. – Until
Thursday, June 2	Continental Breakfast	7 a.m. – 8 a.m.
	Registration	7 a.m. – 5 p.m.
	Exhibitor Hours	7:30 a.m. – Noon
	Armorer's Course	8 a.m. – 5 p.m.
	Technical Session	8 a.m. – Noon
	Raffle	11 a.m. – Noon
	Lunch Break	Noon – 1:20 p.m.
	Exhibitors Break Down	Noon – 4 p.m.
	Technical Session	1:20 p.m. – 2:50 p.m.
	Afternoon Workshops	1:30 p.m. – 5 p.m.
	Cocktail Hour	6 p.m. – 7 p.m.
	Banquet and After Party	7 p.m. – 11 p.m.
Friday, June 3	Workshops	8 a.m. – 5 p.m.
Weeklong Activities	First Time Attendee Bingo & Photo Contest	

NOTE: Lunches will not be covered by the Host Committee or Sponsors.

Schedule of Events

Saturday, May 28

Registration

7 p.m. – 9 p.m. Registration Counters

Sunday, May 29

Registration

7 a.m. – 5 p.m. Registration Counters



Workshops (pages 68 - 77)

- 8 a.m. – 5 p.m. **Ruger LCP Armorer's Course**
Jasperwood
- 8 a.m. – 5 p.m. **AR-15 Armorer's Course**
Belle Chasse
- 9 a.m. – 3 p.m. **Fired Bullet Performance in Wood**
Meet in Lobby
- 9 a.m. – 3 p.m. **Suppressor Familiarization**
Meet in Lobby
- 9 a.m. – 4 p.m. **Practical Shooting Incident Reconstruction**
Meet in Lobby
- 9 a.m. – 4 p.m. **Rusted Firearms**
Meet in Lobby
- 8 a.m. – Noon **Expert Witness Testimony Techniques for Firearms Examiners in a Post Daubert/NAS Report and Current NCFS Environment**
Elmwood
- 8 a.m. – Noon **Ring of Fire**
Oak Alley
- 9 a.m. – Noon **Forensic Double Casting Techniques**
Rosedown
- 1 p.m. – 4 p.m. **Ring of Fire**
Oak Alley
- 1 p.m. – 5 p.m. **Subclass Characteristics**
Melrose
- 1 p.m. – 3 p.m. **MATCHPOINT Tips and Tricks for IBIS-TRAX HD3D User**
Magnolia
- 1 p.m. – 5 p.m. **3D Virtual Microscopy of Cartridge Casings: Technology Intro and Hands-On**
Elmwood
- 3 p.m. – 5 p.m. **Forensic Double Casting Techniques**
Rosedown

Welcome Reception & Cajun Dancing

- 6 p.m. – 9 p.m. **Mulates**
Beverages, hors d'oeuvres, and entertainment provided
Sponsored by Forensic Technology (FTI)

Saturday & Sunday

Schedule of Events

Monday, May 30

Registration

7 a.m. – 5 p.m. Registration Counters

Continental Breakfast

7 a.m. – 8 a.m. Versailles Ballroom

Technical Session

Location: Napoleon Ballroom

Moderator: Jeff Goudeau



Monday

Time	Presenter	Page
8:00 a.m.	Color Guard, New Orleans Police Department Honor Guard National Anthem, James Alford, Louisiana State Police	
8:10 a.m.	Welcome to AFTE 2016! Host Committee Exhibitors/Sponsors Introduction of AFTE President	
8:20 a.m.	Welcome from Brandon Giroux, AFTE President Acknowledgement of Fallen Colleagues Past Presidents, Dinosaurs, 1st Time Attendees International Members	
8:45 a.m.	Welcome to New Orleans, Louisiana State Police Colonel Mike Edmonson	
9:00 a.m.	Keynote Speaker G.W. Bailey, Actor	18
9:30 a.m.	AFTE 2017 Update AFTE 2017 Host Committee, Julie Knapp	19
9:50 a.m.	Break	
10:20 a.m.	Announcements & Door Prizes	

Schedule of Events

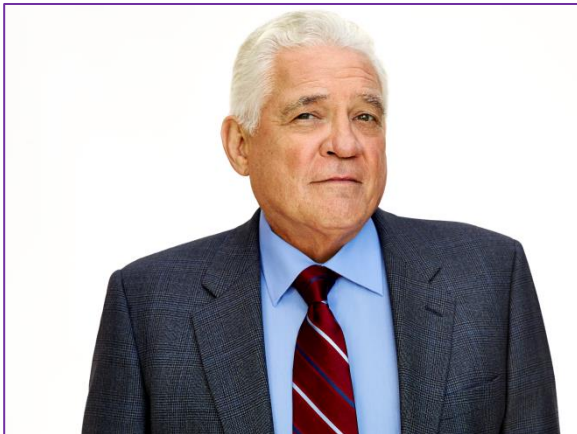
Time	Presenter	Page
10:25 a.m.	Cartridge Case Correspondence Survey: A Study on Subjectivity and Image Format James Stevens (<i>Winner of NFEA Best Paper</i>)	19
10:55 a.m.	Identification of Items in Videos and Photos Which Qualify as Firearms versus Toys under Title 18 U.S. Code, 921 Daniel O'Kelly	20
11:25 a.m.	The September 1935 Assassination of Huey Long, the Subsequent Shooting of Dr. Carl Austin Weiss, and the Enigmatic Bullet Lucien C. Haag	21
Noon	New Automated Composite Comparison Score for Bullet Analysis Using High Resolution Optical 3D Surface Metrology Cristina Cadevall	22
12:30 p.m.	Lunch Break	
1:55 p.m.	Announcements and Door Prizes	
2:00 p.m.	AFTE Business Meeting AFTE President and Board of Directors Napoleon Ballroom Attendance is encouraged!	
6:00 p.m.	Poster Session Jefferson Ballroom Beverages and Hors d'Oeuvres Poster Session Titles on page 67 Sponsored by SDI School of Firearms Technology	23
7:00 p.m.	Slides with Swamp Monster AKA "Bring Your Own Slides" Napoleon Ballroom	23



Monday

G.W. Bailey – Actor

Keynote Speaker



G.W. Bailey, who plays the cantankerous Lieutenant Provenza on TNT's hit series *The Closer* and new series *Major Crimes*, has a career that spans four decades and is packed with memorable and distinctive characters. A native Texan, he began his training at Texas Tech University and started his career at the prestigious Actor's Theatre of Louisville, Ky.

Bailey later moved to Los Angeles, where he started his television career in a string of guest-starring roles on episodic series, in addition to continuing his

stage work. He later played a recurring role on *M*A*S*H* as well as regular roles on *The Jeff Foxworthy Show* and *St. Elsewhere*. Bailey also starred in several TV miniseries, such as the award-winning *Double Crossed* and *The Siege at Ruby Ridge*.

Bailey's feature career began with the film *Police Academy* and flourished with starring roles in such movies as *Mannequin*, *Short Circuit*, *Burglar*, and *Rustler's Rhapsody*, among others. He returned to academia in the mid-1990s and graduated from Texas State University in 1994. Upon graduation, he remained at Texas State and served as artist-in-residence for several years, working occasionally in Hollywood and on the stage in New York.

Bailey's true passion is his work with The Sunshine Kids Foundation, where he serves as the Executive Director. Sunshine Kids is a non-profit organization dedicated to children with cancer. Established in 1982, the foundation is committed to providing positive group activities and emotional support for young cancer patients and their families.

Andrew Sacks
Co-Executive Producer - *Major Crimes*
Warner Bros. Television
323-871-4410
323-871-4411 fax

AFTE 2017 Update

Julie Knapp



The 2017 AFTE training conference will be held in beautiful downtown Denver, Colorado. The conference hotel is the Grand Hyatt, located in the heart of downtown Denver. Area attractions and planned events will be discussed.

Julie Knapp is the AFTE 2017 Host Committee Chair. She worked for the Miami-Dade Police Department for several years and now works for the Colorado Bureau of Investigation in Grand Junction, Colorado. She has been a member of AFTE since 2007.

Cartridge Case Correspondence Survey: A Study on Subjectivity and Image Format

James Stevens (*Winner of NFEA Best Paper*)

Overview: This study is designed to test perceived correspondence differences between color and greyscale images, and to assess the relative amount of subjectivity between non firearms examiners and trained firearms examiners.

Methodology: The data from 77 participants was collected through an online survey, which featured sets of images at varying magnification and color format. Participants were asked to rate the level of correspondence in these images.

Results: The results of this study found a statistically significant difference between the perceived correspondence of non-firearms examiners and trained firearms examiners in regards to known matches with higher expected correspondence. The study also found that there was no statistically significant difference in the perceived correspondence of images viewed in color and greyscale.

Conclusions: Based on the results from the online survey, the need for training and experience is statistically proven. Furthermore, based on mathematical data the amount of level of variance between examiners is relatively low, thus demonstrating the minimal effect of subjectivity on reported correspondence levels.

Monday



James Stevens has been with the Kansas Bureau of Investigation for a little over a year and a half. He attended the 2015 NFEA class and was awarded best paper.

Identification of Items in Videos and Photos Which Qualify as Firearms Versus Toys under Title 18 U.S. Code, 921

Daniel O'Kelly

Overview: ATF has an unwritten policy against making determinations of items as "firearms" merely based on photographic evidence. Having had a 23 year career as a Firearm Specialist with ATF, and believing that it could and can be done in some cases, I have successfully done so in four criminal cases.

Methodology: Identifications can be made using the ability to recognize a specific firearm manufacture/model from a video/photo, knowing and using the reasoning used by "toy" or "airsoft" companies in deciding whether to make a copy of a real firearm, and having the ability to recognize the minute details in the difference(s) between an example of a real firearm of a given model versus a "fake" or "toy" version of the same.

Results: In four separate criminal cases to date, I have been able to determine the suspected firearms in photos and/or videos as real, versus being fake/toy/airsoft versions of the same, and have been instrumental in obtaining convictions in each case.

Conclusions: These methods can be taught to members of the Firearm and Tool Mark Examiners community toward an effort to secure more convictions as the result of this ability.



Daniel O'Kelly earned a Bachelor's Degree from Indiana University, served for 11 years as a Police Officer, and then for 23 years as an ATF Agent. He co-wrote the firearm tech & ID lesson plans for ATF's Academy in the late 1990s, and has taught at the Int'l Law Enforcement Academies in Europe and Africa several times. He is currently the Director of the Int'l Firearm Specialist Academy.

THE SEPTEMBER 1935 ASSASSINATION of HUEY LONG, THE SUBSEQUENT SHOOTING of DR. CARL AUSTIN WEISS and THE ENIGMATIC BULLET

Lucien C. Haag

Overview: On the night of Sunday, September 8, 1935, United States Senator Huey P. Long, Jr., a former governor of the State of Louisiana, was shot while in the corridor of the State Capitol building in Baton Rouge. Thirty hours later he succumbed to his single perforating gunshot as a result of a botched operation. His purported assassin, Dr. Carl Austin Weiss, was immediately shot numerous times by a number of Senator Long's bodyguards. An FN .32 Automatic pistol, later determined to belong to Dr. Weiss, was purportedly found near his body. No autopsies were conducted on either gunshot victim, nor did the subsequent inquest into Senator Long's death specifically state that the cause of death was homicide or an assassination. The official police files on this case and any recovered physical evidence subsequently disappeared shortly after the incident. In 1991, various files, documents, photographs, and some items of physical evidence were discovered in the possession of a relative of the former superintendent of the Louisiana State Bureau of Criminal Investigation and Identification. Among these materials was Dr. Weiss' FN .32 Automatic pistol, a magazine with 6 live rounds of vintage Remington ammunition, and a packet containing a single, slightly damaged vintage 71 grain, .32 Automatic bullet with distinct 6-right rifling engravings. This bullet was ultimately excluded as having been fired from Dr. Weiss' FN Model 1910 pistol. One additional item that was of major importance were photographs of Huey Long's suit coat carefully mounted on a display board and showing a contact gunshot defect to the lower right front of this garment and a probable exit hole in the back, both of which corresponded to the locations and path of his fatal gunshot wound.

Monday

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. 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. He received the Calvin H. Goddard awarded in 2012 and has received the AFTE Key Member Award on three occasions during his many years of participation in AFTE seminars. He is the co-author of the book Shooting Incident Reconstruction (2011).

New Automated Composite Comparison Score for Bullet Analysis Using High Resolution Optical 3D Surface Metrology

Christina Cadevall

Overview: It is a general goal in the firearm and tool mark analysis sciences to provide quantifiable, objective information to assist the examiner with routine casework. Three-dimensional measurements of bullet surfaces enable quantifiable mathematical comparisons between any two surfaces, which can supplement traditional comparison microscopes or 3D virtual microscopy, which provide qualitative information.

Methodology: Resulting Individual Characteristics (IC) surfaces are saved and used for automated batch analysis, making it possible to reduce the processing time for comparisons and to provide easy to interpret scores. We obtained a comparison score for a pair of IC surfaces using cross-correlation of mean profiles. Known non-matches (KNM) pairs have low comparison values, but not all known-matches (KM) pairs have high comparison values. We analyzed different ways to combine comparison scores of all pairs of IC surfaces from two bullets and have created a composite comparison score that shows a very good degree of discrimination between KNM and KM bullets. Thus we can calculate a safer single value for comparison between two bullets and we can define thresholds to obtain a list of probable matches between bullets.

Results: We ran a blind test using the James Hamby study (downloaded from NIST Research Ballistics Toolmarks Database) and correctly identified 100% of unknowns with no false positives. Extraction of IC surfaces for 35 bullets takes 2 hours for a trained examiner, about 3 minutes per bullet. Automatic comparison of 15 unknown bullets against the 20 known bullets (10,800 pairs of IC surfaces), takes about 6 hours, 2 seconds per pair, without human intervention.

Conclusions: The new composite comparison score for bullet analysis makes it possible to automatically process large batches of bullets for comparison and provide the examiners with a list of probable bullet matches by applying filtering criteria on comparison scores.



Cristina Cadevall has degrees in Technical Engineering in Telecommunications (1992) and in Electronic Engineering (1994) from La Salle School of Engineering (URL), and a Ph.D. in Optical Engineering from the Technical University of Catalonia in 2007. She has worked at CD6 as an R&D Engineer since 1996, and holds the position of Software Manager at Sensofar Tech SL since its foundation in 2001, becoming a partner in the company in 2004. She has been involved with developing the use of three-dimensional (3D) topographical analysis in firearms analysis since 2010.

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**Poster Session Event
Jefferson Ballroom
6:00 p.m. to 7:00 p.m.**

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! Posters will remain displayed for the rest of the week. Hors d'oeuvres will be provided, beverages available for purchase.

Please see pages 67 for poster titles and authors.

Thank you to the Sonoran Desert Institute (SDI) School of Firearms Technology for sponsoring the Poster Session!



**Slides with Swamp Monster
(Bring Your Own Slides)
Napoleon Ballroom
7:00 p.m. to 8:30 p.m.**

The BYOS 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 (ten minutes max).



Schedule of Events

Tuesday, May 31

Registration

7 a.m. – 5 p.m. Registration Counters

Continental Breakfast

7 a.m. – 8 a.m. Versailles Ballroom - Sponsored by FTI

Technical Session



Location: Napoleon Ballroom

Morning Moderator: Jill Theriot

Afternoon Moderator: Jessica Winn

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8:25 a.m.	Utility Knife Blades: Are They Distinguishable? John O'Neil	27
8:50 a.m.	A Curious Case of Firing Pin Aperture Shear Marks Jessica Winn	27
9:10 a.m.	Modeling Firearm Toolmark Persistence Through Objective Surface Metrology and Analysis Xiaoyu Alan Zheng	28
9:35 a.m.	Break	
10:05 a.m.	Announcements & Door Prizes	
10:10 a.m.	OSAC Updates and Progress Andy Smith & Mark Keisler	29
10:40 a.m.	Identification of Bullets Fired from Consecutively Manufactured Double-Broached Ruger SR9c Barrels Utilizing Comparison Microscopy and Confocal Microscopy Erich D. Smith and Jennifer L. Stephenson	30
11:20 a.m.	Leveraging NIBIN as a Real-Time Investigative Tool: The Evolution of the Crime Gun Intelligence Center and its Impact on Gun Crime and Active Shooters in Denver, Colorado 2013-2016 Zachary Kotas	31

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1:35 p.m.	A Case Study of a Tandem Bullet from a Small Caliber Revolver Andrew Wheeler, M.F.S.	33
2:05 p.m.	Visualizing Breech Face and Firing Pin Impression Comparisons Using 3D Surface Topographies and the CMC Method Daniel Ott	34
2:35 p.m.	Glock Marking Barrels – An Evaluation of Individual and Subclass Characteristics Omar Felix	35
3:05 p.m.	Break	
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4:00 p.m.	Change in Location of Firing Pin Impression of 7mm Bolt Action Rifles Aurangzaib Ahmad	37
4:20 p.m.	Misfired, Slam-Fired, Snap-Fired, and Drop-Fired Cartridges Lucien C. Haag	37
5:00 p.m.	Usage of Computed Tomography Scans for Wound Ballistics Studies Dr. Nikolaos E. Tsiatis	38
Workshops (pages 68 - 77)		
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6:00 p.m.	NFEA Night on FAT Tuesday at Huck Finn’s!	39

Mystery of a Bullet Wound – A Case Study

Dr. Ajitesh Pal & Dr. H.K. Pratihari

Overview: Firearm suicide is very often reported among security personnel since such tools are available with them for professional requirement. In one case, a security guard was on sentry duty with an INSAS (Indian Small Arms System) rifle and committed suicide with his service firearm. The deceased was lying in a pool of blood along with the firearm and one fired cartridge case nearby. A projectile mark was also found on the roof of the sentry post. On post mortem examination, the autopsy surgeon reported the entry wound as being on the occipital bone 8cm above the cervical vertebra, and the exit wound over the forehead of the deceased, which is uncommon. The features of contact firing like singeing, blackening, burning, tattooing, and muzzle impression, were absent near the entry wound. Moreover, suicide by rifles from the backside is more difficult and such incidents are not reported in the literature so far. Analysis of the photographs of the bullet wound, crime spot, and projectile mark just above the sentry post, strongly suggested the entry wound on the forehead instead of back. The possible position of shooter has also been reconstructed based on crime spot analysis, shown in sketch map.

Methodology: The scene of the crime was examined to reconstruct the incident and corroborate more facts in support of suicide and possible direction of firing. The seized cartridge case was examined by ballistics comparison microscope. The entry/exit wounds on the photograph were examined based on the wound ballistics.

Results: The direction of firing can be of great help in the reconstruction of the event in this case. The systematic study of bullet holes (entry/exit wounds) helped in a great way to establish the possible position of the shooter and direction of firing. Due to the hard nature, the skull could not expand due to inadequate space for expansion of gas. As a result, large quantities of gas entering into the skull rebounded back and escaped through the entry wound pulling out the soft brain matter. On spot analysis, it is found that one bullet mark was present on the roof of sentry post at acute angle with respect to the sitting position (cemented platform) of security guard. The position of bullet mark/dead body just after incident is suggestive of the muzzle end of rifle in upward direction.

Conclusions: Based on the wound ballistics and crime spot analysis, the entry/exit wound has been established. The recovered fired cartridge case was fired from the service firearm used by the security personal.



Dr. Ajitesh Pal has worked as a Scientific Officer in Tripura State Forensic Science Laboratory, Agartala since 2009. He has expertise in Ballistics/Chemical composition of ammunition. Dr. Pal has done research on Thin Film/Spectroscopy and more than 25 publications in national and international journals at his credit. He has undergone advanced training on forensic investigation and engaged in R&D work and case studies in the laboratory. In addition, he is now pursuing Post-Doctoral research work on Material Science.



Dr. H. K. Pratihari joined as founder Director in State Forensic Science Laboratory, Tripura during 2001. He has served in the forensic science laboratory more than 30 years and has many publications in national and international journals. Dr. Pratihari is recipient of a Home Ministry award from the government of India and a Lifetime Forensic Achievement award from the Indian Academy of Forensic Science/Health ultimate research organization (Kolkata).

Utility Knife Blades: Are They Distinguishable?

John O'Neil

Overview: Blades for utility knives are manufactured by the millions each year. These blades are made from steel (bi-metals and ceramic material) and some are coated with other metals. Do these blades produce sufficiently different microscopic striae to distinguish one from another?

Methodology: Each blade was pressed through a section of PVC clear vinyl tubing longer than the blade tested. Twenty blades of differing materials and coatings were used to make the test standards. Ten of the blades were consecutively manufactured. All test materials were then microscopically compared.

Results: While no test cut matched a test cut made with a different blade, there are areas of matching striae between the left side and right side of a test made by the same blade. This is a new discovery in the field of single blade cutting tools.

Conclusions: As examiners, there has been a long held belief that a knife blade sharpened on both sides creates two bevels which marked differently. For these blades it is not true. On some test cuts there are small sections of corresponding striae between the left and right side.



Mr. O'Neil, a distinguished AFTE member, attended his first AFTE meeting in 1972. He spent 16 years as an examiner with the Metropolitan Police Department of Washington D.C., 8 years with the ATF working bombings, arson, and firearm/silencer construction/modification cases, and 10 years with Forensic Technology. He is currently an independent consultant who has testified over 600 times and worked over 4500 cases.

A Curious Case of Firing Pin Aperture Shear Marks

Jessica Winn

Overview: An attempted homicide case was submitted to the laboratory. The agency requested that test fires from a 38 Special revolver be compared to bullets and cartridge cases recovered from the scene.

Results: Although the bullet comparison yielded inconclusive results, an unknown, but unique, mark was observed on the primer of the questioned cartridge cases. This unknown mark was used to identify one of the questioned cartridge cases to the test-fired cartridge cases from the 38 Special revolver.

Conclusions: It was determined during the firearms examination that the unknown mark was produced from the revolver's firing pin aperture and was most likely a result of a manufacturer defect.



Jessica Winn is a Senior Criminalist with the CA DOJ Fresno Crime Laboratory. She is a Regular AFTE member and is currently a member of two AFTE committees. Jessica has a Bachelor's in Chemistry and Master's in Forensic Science, both from CSU Fresno (Go Bulldogs!). Additionally, Jessica graduated from the NFEA in 2011 and has been working firearms cases ever since.

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Modeling Firearm Toolmark Persistence through Objective Surface Metrology and Analysis

Xiaoyu Alan Zheng

Overview: The objective is to quantify the effects of firearm wear and usage on the reproducibility of toolmarks left on cartridge cases and bullets. The project addresses a recommendation of the 2008 National Academies report on Ballistics Imaging: “A designed program of experiments covering a full range of sources of variability is important to test the fundamental assumptions [of toolmarks uniqueness and reproducibility], as well as to better document phenomena like “settle-in” effects.” Previous research evaluated the persistence of firearm toolmarks through the use of comparison microscopes. This project aims to quantify changes in toolmarks by measuring and analyzing the three-dimensional (3D) surface topography of bullets and cartridge cases.

Methodology: Measurements are taken with a Disc Scanning Confocal Microscope. The degree of similarity between toolmarks on bullets (land impression) or cartridge cases (breech face and firing pin impression) is quantified using the maximum value of the normalized cross correlation function. Changes in toolmark characteristics are quantified using parameters developed for surface texture specification and analysis (see e.g., ASME B46.1 – 2009).

The test fires used in this research were generated by:

- 1) Cary Wong (Alameda County Sheriff’s Office Crime Lab): 2000 bullets and cartridge cases fired from a new Ruger P89 pistol.
- 2) Mark Keisler (Indiana State Police Laboratory): 10,000 bullets and cartridge cases fired from three new Beretta 96G pistols.

Results: The largest change in toolmarks occurred in the bullet land impressions. Finer toolmarks generated by a new firearm quickly lose their features after usage, leaving the larger toolmarks that persist. Major toolmarks that persist after a large number of firings reside near the shoulders of the land impression. In comparisons with the sample from a new firearm, the land impression experienced a decline in correlation scores with usage, with the largest decline occurring early in the firing sequence, while the firing pin and breechface scores remained relatively stable. In general, comparisons of samples fired in close proximity to each other yielded higher correlation scores.

Conclusions: The results of the experiments on the persistence of firearm and toolmark topography agree with conclusions reached by examiners through visual comparisons.



Xiaoyu Alan Zheng is a mechanical engineer with the Engineering Physics Division at the National Institute of Standards and Technology (NIST). He holds a BS in Mechanical Engineering from the University of Maryland Baltimore County, as well as a MS in Mechanical Engineering from Johns Hopkins University. His primary research focuses on objective ballistics toolmark identifications. He is currently a technical adviser with AFTE and is serving on the Firearms and Toolmark subcommittee of the NIST OSACs.

OSAC Updates and Progress

Andy Smith & Mark Keisler

Overview: This presentation will provide information to the firearm and toolmark community relating to the Organization of Scientific Area Committees. This organization was developed and is managed through the National Institute of Standards and Technology (NIST) as a response to the 2009 National Academy of Sciences report.

Mark Kiesler, Vice-Chair of the Forensic Science Standards Board (FSSB), will provide an introduction and update concerning this top layer of oversight of the OSAC Scientific Area Committees and general structure of the group.

Andy Smith, Chair of the Firearms/Toolmarks Subcommittee, will provide an update on the goals and progress of the subcommittee and anticipated timelines for current projects.

Tuesday

Andy Smith is the Supervising Criminalist for the San Francisco Police Department Crime Laboratory Firearm/Toolmark Unit and is a current board member of AFTE.



Mark Kiesler is the Supervising Firearm/Toolmark Examiner for the Indiana State Police Forensic Laboratory system and is the immediate Past President of AFTE.

Identification of Bullets Fired from Consecutively Manufactured Double-Broached Ruger® SR9c® Barrels Utilizing Comparison Microscopy and Confocal Microscopy

Erich D. Smith and Jennifer L. Stephenson

Overview: Following the presentation, attendees will be aware of toolmarks produced by double-broached Ruger® barrels, the process of conducting a blind validation study, pattern matching error rates, methods for distinguishing between subclass and individual characteristics on test fired barrels, acquisition techniques for bullets using three-dimensional (3D) confocal microscopy, and correlation procedures used to evaluate 3D topographies from test fired bullets.

Methodology: Test fires were examined from 15 double-broached Ruger® pistol barrels. Twelve barrels were manufactured within a single production run of a broach (run 9mm PBS 650), 10 being consecutively manufactured (designated CM 0-CM 9) and 2 selected from further down the production run (designated CM 22 and CM 33). Three barrels/pistols were selected from the FBI FTU Reference Firearms Collection (RFC) and are designated D1893, D1925, and D1994. Each test set contained 12 fired bullets, including at least one matching pair from four or more production run barrels and one or more matching pairs from RFC pistols. Each test set also contained an instruction sheet and an answer worksheet which insured all 66 bullet comparisons were completed for each test set. This was a blind validation study because test sets were placed into a room where the test administer could not see participants pick-up/return the test sets, participating FTU examiners were not provided with any information in regard to the origin of bullets in the test sets (there were no “known’s”), and the nature of the answer worksheet ensured the test administer could not tell which examiner completed the worksheet. Upon return of the test sets from examiners, a 3D topography of each individual land from every test bullet was acquired using a Sensofar® S neox confocal microscope which provided a total of 360 (5 tests, 12 bullets, 6 lands each) acquired 3D topographies for comparison analysis. The 3D topographies were analyzed with the application of a cross-correlation function (CCFMAX) which provided an objective numerical value that represents the similarity between two topographies. The numerical values were used to determine if there was significant and sufficient variation of individual characteristics between two test fires to correctly render a conclusion or if there were subclass characteristics present which would prevent a conclusion from being correctly rendered. Results from the examiners conclusions using traditional comparison microscopy were compared to results obtained using confocal microscopy combined with CCFMAX.

Conclusions: This presentation will affect the forensic science community by supporting traditional means of pattern matching methods for identification and by beginning to establish/develop an objective nontraditional means to evaluate the rendering of an identification. Additionally, this presentation will serve as a confirmation to the firearms/toolmarks theory of identification that the extent of sufficient agreement of individual characteristics occurring in toolmarks produced by the same tool exceeds that agreement which occurs in toolmarks produced by different tools. The presentation will also inform the forensic community to applications of an emerging technology within comparative based disciplines.



Jennifer L. Stephenson, MSFS*, Visiting Scientist, Counterterrorism and Forensic Science Research Unit, Federal Bureau of Investigation, Laboratory Division, 2501 Investigation Parkway, Quantico, VA; and Erich D. Smith*, MS, Forensic Examiner, Firearms/Toolmarks Unit, Federal Bureau of Investigation, Laboratory Division, 2501 Investigation Parkway, Quantico, VA

Leveraging NIBIN as a Real-Time Investigative Tool: The Evolution of the Crime Gun Intelligence Center and Its Impact on Gun Crime and Active Shooters in Denver Colorado 2013-2016

Zachary Kotas

Overview: Established in 1999, the National Integrated Ballistics Information Network (NIBIN) database and Integrated Ballistic Identification System allows firearms examiners to identify potential linkages between recovered cartridge casings and weapons involved in crime. The Denver Police Department Crime Laboratory (DPDCL) incorporated NIBIN into its workflow beginning in 2002. In collaboration with the Bureau of Alcohol, Tobacco, Firearms and Explosives, the Denver Police Department Crime Laboratory created a program that applied many lessons learned through DNA cold case investigations to NIBIN intelligence. This project, known as the Denver Crime Gun Intelligence Center was formally launched in January 2013. Through March 2015, 571 hits have been confirmed and reported. Proactively using NIBIN has proven a game changer with respect to the identification and apprehension of active shooters in the community.

Methodology: The purpose of CGIC is to utilize NIBIN to provide timely and actionable information to partner agencies. This information is used to focus investigative efforts on active shooters in the Denver metropolitan area with the goal of identifying and removing them from the community before they can commit additional crimes. One significant change within DPD due to the CGIC model is that officers and detectives responding to shooting scenes are acutely aware of the importance of information derived from the use of NIBIN, and the collection of gun crime evidence has become a focus of all police personnel. All hit notifications are now thoroughly reviewed and potentially lead to further investigation by assigned DPD Detectives and ATF personnel.

Conclusions: This presentation will highlight how Denver has coordinated its efforts with ATF and bordering communities to focus on the identification and interdiction of active shooters in our community. The presentation will make the strong case to using NIBIN as a front-end forensic intelligence tool with a well-developed street teams staffed with ATF agents, industry operations specialists, and Denver Police personnel. Creative ways to keeping the database current and experiences with impact on firearms caseload and outcomes will be presented.



Zachary Kotas received a Bachelor's of Science in Zoology from Colorado State University and a Master's of Science in Forensic Science from the University of New Haven. Zachary has been employed at the Denver Crime Laboratory as a Forensic Scientist – Firearm and Toolmark Examiner and NIBIN coordinator since 2007. He has been certified in the field of Firearms Identification by the Association of Firearm and Toolmark Examiners since 2014.

Tuesday

“How good a match is it?” Prototype Software to Render Quantitative Statements

Nicholas D. K. Petraco

Overview: Even if only used for investigative purposes, it would be advantageous to the forensic firearms and toolmark community to have open/reviewable software tools at the ready to help make quantitative statements about the comparative work they do. The purpose of this research is to describe prototype open-source and free software tools we have developed for practitioners and researchers to render quantitative conclusions in the evaluation of striated tool mark evidence.

Methodology: CMS run counts from a striated toolmark comparison are used to render posterior “match” probability and likelihood ratio estimates. Quantitative CMS (QCMS) data can be obtained with comparison microscopy or automatically using software. Our methodology codifies QCMS using a simple Dirichlet-multinomial model which has been implemented in the free Bayesian Network software packages, “Bayesfusion” (<http://www.bayesfusion.com/>) and “gRain” (<http://people.math.aau.dk/~sorenh/software/gR/>).

Results: If an examiner has CMS run length counts for a particular comparison, they can use the simple “Bayesfusion” graphical user interface to input that information and render an estimated posterior “match” probability or a likelihood ratio. While free, “Bayesfusion” is not open-source. Thus we have also implemented the comparison model described above in the slightly more difficult to learn but completely open-source R based Bayesian Network software, gRain. If the examiner is in possession of 3D striated toolmark data from a 3D confocal microscope, they can use our open-source R/C++ software to automatically extract “line” matches and count CMS run lengths. This data can then be used as completely “objective” QCMS input into the Bayesian Network software described above.

Conclusions: Using the Dirichlet-multinomial model for QCMS implemented in the Bayesian Network software packages, “Bayesfusion” and “gRain” practitioners and researchers can estimate “match” probabilities and likelihood ratios for investigative purposes. QCMS data input into the model can be collected “by hand” using comparison microscopy or automatically from 3D striated toolmark surfaces using our R/C++ open-source software.

Nicholas D. K. Petraco’s passion lies in the application of rigorous science to the law. His training is at the intersection of physics, applied mathematics, chemistry and computer science. He earned a bachelor degree in chemistry from Colgate University in 1998 and a doctorate in quantum chemistry from the Center for Computational Quantum Chemistry, University of Georgia in 2002. Currently he is an Associate Professor at the City University of New York, John Jay College of Criminal Justice, where he specializes in quantitative toolmark evidence analysis.

A Case Study of a Tandem Bullet From a Small Caliber Revolver

Andrew Wheeler, M.F.S.

Overview: This case study examines how rare events and deviations from expected velocities can result in observations that are seemingly inconsistent. Witness observations, blood spatter, and trajectory and stippling evidence appeared to be inconsistent until assumptions concerning muzzle velocity were questioned. The consideration of a possible tandem bullet and the resulting decrease in muzzle velocity resolved these inconsistencies. In addition, expectations regarding tandem bullet effects on a .22 caliber revolver were re-evaluated.

Methodology: A literature review for similar cases was explored. Analysis of blood spatter, stippling patterns, bullet grouping, bullet trajectories, and wound dynamics were performed. Inconsistencies in the case evidence were identified. Potential causes of inconsistency were examined. Various scenarios were investigated that might account for the inconsistencies. Subsequent experimental tests were run involving the relationship between barrel obstructions and muzzle velocity.

Results: The evidence in this case was consistent with the rare phenomenon of a tandem bullet. Numerous factors including bullet trajectories, stippling, and shot grouping support the finding.

Conclusions: The criteria of a concave based projectile being indicative of a tandem bullet should be cautiously evaluated in the context of other supporting evidence. Other factors such as closely grouped, parallel wound tracks and evidence of decreased muzzle velocity should be considered. Expectations of barrel damage as the result of a barrel obstruction should be tempered by the caliber of the weapon, the location of the obstruction in the barrel, the ratio of barrel thickness to caliber, and the existence of a cylinder gap. Finally, investigators should be cautious not to dismiss rare events merely because they are rare.

Tuesday



Professor Wheeler received his B.A. in Sociology from Concord College in Athens, WV and his Masters in Forensic Science from The George Washington University, in D.C. He was a civil and criminal investigator for over a decade before entering academia. An Associate Professor of Forensics at WVU Tech, his research interests include staged crime scenes and the shaping of investigator perceptions

Visualizing Breech Face and Firing Pin Impression Comparisons Using 3D Surface Topographies and the CMC method

Daniel Ott

Overview: Recent work at NIST in the field of firearms identification has led to the development of the Congruent Matching Cell (CMC) algorithm for repeatable and quantifiable comparisons of breech face impressions. This work is one aspect of a push in the forensics sciences to establish objective analysis procedures with associated error rates. This presentation will provide a connection between the ways that a firearms examiner conducts comparisons and the way that the CMC method evaluates matches and exclusions. An intuitive explanation the CMC method will be presented in the context of how an examiner finds matching features. This will be supported with visualizations that highlight regions used to make conclusions.

Methodology: Several methods exist to align and compare firearms impression evidence. We use the areal cross correlation function and the CMC method to align and compare breech face impressions on fired cartridge cases. This alignment allows us to present 3D topography comparisons in a manner that is familiar to examiners resulting in an effective comparison of traditional examinations using a comparison microscope and modern alignment algorithms using 3D topography data. Using newly developed filtering techniques we are now also able to demonstrate this same comparison method for firing pin impression evidence.

Results: Using our comparison algorithm and appropriate parameters for breech face and firing pin impressions we are able to correctly identify or exclude each comparison from a firearms examination proficiency test. Several methods for presenting the matching regions of interest are used alongside images captured using a comparison microscope. In this manner the important features in evaluating a comparison are highlighted.

Conclusions: The CMC method is an effective way of comparing impressed firearm marks and it is possible to relate modern comparison algorithms to methods used by firearms examiners. The presentation of data highlights regions of interest that are used in traditional comparison microscopy as well as computer aided 3D topography comparisons. This study helps to bridge the gap between human examiners and comparison algorithms.



Authors are members of NIST's Forensic Topography and Surface Metrology Project for the Surface and Nanostructure Metrology Group of the Physical Measurement Laboratory.

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Glock Marking Barrels – An Evaluation of Individual and Subclass Characteristics

Omar Felix

Overview: Glock Inc. recently replaced the Enhanced Bullet Identification System (EBIS) with what Glock refers to as the Glock Marking Barrel. Casts and test fired bullets from thirty-five Glock Marking Barrels were evaluated for subclass and individual characteristics. It was determined that the barrels have subclass carryover from barrel to barrel when manufactured using the same mandrel. However, identification of a fired bullet back to the barrel/firearm that fired it was still possible using specific areas of the fired bullet. Due to the fact that this type of barrel will reportedly be rolled out in all models of Glock pistols, an examiner should be aware of which areas of a fired bullet may have a high potential for subclass characteristics.

Methodology: Thirty-five new Glock model 22 pistols with the Glock marking barrel purchased by the Palm Beach County Sheriff's Office were used for this research project prior to being issued to Deputies. Each barrel was cast to evaluate the potential for subclass carryover. Ten of the firearms were then test fired to obtain samples for microscopic comparison.

Conclusions: The biggest difference between the typical Glock polygonal rifling and the Glock Marking Barrel are what can be described as rails that run along the “shoulders” of each of the lands from the chamber to the muzzle. When the casts of the barrels were examined two things were observed: 1) the presence of subclass characteristics on the rails, and 2) the presence of cross-hatch striations on all of the lands resulting from honing at the factory. The markings on a fired bullet created by the rails should not be used for identification due to the high potential of subclass carryover; however, the striations created by the honing marks within the lands were found to be individual in nature.

Tuesday



After receiving his Bachelor of Science degree in Forensic Science from the University of Central Florida, Omar Felix began his career as a firearms examiner for the Florida Department of Law Enforcement's Orlando crime laboratory in 2000. In 2007, he moved to south Florida where he was hired as a Senior Forensic Scientist in the firearms unit of the Palm Beach County Sheriff's Office in West Palm Beach.

MANTIS: Portable Prototype System for Objective Characterization of Toolmarks

Dr. Scott Chumbley & Dr. Song Zhang

Overview: This presentation will provide results concerning the development of an innovative system that is designed to provide examiners with the ability to obtain and characterize toolmark data in an objective, statistical manner. Design has been guided by consulting retired and current forensic examiners in order to develop a system that is intuitive, flexible, and easy to use.

Methodology: The system is based on an optical microscope and has the ability to measure surface topography down to the submicron level. The device used is small and can be packed in a hard-shell suitcase for transport. All acquisition and analysis software is resident on a laptop computer.

Results: The analysis suite is termed Mantis, for Mark and Tool Inspection Suite. Acquired data can be cleaned (if necessary), then the data files examined using the viewer built into Mantis that mimics a comparison microscope in its ability to compare data files side-by-side. The operator has a wide range of sample movement, magnification, and rotation control, and can activate a statistical algorithm that objectively determines the area of best fit for the marks, given the operator-specified comparison parameters. A graph of the surface roughness of the marks is generated with the best-fit regions identified and the resultant statistical relevance is displayed.

Conclusions: One feature of the prototype is the ability to compare actual tools to toolmarks. By acquiring data from a tool, the operator can either compare the resultant data file directly or choose to create a “virtual mark” from that acquired data that can then be compared to the actual toolmark. A search routine can be employed that, for the first time, gives examiners predictive capabilities as to which angle the real mark was made. A blind study testing this ability identified 20 out of 20 screwdriver test marks in most cases to within 5 degrees.



Dr. Chumbley is a professor in the Materials Science and Engineering Department of Iowa State University (ISU). He has conducted research for both the FBI and the National Institute of Justice, collaborating with fellow professors Max Morris (statistics) and Song Zhang (ME) of Iowa State University. He was on the 2008 National Academy of Science panel to discuss the feasibility of establishing a national ballistics database.



Dr. Song Zhang is an associate professor of mechanical engineering at Purdue University. Dr. Zhang's research mainly focuses on 3D optical imaging and 3D geometric data processing and manipulation. Besides being extensively utilized in academia and industry, the technologies he developed have been used by rock band Radiohead to create a music video House of Cards; and by the Zaftig Films to produce a movie Focus (II).

Purdue University

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Change in Location of Firing Pin Impression of 7MM Bolt Action Rifles

Aurangzaib Ahmad

Overview: During an examination, it was observed that the firing pin of a 7mm bolt action rifle may change its location on cartridge cases because of its free movement in its housing. We can still identify the firearm on the basis of internal markings of the firing pin and its shape.

Methodology: The firing pin of bolt action rifles is spring loaded, because of which its location on cartridge cases may be different, but its shape and internal marking are always the same. Although the firing pin impression changes its position, we examined the internal markings of the firing pin impression and its periphery using a comparison microscope. We also oriented the firing pin at different angles to check the possible matching points.

Results: Although the firing pin impression changes its position, identifications can be made after careful examination of the periphery of the firing pin and its internal markings.

Conclusions: This paper highlights the importance of internal markings of the firing pin of a 7mm bolt action rifle and its change in location of the firing pin impression on cartridge cases which could be helpful for forensic firearm examiners/forensic scientists in making the right decision.

Aurangzaib Ahmad earned his B.Sc (Hons) and recently enrolled in Mphil Physics Program at the University of Lahore, Pakistan. He is a Junior Forensic Scientist and is currently working at the Punjab Forensic Science Agency, Lahore-Pakistan. He has worked more than eight hundred cases related to firearm identification, serial number restoration, functionality testing, and GSR analysis. He is also a researcher and doing research on Firearm Identification.

MISFIRED, SLAM-FIRED, SNAP-FIRED, and DROP-FIRED CARTRIDGES

Lucien C. Haag

Overview: Careful examination of firing pin impressions in centerfire primers, and accurate measurements of their depths, can reveal much about the means by which they came to be formed in the primer. The design and method of operation of certain semi-automatic firearms produce very shallow 'tick' marks which may be confused with an attempt to discharge the cartridge. Cartridges discharged by an impact to the hammer of certain single action firearms can often be differentiated from cartridges discharged in the normal manner.

Moreover, cartridges discharged in the normal manner, after which the hammers in these same firearms are struck, can also be recognized and documented if one knows what to look for. Finally, it may also be possible to identify cartridges discharged by an interrupted hammer fall or a loss of control while manipulating the hammer in firearms of this design. These distinctions and determinations are the subject of this presentation.

Knowledge of the particular firearm's design and method of operation, coupled with empirical testing, accurate measurements, and an understanding of the context of the case, are critically important in designing ones analytical protocol and in arriving at a fully supportable conclusion.

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. 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. He received the Calvin H. Goddard awarded in 2012 and has received the AFTE Key Member Award on three occasions during his many years of participation in AFTE seminars. He is the co-author of the book Shooting Incident Reconstruction (2011).

Tuesday

Usage of Computed Tomography Scans for Wound Ballistics Studies.

Nick Tsiatis

Overview: The purpose of this presentation is to evaluate the application of Computed Tomography (CT) for wound ballistics studies; there is a relationship between the data that characterize a bullet and the injury resulted after shooting when a projectile perforates the human body. The bullet path in the human body following skin perforation as well as the damaging effect cannot always be predictable as they depend on various factors such as the bullet's impact velocity, its construction, and the tissue types that the bullet encounters.

Methodology: Using CT technology and studying virtual "slices" of specific areas on scanned human bodies, allows from taken measurements, the evaluation of density and thickness of the skin, the subcutaneous tissue, the muscles, the vital organs and the bones. For the purpose of wound ballistics research, the human body's figure has been "separated" in five parts according to the morphology, the muscles' mass division, the shape and the bones' form, as following: head-brain, arms-forearms, thorax, abdomen, foot. Density data taken from Hounsfield units can be converted in g/cc by using the appropriate mathematic equations-software.

Results: After the evaluation of almost two hundred measurements the average humans' body density value was calculated from 0.93 to 1.12 g/cc depending on the area (arms - forearms, thorax - chest, abdomen, foot). By evaluating the results of this study, the anatomy of the human body utilizing ballistic gel will be reproduced in order to simulate the path that a bullet follows.

Conclusions: Through CT technology we can calculate the density of specific tissues and organs in different areas of the human body; we can then produce the ballistic gel for more accurate simulation. Also, the thickness of layers in several areas of the human body can be calculated so as to simulate the wound channels.



Nick Tsiatis, a Police Major, has a M.Sc. in Applied Physics in the Physics Department of the University of Athens and is currently a Ph.D. candidate related in wound ballistics, in the Department of Forensic Medicine and Toxicology/School of Medicine/University of Athens. He joined the Hellenic Police in 1995 and graduated from the Police Academy as a Police Officer in 2000. He has been serving in the Forensic Science Division of Hellenic Police / Section of Firearms & Tool Mark Labs since 2001 as a court qualified Firearms & Tool Mark / Keys & Locks Examiner.

Swamp Airboat Tours
Meet in Lobby
2:45 p.m. to 6:30 p.m.



Sign up for a tour of the Louisiana swamps and bayous on an airboat! During the ~2 hour tour, you'll have the chance to see alligators, snakes, turtles (oh my!), egrets, herons, and ibis. You might even spot some hawks, owls, and white-tailed deer. Don't miss out on this fun opportunity!



NFEA Night on FAT Tuesday
Huck Finn's Cafe
135 Decatur Street, New Orleans
6:00 p.m. until



Missed out on FAT Tuesday this year?! Well, we're bringing it to you! Join us for NFEA night on **FAT (Firearm and Toolmark) Tuesday** on Tuesday, May 31 at Huck Finn's Cafe! Spend some time with your colleagues, teachers, students and friends... and even make a few new friends while you're there! Huck Finn's is located in the French Quarter and is within walking distance from the hotel.

Everyone is welcome!!!

Tuesday

Schedule of Events

Wednesday, June 1

Registration

7 a.m. – 5 p.m. Registration Counters

Continental Breakfast

7 a.m. – 8 a.m. Versailles Ballroom

Technical Session



Location: Napoleon Ballroom

Morning Moderator: Nancy McCombs
Afternoon Moderator: Greg Laskowski

Time	Presenter	Page
8:00 a.m.	Announcements & Door Prizes	
8:05 a.m.	Effect of Velocity on the Level of Expansion and Penetration Depth of Hollow Point Bullets Dijana Coric	42
8:35 a.m.	Comparison of Manufacturing Marks on Nylon Cable Ties Andre Horne	43
9:05 a.m.	Evaluation of Recent Daubert/Frye Challenges to Firearm and Tool Mark Identification – Part II James E. Hamby, Ph.D.	43
9:25 a.m.	The Importance of Skid Marks in Ballistic Comparison for Revolver Pistols Paolo Suraci	44
9:50 a.m.	Break - Sponsored by FTI	
10:20 a.m.	Announcements & Door Prizes	
10:25 a.m.	Proposed Congruent Matching Profile Segments (CMPS) Method for Bullet Signature Correlations John Song, Wei Chu, and Dan Ott	45
11:00 a.m.	The Reconstruction of a Single Shot Sniper-Type Homicide Don Dunbar	46
11:20 a.m.	Lunch Break	
12:55 p.m.	Announcements & Door Prizes	
1:00 p.m.	Electronic Resource Committee (ERC) Developments – GRC/Class Characteristics Matrix Databases and Safety Recall List Erica Lawton and Adam Grooms	47

Schedule of Events

Wednesday

Time	Presenter	Page
1:20 p.m.	Comparing 6000 Consecutively Fired .40 S&W Bullets and Cartridge Cases from a Sig Sauer P320 Pistol Utilizing Three-Dimensional and 2D+D Imaging and Objective Comparative Analysis Erich D. Smith and Jennifer L. Stephenson	48
2:00 p.m.	Halloween Ambush: An Execution of a Seattle Police Officer R. T. Wyant	49
2:30 p.m.	Break	
3:00 p.m.	Announcements & Door Prizes	
3:05 p.m.	The Effects of Measurement Resolution on the Comparison of Tool Mark Topography Data Michael Stocker	50
3:25 p.m.	Shot to the Head Without an Exit Wound Dr. Jan Eckert	51
3:45 p.m.	Lethality: Complications in Reporting and Testimony in Foreign Countries Erica Lawton & Andre Horne	52
4:15 p.m.	QCMS and Subclass Stephen M Deady	53
4:35 p.m.	Towards More Objective Acquisition & Comparison of Tool and Bullet Marks in Casework Martin Baiker & Rene Pieterman	84

Workshops (pages 68 - 77)

8:00 a.m.	Glock Armorer's Course Oak Alley	
8:00 a.m.	Benelli Nova Armorer's Course Jasperwood	
1:00 p.m.	Firearm Classifications and Firearm Markings Elmwood	

Evening Activity

5:30 p.m.	AFTE Crawfish Boil at the Spanish Plaza	55
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Effect of Velocity on the Level of Expansion and Penetration Depth of Hollow Point Bullets

Dijana Coric

Overview: Several of the author's colleagues have received casework containing an unexpanded hollow point bullet retrieved from a victim's body showing no indication of striking an intermediate object. The objective of this study is to determine the effect of velocity on the level of expansion and penetration depth of hollow point bullets. Four different manufacturer brands were used: .40 S&W caliber Speer Gold Dot, Winchester Ranger, Federal Hydra-Shok, and Remington Golden Saber.

Methodology: Each ammunition brand was downloaded until approximate velocities of 900, 700, and 500 ft./sec. were achieved. Five rounds of each downloaded ammunition brand were fired into ballistic gelatin using a Glock 23 pistol. The velocity, level of expansion, and penetration depth were recorded.

Results: The bullets downloaded to approximately 900 ft./sec. resulted in partial expansion with lengths from the base of the bullet to the point of bend for the individual petals of ~0.50" (Hydra-Shok, GDHP, and Ranger) and ~0.4375" (Golden Saber). The bullets downloaded to approximately 700 and 500 ft./sec. did not significantly expand. The 700 ft./sec. downloaded bullets (Hydra-Shok, GDHP, Ranger, and Golden Saber) penetrated an average of 30", 25", 29", and 33" through gelatin, respectively. These penetration depths are greater (range of ~5 to 20 inches) compared to the rest of the bullets (full-load and 900 and 500 ft./sec. downloaded bullets).

Conclusions: This research demonstrates that the ability of a hollow point to expand in an aqueous substance is related to its velocity when entering a target without striking an intermediate object. Therefore, if a hollow point is fired from a great enough distance that its velocity will sufficiently decrease by the time it enters the target, the hollow point may not expand fully. Since the 700 ft./sec. downloaded bullets did not expand upon striking the gelatin, each of the unexpanded hollow point bullets simulated a FMJ or TMJ and penetrated further. The 500 ft./sec. downloaded bullets did not expand upon striking the gelatin, but they did not penetrate as far as the 700 ft./sec. downloaded bullets.



Dijana Coric received her Bachelors of Science at Louisiana Tech University, and her Masters of Science in Forensic Science at Marshall University. She is currently employed with the Washington State Patrol Crime Laboratory in Seattle, WA as a Forensic Scientist in the Firearm/Toolmark Section.

Comparison of Manufacturing Marks on Nylon Cable Ties

Andre Horne

Overview: During a murder, a victim was restrained with nylon cable ties. A search of the suspects' house resulted in the recovery of similar cable ties. The lab was asked to determine if a link could be established between the questioned cable ties and the controls. Three sets of manufacturing marks on each cable tie were compared.

Methodology: Mould manufacturing marks, mould number engraving marks, and knock out pin surface patterns were compared between the questioned cable ties and the controls.

Results: One of the cable ties used to bind the victim was identified to the same mould with all three sets of manufacturing marks as one of the control cable ties.

Conclusions: Nylon cable ties can be conclusively associated with the mould they had been casted in.



Andre is the Team Lead for Firearms and Toolmark Examinations at LGC Forensics in the UK. Prior to that, he was the Head of Forensic Firearms at the Forensic Science Laboratory of the South African Police in the Eastern Cape. He is a regular AFTE member and has a Bachelor of Medical Science. LGC Forensics is ISO 17025 accredited. Andre specializes in External Ballistics, Crime Scene Reconstruction and Wound Ballistics. He has presented papers and workshops at annual ENSFI Firearms and GSR conferences.

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Evaluation of Recent Daubert / Frye Challenges to Firearm and Tool Mark Identification - Part II

James E. Hamby, PhD

Overview: The field of firearm and tool mark identification continues to experience attacks by various academics and unqualified individuals. This presentation, an update from the 2015 Annual Training Seminar, will focus on challenges and events that have been occurring primarily in the United States.

Methodology: Recent court challenges to our science, as well as a change in how we can potentially word our conclusions, were researched.

Results: Information will be provided on continuing legal challenges to our science.

Conclusions: Every examiner should be aware of legal issues facing our field, as well as the potential challenges they may encounter from various individuals that are appearing with a continuing frequency as 'defense' experts.



Dr. Hamby is a firearms and tool mark examiner with nearly 46 years in the field. He received his initial training at the US Army Criminal Investigation Laboratory (USACIL), then at Fort Gordon, Georgia. Hamby has worked for the US Army Lab System in Camp Zama, Japan and Fort Gordon, Georgia, the Commonwealth of Virginia Laboratory in Roanoke, Virginia, the Illinois State Laboratory System in Joliet and Maywood, Illinois, the Indianapolis-Marion County Forensic Services Agency in Indianapolis, Indiana and currently for the International Forensic Science Laboratory & Training Centre in Indianapolis. Jim has an Associate's Degree (Administration of Justice), 2 Bachelor's Degrees (Liberal Studies, Sociology), a Master of Arts Degree (Secondary Education), and a Ph.D. Degree (Forensic Science). He is a past-president of AFTE and edited the AFTE Journal for 12 years.
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Wednesday

The Importance of Skid Marks in Ballistic Comparison for Revolver Pistols

Paolo Suraci

Overview: Ballistic impressions called “skid marks” have been observed and described by many authors since the first decades of the last century. These particular signs are found on bullets fired by revolver pistols and, in general, they are believed to be related to some small differences in the collimation between cartridge chamber axis and the barrel axis. Although it is not unlikely to observe such marks when revolver pistols are used, the formation and the resulting shape of the skid marks on fired bullets surface may depends on the physical characteristics (in particular caliber, mass, and hardness) of the ammunition. For this reason, the skid mark is not a constant in the totality of ballistic impressions left by a specific pistol. As a consequence, there is not a uniform opinion in the ballistic expert community of whether or not these impressions can be considered in the list of the characteristic ones.

Methodology: The present research is an attempt to perform a systematic evaluation of the skid mark value in the context of ballistic comparison. A uniform sample of twelve revolvers has been selected to study the skid mark features as well as its value with respect to the gun identification.

Results: The experimental tests have shown that the mechanism of formation of these ballistic impressions depends, for the same type, size, and effective mass of the projectile, on a set of individual characteristics of the gun (i.e. collimation between the cartridge chamber axis and barrel axis).

Conclusions: As a result, the collected data suggest that it is unlikely to observe skid mark coincidence for shape and position if the bullets are fired by different guns. Moreover, we have found that the presence of this mark characterizes the land impression in such a way that it is possible to use it to correctly phase the bullets during comparison.

Mr. Suraci has a degree in engineering, a Master’s in Environment Engineering, a PhD in Geotechnical Engineering, and a Master’s in Management Engineering. He has been with the Italian State Police since 1998 and is currently a Forensic Specialist Engineer.

Proposed Congruent Matching Profile Segments (CMPS) Method for Bullet Signature Correlations

John Song, Dr. Chu, and Dr. Daniel Ott

Overview: A Congruent Matching Profile Segments (CMPS) method is proposed at NIST for bullet signature correlation and error rate estimation. The captured 3D topographies on the land engraved areas (LEA) are processed by striation edge detection. The resulting 3D striation signatures are compressed into 2D profiles for representing the individual characteristics of bullet LEAs.

Methodology: The CMPS method is based on the principle of discretization. Each compressed profile of the LEA is divided into profile segments for accurate correlation using four identification parameters: the cross correlation function, the twist angle, the index number of correlated LEA, and the series number of correlated profile segments at each LEA.

For any correlated profile segment pair, if the four identification parameters are within the range of thresholds, it is considered as a CMPS. For any correlated bullet image pair, if the CMPS number is large enough, say, $\text{CMPS} \geq 6$, it can be concluded that this image pair is from the same source.

A set of test bullets fired from 10 consecutively manufactured gun barrels including 10 pairs of KM bullets for training and 15 unknown bullets for tests. The total correlations include 46 known-matching (KM) and 549 known-non-matching (KNM) comparisons with a total of 595 image pairs correlated by the CMPS method. Each pairwise bullet image correlation consists of 6×6 land comparisons. Two methods are used for calculating the CMPS scores. In both cases, there is a significant separation between CMPS scores of KNM and KM distributions, which means no false identification or false exclusion occurred.

Conclusions: Based on the principle of discretization, the CMPS method is proposed for bullet signature correlation using four identification parameters. Initial tests have shown that the CMPS method doesn't show any false identification and false exclusion. The CMPS method also enables an approach to estimating error rates based on statistical fitting of CMPS distribution models, and statistical analysis of the total number of the profile segments N , the number of the Congruent Matching Profile Segments CMPS, and the statistical distribution of the identification parameters.



John Song is a Project Leader for Forensic Topography and Surface Metrology and a Post-Doc research adviser at NIST. Dr. Chu is a Guest Researcher of NIST. Dr. Ott is a Post-Doc research associate of NRC/NIST.



Wednesday

The Reconstruction of a Single Shot Sniper-type Homicide

Don Dunbar

Overview: On September 21, 2011, at approximately 0300 hours, a 26-year-old man was returning to work from his “lunch” break. While waiting at a traffic signal, he was killed by a single gunshot to the right side of his neck.

Methodology: The victim had been removed from the driver’s seat of the vehicle prior to the arrival of laboratory personnel. Officers had photographed the victim in place prior to his removal, thereby establishing his position in the vehicle. The right front passenger window had most of its glass missing. Radial cracks were present in some of the remaining glass pieces. Some of the glass on the lower edge was precariously held in the rubber strip and leaning inward. Detailed photographs of the glass were taken with a scale present. A reconstruction of the shooting was conducted one week after the homicide, at the crime scene intersection, using the victim’s vehicle and information obtained from crime scene and laboratory examinations.

Results: Three glass fragments recovered from inside the vehicle had characteristic shapes from being adjacent to the impact point of a high velocity projectile. Comparing the optical properties of the recovered glass fragments, with the reference glass samples collected from the passenger window, allowed a determination that the projectile came from the outside of the vehicle. The point of bullet impact was determined and marked on a plastic overlay. The vehicle was returned to its original location at the scene of the homicide. A victim “stand-in” was utilized to sit in the driver’s seat with a mark placed on the position corresponding to the impact point on the neck. The possible positions of the shooter included a raised hillside adjacent to a power pole. This location would have been in the shadows of the otherwise well-lit intersection.

Conclusions: This homicide case was unusual in its implementation and its unknown motive. It also involves glass breakage patterns that some examiners may not be familiar with, which allow the bullet directionality to be determined.



Mr. Dunbar spent 31.5 years with the California Department of Justice, Bureau of Forensic Services as a Criminalist, and retired as Criminalist Supervisor.

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Electronic Resource Committee (ERC) Developments – GRC/Class Characteristics Matrix Databases and Safety Recall List

Eric Lawton & Adam Grooms

Overview: Over the last three years, the ERC has been developing a web-based version of the GRC and a class characteristics matrix for use by the general membership. This presentation will cover what has been developed to date, the overview of its functionality, quality assurance and ISO issues, and future endeavors.

Methodology: The concern amongst the AFTE community is the state of the FBI's General Rifling Characteristics (GRC) database. It has not been updated since 2010, and due to this, many examiners have stopped utilizing this resource. To remedy this, the ERC has collaborated with a website design company to integrate several databases, including the GRC, into the AFTE website. In their new location, the databases will be continually updated and maintained by AFTE members. Since these resources will be web-based, users will always have access to the most current editions. These databases will be membership-driven, therefore new editions will be dependent upon submissions by AFTE members.

Results: Both the GRC and Class Characteristics Matrix are fully operational. Additionally, the Safety Recall List has also been posted on the website. The Admissibility Resource Kit (ARK) has been moved from the SWGGUN website to the AFTE website where it is still being updated and maintained.

Conclusions: The ERC is always open to new ideas and your concerns, please feel free to contact one of our committee members if you have a question.

Wednesday



Ms. Lawton is the Supervisor and Technical Leader of the Broward Sheriff's Office Crime Lab Firearm and Tool Mark Unit. She has a Bachelor of Science in Chemistry, a Master of Science in Forensic Science, and has been a Firearm and Tool Mark Examiner for over 12 years. Erica is certified by the Association of Firearm/Tool Mark Examiners (AFTE) in the area of Firearms Evidence Examination and Identification and is currently a member of the Electronic Resource Committee, the Nominating Committee, and serves on the AFTE Journal Editorial Review Panel.



Mr. Grooms is the Chief of Firearms at the Alabama Dept. of Forensic Sciences in which he oversees three (3) ASCLD-LAB International accredited regional laboratories' Firearm and Tool Mark Identification units. He is currently a member of the (AFTE) Training Seminar Steering Committee and the Electronic Resource Committee.

Comparing 6000 Consecutively Fired .40 S&W Bullets and Cartridge Cases from a Sig Sauer P320 Pistol Utilizing Three-Dimensional and 2D+D Imaging and Objective Comparative Analysis

Erich D. Smith and Jennifer L. Stephenson

Overview: Following the presentation, attendees will be aware of the acquisition techniques used by two types of three-dimensional instruments (Sensofar and Cadre Forensics) and one 2D+D instrument (Evofinder), the correlation procedures used to interpret the data collected from test fired bullets and cartridge cases, the application of the results as it relates to firearms identification, variations occurring throughout the sequence, and interpretation of the variations.

Methodology: A total of 6000 cartridges were consecutively fired for this study over a period of two weeks. Of the 6000 cartridges, 342 were collected for analysis. Cartridge sets of 1-10, 91-100, 491- 500 and 991-1000 were collected and inter-compared for each 1000 cartridge interval. In addition to the multiple test fire sets, every 50th cartridge was collected. No parts of the pistol were cleaned until after cartridge 6000 was fired. The first test fire was used as the reference sample for comparative analysis against all of the subsequent test fires. Prior to the three-dimensional image acquisition, the bullets and cartridge cases were laser etched with a unique identifier and cleaned with acetone. Images of land impressions on the bullets were acquired using confocal microscopy and analyzed with the application of a cross-correlation function. Images of breech face marks on the cartridge cases were acquired using photometric stereo and analyzed with the application of a bidirectional reflectance distribution function. Both the cross-correlation and bidirectional reflectance distribution functions provided objective numerical values representing the similarity between two samples topography. The numerical values were used to determine if there was a significant variation of individual characteristics over the sequence of test fires and whether or not the variations would prevent a result of identification from being rendered. The bullets and cartridge cases were also examined by several firearms/toolmarks examiners to determine if they were still identifiable by traditional means. Photographs of the pistols barrel and breech face were taken prior to firing and at every 1000 round interval. These photographs serve as an additional indication of variation of individual characteristics over the sequence of test fires due to wear. The photographs also indicated the extent of buildup of brass, lead, and other residues over the lifetime of the pistol without cleaning.

Conclusions: This presentation will affect the forensic science community by establishing/developing an objective means to evaluate an identification and serve as a confirmation to the firearms/toolmarks theory of identification that the extent of sufficient agreement of individual characteristics occurring in toolmarks produced by the same tool exceeds that agreement which occurs in toolmarks produced by different tools. The presentation will also inform the forensic community to applications of emerging technologies within comparative based disciplines.



Jennifer L. Stephenson, MSFS*, Visiting Scientist, Counterterrorism and Forensic Science Research Unit, Federal Bureau of Investigation, Laboratory Division, 2501 Investigation Parkway, Quantico, VA; and Erich D. Smith*, MS, Forensic Examiner, Firearms/Toolmarks Unit, Federal Bureau of Investigation, Laboratory Division, 2501 Investigation Parkway, Quantico, VA

Halloween Ambush: An Execution of a Seattle Police Officer

R.T. Wyant

Overview: On Halloween 2009, Seattle Police Officer Timothy Brenton was parked with his trainee after a traffic stop when the patrol car was fired upon and Brenton was killed. His trainee, Britt Sweeney, returned fire striking the suspect's vehicle. Subsequent investigation linked the murder to a firebombing of a police facility just a few days earlier. During Brenton's memorial service, detectives located the suspect's vehicle with a repaired bullet hole. He confronted detectives and attempted to shoot one of them. The suspect was eventually wounded as he attempted to reach his fortified apartment. Forensic analysis of firearm and tool evidence located at all three crime scenes were linked to the suspect's residence. This was a complex, yet interesting case where traditional police work combined with forensic science help to bring resolution to the murder of a police officer.

Methodology: Although traditional methods were employed, this complex case involved the examination of items not normally seen in the firearms laboratory. Fuse holes from pipe bombs were compared to drill bits located in the suspect's residence. Creating exemplars for comparison became challenging and required empirical testing.

Results: After attempts with different methods, exemplar tests into similar material yielded suitable areas for microscopic comparison to the pipe bombs in evidence. The drill bits and bombs from the suspect residence were identified to each other as well as a bolt-cutter that was identified to the fencing at the first crime scene.

Conclusions: Bullet fragments, cartridge cases, tool marks from both improvised explosive devices and fencing effectively tied together the all of the crime scenes. It serves as a testament that persistence in creating suitable exemplars for comparison can be successful if one understands the practical application of tools.

Wednesday

R.T. Wyant is a distinguished member of AFTE and supervisor of the Seattle firearms laboratory. He instructs at the National Firearms Examiner Academy, served on the SWGGUN board, and authored a textbook on less lethal weapons.

The Effects of Measurement Resolution on the Comparison of Tool Mark Topography Data

Michael Stocker

Overview: A promising approach to improving the quality of tool mark data obtained in forensic laboratories is the measurement of the sample surface topography. Improvements in cost and capabilities of instruments for the optical measurement of surface topography have made this approach a viable alternative to the current practice of comparing sample images obtained using reflectance microscopy. A major advantage of measuring surface topography is that the measured data are less affected by variations in sample lighting conditions, focus, and sample reflectivity, thus facilitating the objective comparison of the actual tool marks. Instruments for measuring surface topography employ different measurement principles and have different performance characteristics. The presentation describes results of experiments conducted to improve understanding as to how these characteristics affect the ability to accurately discriminate same-source and different-source tool mark samples. This understanding is crucial to the development of measurement uncertainty in addition to measurement protocols and performance tests that yield consistent comparison results for different instruments, examiners, and laboratories.

Methodology: The presentation focuses on the effects of the lateral and vertical measurement resolution, i.e., the ability of the instrument to resolve height variations across and orthogonal to the sample surface. The surface topography of cartridge case breech face impressions were measured with three different instruments, two based on confocal microscopy and one on focus variation microscopy. Measurements were performed using different settings for the desired lateral and vertical resolution. The similarities among the obtained surface topography data were quantified using the normalized areal cross correlation coefficient.

Results: Initial focus variation based results show that comparisons of data obtained at increasing lateral resolutions cause a non-negligible decrease in the normalized cross correlation coefficient and require consideration of the filtering effects associated with the lateral instrument transfer function.

Conclusions: Areal surface topography measurement by optical methods is a useful emerging tool for evaluating similarity of tool mark data. Acquiring accurate topography data requires an understanding of the effect of instrument measurement resolution.



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 an A.A.S in Metrology from Butler County Community College and a B.S. of Computer Science from Hood College. He has been with the group since 2001 and has worked on various optics related projects for the semiconductor industry, fuel cell industry and tool mark forensics.

Institute of Standards and Technology stocker@nist.gov 301-975-5102

Case Report: Shot to the Head Without an Exit Wound

Dr. Jan Eckert

Overview: The presentation is about the case of a young woman who was shot in the head with a .223 Remington caliber rifle without an exit wound. The task was to find out if it is possible that she committed suicide.

Methodology: Shots at ballistic gelatine and synbone were captured with a high speed video camera and analyzed.

Wednesday



Dr. Jan Eckert is a firearms examiner at the Bundeskriminalamt (BKA) in Wiesbaden / Germany since 2009. He studied Fine Mechanics at the University of Applied Sciences Frankfurt a. M. and obtained a Ph.D. degree in Business Management. Besides his casework, he is Technical Assessor (Quality Assurance) and head of one firearms identification subunit.

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Lethality: Complications in Reporting and Testimony in Foreign Countries

Erica Lawton & Andre Horn

Overview: In some countries the firearms law can be vague and critical concepts not defined. This can become especially problematic in cases where questions of lethality are important for the courts to rule in their opinions. This presentation will cover two experts approach to a situation in which this occurred.

Methodology: During a recent case in the Royal Cayman Islands, the defense and state counsels requested their respective experts to examine evidence related to the unlawful possession of two CO2 powered pistols. During the preparation for trial, both examiners were asked to produce a joint statement for use in the court proceedings. A firearm is defined as a 'lethal barreled weapon' but lethal is not defined. Research into the question of lethality was conducted and compared to the evidence that was submitted under the case. Kinetic energy per cross-sectional area was agreed upon as the most accurate way to compare the research with the submitted evidence. Calculations were performed on research results known to be the most consistent with the evidence to compare like with like. These figures were presented to the court for their determination.

Results: A final joint statement was submitted to the courts for their decision and both examiners testified to the joint statement.

Conclusions: Research proved to be difficult, and published results inadequate for dealing with borderline cases. When dealing with this type of evidence, additional research into the question of lethality would benefit both the examiner and the courts in giving factual information.



Ms. Lawton is the Supervisor and Technical Leader of the Broward Sheriff's Office Crime Lab Firearm and Tool Mark Unit. She has a Bachelor of Science in Chemistry, a Master of Science in Forensic Science, and has been a Firearm and Tool Mark Examiner for over 12 years. Erica is certified by the Association of Firearm/Tool Mark Examiners (AFTE) in the area of Firearms Evidence Examination and Identification. She is a member of the Association of Firearm/Tool Mark Examiners, the International Association for Identification (IAI), and the Florida Division of the IAI and has given lectures at all three. She is currently a member of the Electronic Resource Committee, the Nominating Committee, and serves on the AFTE Journal Editorial Review Panel.



Andre is the Team Lead for Firearms and Toolmark Examinations at LGC Forensics in the UK. Prior to that, he was the Head of Forensic Firearms at the Forensic Science Laboratory of the South African Police in the Eastern Cape. He is a regular AFTE member and is a Bachelor of Medical Science. LGC Forensics is ISO 17025 accredited. Andre specializes in External Ballistics, Crime Scene Reconstruction and Wound Ballistics. He has presented papers and workshops at annual ENSFI Firearms and GSR conferences. He has been a Firearms and Toolmark examiner for more than nineteen years.

QCMS and Subclass

Stephen M. Deady

Overview: A ten barrel test (Ruger LC9 Steve Norris AFTE 2015) with prevalent subclass was analyzed using pattern matching, QCMS, and higher magnification ranges. A limited study was conducted using 10-12 QCMS trained FA examiners.

Methodology: Comparison microscopy utilizing both pattern matching and QCMS with discharged bullet to discharged bullet comparisons.

Results: Subclass did not meet 2D QCMS criteria when examined at higher magnification ranges. Identifications did meet and exceed 2D QCMS criteria at higher magnification ranges.

Conclusions: Specific to this study, QCMS used in conjunction with pattern matching and higher magnification ranges can eliminate subclass and assist in identifications.

Wednesday



Stephen is a distinguished life and certified (FA,TM,GSR) member of AFTE and a FATM examiner since 1987. He has worked as a New York City Police Department and Ocean County Sheriff's Office Firearms Technical Leader and as a firearms examiner at the New Jersey State Police. He has testified in state and federal courts, including a published Daubert Hearing. He has his own independent firearms laboratory and has been consulted in the USA and internationally.

Towards More Objective Acquisition & Comparison of Tool and Bullet Marks in Casework

Martin Baiker & René Pieterman

Overview: The traditional way of comparing tool or firearm marks is based on 2D comparison microscopy. This has the disadvantages that it requires the illumination of the samples to be adjusted manually and that the result of the examination is dependent on the experience of the expert. It therefore includes subjective judgments in the process. In addition, 2D microscopy has a limited focal depth, especially at high magnifications, and marks with a significant shape component, like bullets or blunt and sharp force traumas in bone, cannot easily be studied as a whole. Therefore the variety of the pieces of evidence that can be assessed is restricted. In the first part of the presentation, we will show several possibilities to overcome some of the restrictions of 2D comparison microscopy and to render daily casework more objective and efficient. With several examples from casework of tool and firearm examiners, we will demonstrate the advantages of using more objective 3D surface data of pieces of evidence. In addition, we will give examples of cases where using 3D surface data was crucial to the outcome of the investigation. In the second part of the presentation, we will demonstrate the Graphical User Interface 'Scratch', developed at the Netherlands Forensic Institute, that provides a virtual comparison microscope and that enables an examiner to automatically align and compare striated tool- and firearm marks and to derive the evidential power, the likelihood ratio, and error rates from a piece of evidence. Several additional features of virtual microscopy, like automated determination of the angle of attack of screwdriver marks or global shape removal, will be demonstrated, which are not available with conventional comparison microscopy.



Martin Baiker has worked with the Netherlands Forensic Institute since 2011 as a scientific researcher. His research focuses at objective acquisition and automated comparison of striated tool- and firearm marks and the evaluation of automated methods for forensic applications.



René Pieterman is a certified forensic examiner at the Netherlands Forensic Institute with many years of experience in toolmarks and firearms examination. He currently employs 3D surface technology in cases where it is difficult to study pieces of evidence with conventional 2D microscopy.

Wednesday

AFTE Crawfish Boil Spanish Plaza 5:30 p.m. until

Join us for a New Orleans tradition on Wednesday, June 1! The AFTE Crawfish boil, located at the Spanish Plaza which is adjacent to the hotel and the Riverwalk Market Place, is your chance to get messy (*casual attire is definitely recommended*) and have some fun while eating some great food!

The cost is \$20/person and covers 3-5 pounds of crawfish & 2 drinks!

A very special thank you to Sheriff Mike Cazes from West Baton Rouge Sheriff's Office and Jacob David of "Hole 'n' da Wall Seafood" for their help and support of the crawfish boil!



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Schedule of Events

Thursday, June 2

Registration

7 a.m. – 5 p.m. Registration Counters

Continental Breakfast

7 a.m. – 8 a.m. Versailles Ballroom

Technical Session

Location: Napoleon Ballroom

Morning Moderator: Lynette Lançon

Afternoon Moderator: Justin Bechaver



Time	Presenter	Page
8:00 a.m.	Announcements & Door Prizes	
8:05 a.m.	Deformation Analysis Based on Three-Dimensional Finite Element Method for Firing Pin Impression Shape Tsutomu Nitobe	58
	NIBIN as an Investigative Tool for Reduction in Violent Gun Crime: A Snapshot of Laboratory Methods and Successes from the Washington Patrol Crime Laboratory Jennifer M. Tardiff	59
8:55 a.m.	Different Types of Paintballs in the Market: Their Accessibility Could be Dangerous in the Wrong Hands Hery M. Figueroa Wong	60
9:25 a.m.	Break	
9:55 a.m.	Announcements & Door Prizes	
10:00 a.m.	Flight of Shotgun Slugs, Part II Evan Thompson	61
10:30 a.m.	Comparison of a .45 Auto Caliber Bullet Fired into the Muzzle of a .40 S&W Caliber Barrel Alan S. Hammond	62
11:00 a.m.	Raffle	
Noon	Lunch Break	

Thursday

Schedule of Events

Thursday

Time	Presentation	Page
1:20 p.m.	Ballistic Investigation on Lead Bullets in Presence of Oxidative/Corrosive Phenomena Pasquale Luca Iafelice	63
1:50 p.m.	Optimizing Ballistic Imaging Operations Lawrence Wein	64
2:20 p.m.	A Study on the Effects of the Break-In Period on Fired Cartridge Cases Amanda Gibson	65

Workshops (pages 68 - 77)

8:00 a.m.	Springfield XD/XDm Armorer's Course Oak Alley	
1:00 p.m.	Barrel Making Jasperwood	
1:00 p.m.	Report Writing and Testimony for Shooting Incident Reconstruction Belle Chasse	
1:00 p.m.	Objective Acquisition & Comparison of 3D Striated Tool Mark Data Elmwood	
1:00 p.m.	Quantitative Measurement and Automated Bullet Comparison Using High-Resolution and Optical 3D Surface Metrology Rosedown	
1:00 p.m.	Shooting Scenes – Staged and Not Stage – Find the Red Flag Indicators Magnolia	

Evening Activities

6:00 p.m.	Cocktail Hour Chemin Royale (1 st Floor of Hotel)	
7:00 p.m.	Banquet and After Party Grand Ballroom (1 st Floor of Hotel)	

Deformation Analysis Based on Three-Dimensional Finite Element Method for Firing-Pin Impression Shape

Tsutomu Nitobe

Overview: The reproducibility of the impression of a firing pin on a cartridge case is reduced when cartridges of different manufacture are fired in the same firearm. Many factors, such as the chamber pressure, cartridge case material, and amount and type of propellant, affect the marks produced on cartridge cases. However, these factors have not been evaluated quantitatively. The present study quantitatively evaluates the change in the firing-pin impression employing the three-dimensional finite element method (FEM).

Methodology: Experiments and FEM simulation were carried out for the simplified firing condition that the firing pin presses against the primer cup without propellant. In the experiments, the firing pin was pressed against the primer cup under the action of a tensometer. The models of the firing pin and primer cup in the FEM match the shapes of the firing pin and primer cup measured in the pressing experiment. The boundary conditions for the FEM simulation are fixed by comparing simulation and experiment results. The material and shape of the primer cup are changed in the FEM simulation.

Results: The FEM results were compared with the results of the pressing experiment. The firing-pin impression in the FEM simulation is similar to that obtained in the pressing experiment. The FEM simulation run under many conditions of the material and shape of the primer cup reveals that the firing-pin impression depends on the shape of the primer cup.

Conclusions: The FEM model for simulation of the pressing experiment is obtained. The firing-pin impression depends on the shape of the primer cup in the pressing experiment.



Tsutomu Nitobe is a researcher involved with firearms examination at the National Research Institute of Police Science. He has been in charge of open cases of shooting incidents in Japan since 2009. He joined AFTE in 2010.

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NIBIN as an Investigative Tool for Reduction in Violent Gun Crime: A Snapshot of Laboratory Methods and Successes from the Washington State Patrol Crime Laboratory

Jennifer M. Tardiff

Overview: This article will examine the methods adopted from those listed in the AFTE Journal Article in Volume 47 Number 4, January 2015 “The Denver Crime Gun Intelligence Center (CGIC): An Example of Successful Implementation of NIBIN as an Investigative Tool” as it pertains to the Washington State Patrol Crime Laboratory’s use of NIBIN.

Methodology: This paper seeks to examine the incorporations of methods used in the state of California as well as Denver and Connecticut within the Washington State Patrol Crime Laboratory system.

Results: As a result of incorporating other States’ methodologies, turnaround time has decreased, more real-time identifications (or hits) have occurred, and more agencies have joined the mission to create a more effective NIBIN database.

Conclusions: Since the Washington State Patrol Crime Laboratory has adopted the use of NIBIN as an investigative tool in its laboratory practices, in partnership with Seattle’s ATF CGIC (Crime Gun Intelligence Center) and cooperating agency task forces, there has been measureable success in creating investigative leads and potentially reducing violent gun crime.

Thursday



Jennifer Tardiff is the IBIS Technician for the Washington State Patrol Crime Laboratory Firearms section in Seattle, Washington and has been on board with the crime lab for over a year. Her experience before becoming the primary IBIS-trained operator for the State included being a Fingerprint Technician with the Washington State Patrol Criminal Records Division, working for the Washington State Senate as well as the Washington State Department of Corrections. She is a graduate of Central Washington University with a degree in Anthropology.

Jennifer.Tardiff@wsp.wa.gov

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Different Types of Paintballs in the Market: Their Accessibility Could be Dangerous in the Wrong Hands

Hery M. Figueroa Wong

Overview: This research has as its main purpose to prove how dangerous and/or lethal paintball markers with different types of round projectiles loaded into it could be. There are records of events in which the misuse of these types of weapons has injured and even killed.

Methodology: The research was developed to go through various phases. A series of pretests determined the performance of the paintball markers and what could be the longest range of the heaviest projectile. This part of the pretest also discovered the highest amount of rotations required to get to the highest pressure. The research performed under a controlled laboratory environment tested the different types of projectiles getting shot at a block of ballistic soap at a distance of five (5) meters. The ammunitions obtained were: regular paint balls, soft rubber paint balls, hard rubber paint balls, nylon paint balls, skull breaker balls, and chrome steel balls. After comparing the behavior of the ammunitions on the ballistic medium with the calculations performed, the factors observed and measured that influenced the force impact on the target were: the sectional density and the diameter of the projectile, the kinetic energy remaining at the impact with the target causing abrupt reduction of its acceleration, and its partial or complete power dissipation into the target.

Results: Regular paintballs did not reach the minimum velocity required to break through skin which is 49.68m/s but it was not so far from it, with a value of 49 m/s. The soft rubber balls reached the minimum velocity required to break through skin with a value of 66m/s. The hard rubber balls reached a minimum velocity of 79 m/s which is above the velocity required to break bones. The nylon balls reached a minimum velocity of 88 m/s which is above the velocity required to break through bones. The diameter of the skull breaker balls have differences with the marker caliber measurements, creating a gap. These projectiles, even when they have an air leak at the launching phase, the velocity and its hardness are enough to create considerable damage. The last group of projectiles tested were the chrome steel balls. Initially they did not reach five (5) meters. With their massive weight, this category of projectiles reached velocities between 15m/s and 17 m/s.

Conclusions: After performing the research with different types of projectiles available in the market, the following conclusions arose: the material of the projectile directly influenced the impact and dissipation or transfer of energy. The weight of the projectile has nothing to do with the amount of damage to the target. Some of these projectiles potentially exceed the limit of elasticity of the human skin, causing its rupture and in the worst case, cavitation. The projectiles with higher density and mass combined with velocity and momentum could create great damage due to their acceleration and force of impact; also, regardless to the type of material, they all could cause damage depending on its mass but as the weight increases, this will be a negative factor against the speed and flying distance of the projectile, because of the increase in weight, the traveling distance will be shorter. The hypothesis was fulfilled because as the projectiles density and mass increased, as the acceleration and force of impact gets higher, it penetrated deeper into the ballistic soap. In the last projectile category weight acted as great determining factor in which the target was moved half the distance to test the potential degree of damage that it could cause. The paintball markers as specified by the manufacturer, are not toys, and in combination with these projectiles could be harmful or fatal.



Mr. Wong has a Bachelor's Degree in Natural Sciences and a Master's in Education Computing. He is currently training as a Firearm and Toolmark Examiner with the Institute of Forensic Sciences of Puerto Rico, where he received certification as an Evidence Custodian Technician. Mr. Wong spent 4 years with the U.S. Army Military Intelligence Corps as an electronic voice and signal interceptor and translator and 7 years with the Transportation Security Administration.

Institute of Forensic Sciences of Puerto Rico

Flight of Shotgun Slugs, Part II

Evan Thompson

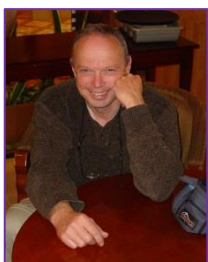
Overview: The presentation and eventual publication will assist firearm examiners if and when an errant 12 gauge shotgun slug is fired at an elevated angle, striking an individual downrange. The maximum range data as well as the ballistic gelatin data will go towards proving that shotgun slugs can go further than most individuals believe and that their striking energy can cause serious injury or death.

Methodology: Various brands of shotgun slugs were fired at an elevated angle and either heard passing overhead or striking the ground beyond 750 yards (685 meters). Later, the powder charge was reduced and the shotgun slug fired at terminal velocities into various types of ballistic gelatin.

Results: The maximum range data as well as the ballistic gelatin data will go towards proving that shotgun slugs can go further than most individuals believe and that their striking energy can cause serious injury or death.

Conclusions: The maximum range of fired slugs was surprising, and no one wants to be downrange and be struck by a one ounce of lead traveling at terminal velocity.

Thursday



Evan Thompson has been a firearm examiner since 1984, published numerous AFTE papers, and is a distinguished member of this great organization. Evan is employed by the Arizona Department of Public Safety Northern Regional Crime Laboratory-Flagstaff, Arizona. He has been a Forensic Scientist for over thirty years and will soon retire!



Comparison of a .45 Auto Caliber Bullet Fired into the Muzzle of a .40 S&W Caliber Barrel

Alan S. Hammond

Overview: An off duty officer was involved in a shoot-out with 2 armed assailants. The officer fired a .45 Auto caliber bullet that entered the muzzle of the assailant's .40 S&W pistol, impacting the live cartridge in the chamber and disabling the pistol.

Methodology: A microscopic comparison of the fired test bullets from the officer's and assailant's pistols to the fired bullet from the chamber of the assailant's pistol was performed.

Results: Copper jacket fragments sheared off as the bullet entered the muzzle; these were identified to the officer's pistol. The core of the fired bullet from the chamber possessed rifling characteristics of the assailant's firearm.

Conclusions: Swaging of the .45 Auto caliber bullet core by passage through the .40 caliber barrel imparted rifling characteristics of the smaller caliber barrel.

Mr. Hammond has a B.S. from Kentucky State University-May 1976. He worked with the Kentucky State Police Forensic Lab from July 1977 through August 1987, the Colorado Bureau of Investigation Forensic Lab from September 1987 through November 2007, and the Aurora PD Crime Lab from December 2007 to the present.

Ballistic Investigation on Lead Bullets in Presence of Oxidative/Corrosive Phenomena

Pasquale Luca Iafelice

Overview: The use of the comparison microscope is a well-established practice in ballistic investigation. This method, however, does not account for changes that may have occurred on the metal surface after the shot, possibly due to oxidative/corrosive actions. Indeed, in many forensic cases, the evidence bullets are collected from the victim's body after they have had interactions with muscle, tissue, bones and organs. Besides the possible morphological deformations, from a microscopic point of view, the contact with physiological fluids may change the reflectance and/or transmittance of the metal, thus affecting the aspect of the ballistic striations. This effect is all the more evident for lead alloy bullets.

Methodology: Inspired by a cold case investigation, the corrosive/oxidative effect produced by acidic substances (gases or liquids) has been simulated and studied to evaluate its impact on ballistic comparison. A series of lead amalgam wadcutter test bullets were fired using a 2.5 inch barrel revolver pistol. Two test bullets were selected and comparatively observed by means of both a traditional comparison microscope and a confocal microscope, while one of them was treated with a hydrochloric acid solution for different time/dilutions.

Results: The treated bullet appears to lose some of its ballistic fingerprint, with a "deletion" strongly dependent on the instrument used for the observation. The results show that, starting from a certain cancellation rate, it is possible to infer for a positive match only using a high-resolution device for the analysis, while the use of the comparison microscope results into a seeming failure of the CMS method, leading to the conclusion for a (false) negative match.

Conclusions: This result emphasizes the importance of developing new approaches to the ballistic examination that can take into account the effect of bias factors in the evaluation of ballistic evidence. In this respect, some preliminary quantitative results from a joint work with A. Hmelo and T. Kephart (Vanderbilt University, Nashville, TN) suggest the application of the SEM/EDX technology for forensic analysis of bullets.

Thursday

Pasquale Iafelice is Director of Forensic Investigation in the Italian State Police. He received his M.Sc. in Physics in 2004 and his Ph.D. in Physics in 2008 from the University of Bologna. Since 2013 he has served in the Ballistic and Gunshot Residues Analysis Unit of the Scientific State Police Headquarter, in Rome. He was appointed as an expert witness in digital forensic and ballistic in several criminal process.

Optimizing Ballistic Imaging Operations

Lawrence Wein

Overview: In an attempt to gain a clearer understanding of ballistic imaging operations, we use several years' worth of data from Stockton, CA to address three research questions: (i) how does the number of hits vary with the proportion of evidence that is processed, (ii) if there is not sufficient capacity to process all evidence, which evidence should be processed to maximize the hit rate, and (iii) for a given capacity to process evidence, in what order should the evidence be processed to maximize the number of useful hits, i.e., hits that are detected before the corresponding criminal case is closed.

Methodology: A mathematical optimization model was built that allows us to prioritize the evidence so as to maximize the hit rate when capacity is not sufficient to process all evidence. We also built a waiting line (or queueing model) model to compare two different approaches to order the evidence that is to be processed: First-Come First-Served (FCFS) and Last-Come First-Served).

Results: When capacity is limited, the hit rate is not linear, as in virtually every manufacturing and service operation, but rather is quadratic. Ranking cartridge types (i.e., caliber and make of gun) by their hit rate, and processing all evidence from only the top-ranking cartridge types, can significantly increase the hit rate. LCFS significantly increases the proportion of hits that are useful, although this raises serious equity issues.

Conclusions: These results imply that additional processing capacity can generate increasing returns to scale, and that the hit rate can be significantly increased by using a simple policy that groups and prioritizes different types of casings as well as prioritizing crime scene evidence over test fires.



Lawrence M. Wein is the Jeffrey S. Skoll Professor of Management Science at the Graduate School of Business, Stanford University. He received a B.S. in Operations Research and Industrial Engineering from Cornell University in 1979 and a Ph.D. in Operations Research at Stanford University in 1988. He has been awarded a Presidential Young Investigator Award, the Erlang Prize, the Koopman Prize, the INFORMS Expository Writing Award, the Philip McCord Morse Lectureship, the INFORMS President's Award, the Frederick W. Lanchester Prize, the George E. Kimball Medal, and a best paper award from Risk Analysis.

This is joint work with Mardy Beggs-Cassin, Firearms Unit, Stockton Police Department, Stockton, CA.

A Study on the Effects of the Break-in Period on Fired Cartridge Cases

Amanda Gibson

Overview: Multiple studies examine the effects that frequent discharges may have on the breech face of firearms, however no research has been conducted to analyze the effects of the recommended “break-in period” on the breech face of new firearms. This study seeks to minimize this gap in research by comparing fired cartridge cases from various firearms to factory-supplied cartridge cases.

Methodology: To conduct this research, 26 different slides were acquired and utilized. The slides ranged from having never been used, to having been used 1,500 times. Samples were collected in the agency's laboratory, at an outdoor range with the researcher present, or from previous studies. When possible, factory-supplied cartridge cases were collected for the slides used. If no factory-supplied cartridge cases were available, the first cartridge cases to be fired with a slide were considered equivalent.

Results: As a result of this study, the researcher found that the characteristic detail observed on the factory-supplied cartridge cases may or may not reproduce on cartridge cases fired after extensive firearm use.

Conclusions: While it is not common practice, this researcher suggests that there may be potential in using factory-supplied cartridge cases in instances where a firearm is not recovered. However, changes during the break-in period may hinder the analysis and comparison process conducted with those cartridge cases.

Thursday

Amanda Gibson completed her schooling after obtaining her master's degree from the University of Central Oklahoma. Mrs. Gibson started her career with the Kansas Bureau of Investigation in May 2014. She is also a graduate of the 2015 class of the National Firearms Examiners Academy.

Schedule of Events

Friday, June 3

Workshops (pages 68 - 77)



- | | |
|-----------------|--|
| 8 a.m. – 5 p.m. | Handgun Function and Repair
Melrose |
| 8 a.m. – 5 p.m. | Metallurgy for the Non-Metallurgist
Jasperwood |
| 8 a.m. – 5 p.m. | Bloodstain Patterns: Size, Shape, and Surface Considerations
Oak Alley |
| 9 a.m. – 5 p.m. | WWII Museum Tour
Meet in the Lobby |
| 8 a.m. – Noon | Successful PowerPoint Presentations
Magnolia |
| 8 a.m. – Noon | Ammunition Workshop
Elmwood |
| 8 a.m. – Noon | CartWin Pro
Rosedown |
| 9 a.m. – Noon | Serial Number Restoration and Barcode Deciphering
Belle Chasse |
| 1 p.m. – 4 p.m. | Hi-Point Familiarization/Armorer's Course
Belle Chasse |



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Leeds introduces the next generation firearms comparison microscope, the *Discovery-Z*. A powerful microscope built with Zeiss components, the *Discovery-Z* allows examiners to capture tiled and Z-stack images.

The *Discovery-Z* directly interfaces with the Zeiss Zen software, providing control of the Zeiss camera, as well as the 3-axis motorized stages.

To learn more about the Discovery-Z, visit Leeds booth #104 at AFTE to see a live demonstration.

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Poster Session Titles

The Poster Session allows for a more personalized experience during the seminar. Posters will remain displayed for the rest of the week.

Barrier Perforation Characteristics of Polycase ARX Ammunition

Peter Diaczuk, Andrew Winter, Jack Hietpas, Xiao Shan Law

Remington Model 51

Heather Dover

Marking on Fired Bullets From the Use of Suppressor at Crime Scenes

Kristen Drury

Glock Factory Tour in Smyrna, GA

Omar Felix

GSR Screen Printing: Nitrite Pattern Replication

Kathy Geil

The Use of 3D Measurement for Entries into the FBI GRC Database

Earl Gliem

Quantitative Characterization of Dot Matrix Printers for Comparison

Adam Hartley

Getting the Whole Story

Dale Justice

The Identification of a Slug back to an Altered Shotgun Barrel

Kasi Lancaster

St. Valentine's Day Massacre - Evidence Comparison Comparisons conducted by: Gary Lind and Mark Simonson of Firearm Forensics LLC

Gary Lind and Mark Simonson

Using Tabasco® Pepper Sauce to Remove Soot from Cartridge Cases

Cara McCarthy

Distinguishing Cartridge Cases Fired in Glock and Smith & Wesson Sigma Pistols by Class Characteristics

Eric Warren



Workshops

Sunday, May 29, 2016

Practical Shooting Incident Reconstruction

Instructors: Tim Scanlan and Jene Rauch, Jefferson Parish Sheriff's Office
Course Cost: \$80 (Lunch included)
Time: 9:00 A.M. – 4:00 P.M.
Location: JPSO Range

This workshop will focus on the practical techniques and principles utilized in shooting incident reconstruction. Too often reconstruction workshops focus on rarely used techniques or situations not commonly seen in casework. Utilizing a combination of lecture, case examples, and practical exercises, participants will be exposed to proven methods that can be applied to reconstructions while on the crime scene, or after the fact, when provided with sketches, reports, photographs, and evidence by investigators. The course will be held at a state-of-the-art indoor range facility that will allow for participants to do the following:

- Recreate actual crime scenes
- Process vehicles and other items for trajectory analysis
- Examine cartridge case ejection patterns
- Conduct other practical exercises

Meet in the Hilton Lobby at 8:00 am for bus ride to JPSO Range.

Rusted Firearms

Instructor: Derek Mears, Salt Lake City Police Department
Course Cost: \$80 (Lunch included)
Time: 9:00 AM - 4:00 P.M.
Location: JPSO Crime Laboratory

Firearms that have been purposefully “planted” in under water conditions will be accessed for this workshop. Classroom instruction on how to safely receive, handle, and unload such submissions will be covered and each student will receive a rusted gun to unload, clean, and prepare for test firing. Students will receive a set of pre-submersion test fires. The cleaned firearms will be test fired (by the instructor) after student clean up and the set of post cleaned samples provided so students will have pre- and post-clean examples to compare at their lab. Students are encouraged to dress casually, as they will be working with rusted firearms.

Students are to meet in the Hilton Lobby at 8:00 a.m. for bus ride to JPSO Crime Lab.

Fired Bullet Performance in Wood

Instructors: Dan Alessio, Oregon State Police Forensic Services
 Matthew Noedel, Noedel Scientific
Course Cost: \$80 (Lunch included)
Time: 9:00 A.M. – 3:00 P.M.
Location: Slidell Police Academy/Camp Villere

This workshop will examine bullet performance after impacting various wooden structures. Students in this course will work in groups to help organize experiments comparing test shots from pistols, rifles and

shotguns into plywood, press board, 2x4, 2x6 and other similar wooden structures. Variables will include the resulting appearance of angled shots that travel with the wood grain-vs-against the wood grain, deflection of pellets from shotgun patterns, and general performance of projectiles when perforation occurs. Experiments will include a variety of different ammunition including some unique “specialty” handgun ammunition.

Students are encouraged to bring cameras. Eye and ear protection will be provided.

Meet in the Hilton Lobby at 7:45 a.m. for bus ride to Camp Villere.

Suppressor Familiarization

Instructors: Zach Hall, Aklys Defense
Course Cost: \$80 (Lunch included)
Time: 9:00 A.M. – 3:00 P.M.
Location: Slidell Police Academy/Camp Villere

Taught by Aklys Defense suppressor research and design engineer Zach Hall, this class will be an overview of suppressor theory, discussion of design, manufacture and materials. Some discussion of the legal nature of suppressors will also be part of the course. A practical hands on demonstration of how suppressors function will also be included.

Meet in the Hilton Lobby at 7:45 a.m. for bus ride to Camp Villere.

Ruger LCP Armorer’s Course

Instructor: Bob Wood, Chief Armorer, Ruger Firearms
Course Cost: \$75
Time: 8:00 A.M. - 5:00 P.M.
Location: Jasperwood Room

This one day training course will familiarize the student with the LCP pistol. The course will cover an introduction, model variations, nomenclature, field and complete disassembly, inspections, trouble shooting, and function/cycle of operation. This is a hands on training course. All weapons, tools, and training materials will be provided. Writing utensils and safety glasses are recommended. Students should bring a flashlight.

AR-15 Armorer’s Course

Instructor: Frank Vigil, Heritage Gun Works
Course Cost: \$70
Time: 8:00 A.M. - 5:00 P.M.
Location: Belle Chasse Room

This one day training course will familiarize students with a complete understanding of the nomenclature, disassembly, reassembly, maintenance, and trouble-shooting of the AR-15 rifle.

Expert Witness Testimony Techniques for Firearm Examiners in a Post Daubert/NAS Report and Current NCFS Environment

Instructor: Ron Smith, President at Ron Smith & Associates, Inc.
Course Cost: \$45
Time: 8:00 A.M. – Noon
Location: Elmwood Room

Contrary to the public's perception, the majority of crime laboratories and forensic units do not have a formal and comprehensive expert witness testimony training program. This leaves the newly trained firearms examiner in the precarious position of learning to testify by attending the "School of Hard Knocks". Compound this lack of standardized training with the challenges to the forensic sciences since the "Daubert" decision and the NAS report and the courtroom environment becomes a potential mine field for the unprepared expert witness.

This ½ day workshop will focus on one basic premise, and that is: Jurors do not vote on the truth! They can only vote on their perception of the truth as they see it that day in court. It certainly is not our job as expert witnesses to convict, but it is incumbent upon us to testify in a manner which is believable and understandable, regardless of the verdict.

"Ring of Fire"

Instructors: Glenn Davis and Brian Smelser, Washington State Patrol Crime Laboratory
Course Cost: \$45
Time: 8:00 A.M. – Noon & 1:00 P.M. – 5:00 P.M.
Location: Oak Alley Room

This half day course will cover the history and firearms of the so-called "Ring of Fire" manufacturers such as Jennings, Bryco, Davis, Lorcin, Phoenix, Raven, Sundance, Sedco, Cobra, and Jimenez Arms. Students will be provided with an armorer's manual, as well as information on the various versions, functionality issues, and modifications observed in casework.

Forensic Double Casting Techniques

Instructor: Paul J. Murphy, Forensic Technology, Inc.
Course Cost: \$45
Time: 9:00 A.M. – Noon (3 Hour) & 3:00 P.M. – 5:00 P.M. (2 Hour)
Location: Rosedown Room

Forensic Double Casting, also known as "evidence cloning", is a technique used to make microscopic accurate resin replicas of fired bullets and cartridge cases (evidence or test fires) by making a RTV Silicone mold of the originals of the originals and pouring liquid urethane resin into the mold. The end result is a microscopic accurate urethane replica of the original items. This technique can also be applied for Tool Marks and is non-destructive. This technique is becoming an increasingly common practice to move evidence or reference material from one jurisdiction to another or from one country to another.

Sub-class Characteristics

Instructor: Nancy McCombs, California DOJ-Fresno
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Melrose Room

This half day 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.

MATCHPOINT Tips and Tricks for IBIS-TRAX HD3D Users

Instructor: Andrew Boyle, Forensic Technology, Inc.
Course Cost: \$35
Time: 1:00 P.M. – 3:00 P.M.
Location: Magnolia Room

The dynamic exhibit interaction IBIS-TRAX HD3D makes possible during comparisons can make screening correlation results extremely time consuming. This workshop will highlight an effective use of MATCHPOINT tools and image preferences that have been proven to make the reviewing process of both cartridge cases and bullets easy and efficient.

3D Virtual Microscopy of Cartridge Casings: Technology Intro and Hands-On

Instructors: Ryan Lilien, MD/PhD of Cadre Research Labs; Todd Weller, MS of Oakland PD; Alan Zheng, MS of NIST; Erich Smith, MS of FBI Laboratory
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Elmwood Room

The visual examination of an indirect 3D microscopic representation of an object has been referred to as “3D Virtual Microscopy.” In virtual microscopy the examiner views and manipulates the measured 3D representation of an object using a computer without physical access to the specimen. Questions remain on the best use of this technology; for example, can virtual microscopy take the place of physical examination or will virtual microscopy simply complement traditional examination?

This workshop will introduce the participant to virtual microscopy of cartridge casings through presentation, hands-on experience, and a panel/group discussion. The presenters will briefly introduce scanning technologies and demonstrate that an ideal virtual platform should be built using data from high-resolution 3D scanners capable of measuring in standard units. Instructors will discuss potential use cases and introduce prototype software.

Tuesday, May 31, 2016

Sig Sauer Armorer’s Course

Instructor: Curt Spanos
Course Cost: \$70
Time: 8:00 AM - 5:00 P.M.
Location: Oak Alley room

One day armorer certification for the P229 DAK Classic Pistol.

Wednesday, June 1, 2016

Glock Armorer's Course

Instructor: Joe Evans, Glock Armorer, Glock Firearms
Class Size: Limit 35
Time: 8:00 A.M. - 5:00 P.M.
Location: Oak Alley Room

This full day class will familiarize the student on how to maintain and service all handgun models. This class requires 100% attendance by the student. To successfully complete the class, the student must pass a written test with a minimum score of 80% and perform all practical tests as required. Practical tests consist of assembly/disassembly of the pistol.

Graduates receive certification as an armorer for 3 years and upon expiration of the certificate, they must recertify by attending the updated class again.

Benelli Nova Armorer's Course

Instructor: Gary Monreal, Team One Network
Course Cost: \$125
Time: 8:00 AM - 5:00 P.M.
Location: Jasperwood Room

Armorer Tools and Benelli shotguns are provided for use in the classes.

This course is structured to provide each student with a practical understanding of the advanced features that make Benelli shotguns unique. Students will gain armorer level, hands-on experience with the following Benelli shotgun systems:

- M1/M2, with Inertia Rotary Bolt System
- M3 Convertible Semi-Auto Pump Shotgun
- M4 with the patented unique Auto Regulating Gas Operated (ARGO) System
- Vinci Tactical Shotgun, with In-Line, Inertia-Driven, 3-Piece Modular System (new for 2014)
- Nova/SuperNova Polymer Technology Pump Action Shotgun

Student who successfully complete each course will receive Benelli Certification.

Firearm Classifications and Firearm Markings

Instructor: Dan O'Kelly, International Firearm Specialist Academy (GunLearn.com)
Course Cost: \$45
Time: 1:00 P.M. - 5:00 P.M.
Location: Elmwood Room

Firearm Classifications:

This workshop reviews the five categories of guns as defined under the Gun Control Act (Pistol, Revolver, Rifle, Shotgun, and "Other"). This training will provide attendees the ability to classify firearms, according to ATF definition and avoid mistakes. This session covers items which shoot, but are not firearms, and things which do not shoot, but which are firearms under federal law, as well as the installation of forearm braces, vertical fore-grips, "80%" receivers, and dummy (non-guns). This

session is perfect for firearm novices as well as seasoned firearm professionals who are looking to update their knowledge.

Firearm Markings:

A solid understanding of firearm markings is critical. The biggest number of mistakes on an ATF Form 4473 or an evidence tag (for law enforcement) can be inaccurate gun ID. Considering that old and foreign firearms are even more difficult, former ATF Special Agent and Firearm Specialist Daniel O'Kelly will teach how to sort the legally-required markings on a firearm from the sometimes purposely deceiving marks meant for marketing purposes. It is also essential for the law enforcement officer in order to accurately identify it for evidence purposes.

Thursday, June 2, 2016

Springfield XD/XDm Armorer's Course

Instructor: Gary Monreal, Team One Network
Course Cost: \$150
Time: 8:00 A.M. - 5:00 P.M.
Location: Oak Alley Room

This course is structured to provide each student with a practical understanding of the advanced features that make the Springfield family of firearms unique. Students will gain hands-on experience with the XD pistols, the safest polymer handgun available, bringing together a number of important safety innovations into one firearm. Students will receive practical skills on the 1911-A1 pistols the "warhorse" of combat pistols and the M1A rifle which is based on the legendary M-14 renowned for its accuracy, reliability and durability.

Shooting Scenes - Staged or Not Staged - Find the Red Flag Indicators

Instructor: Jan Johnson, Trainer and Consultant Forensic Pieces, Inc.
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Magnolia Room

This workshop will equip the attendee to recognize the characteristic "red flags" that are so often present but frequently overlooked within the crime scenes, which would allow the investigator to tell the difference between the incidentals versus sinister staging events. A systematic approach to evaluating the scenes will be presented which, if applied, should enable the attendee to identify the staged scenes and to properly discern whether the staging is benign or sinister in origin. Come and solve a few cases as we learn to "find the red flags".

Report Writing and Testimony for Shooting Incident Reconstruction

Instructors: Tim Scanlan and Jene Rauch, Jefferson Parish Sheriff's Office
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Belle Chasse Room

This workshop will serve as an overview for authoring crime scene reconstruction reports and testifying to those reports at trial. Specifically geared toward shooting incident reconstructions, this course will review actual cases that have gone through the trial process, demonstrating the crime scene to courtroom approach of presenting a case. Report writing for reconstructions requires incorporating scene information and diagrams into analytical reports. Providing testimony in shooting incident

reconstructions is complex and requires both general and specific knowledge of proper testimony skills and presenting complex cases through visual aids. This course is structured to be highly interactive, where students may present reconstruction diagrams, testify in mock courts, and view expert witness testimony.

Barrel-Making

Instructor: Allan Offringa
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Jasperwood Room

This workshop will cover the processes used to make barrels from start to finish.

Objective Acquisition & Comparison of 3D Striated Tool Mark Data

Instructors: Martin Baiker and Rene Pieterman, Netherlands Forensic Institute; Daniel Grossmann, Business Development; Brad Etter, Sales Manager US, Alicona
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Elmwood Room

The traditional way of comparing two striated tool or bullet marks is to use 2D comparison microscopy. This has the disadvantage that it requires the illumination of the samples to be adjusted manually and that the result of the examination is dependent on the experience of the expert. It therefore includes subjective judgments in the process

We will present several possibilities to overcome some of the restrictions of 2D comparison microscopy and to render daily casework more objective and efficient. We will demonstrate the principle and practical implementation of a non-contacting 3D surface acquisition technology, focus variation, that allows to measure pieces of evidence objectively, largely independent on the shape (e.g. form) of the sample and at very high resolution. We will also show how 3D data of marks can be studied and compared using a computer with a virtual comparison microscope and which additional features are available in comparison to 2D microscopy. Finally, an objective method for automated comparison of complete or partial striated marks and the calculation of likelihood ratios and error rates for forensic applications will be presented.

Quantitative measurement and automated bullet comparison using high-resolution optical 3D surface metrology

Instructors: Cristina Cadevall, Software Manager/PhD, Sensofar Tech; Bill Henderson, Eastern Region Manager, Sensofar LLC; Erich Smith and/or Jennifer Stephenson, FBI Labs
Course Cost: \$45
Time: 1:00 P.M. – 5:00 P.M.
Location: Rosedown Room

It is a general goal in the firearm and tool mark analysis sciences to provide quantifiable, objective information to assist the examiner with routine casework. Three-dimensional measurements of bullet surfaces enable quantifiable mathematical comparisons between any two surfaces, which can supplement traditional comparison microscopes or 3D virtual microscopy, which provide qualitative

information. In order to further that effort, we will present a method for making accurate topographic measurements of bullet land surfaces, along with a methodology to extract individual characteristics and calculate a composite comparison score between two bullets. This makes it possible to automatically process large batches of bullets for comparison and provide the examiners with a list of probable bullet matches by applying filtering criteria on comparison scores.

The course will cover the measurement of a three-dimensional surface of each individual land on a bullet using a high-resolution confocal microscope.

Friday, June 3, 2016

Handgun Function and Repair

Instructor: Keith Gipson, Trinidad State Junior College
Course Cost: \$75
Time: 8:00 A.M. – 5:00 P.M.
Location: Melrose Room

This one day seminar will focus in the design, function, and general repairs for revolvers and semi-auto handguns. The revolver presentation will focus on common revolver types, (Smith & Wesson, Ruger, and Colt) with discussion of others as time and interest may allow. Semi-auto handguns including inexpensive striker fired (Raven/Jennings), single action (1911 style), double action (Beretta 92), and Safe Action (Glock types) will be presented to illustrate the various firing and operating systems. These handguns are chosen as representative of the various types and also as they will likely be familiar to many of the participants, giving a common point of reference to help visualize some of the malfunctions and repairs.

Metallurgy for the Non-Metallurgist

Instructor: Dr. Dana Medlin, Ph.D., P.E., FASM, Engineering Systems, Inc. Omaha, NE
Course Cost: \$75
Time: 8:00 A.M. – 5:00 P.M.
Location: Jasperwood Room

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.
- 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.
- Review the fundamentals of metal corrosion, corrosive environments, why different metals respond differently to corrosion, and controlling/minimizing corrosion damage.
- Explain typical metal surface finishing techniques for firearms, the processes involved and the performance attributes.

The National WWII Museum

Moderator: Luke Haag
Tour Cost : \$100 (Lunch not included - 2 lunch venues at the Museum: American Sector & Soda Shop)
Time: 9:00 A.M. – 5:00 P.M.
Location: Andrew Higgins Drive at Magazine Street, N.O.

The National WWII Museum tour includes a one hour private tour conducted by one of the Museum's Curators, Beyond All Boundaries documentary produced by Tom Hanks exclusively for the National WWII Museum, Final Mission: The USS Tang Submarine Experience, and a self-guided tour of the Museum's permanent and special exhibits galleries.

Guests will have an opportunity to examine and handle pistols, rifles, sub-machine guns and machine guns from the United States, Great Britain, Germany, Japan, and the Soviet Union. The exact selection of what will be available for inspection and handling is subject to change depending on the exhibition needs of The National WWII Museum.

Meet in the Hilton Lobby at 8:15 A.M. for bus ride to the WWI Museum.

Bloodstain Patterns: Size, Shape, and Surface Considerations

Instructor: Jan Johnson, Trainer and Consultant Forensic Pieces, Inc.
Course Cost: \$75
Time: 8:00 A.M. – 5:00 P.M.
Location: Oak Alley Room

Bloodstain pattern recognition and identification are important pieces of the puzzle when attempting to reconstruct events that occur in violent crime scenes, and especially in shooting incidents. This 8 hour workshop will provide hands-on experience with scientific experiments that demonstrate the final appearance of blood on various targets. These experiments were designed to demonstrate the effects on bloodstains that are deposited on various surfaces, at various heights, and various angles. The participants will become familiar with the appearances of forward spatter, side spatter, and back spatter as they relate to shooting incidents. A review of the recommended Bloodstain Pattern Terminology in addition to abundant case studies will also be presented in this workshop.

Please bring your camera if you wish to document these experiments.

Serial Number Restoration and Barcode Deciphering

Instructors: Sheila Hopkins, Jodi Marsanopoli, & Howard Kong, ATF Laboratory Services
Course Cost: \$45
Time: 9:00 A.M. – Noon
Location: Belle Chasse Room

The Bureau of Alcohol, Tobacco, Firearms and Explosives will present a 3 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 should bring a lab coat. Protective eyewear will be provided.

Successful PowerPoint™ Presentation

Instructor: Jessica Winn, California DOJ-Fresno
Course Cost: \$45
Time: 8:00 AM – Noon
Location: Magnolia Room

This ½ day course will cover basic strategies for preparing slides in PowerPoint™ presentations for professional presentations or court. Topics will include how to format your slides for clarity, how much data should be put on a slide, the use and misuse of sound and animation, imbedding video clips, font and size selection for professional appearance, and the use of hyperlinks to help move through a presentation.

Ammunition Workshop

Instructor: George Kass, Forensic Ammunition Services
Course Cost: \$45
Time: 8:00 A.M. – Noon
Location: Elmwood Room

This course will cover the development of the cartridge, head stamps, reference material, bullets, color codes, reference collections, etc.

Hi-Point Firearms Familiarization/Armorer's Course

Instructor: Evan Thompson
Course Cost: \$45
Time: 1:00 P.M. – 4:00 P.M.
Location: Oak Alley Room

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.

CartWinPro

Instructors: Axel Manthei, CartWinPro
Course Cost: \$45
Time: 8:00 A.M. – Noon
Location: Rosedown Room

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 may also be hidden on the head stamp amongst the more obvious information. Demonstrations will show how CartWinPro can be applied to cases of determining caliber designations, color code designations, and additional bullet information important to the forensic examiner.

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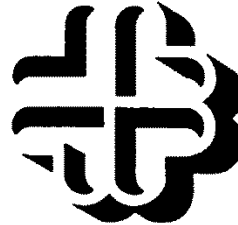
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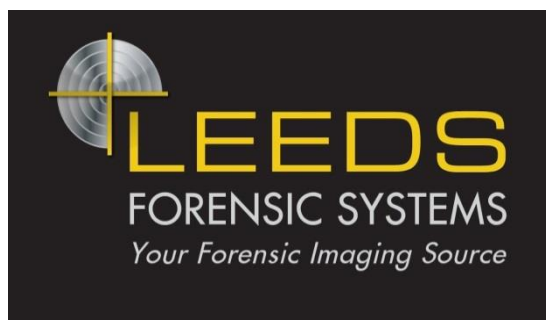
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Excerpt Taken from “A Brief History of Challenge Coins”

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 2016 Challenge Coins

In your welcome bags, you will find the AFTE 2016 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 2016 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 2016 Committee Member. GOOD LUCK!

Challenge Coin History

A Brief History of New Orleans

Excerpt taken from The History Channel, 2010: <http://www.history.com/topics/new-orleans>

France and the Founding of New Orleans

The first known residents of the New Orleans area were the Native Americans of the Woodland and Mississippian cultures. The expeditions of De Soto (1542) and La Salle (1682) passed through the area, but there were few permanent white settlers before 1718, when the governor of French Louisiana, Jean-Baptiste Le Moyne, Sieur de Bienville, founded the city of Nouvelle-Orléans on the first crescent of high ground above the Mississippi's mouth. In 1722 he transferred Louisiana's capital from Biloxi. The same year a hurricane destroyed most of the new city, which was rebuilt in the grid pattern of today's French Quarter.

New Orleans under Spanish Rule and the Louisiana Purchase

In 1762 and 1763 France signed treaties ceding Louisiana to Spain. For 40 years New Orleans was a Spanish city, trading heavily with Cuba and Mexico and adopting the Spanish racial rules that allowed for a class of free people of color. The city was ravaged by fires in 1788 and 1794 and rebuilt in brick with buildings and a cathedral that still stand today. In 1803 Louisiana reverted to the French, who sold it to the United States 20 days later in the Louisiana Purchase. The final battle of the War of 1812 was fought in defense of New Orleans; Colonel Andrew Jackson led a coalition of pirates, free blacks and Tennessee Volunteers to defeat a British force outside the city.

New Orleans in the 1800s

During the first half of the 19th century, New Orleans became the United States' wealthiest and third-largest city. Its port shipped the produce of much of the nation's interior to the Caribbean, South America and Europe. Thousands of slaves were sold in its markets, but its free black community thrived. At the start of the Civil War, New Orleans was the largest city in the Confederacy, but it was only a year until Union troops, having captured its downriver defenses, took the city unopposed. During the Reconstruction era race became a potent political force, as emancipated slaves and free people of color were brought into the political process and, with the 1870s rise of the White League and the Ku Klux Klan, forced back out of it. Although the rise of railroads made shipping on the Mississippi less essential than it had been, New Orleans remained a powerful and influential port.

New Orleans in the 20th Century

By 1900, the city's streetcars were electrified, and New Orleans jazz was born in its clubs and dance halls. The city grew. New pump technology drove the ambitious draining of the low-lying swampland located between the city's riverside crescent and Lake Pontchartrain. New levees and drainage canals meant that many residents could live below sea level. Hurricanes in 1909, 1915, 1947 and 1965 damaged the city, but never catastrophically. After World War II, suburbanization and conflicts over school integration drew many white residents out of the city, leaving a core that was increasingly African-American and impoverished. Despite these social changes, the city grew as a tourist attraction, with hundreds of thousands of annual visitors drawn to its Mardi Gras festivities and to the culture that had inspired playwright Tennessee Williams, trumpeter Louis Armstrong and Chef Jean Galatoire.

New Orleans and Hurricane Katrina

On August 29, 2005, Hurricane Katrina struck a haphazardly evacuated New Orleans. The Category 5 storm's winds tore away roofs and drove a storm surge that breached four levees, flooding 80 percent of the city. Hundreds were killed in the flooding and thousands were trapped for days in harsh circumstances before state and federal rescuers could reach them. The waters receded, but a year later only half the city's residents had returned. Within five years 80 percent were back, but New Orleans—though as diverse, unique and historic as ever—remained far from reclaiming its 1930s nickname, "the city that care forgot."

AFTE Member Favorites



New Orleans Street Car

Between the Canal-Cemeteries / Canal-City Park Museum / Loyola-Uptown / Riverfront / St. Charles Streetcar Lines the entire city is at your beck and call! Streetcars in New Orleans offer \$1.25 fares and can be paid with exact change when you board.

New Orleans Museum of Art (NOMA)

NOMA, New Orleans' oldest fine arts institution, opened on December 16, 1911 with only 9 works of art. Today, the museum hosts an impressive permanent collection of almost 40,000 objects. The collection, noted for its extraordinary strengths in French and American art, photography, glass, and African and Japanese works, continues to expand and grow.

Hours: Tue-Thurs 10 a.m.-6 p.m. / Fri 10 a.m.-9 p.m. / Sat 10 a.m.-5 p.m. / Sun 11 a.m.-5 p.m.

Cost: \$10/Adult - Sculpture Garden is Free

WWII Museum

The National WWII Museum tells the story of the American Experience in *the war that changed the world*—why it was fought, how it was won, and what it means today—so that all generations will understand the price of freedom and be inspired by what they learn.

Hours: 7 Days a Week 9 a.m.-5 p.m.

Cost: \$24/Adult (Veterans are Free)

Audubon Nature Institute

Dive into worlds of exotic marine life at Audubon Aquarium of the Americas, escape to BIG adventures at the Entergy Giant Screen Theater, take a walk on the wild side at Audubon Zoo and discover Audubon Butterfly Garden and Insectarium!

Go to <http://audubonnatureinstitute.org/> for hour and ticket information.

Riverwalk Outlets

The Outlet Collection at Riverwalk – the nation's first upscale outlet center in a downtown setting – is proud to open in the heart of New Orleans. Featuring over 75 retailers and restaurants on the bank of the majestic Mississippi River, The Outlet Collection at Riverwalk offers shoppers and diners an experience like no other.

Haunted History Tours

Are you afraid of ghosts? If it doesn't say haunted history tours then it isn't the original Ghost Tours, Vampire Tours, Cemetery Tours, Scandal Tours, Garden District Tours, and Voodoo Tours of New Orleans! These are the New Orleans tours you've heard about featured on A&E, History Channel, Discovery Channel, Sci Fi Channel, Fox Network, and recommended by The Travel Channel.

Hours: 7 Days a Week

Cost: \$25/Adult

Mardi Gras World

Missed out on Mardi Gras this year? Since 1947, artists and craftsmen have designed and built the oldest and biggest parade floats and attractions for each Mardi Gras season, with over 500 floats built and decorated each year. Visit Mardi Gras World to get a taste of New Orleans!

Hours: 7 Days a Week, 9 a.m.-5:30 p.m.

Cost: \$19.95 General Admission

Fun Things to Do in NOLA

Thank you Hi-Point!



The 2016 Host Committee offers its sincere condolences to the Deeb and Hi-Point families on the passing of Tom Deeb. At the time of his death, Tom had been working with us on making our meeting a success, as he had done for many host committees. We would like to thank Mike Strassell, President of Hi-Point Firearms, for honoring Tom by continuing to support the First-Time Attendee and Workshop Program.



We hope you enjoyed your time with us! See you in Denver!

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AFTE 2017 DENVER

48th Annual Training Seminar

May 14th – May 19th, 2017

“Guns with Altitude”



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Ground Transportation: The Grand Hyatt hotel is located 25 miles from Denver International Airport (DIA). The Grand Hyatt does not offer complimentary shuttle services to/from the airport.

Taxi: \$55 one way

SuperShuttle: \$25 one way

Light Rail and a short free Mall Ride: \$9 one way

Hotel Room Rate: Prevailing Government Rate (\$163 per night) will be offered for single/double occupancy rooms. This rate will be honored 3 days before and 3 days after the conference (5/9-5/22) based on availability. The local tax rates are 14.75%. Please be sure to identify yourself as an attendee of the AFTE 2017 training seminar and make your reservation before April 21, 2017.

Guest Parking: The Grand Hyatt offers valet onsite covered parking for \$37 a night.

Guest Amenities & Services: Newly renovated rooms featuring 42” HD flat screen televisions and complementary Wi-Fi in each room. The hotel features a 24-hour FedEx business center, 24-hour StayFit gym, outdoor rooftop jogging track and outdoor tennis court at the rooftop Skycourt, indoor heated pool with an outdoor deck.

Attractions and Activities: The Grand Hyatt Hotel is conveniently located in the heart of downtown Denver. There are numerous great restaurants, coffee shops, local breweries and entertainment within walking distance. The famous 16th Street pedestrian mall is located just three blocks from the hotel. There is a free mall shuttle can transport you from the State Capitol all the way to the newly renovated Union Station. Downtown Denver offers amazing shopping, gourmet food, museums, parks, bike paths, sporting events and more. Walk to all the nearby attractions or take advantage of the Denver’s rental bicycles, B-cycle, located throughout the downtown area.

Please visit the www.AFTE.org website for host committee information and further details.



AFTE 2017- Denver