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Toolmarks Examination
Test No. 25-5282 Summary Report

Each participant received a sample pack containing tool(s) and material(s) with questioned toolmarks, which they were asked to examine. Data were returned from 127 participants and are compiled into the following tables:

This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

Manufacturer's Information

Each sample pack contained tool(s) and material(s) with questioned toolmarks. Participants were asked to determine if any of the questioned toolmarks were made by the submitted tool(s).

SAMPLE PREPARATION: To assist examiners, each piece of solder wire was marked with paint to identify it to its item number. Before use, each v-notch wire stripper was inspected for defects and then "broken in" by cutting solder wire to remove any manufacturing residue.

IDENTIFICATION ITEMS: The solder wires were cut with the provided V-notch wire stripper.

ELIMINATION ITEMS: The solder wires were cut with a different tool, a diagonal cutter, which was not provided for examination

SAMPLE PACK ASSEMBLY: The elimination items were placed into their respective pre-labeled envelopes and sealed. The identification items were also placed into their respective pre-labeled envelopes and sealed. The corresponding tool for each identification item was labeled, packaged in bubble wrap, and placed directly into the same pre-labeled sample pack box as its associated identification item. Subsequently, one of each of the elimination items was packaged into a pre-labeled sample pack box along with additional material (unmarked solder wire) intended for testing purposes.

VERIFICATION: Predistribution results were consistent with each other and the manufacturer's preparation information. In addition, ten randomly selected sample packs were verified by a qualified toolmark examiner who confirmed the manufacturer's preparation information.

Item	Known/ Questioned	Identification/ Elimination	Tool	Material Description
1	Known	--	Pittsburgh® 5" V-Notch Wire Stripper	--
2	Questioned	Elimination	Craftsman® 6" Diagonal Cutter	Oatey® 0.117" 95/5 Lead Free Solder Wire (with blue paint)
3	Questioned	Identification	Pittsburgh® 5" V-Notch Wire Stripper	Oatey® 0.117" 95/5 Lead Free Solder Wire (with red paint)

Summary Comments

This test was designed to allow participants to assess their proficiency at a toolmark examination involving striated, impression marks. Participants were supplied with one v-notch wire stripper (Item 1) and two pieces of solder wire containing questioned toolmarks (Items 2 and 3). The toolmarks on Item 3 were created with the Item 1 tool that was provided for examination. The toolmarks on Item 2 were created by a tool (diagonal cutter) that was not provided for examination. Refer to the Manufacturer's Information for preparation details.

Among the 127 responding participants, 121 (95%) identified the toolmarks on Item 3 and either eliminated or reported inconclusive for Item 2 as having been created by the Item 1 tool. Of the remaining six participants, four eliminated or reported inconclusive for both Items 2 and 3, one identified both Items 2 and 3, and one identified Item 3 but did not report a response for Item 2 as having been created by the Item 1 tool.

Examination Results

Were the questioned toolmarks on either of the pieces of solder wire (Item 2 and Item 3) produced by the suspect's wire stripper (Item 1)?

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
2HWQUP	No	Yes	AFXBWJ	No	Yes
37UU6R	No	Yes	AG9CJH	No	Yes
3ETCLP	No	Yes	ANTFQK	No	Yes
3N2UDV	Inc	Yes	BMEDDK	No	Yes
3Q8AQT	No	Yes	C8ETBM	No	Yes
3VBHQU	No	Yes	CJAZBD	No	Yes
4EMLPQ	No	Yes	CLZ9EM	No	Yes
4VW7TP	No	Yes	CPYJBM	No	Yes
66YTDU	No	Yes	CQU3CN	No	Yes
7TFWRM	No	Yes	CUPUKK	No	Yes
87HQH3	No	Yes	D7G3HD	No	Yes
88RWVR	No	Yes	DAFBTF	No	Yes
89MEXT	No	Yes	DAX6PJ	No	Yes
8NGWTH	No	Yes	E2M34H	No	No
8PCK6L	No	Yes	EF4F2A	No	Yes
8YKUWL	No	Yes	EW7ZWD	No	Yes
9C6U8K	No	Yes	EYDF4J	No	Yes
9FJRCM	No	Yes	EYWWPD	No	Yes
9LRUG3	No	Yes	FBJVMT	No	Yes
9UPK7K	No	Yes	FP3DHH	No	Yes
9VFQKP	No	Yes	G44AGB	No	Yes
9XL9JK	No	Yes	G7ARJD	No	Yes
9ZCCCR	No	Yes	GEJGWB	No	Yes
A7AJ7K	No	Yes	GW2HRD	No	Yes
AD7GTN	No	Yes	H69GW9	No	Yes
AEM9BK	No	Yes	H9QJ4E	Yes	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
HMBY7D	No	Yes	QFX68Z	No	Yes
HMNPWA	No	Yes	QGTN92	No	Yes
HPFMQA	No	Yes	QKF8E6	No	Inc
HQBA3D	No	Yes	QKVMNZ	No	Yes
HR7T4E	No	Inc	QLBQF8	No	Yes
HW2KCC	No	Yes	QU2CJJ	No	Yes
JJQNC7	Inc	Yes	R4L3L3	No	Yes
JKFWFF	No	Yes	R7RM8G	No	Yes
JU4QRC	No	Yes	RAQ2U7	No	Yes
KF2LZQ	No	Yes	RFFJ9H	No	Yes
KQMNK8	No	Yes	RM2CL3	No	Yes
KTT998	No	Yes	RW222J	No	No
KYGN47	No	Yes	TCC634	No	Yes
KZP7VA	No	Yes	TCCZR2	No	Yes
LAWZU9	No	Yes	TH6Z7W	No	Yes
LKPLUC	No	Yes	THL4WH	No	Yes
LRE4A9	No	Yes	TJV9A7	No	Yes
M793G3	No	Yes	TQWK74	No	Yes
M8YBKC	No	Yes	TUWV24	No	Yes
MXC9J4	No	Yes	TZ2DWJ	No	Yes
NJTPHM	No	Yes	U9BCNZ	No	Yes
P3JKA2	No	Yes	UD6B3V	No	Yes
PCN9M9		Yes	UDZXEY	No	Yes
PD2YD4	No	Yes	UGLDAZ	No	Yes
PER47B	No	Yes	UXAT86	No	Yes
PYGFY3	No	Yes	V676LY	No	Yes
PYGKA6	No	Yes	VAF9QF	No	Yes
Q497K4	No	Yes	VAKQNE	No	Yes

TABLE 1

WebCode	Item 2	Item 3	WebCode	Item 2	Item 3
VCLQQW	No	Yes			
VG4UX2	No	Yes			
VXPCQ3	No	Yes			
W2676E	No	Yes			
W6H4C2	No	Yes			
WCHNEW	No	Yes			
WM7F6V	No	Yes			
WNWLJZ	No	Yes			
X83FNC	No	Yes			
XB2RMX	No	Yes			
XB74AT	No	Yes			
Y7QZUB	No	Yes			
YUCYGQ	No	Yes			
YV8LTU	No	Yes			
Z4XJZT	No	Yes			
ZKHBYT	No	Yes			
ZLDT2U	No	Yes			
ZQRD4A	No	Yes			
ZRMW6B	No	Yes			

Response Summary

Total Participants: 127

Were the questioned toolmarks on either of the pieces of solder wire (Item 2 and Item 3) produced by the suspect's wire stripper (Item 1)?

	ITEM 2	ITEM 3
Yes	**1** *(0.8%)*	**123** *(96.9%)*
No	**123** *(96.9%)*	**2** *(1.6%)*
Inc	**2** *(1.6%)*	**2** *(1.6%)*

Conclusions

TABLE 2

WebCode	Conclusions
2HWQUP	In my opinion, the exhibit wire, Item 2, was not cut using the exhibit wire cutters, Item 1. In my opinion, the exhibit wire, Item 3, was cut using the exhibit wire cutters, Item 1.
37UU6R	Item 2 was not cut using the wire stripper recovered from the suspect. Item 3 was cut using the wire stripper recovered the suspect.
3ETCLP	THE TOOLMARKS ON EXHIBIT 3 (ITEM 3) WERE IDENTIFIED AS HAVING BEEN MADE BY EXHIBIT 1 (ITEM 1), THE SUBMITTED WIRE STRIPPER. THE TOOLMARKS ON EXHIBIT 2 (ITEM 2) WERE NOT MADE BY EXHIBIT 1 (ITEM 1), THE SUBMITTED WIRE STRIPPER, BASED ON DIFFERENCES IN CLASS CHARACTERISTICS.
3N2UDV	1.The piece of wire, Exhibit 2, was neither identified nor eliminated as having been cut with the wire stripper, Exhibit 1. 2.The piece of wire, Exhibit 3, was identified as having been cut with the wire stripper, Exhibit 1.
3Q8AQT	Examinations showed the tool marks on Item 2 were not created by Item 1. Examinations showed the tool marks on Item 3 were created by Item 1.
3VBHQU	Q1/Item#1-Q1 is a Pittsburgh brand V-Notch wire stripper tool with a carbon steel finish and green-colored vinyl grips, approximately 5-1/4" total length and 2-9/16" total width. It is suitable for comparison purposes.; Q2/Item#2-Toolmarks present on item Q2 were microscopically examined, compared, and eliminated as having been produced by the same tool as item Q1. (Elimination); Q3/Item#3-Toolmarks present on item Q3 were microscopically examined, compared, and identified as having been produced by the same tool as item Q1. (Identification); K1/Item#4-Sub-item K1 (wire pieces) were used to produce test mark samples (TM#1-5) of item Q1, for comparison purposes.; (Q=Question, K=Known)
4EMLPQ	a. Toolmark in piece of wire identified as Item 2 (marked with blue paint), were not produced by cable stripper identified as Item 1. 2. b. Toolmark in piece of wire identified as Item 3 (marked with red paint), were produced by cable stripper identified as Item 1.
4VW7TP	Microscopic examination and comparison reveal that the questioned toolmarks on Item 1.C were made by the tool, Item 1.A, based on agreement of class and individual characteristics. Microscopic examination and comparison reveal that the questioned toolmarks on Item 1.B were not made by the tool, Item 1.A, based on disagreement of class characteristics. Microscopic examination reveals that the questioned toolmarks on Item 1.B are suitable for further comparison and are consistent with having been made by a pinching tool. Item 1.D was inspected to verify and document contents. No analysis was performed on the item listed. 1.A = tool 1.B = Item 2 1.C = Item 3 1.D = reference wires
66YTDU	The toolmarks present on the piece of solder wire (Item 3) were produced by the suspect's wire stripper (Item 1). The toolmarks present on the piece of solder wire (Item 2) were produced by another type of tool.
7TFWRM	The Exhibit 1 wire strippers were used to make test toolmarks. The test toolmarks were designated as Exhibit 1.1. The Exhibit 3 metal segment toolmarks were identified as having been made by the Exhibit 1 wire strippers. The Exhibit 2 metal segment toolmarks were excluded as having been made by the Exhibit 1 wire strippers.
87HQH3	The Item 3 piece of wire was examined microscopically and identified as having been cut by the Item 1 tool based on corresponding class and individual characteristics. The Item 2 piece of wire was examined microscopically and eliminated as having been cut by the Item 1 tool based on differences in class and individual characteristics.
88RWVR	The toolmarks on Item 2 were not made by the wire stripper in Item 1 based on a disagreement of class characteristics. The toolmarks on Item 3 were made by the wire stripper in Item 1 based on an agreement of class and individual characteristics.
89MEXT	[No Conclusions Reported.]
8NGWTH	1. The wire stripper, Item 1, was identified as having cut the wire, Item 3. 2. The wire stripper, Item 1,

TABLE 2

WebCode	Conclusions
	was eliminated as having cut the wire, Item 2.
8PCK6L	The suspect's wire stripper, Item 1, was used to produce the questioned toolmarks on Item 3. The suspect's wire stripper, Item 1, was not used to produce the questioned toolmarks on item 2.
8YKUWL	Based on the comparative examination, the toolmark observed on the solder wire fragment marked as Item 2 exhibits morphological characteristics that are inconsistent with those of the toolmark found on Item 3, as well as with the test marks produced using Item 1. Therefore, Item 2 was not cut or stripped by Item 1. In contrast, the toolmark observed on the solder wire fragment marked as Item 3 shows sufficient agreement in class and individual characteristics with the test marks produced by Item 1. Accordingly, it is concluded that the toolmark on Item 3 was made by the suspect's wire stripper (Item 1).
9C6U8K	The toolmarks on exhibit 3 (Item 3) were identified as having been made by exhibit 1 (Item 1), the submitted wire stripper. The toolmarks on exhibit exhibit 2 (Item 2) were not made by exhibit 1 (Item 1), the submitted wire stripper, based on differences in class characteristics.
9FJRCM	Examinations showed the toolmarks present on Item 3 were made by Item 1. Examinations showed the toolmarks present on Item 2 were not made by Item 1, due to a difference in class characteristics.
9LRUG3	Items 1B and 1C (pieces of wire solder) and test marks from Item 1A were physically examined then microscopically compared using light comparison microscopy. Tool marks observed on Item 1C (piece of wire solder) are identified as having been produced by Item 1A (wire stripper). Tool marks observed on Item 1B (piece of wire solder) are eliminated as having been produced by Item 1A (wire stripper). There are differences in class characteristics (tool action - pinching vs shearing; and machining marks - angled vs perpendicular).
9UPK7K	Item 2 was not cut by the Item 1 wire stripper. Item 3 was microscopically identified as having been cut by the Item 1 wire stripper.
9VFQKP	Based on the results of the investigation, it is clear that the toolmark item 3 was caused by the tool item 1. Based on the results of the investigation, it can be ruled out that the toolmark item 2 was caused by the tool item 1.
9XL9JK	The toolmarks on the cut wire, Lab Item 2, were eliminated from having been produced by the tool, Lab Item 1, based on disagreement of class characteristics using microscopic comparison. The toolmarks on the cut wire, Lab Item 3, were identified as having been produced by the tool, Lab Item 1, based on agreement of class characteristics and corresponding individual detail using microscopic comparison.
9ZCCCR	The results extremely strongly support that the toolmarks on Item 3 was produced by the wire stripper Item 1 (Level +4). The results support that the toolmarks on Item 2 were not produced by wire stripper Item 1 (Level -X).
A7AJ7K	The comparison showed no match for item 2. For item 3, a match could be found. It is certain, that the toolmarks on Item 3 have been caused by the wire stripper.
AD7GTN	Toolmarks present on the Item 3 solder were identified as having been produced by the Item 1 wire stripper/cutter. Toolmarks present on the Item 2 solder were eliminated as having been produced by the Item 1 wire stripper/cutter due to a difference in class characteristics.
AEM9BK	Item 1 was examined and test standards were made for future reference and comparison purposes. Disagreement of class characteristics confirmed item 2 was not cut by item 1. Agreements of class characteristics and sufficient agreement of individual characteristics confirmed item 3 was cut by item 1.
AFXBWJ	1. Exhibit 1 is a Pittsburgh brand wire stripper. a. Examination disclosed that it is designed as a bypass shearing tool. b. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2. Exhibit 2 contains one piece of cut wire. a. Examination disclosed damage that is consistent with an opposed jaw cutting tool such as diagonal cutters or similar tool. b. Microscopic comparison disclosed disagreement of class characteristics to conclude that Exhibit 2 was not cut by Exhibit 1. 3. Exhibit 3 contains one piece of cut wire. a. Microscopic comparison disclosed sufficient agreement of class and individual characteristics to conclude that Exhibit 3 was cut by Exhibit 1.

TABLE 2

WebCode	Conclusions
AG9CJH	Microscopic examination and comparison reveal that the questioned toolmark on Item 1.C was made by the tool, Item 1.A, based on agreement of class and individual characteristics. Microscopic examination and comparison reveal that the questioned toolmark on Item 1.B was not made by the tool, Item 1A, based on disagreement of class characteristics. Microscopic examination reveals that the questioned toolmark on Item 1.B is suitable for further comparison and is consistent with having been made by a pinching tool. Item 1.D was used to generate test marks with the tool, Item 1.A.
ANTFQK	Examinations showed that the toolmark on Item 3 (N-2) was produced by Item 1 (NTI-1) wire stripper. Examinations showed that the toolmark on Item 2 (N-1) was not produced by Item 1 (NTI-1) wire stripper.
BMEDDK	after examination it was found that item 3 (red paint) matched with the control made from item 1 whereas item 2 (blue paint) did not matched with the control
C8ETBM	I compared the class and individual markings on the pieces of solder wire marked 497163/25(2); 497163/25(3) and tests marked 163T1 to 163T5 using a comparison microscope and found: 2.1 The marks on the piece of solder wire marked 497163/25(3) were produced by the wire stripper marked 497163/25(1) 2.2 The marks on the piece of solder wire marked 497163/25(2) were not produced by the wire stripper marked 497163/25(1).
CJAZBD	1. Examination of Exhibit 1 revealed one Pittsburgh brand wire stripper designed to be used as a bypass shearing tool. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2. Examination of Exhibit 2 revealed one non-ferromagnetic wire displaying damage on one end consistent with that caused by an opposed jaw pinching tool such as diagonal cutters or a bypass shearing tool such as wire strippers. Exhibit 2 is suitable for microscopic comparison. 3. Examination of Exhibit 3 revealed one non-ferromagnetic wire displaying damage on one end consistent with that caused by a bypass shearing tool such as wire strippers. Exhibit 3 is suitable for microscopic comparison. 4. Microscopic comparison revealed the damage on Exhibit 3 was caused by Exhibit 1 due to sufficient agreement of individual characteristics. 5. Microscopic comparison revealed the damage on Exhibit 2 was not caused by Exhibit 1 due to sufficient disagreement of individual characteristics. 6. See photos for measurements; please note all measurements are approximate. TECHNICAL NOTES Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote. [Participant submitted data in a format that could not be reproduced in this report.]
CLZ9EM	Test marks were made with Item 1, the wire strippers, using submitted testing material. The set of test tool marks are designated Item 1TM. The tool marks on Item 2 were not made by Item 1 due to significant disagreement of class and individual characteristics. The tool marks on Item 3 were made by Item 1 based on agreement of all discernable class characteristics and significant agreement of individual characteristics.
CPYJBM	The class characteristics and toolmark features on Item 2 (solder wire) are clearly inconsistent with the test marks produced by the suspect's wire stripper. It is therefore concluded that Item 2 solder wire was not cut by the wire stripper recovered from the suspect. The individual characteristics and toolmark features on Item 3 (solder wire) show continuous and corresponding agreement with the test marks produced by the suspect's wire stripper. It is therefore concluded that Item 3 solder wire was cut by the wire stripper recovered from the suspect.
CQU3CN	3. On 2025-10-13 during the performance of my official duties I received an intact sealed evidence bag with number PA4500471381 marked inter alia [Participant Code] from Case Administration of the Ballistics Section. I opened the bag and found the following exhibits: 3.1 One (1) Pittsburgh 5-inch V-notch wire stripper marked by me "535678/25 1". 3.2 Two (2) pieces of solder wire marked by me "535678/25" each and "2" and "3" respectively. 4. The intention and scope of this forensic examination comprise of the following Ballistics techniques: 4.1 Microscopic individualization of

TABLE 2

WebCode	Conclusions
	toolmarks. 4.3 Examination of tools and toolmark related materials. 5. I examined the wire stripper mentioned in paragraph 3.1 and made replications for test purposes marked as 678AT1 to 678AT5 and 678BT1 to 678BT5 respectively. 6. I compared the class and individual characteristics markings on the pieces of solder wire mentioned in paragraph 3.2 with the tests mentioned in paragraph 6 using a comparison microscope and found: 6.1 The wire mentioned in paragraph 3.2 marked "535678/25 3" was cut by the wire stripper mentioned in paragraph 3.1. 6.2 The wire mentioned in paragraph 3.2 marked "535678/25 2" was not cut by the wire stripper mentioned in paragraph 3.1.
CUPUKK	Tool marks on items 001-02 and 001-03 were examined and microscopically compared with test tool marks produced with the tool in item 001-01 with the following results: Tool marks on item 001-02 were eliminated as having been made by the 001-01 tool. Tool marks on item 001-03 were identified as having been made by the 001-01 tool.
D7G3HD	On examination, I found that: i) The characteristic marks on the piece of solder wire recovered from the crime scene (Item 3) to be similar to the characteristic marks produced by the wire stripper recovered from the suspect (Item 1). ii) The characteristic marks on the piece of solder wire recovered from the crime scene (Item 2) to be dissimilar to the characteristic marks produced by the wire stripper recovered from the suspect (Item 1). Therefore I am of the opinion that: i) The piece of solder wire recovered from the crime scene (Item 3) was produced by the wire stripper recovered from the suspect (Item 1). ii) The piece of solder wire recovered from the crime scene (Item 2) was not produced by the wire stripper recovered from the suspect (Item 1).
DAFBTF	Exhibit 1 consists of a pair of Pittsburgh brand wire strippers, employing a shearing action. The Exhibit 1 wire strippers were used to make test toolmarks. The test toolmarks were designated as Exhibits 1.1 through 1.3. Exhibits 2 and 3 each consist of one (1) piece of cut solder wire. The Exhibit 2 toolmarks were excluded as having been made by the Exhibit 1 tool. (Source exclusion) The toolmarks present on the Exhibit 2 cut wire bears class characteristics consistent with having been produced by a pinching or shearing type tool, such as bolt cutters or diagonal cutters. The Exhibit 3 toolmarks were identified as having been made by the Exhibit 1 tool. (Source identification)
DAX6PJ	Test standards were made with the item #1 Pittsburgh brand wire stripper and compared against the striations on the solder wire marked #3 with positive results. The striations on the solder wire marked #3 were identified as having been made by blades of the wire cutter marked #1. The standards were compared against the striations on the solder wire marked #2 with negative results. The striations on the solder wire marked #2 were eliminated as having been made by item #1 wire stripper.
E2M34H	The questioned toolmark impression on Item 2 was inconsistent in class characteristics in terms of the direction of the toolmark impression and dimension of the toolmark impression area with the toolmark impression of the test specimen of Item 1. The questioned toolmark impression on Item 3 was consistent in class characteristics in terms of the direction of the toolmark impression of the test specimen of Item 1. However, it was inconsistent in terms of the dimension of the toolmark impression area and striation formation with the toolmark impression of the test specimen of Item 1. Based on the findings, in my opinion, the suspect's wire stripper recovered from the suspect (Item 1) was not consistent in terms of the class and individual characteristics and did not produce the questioned toolmarks on the two pieces of solder wire recovered from the crime scene (Item 2 and Item 3).
EF4F2A	The wire stripper (Item 1), was used to create the toolmark observed on the piece of solder wire recovered from the crime scene (Item 3, marked with red paint). The toolmark observed on the piece of solder wire recovered from the crime scene (Item 2, marked with blue paint), was not created by the wire stripper (Item 1).
EW7ZWD	A comparison of the tool marks on the cut pieces of solder wire in items 2 and 3 with test marks made using the suspected wire stripper, item 1 was undertaken. A high degree of correspondence was noted between the tool marks on item 3 and the test marks. There was no correspondence with the tool marks on item 2 and the test marks. I have considered the proposition that the tool marks on the cut piece of solder wire in item 3 were made using the suspected wire stripper; the results of this examination provide conclusive support for this proposition. The tool marks on the cut piece of solder in item 2 have been made by a different tool. The scale I have used in the assessing the strength of evidence is as follows: No support - Weak Support - Support - Strong Support - Conclusive Support.
EYDF4J	Due to a difference in class characteristics, the Item 2 wire was excluded as having been cut by the

TABLE 2

WebCode	Conclusions
	Item 1 wire stripper. Toolmarks present on the Item 3 wire were identified as having been produced by the Item 1 wire stripper.
EYWWPD	Item 1, 3 The Item 1 tool was microscopically identified as having caused the cut on the Item 3 wire. Item 2 The Item 1 tool did not cut the Item 2 wire.
FBJVMT	The cut solder wire, Agency Exhibit 2, was eliminated as having been cut by the same cutters as the cut solder wire, Agency Exhibit 3, and/or cut by the wire cutters, Agency Exhibit 1. The cut solder wire, Agency Exhibit 3, was identified as having been cut by the wire cutters, Agency Exhibit 1.
FP3DHH	The Item 3 piece of solder wire was identified as having been cut by the Item 1 wire stripper. Due to a difference in class characteristics, the Item 2 piece of solder wire was excluded as having been cut by the Item 1 wire stripper.
G44AGB	The toolmarks found on Item 3 were made by Item 1. Based on exclusionary difference in appearance, the toolmarks found on Item 2 were not made by Item 1.
G7ARJD	1. Exhibit 1 contains one Pittsburgh brand wire stripper which is designed as an opposed blade bypass cutting tool. a. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2. Exhibits 2 and 3 each contain one metal wire with damage to one end. a. Microscopic comparison revealed that the damage on the Exhibit 2 wire was not made by the Exhibit 1 wire stripper based on a disagreement of discernible class characteristics. b. Microscopic comparison revealed that the damage on the Exhibit 3 wire was made by the Exhibit 1 wire stripper based on an agreement of all discernible class characteristics and a sufficient agreement of individual characteristics. TECHNICAL NOTES Class characteristics are defined as measurable features of a firearm or tool, which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm or tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm or tool surfaces. These random imperfections or irregularities can be either produced incidental to manufacture or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm or tool are not to the absolute exclusion of all other firearms or tools, because it is not feasible to examine all firearms or tools in the world. However, observing this amount of agreement between different sources is considered extremely remote. [Participant submitted data in a format that could not be reproduced in this report.]
GEJGWB	Microscopic examination and comparison reveal that the questioned toolmarks on Item 1.C were made by the tool, Item 1.A, based on agreement of class individual characteristics. Microscopic examination and comparison reveal that the questioned toolmarks on Item 1.B were not made by the tool, Item 1.A, based on disagreement of class. Microscopic examination reveals that the questioned toolmarks on Item 1.B are consistent with having been made by a pinching tool.
GW2HRD	The submitted metal wire segment, Item 3, was identified as having been severed by the submitted wire stripper, Item 1. The submitted metal wire segment, Item 2, was eliminated as having been severed by the submitted wire stripper, Item 1.
H69GW9	The Item 2 wire segment is eliminated as having been cut using the Item 1 wire stripper based on a difference in class characteristics. The Item 3 wire segment is identified as having been cut using the Item 1 wire stripper.
H9QJ4E	Item (2) and Item (3) have been cut using Item (1)
HMBY7D	Item 2 has not been cut by item 1, as the cutting angle of one of the faces is more pronounced. Furthermore, the direction of the marks on that face does not correspond to those made by item 1. The marks contained in item 3 were made by the cable cutter. The cutting angles are the same and the marks contained there are identical.
HMNPWA	Item: 1-1-1 (CTS Item 1) Brand: Pittsburgh Type: V-notch wire strippers Tool Action: Shearing, striated toolmarks Item: 1-2-1 (CTS Item 2) Type: Length of solder wire with cut end and blue painted end Toolmark Type: Pinching Action, striated and impressed toolmarks Toolmark Suitability: Suitable Item: 1-3-1 (CTS Item 3) Type: Length of solder wire with cut end and red painted end Toolmark Type: Shearing Action, striated toolmarks Toolmark Suitability: Suitable Item: 1-4 Type: Two lengths of solder wire to use for standard test cuts Based on microscopic comparisons, in the opinion of the

TABLE 2

WebCode	Conclusions
	laboratory: Item 1-3-1 (CTS Item 3: solder wire with red paint) was identified as having been cut by item 1-1-1 (CTS Item 1: tool). Based on differences in class characteristics: Item 1-2-1 (CTS Item 2: solder wire with blue paint) was eliminated as having been cut by item 1-1-1 (CTS Item 1: tool). [Participant submitted data in a format that could not be reproduced in this report.]
HPFMQA	The wire stripper in Item 1 was examined and test cuts were made. Those test cuts were microscopically compared to the soldered wire in Items 2 and 3. It was determined that the wire stripper in Item 1 made the cut on the solder wire in Item 3. It was also determined that the wire stripper in Item 1 did not make the cut on the solder wire in Item 2.
HQBA3D	[No Conclusions Reported.]
HR7T4E	[No Conclusions Reported.]
HW2KCC	The two propositions to evaluate are whether (1) the solder wire was cut with the provided wire stripper (Item 1) or whether (2) the solder wire was cut with another tool. The marks left behind on Item 2 seem to be more coarse than the marks on Item 3. The straight portion of the side cutting edge of Item 1 leave marks in a similar fashion (fine striae, the two surfaces almost half-half) to the ones observed on Item 3. The comparison between marks left by Item 1 and the marks on Item 3 show corresponding striae on almost the entire length of the surface on both cutting surfaces. These observations provide extremely strong support for the first proposition (Item 3 was cut with Item 1) rather than the alternative (Item 3 was cut with another tool). For Item 2 the findings provide extermely strong support for the alternative (Item 2 was cut with another tool) rather than the first proposition (Item 2 was cut with Item1).
JJQNC7	An examination was undertaken between the exhibit wire cutters (Item 1) and two portions of exhibit lead solder (Item 2 - Blue) and Item 3 - Red). Test cuts using Item 1 were made using the flat blade, and this revealed: Item 2 (Blue) - Inconclusive C. Limited correspondence between the exhibit item and test cuts made using the suspect wire cutter. Some marks noted, that appeared to be damage that were angled to the striation direction. Item 3 (Red) - Identification. Correspondence between the exhibit item and test cuts made. No correspondence between Item 2 and Item 3. These have been cut by different parts of the wire cutter blades or different wire cutters. In my opinion, the wire cutters (Item 1) made the cut to Item 3 (Red).
JKFWFF	3. On 2025-10-22 during the performance of my official duties I received an intact sealed evidence bag with number PA4500471382 marked inter alia [Participant Code] from Case Administration of the Ballistics Section. I opened the bag and found the following exhibits: 3.1 One (1) Pittsburgh manufactured wire stripper (cutter) marked by me “ITEM 1”. 3.2 One (1) solder wire marked by me “ITEM 2”. 3.3 One (1) solder wire marked by me “ITEM 3”. 3.4 Two (2) solder wire pieces for test purposes not marked by me. 4. The intention and scope of this forensic examination comprises of the following Ballistics techniques: 4.1 The examination of tools and toolmark related materials. 4.2 Microscopic individualization of toolmarks. 5. I examined the wire stripper mentioned in paragraph 3.1 and the two (2) solder wire pieces mentioned in paragraph 3.4 and found: 5.1 The two (2) solder wire pieces mentioned in paragraph 3.4 were used as replications for test purposes and marked as TEST 1, TEST 2, TEST 3, TEST 4 and TEST 5 respectively and cut with the wire stripper mentioned in paragraph 3.1. 6. I examined the class and individual characteristics markings on the solder wires mentioned in paragraphs 3.2, 3.3 and 5.1 using a comparison microscope and found: 6.1 The marks on the solder wire mentioned in paragraph 3.3 were produced by the wire stripper mentioned in paragraph 3.1. 6.2 The marks on the solder wire mentioned in paragraph 3.2 were not produced by the wire stripper mentioned in paragraph 3.1.
JU4QRC	1. The questioned toolmarks on the piece of solder wire (Item 3) were produced by the suspect's wire stripper (Item 1). 2. The questioned toolmarks on the piece of solder wire (Item 2) were not produced by the suspect's wire stripper (Item 1).
KF2LZQ	Toolmarks observed on Item 1C (silver colored wire with red end) are identified as having been made by Item 1A (Pittsburgh wire cutters with green handles). Toolmarks observed on Item 1B (silver colored wire with blue end) are eliminated as having been made by Item 1A (Pittsburgh wire cutters with green handles). There are differences in the class characteristics (angle vs straight cuts).
KQMNK8	The item 3 section of silver colored wire is identified as having been cut by the item 1 combination

TABLE 2

WebCode	Conclusions
	wire cutters and wire strippers. The item 2 section of silver colored wire is eliminated as having been cut by the item 1 combination wire cutters and wire strippers.
KTT998	Our examination with a comparison light microscope leads us to the following conclusion: Item 2 (blue) The toolmarks on the piece of solder wire (Item 2) and the comparison marks made by the wire stripper (Item 1) show no matching marks. The toolmarks (Item 2) weren't caused by the wire stripper (Item 1). Item 3 (red) The toolmarks on the piece of solder wire (Item 3) and the comparison marks made by the wire stripper (Item 1) show numerous well matching marks with general and individual characteristics. The toolmarks (Item 3) were caused by the wire stripper (Item 1).
KYGN47	The recovered toolmark in the piece of solder wire in item 2 was not made by the wire stripper in item 1. The recovered toolmark in the piece of solder wire in item 3 was made by the wire stripper in item 1.
KZP7VA	When comparing the severed red wire (item 3) with the pliers (item 1), matching, group-specific, and individualizing characteristics were identified.
LAWZU9	Toolmarks present on the unpainted end of Item 2 were microscopically compared with test specimens produced by the Item 1 tool, revealing class characteristic and significant individual distinguishing characteristic differences (attributed to different source tool design). It was concluded that the toolmarks displayed on the unpainted end of Item 2 were not made by the Item 1 tool. Toolmarks present on the unpainted end of Item 3 were microscopically compared with test specimens produced by the Item 1 tool, revealing correspondence of class characteristics and individual distinguishing characteristics. It was concluded that the toolmarks displayed on the unpainted end of Item 3 were made by the Item 1 tool (A-C blade, as designated during testing).
LKPLUC	Toolmarks present on the Item 3 piece of solder wire were identified as having been produced by the Item 1 wire stripper. The Item 2 piece of solder wire was excluded as having been cut by the Item 1 wire stripper.
LRE4A9	1. The tool marks present on the solder wire, described in Item 3, were produced by the wire stripper described in Item 1 (Identification). [Initials] October/27/2025 2. The tool marks present on the solder wire, described in Item 2, were produced by a tool. They were not produced by de wire stripper described in Item 1 (Elimination). [Initials] October/27/2025
M793G3	For the test, the two additional pieces of wire samples were cut with Item 1, and the cut shape and striation on the cross section of Item 2 and Item 3 were compared. 1) Microscopi examination: When the two additional pieces of wire were cut with Item 1, the resulting cut shape were same as Item 3, while the cut shape of Item 2 differed. 2) Comparison microscopic examination: When the two additional pieces of wire were cut with Item 1, the toolmark pattern generated on the cross section surface showed same spacing and arrangement to that of Item 3. In contrast, the spacing and arrangement of Item 2 differed. Based on the examination results, the solder wire cut by Item 1 corresponded to Item 3.
M8YBKC	I compared the class and individual markings on the pieces of solder wire marked 497170/25(2); 497170/25(3) and tests marked 170T1 to 170T4 using a comparison microscope and found: 2.1 The marks on the piece of solder wire marked 497170/25(3) were produced by the wire stripper/pair of pliers marked 497170/25(1) 2.2 The marks on the piece of solder wire marked 497171/25(2) were not produced by the wire stripper/ pair of pliers marked 497170/25(1).
MXC9J4	Toolmarks at the unpainted end of Item 3 were identified as having been produced by Item 1 based on the sufficient agreement of class and individual characteristics. Toolmarks at the unpainted end of Item 2 were eliminated as having been produced by Item 1 based on the sufficient disagreement of class characteristics.
NJTPHM	The piece of solder wire, item 3, has been cut by the wire stripper item 1. The piece of solder wire, item 2, has not been cut by the wire stripper item 1.
P3JKA2	Item 1 is eliminated from having cut item 2. Item 1 is identified as having cut item 3.
PCN9M9	[No Conclusions Reported.]
PD2YD4	The toolmarks on the piece of cut wire, Lab Item 3, were identified as having been produced by the

TABLE 2

WebCode	Conclusions
	tool, Lab Item 1, based on agreement of class characteristics and corresponding individual detail using microscopic comparison. The toolmarks on the piece of cut wire, Lab Item 2, were eliminated from having been produced by the tool, Lab Item 1, based on disagreement of class characteristics using microscopic comparison.
PER47B	1.1 I received one plier marked by me 524393/25 A1 1.2 Two pieces of wire marked by me 524393/25 Item2 and Item3 respectively. The intention and scope of this forensic examination comprises of the following Ballistics techniques, 2.1 Examination of tools and toolmark related materials, 2.2 Microscopic individualization of toolmarks. I examined the two pieces of wire mentioned in paragraph 1.2 using a comparison microscope and found microscopic comparable marks which can possibly be utilised for individualization. 3.1 I examined the plier mentioned in paragraph 1.1 and cut tests for test purposes marked as 393T1 and 393T2 I compared the class characteristics markings on the two pieces of wire and the tests mentioned in paragraph 1.2 and 3.1 using a comparison microscope and found: 4.1 The marks on the one piece of wire mentioned in paragraph 1.2 marked 524393/25 Item3 were produced by the plier mentioned in paragraph 1.1. 4.2 The marks on the one piece of wire mentioned in paragraph 1.2 marked 524393/25 Item2 were not produced by the plier mentioned in paragraph 1.1.
PYGFY3	Tool Mark Analysis: Methodology: Physical (Visual Examination) Microscopy (Comparison Microscope) Test marks were made with Item 1A using laboratory standard testing media. Item 1A1 was sealed in a manila envelope and will be returned with the evidence to the submitting agency. The tool mark on Item 1C was made with Item 1A based upon corresponding class and individual microscopic characteristics. The tool mark on Item 1B was not made with Item 1A based upon different class characteristics.
PYGKA6	[No Conclusions Reported.]
Q497K4	Item 2 was not made by Item 1. Item 3 was made by Item 1.
QFX68Z	A sized V-Notch Wire Stripper from Pittsburgh was send in for examination and two cut wire pieces marked Item 2 and Item 3. During the examination of the test marks produced with the wire stripper (Item 1) on the comparison wire and its respective casts, it was determined that both the cutting angle and the morphology of the cut surfaces differ significantly between Item 2 and Item 1. Item 3 exhibits an identical cutting angle to Item 1. Furthermore, the cut surfaces show very similar characteristics in shape and texture. Upon further analysis of the original scans of Item 3 and the corresponding comparison cuts, numerous areas of matching toolmarks were identified. Summary: It can therefore be concluded with a very high degree of probability that the questioned mark (Item 3, red) was produced using the V-notch Wire Stripper bearing the inscription “PITTSBURGH.” The questioned mark (Item 2, blue) was not produced with the tool currently under examination.
QGTN92	The toolmarks observed in the piece of solder (ITEM 3) have been produced by the wire stripper (ITEM 1). The toolmarks observed in the piece of solder (ITEM 2) have not been produced by the wire stripper (ITEM 1).
QKF8E6	The results of the investigation strongly support the hypothesis that the tool mark ITEM 3 was caused by the tool in question, ITEM 1. Several matches with the cutting edge mark from ITEM 3 were found in an area of the cutting surfaces of the wire stripper ITEM 1. However, the characteristics are not so clear that an identification would have been possible. The evidential value is measured against the counter-hypothesis that the tool mark ITEM 3 originated from another unknown tool (with comparable characteristics of the cutting surfaces). ITEM 2 could be ruled out. Translated with DeepL.com (free version)
QKVMNZ	Tool Mark Analysis: Methodology: Physical (Visual Examination) Microscopy (Comparison Microscope) Test marks were made with Item 1A, the wire stripper, using submitted standard testing media. Item 1A1, the tests from Item 1A, was sealed in a manila envelope and will be returned with the evidence to the submitting agency. The tool mark on Item 1C, the solder wire, was made with Item 1A, the wire stripper, based upon corresponding class and individual microscopic characteristics. The tool mark on Item 1B, the solder wire, was not made with Item 1A, the wire stripper, based upon different class and individual microscopic characteristics.
QLBQF8	Tool marks present on Items 001-02 and 001-03 were microscopically compared to test tool marks

TABLE 2

WebCode	Conclusions
	produced from the Item 001-01 Pittsburgh wire strippers. The Item 001-03 tool mark was identified as having been produced by the Item 001-01 tool due to a sufficient agreement of individual characteristics. The Item 001-02 tool mark was eliminated as having been produced by the Item 001-01 tool due to significant differences in class and individual characteristics.
QU2CJJ	Toolmarks present on Item 2 were microscopically examined and eliminated as having been produced by the Item 1 tool due to differences in class characteristics. Toolmarks present on Item 3 were microscopically examined and identified as having been produced by the Item 1 tool based on corresponding class and individual characteristics.
R4L3L3	Only Item 3 was cut by Item 1 (bearing similar cut marks/striation marks)
R7RM8G	The Item 01-02 wire was eliminated as having been cut by the Item 01-01 Pittsburgh wire stripper. The Item 01-01 Pittsburgh wire stripper was identified as having cut the Item 01-03 wire.
RAQ2U7	After Applying experiments on the test, the result is: item (3) produced by item (1), however, item (2) cut by different tool or stripper. Item (3) produced by Item (1). Item (2) is different from Item (3).
RFFJ9H	Evidence Description Item Description/Visual Examination 1 is a Pittsburgh brand wire stripper with bright green handles. 2 is one cut 1/4" wire with a blue colored end with toolmark striations. 3 is one cut 1/4" wire with a red colored end with toolmark striations. Results Item Results 1 Test toolmarks were created with Item 1 for comparison purposes. 2 was found to be suitable for comparison purposes. 3 was found to be suitable for comparison purposes. Microscope Comparison Conclusions Identification - Agreement of class and individual characteristics were observed. It is the opinion of the examiner that the observed toolmarks were created by the same tool. Elimination - Disagreement of class characteristics and/or individual characteristics were observed. It is the opinion of the examiner that the observed toolmarks were not created by the same tool. Lab Item # Evidence Type To Lab Item # Evidence Type Conclusion 3 Tool Mark 1 Tool Identification 2 Tool Mark 1 Tool Elimination Methods Physical, Visual, and Microscopic Examination Microscopic Comparison Verification Completed By: [Name]. Technical Review Completed By: [Name]. [Participant submitted data in a format that could not be reproduced in this report.]
RM2CL3	The suspect's wire stripper (Item 1) were used to produce the questioned toolmarks on the submitted piece of soldier wire Item 3. The suspect's wire stripper (Item 1) were not used to produce the questioned toolmarks on the submitted piece of soldier wire Item 2.
RW222J	The toolmarks on Item 2 and Item 3 were made with a different tool than the one examined wire stripper (Item 1). The same tool was not used on Items 2 and 3.
TCC634	The wire marked red was cut with the supplied tool – a wire stripper. The wire marked blue was not cut with this tool (or another tool).
TCCZR2	Examinations showed the toolmarks present on Item 2 were not created by Item 1. Examinations showed the toolmarks present on Item 3 were created by Item 1.
TH6Z7W	1. Examination of Exhibit 1 revealed it to be one Pittsburgh brand v-notch wire stripper designed as a bypass shearing tool. Exhibit 1 was used to create the test standards in Exhibit 1.1. 2. Examination of Exhibit 2 revealed it to be one non-ferromagnetic wire, damaged on one end, consistent with a cut from an opposed jaw pinching tool, such as diagonal cutters, or a bypass shearing tool such as wire strippers. Exhibit 2 is suitable for microscopic comparison. 3. Examination of Exhibit 3 revealed it to be one non-ferromagnetic wire, damaged on one end, consistent with a cut from a bypass shearing tool such as wire strippers. Exhibit 3 is suitable for microscopic comparison. 4. Microscopic comparison of the test standards from Exhibit 1 with Exhibits 2 and 3, revealed the following. a. The damage on Exhibit 2 was not caused by Exhibit 1 due to sufficient disagreement of individual characteristics. b. The damage on Exhibit 3 was caused by Exhibit 1 due to sufficient agreement of individual characteristics. 6. See photos for measurements, all measurements are approximate. TECHNICAL NOTES Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidentally to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to

TABLE 2

WebCode	Conclusions
	the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote. [Participant submitted data in a format that could not be reproduced in this report.]
THL4WH	#2 The toolmarks on this wire were examined microscopically and determined to be suitable for comparisons. Based on differences in class characteristics, the toolmarks on this wire are eliminated as having been made by #1. #3 The toolmarks on this wire were examined microscopically and determined to be suitable for comparisons. The toolmarks on this wire were compared microscopically to test toolmarks made using Item #1. There is agreement of all discernible class characteristics and sufficient agreement in individual characteristics for identification. The toolmark on this wire was made by Item #1.
TJV9A7	I compared the class and individual markings on the pieces of solder wire marked 497159/25(2); 497159/25(3) and tests marked 159T1 to 159T2 using a comparison microscope and found: 2.1 The marks on the piece of solder wire marked 497159/25(3) were produced by the wire stripper marked 497159/25(1) 2.2 The marks on the piece of solder wire marked 497159/25(2) were not produced by the wire stripper marked 497159/25(1).
TQWK74	The toolmarks observed on the item 001-02 and 001-03 pieces of solder wire were examined and microscopically compared to test toolmarks made from the 001-01 wire stripper with the following results: The toolmarks on the 001-02 piece of solder wire were eliminated as having been made by the 001-01 wire stripper. The toolmarks on the 001-03 piece of solder wire were identified as having been made by the 001-01 wire stripper.
TUWV24	Tool marks present on the cut wires in Items 001-02 and 001-03 were microscopically examined and compared with test tool marks produced by the Item 001-01 wire strippers with the following results: Item 001-02 was eliminated as having been cut by the Item 001-01 tool based on observed differences in class characteristics. Item 001-03 was identified as having been cut by the Item 001-01 tool based on sufficient agreement of individual characteristics. Item 001-04 was used to produce test tool marks from the submitted tool in Item 001-01.
TZ2DWJ	The toolmark traces on item 2 were not caused by the pliers item 1. The toolmark traces on item 3 were caused by the pliers item 1.
U9BCNZ	The Exhibit 1 pair of wire strippers were used to make three (3) sets of test toolmarks, which were designated Exhibits 1.1, 1.2, and 1.3. The toolmark on the Exhibit 3 segment of cut solder wire was identified as having been made by the Exhibit 1 pair of wire strippers. (Source identification) The toolmark on the Exhibit 2 segment of cut solder wire was excluded as having been made by the Exhibit 1 pair of wire strippers. (Source exclusion) The Exhibit 2 segment of cut solder wire bears toolmarks consistent with having been produced by a pinching or shearing action, such as diagonal cutters.
UD6B3V	1) Examination of Exhibit 1 revealed one pair of ferromagnetic Pittsburgh brand wire strippers. a. Exhibit 1 is a bypass shearing type tool. b. Exhibit 1 was used to create the Exhibit 1.1 test standards. 2) Examination of Exhibits 2 and 3 revealed each contains one severed piece of non-ferromagnetic soldering wire. a. Exhibit 2 displays damage caused by either an opposed jaw pinching type tool such as a diagonal cutters or a bypass shearing type tool such as wire strippers. This toolmark is suitable for microscopic comparison. b. Exhibit 3 displays damage caused by a bypass shearing type tool such as wire strippers. This toolmark is suitable for microscopic comparison. 3) Microscopic comparison of Exhibits 1.1, 2, and 3 revealed the following: a. The damage on Exhibit 2 was not made by Exhibit 1 due to sufficient disagreement of individual characteristics. b. The damage on Exhibit 3 was made by Exhibit 1 due to sufficient agreement of individual characteristics. 4) See photos for markings and measurements. Please note that all measurements are approximate. Technical Notes Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.

TABLE 2

WebCode	Conclusions
	[Participant did not provide photos and their submitted data is in a format that could not be reproduced in this report.]
UDZXEY	The toolmarks on the piece of cut wire, Lab Item # 2, were eliminated from having been produced by the tool, Lab Item # 1, based on disagreement of class characteristics using microscopic comparison. The toolmarks on the piece of cut wire, Lab Item # 3, were identified as having been produced by the tool, Lab Item # 1, based on agreement of class characteristics and corresponding individual detail using microscopic comparison.
UGLDAZ	The toolmarks observed on the Exhibit 3 wire were identified as having been produced by the Exhibit 1 wire stripper. (Source identification) The toolmarks observed on the Exhibit 2 wire were excluded as having been produced by the Exhibit 1 wire stripper. (Source exclusion) Tools that produce toolmarks like those present on Exhibit 2 include pinching and shearing tools.
UXAT86	I compared the class and individual markings on the pieces of solder wire marked 497166/25(2); 497166/25(3) and tests marked 166T1 to 166T3 using a comparison microscope and found: 2.1 The marks on the piece of solder wire marked 497166/25(3) were produced by the wire stripper marked 497166/25(1) 2.2 The marks on the piece of solder wire marked 497166/25(2) were not produced by the wire stripper marked 497166/25(1).
V676LY	Examinations showed that the toolmarks on Item 2 were not produced by the Item 1 wire stripper tool. Examinations showed that the toolmarks on Item 3 were produced by the Item 1 wire stripper tool.
VAF9QF	In comparing item 1 and item3, an identification was found in individual characteristics. A comparison between item1 and item2 found a fundamental mismatch (negative).
VAKQNE	The cut wire, item 1.3, was identified as having been made by the Wire Stripper, item 1.1, based on agreement of all discernible class characteristics and agreement of corresponding individual microscopic markings The cut wire, item 1.2, was eliminated as having been made by the Wire Stripper, item 1.1, based on a difference in class characteristics (toolmark angle).
VCLQQW	Observed toolmarks on item 2 have not been produced by item 1. Observed toolmarks on item 3 have been produced by item 1.
VG4UX2	The section of solder wire marked #3 was compared microscopically against test cuts and identified as having been cut by the wire stripper marked #1. The section of solder wire marked #2 was compared microscopically against test cuts and eliminated as having been cut by the wire stripper marked #1.
VXPCQ3	In my opinion Item 1 was not used to cut Item 2 - CONCLUSIVE ELIMINATION In my opinion Item 1 was used to cut Item 3 - CONCLUSIVE ASSOCIATION
W2676E	Toolmarks were observed on the submitted wires, Item #1.2-1.3. Test toolmarks were made in the sample wires, Item #1.4 using the submitted wire cutter/stripper, Item #1.1. The toolmarks present on Item #1.3 were compared microscopically with tests made using Item #1.1. Based on the agreement of all discernible class characteristics and sufficient agreement of corresponding individual characteristics, the toolmark on Item #1.3 is identified as having been made by the submitted wire cutter/stripper, Item #1.1. Due to differences in class characteristics, the toolmark on Item #1.2 is eliminated as having been made by the submitted wire cutter/stripper, Item #1.1.
W6H4C2	In the result of examination we conclude, that toolmark at item 3 was produced by the suspect wire stripper (item 1). The toolmark at item 2 shows different structures to item 1, so it can be conclude, that these toolmark wasn't produced by the wire stripper item 1.
WCHNEW	I concluded that the questioned toolmarks present on the piece of solder wire, Item 2 were not produced by the wire stripper recovered from the suspect, Item 1. I also concluded that the questioned toolmarks present on the piece of solder wire, Item 3 were produced by the wire stripper recovered from the suspect, Item 1.
WM7F6V	Test-cuts were made using the Item 1 tool and they were compared to Items 2 and 3. Sufficient agreement of individual marks were observed between Item 3 and the test-cuts to conclude that the toolmarks on Item 3 were made by the Item 1 tool. Significant differences in individual marks were observed between Items 2 and 3 to conclude that they were not made by the same tool.

TABLE 2

WebCode	Conclusions
WNWLJZ	A microscopic comparative examination of item 2 (MO-1) against item 1, disclosed that item 2 (MO-1) was not cut from item 1 due to differences in class characteristics. A microscopic comparative examination of item 3 (MO-2) against item 1, disclosed that item 3 (MO-2) was cut from item 1.
X83FNC	On the item 2 there is mark which doesn't correspond in striation of cut surfaces left by blades of item 1. Mark on the item 2 is not left by the item 1. On the item 3 there is mark which correspond in shape, side striation/sliding marks and a few individual characteristic with the test marks made with item 1. It is probable that mark on the item 3 is left by the item 1.
XB2RMX	The cut wire (item 2) was not cut by the submitted cutters due to class differences in the tool mark cuts The cut wire (item 3) was identified as having been cut by the center opposing blades of the cutter submitted as item 1.
XB74AT	Tool Mark Analysis: Methodology: Physical (Visual Examination) Microscopy (Comparison Microscope) Digital Micrometer Test marks were made with Item 1A using submitted testing media. Item 1A1 was sealed in a manila envelope and will be returned with the evidence to the submitting agency. The tool mark on Item 1C was made with Item 1A based upon corresponding class and individual microscopic characteristics. The tool mark on Item 1B was not made with Item 1A based upon different class characteristics.
Y7QZUB	The Item 1.3 (CTS Item 3) piece of cut solder wire was cut by the Item 1.1 (CTS Item 1) wire stripper/cutter. This identification is based on sufficient agreement of the combination of individual characteristics and all discernible class characteristics. The Item 1.2 (CTS Item 2) piece of cut solder wire was not cut by the Item 1.1 (CTS Item 1) wire stripper/cutter. This elimination is based on differences in class/subclass characteristics and individual characteristics (Item 1.2 subclass and individual characteristics are at angles to the cut/pinch point, but for Item 1.1 Tests they are perpendicular to cut/pinch point).
YUCYGQ	1. Examination of Exhibit 1 revealed one Pittsburgh brand 5in. V-notch wire stripper designed to be used as a bypass shearing tool. a. Exhibit 1 measures 130.79mm long. b. Test standards sub-exhibited as Exhibit 1.1, were created using Exhibit 1. 2. Examination of Exhibit 2 revealed one nonferromagnetic solder wire displaying damage consistent with that caused by a bypass shearing tool, such as a wire stripper. a. Exhibit 2 measures 2.99mm in diameter. b. Microscopic comparison revealed the damage on Exhibit 2 was not caused by Exhibit 1 due to sufficient disagreement of individual characteristics. 3. Examination of Exhibit 3 revealed one nonferromagnetic solder wire displaying damage consistent with that caused by a bypass shearing tool. a. Exhibit 3 measures 2.99mm in diameter. b. Microscopic comparison revealed the damage on Exhibit 3 was caused by Exhibit 1 due to sufficient agreement of individual characteristics. Please note all measurements are approximate. Technical Notes Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote. [Participant submitted data in a format that could not be reproduced in this report.]
YV8LTU	The toolmarks on the wire segment, Lab Item 3, were identified as having been produced by the tool, Lab Item 1, based on agreement of class characteristics and corresponding individual detail using microscopic comparison. The toolmarks on the wire segment, Lab Item 2, were eliminated from having been produced by the tool, Lab Item 1, based on disagreement of class characteristics using microscopic comparison.
Z4XJZT	As a result of microscopic comparison, it was concluded: Item 2 was eliminated as having been cut by Item 1 based on significant disagreement of class characteristics. Item 3 was identified as having been cut by Item 1.
ZKHBYT	The Exhibit 1 wire strippers were used to make test toolmarks. The test toolmarks were designated as Exhibit 1.1 and 1.2. The Exhibit 2 toolmark was excluded as having been made by the Exhibit 1 tool.

TABLE 2

WebCode	Conclusions
	(Source exclusion) The Exhibit 3 toolmark was identified as having been made by the Exhibit 1 tool. (Source identification)
ZLDT2U	The piece of wire with a toolmark marked #2 (blue paint) was microscopically examined and compared to the test marks from the submitted wire strippers, marked #1, with negative results (Elimination). The submitted wire strippers, marked #1, did not create the toolmark on the wire marked #2 (blue paint). The piece of wire with a toolmark marked #3 (red paint) was microscopically examined and compared to the test marks from the submitted wire strippers, marked #1, with positive results (Identification). The submitted wire strippers, marked #1, created the toolmark on the wire marked #3 (red paint).
ZQRD4A	The Item 01-02 piece of wire was eliminated as having been cut by the Item 01-01 Pittsburgh brand wire stripper. The Item 01-02 piece of wire was cut by an unknown pinching type tool. Examples of pinching type tools include, but are not limited to, bolt cutters and diagonal cutters. The Item 01-03 piece of wire was identified as having been cut by the Item 01-01 Pittsburgh brand wire stripper.
ZRMW6B	Item 2 was eliminated as having been cut by Item 1. This eliminated is based on differences in individual characteristics observed within the marked surfaces (toolmarks). Item 3 was identified as having been cut by Item 1 based on the agreement of class characteristics, and individual characteristics observed within the marked surfaces (toolmarks).

Additional Comments

TABLE 3

WebCode	Additional Comments
37UU6R	The wire stripper was signtly damage whitch made direct comparision of toolmark a bit dificult
3N2UDV	Class characteristics were in agreement with significant differences in individual characteristics observed between the piece of wire, Exhibit 2, and the test cuts made with the wire stripper, Exhibit 1. Lab procedures manual requires more than one item within a group to eliminate on individual characteristics, therefore, an inconclusive result was reported.
9LRUG3	CTS item 1 is my item 1A. CTS item 2 is my item 1B. CTS item 3 is my item 1C.
9ZCCCR	Level -X means that the degree is somewhere between level -1 and -4. If the client wants a specific grade, we will provide it.
AFXBWJ	TECHNICAL NOTES: Class characteristics are defined as measurable features of a firearm/tool which indicate a restricted group source. They result from design features and are determined prior to manufacture of the firearm/tool. Individual characteristics are defined as marks produced by the random imperfections or irregularities of firearm/tool surfaces. These random imperfections or irregularities are produced incidental to manufacture and/or caused by use, corrosion, or damage, and are unique to that specific tool. Any conclusions indicating that a toolmark was made by a specific firearm/tool are not to the absolute exclusion of all other firearms/tools because it is not feasible to examine all possible firearms/tools. However, observing this amount of agreement from a different source is considered extremely remote.
AG9CJH	Item 1.A = Item 1 Suspect Tool Item 1.B = Item 2 Item 1.C = Item 3 Item 1.D = Test material
GEJGWB	1.A (Item 1) 1.B (Item 2) 1.C (Item 3)
HR7T4E	Item 3 did not show enough individual features to categorically identify the tool. Given the group consistency regarding shape, type, and cut, it can be concluded that the evidence item could have been cut using the questionable tool.
LRE4A9	Identification: Is based on the agreement of individual characteristics observed through the microscopic comparison examination. [Initials] October/27/2025 Elimination: Is based in the disagreement of individual characteristics observed through the microscopic comparison examination. [Initials] October/27/2025
M793G3	The general features of toolmarks appear repeatedly on the same tool due to design and manufacturing processes. These are called class characteristics, and they form the basis for identifying the shape of toolmarks according to production standards. Individual characteristics of a tool, however, appear only on a specific tool and result from microscopic imperfections generated during manufacture or use. Examples include microscopic marks caused by machining, polishing, or wear. In this test, the microscopic and individual characteristics of the toolmarks produced by Item 1 were identical to those observed on Item 3. Therefore, it was concluded that the wire cut by Item 1 corresponded to Item 3.
TCC634	M80 stereoscopic microscopes and an FS-M comparative microscope were used in the research.
TZ2DWJ	The report was submitted via email, because the website www.cts-portal.com was not available.

-End of Report-
(Appendix may follow)

Collaborative Testing Services ~ Forensic Testing Program

Test No. 25-5282: Toolmarks Examination

DATA MUST BE SUBMITTED BY **Nov. 10, 2025, 11:59 p.m. EST** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A WebCode: 73H9NG

The Accreditation Release section can be accessed by using the "Continue to Final Submission" button above. This information can be entered at any time prior to submitting to CTS.

Scenario:
Police have recovered two pieces of solder wire with a questioned toolmark from a crime scene. In addition, a wire stripper was recovered from the apprehended suspect. Investigators are requesting that you examine the toolmarks and determine if any were made using the suspect's wire stripper.

Please note the following:

-Item 2 and Item 3 pieces of wire are individually packaged in labeled envelopes. It is suggested that when an item is removed, it is marked according to your laboratory's procedure.

-Be careful when handling the wire stripper and pieces of wire as the blade and cut ends are sharp.

-The Item 2 and Item 3 wires have been marked with paint according to their item numbers and to assist in distinguishing the side that is NOT to be examined.

-Two additional pieces of wire have been included for possible test marking purposes.

Items Submitted (Sample Pack T2):
Item 1: Wire stripper recovered from the suspect.
Item 2: Piece of solder wire recovered from the crime scene (marked with blue paint).
Item 3: Piece of solder wire recovered from the crime scene (marked with red paint).

1.) Were the questioned toolmarks on either of the pieces of solder wire (Item 2 and Item 3) produced by the suspect's wire stripper (Item 1)?

	Yes	No	Inconclusive*
Item 2:	○	○	○
Item 3:	○	○	○

*Should an item(s) be marked "Inconclusive", please document the reason in the Additional Comments section of this data sheet.

2.) What would be the wording of the Conclusions in your report?

Note: *Please use appropriate punctuation to indicate the end of sentences, sections, and statements in the free-form space below. Extra spacing and returns used for separation within your text will not transfer and may cause your information to be illegible in the Summary Report. The use of lists and tabular formats to deliver information is also cautioned against, as these do not transfer.*

3.) Additional Comments

Note: *Please use appropriate punctuation to indicate the end of sentences, sections, and statements in the free-form space below. Extra spacing and returns used for separation within your text will not transfer and may cause your information to be illegible in the Summary Report. The use of lists and tabular formats to deliver information is also cautioned against, as these do not transfer.*

Participant Code: U1234A
WebCode: 73H9NG

RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

CTS submits external proficiency test data directly to ANAB and/or A2LA. Please select one of the following statements to ensure your data is handled appropriately.

- ○ This participant's data is intended for submission to ANAB and/or A2LA. (Accreditation Release section below must be completed.)
- ○ This participant's data is **not** intended for submission to ANAB and/or A2LA.

Have the laboratory's designated individual complete the following steps
only if your laboratory is accredited in this testing/calibration discipline
by one or more of the following Accreditation Bodies.

Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory

ANAB Certificate No.

A2LA Certificate No.

Step 2: Complete the Laboratory Identifying Information in its entirety

Authorized Contact Person and Title

Laboratory Name

Location (City/State)