



## OSAC RESEARCH NEEDS ASSESSMENT FORM

**Title of research need:** Resolution Requirements for 3D Virtual Comparison Microscopy

**Keyword(s):** virtual comparison microscopy (VCM), toolmarks, 3D

**Submitting subcommittee(s):** Firearm and Toolmarks **Date Approved:**

*(If SAC review identifies additional subcommittees, add them to the box above.)*

### Background Information:

#### 1. Description of research need:

Evaluation of instrument resolution required and/or recommended for virtual comparison microscopy and three dimensional toolmark comparisons. Assessment of sizes/scale of impressed and striated toolmarks utilized by examiners.

#### 2. Key bibliographic references relating to this research need:

Pierre Duez M.A.Sc., Todd Weller M.S., Marcus Brubaker Ph.D., Richard E. Hockensmith B.S. II, Ryan Lilien M.D., Ph.D., Development and Validation of a Virtual Examination Tool for Firearm Forensics, Journal of Forensic Sciences, Summer. 2018

Vorburger T.V., Rhee H.G., Renegar R.B., Song J, Zheng, X.A., "Comparison of Optical and Stylus Methods for Measurement of Rough Surfaces," International Journal of Advanced Manufacturing Technology, 33(1):110-118, 2007

#### 3a. In what ways would the research results improve current laboratory capabilities?

Significant research has been performed in the area of measuring and recording microscopic toolmarks. The measured toolmarks can be displayed "virtually", i.e. on a computer screen, and compared using visualization software. High-resolution scans increase file size and acquisition time; low-resolution scans may result in the inability to reach source conclusions. Thus it would be useful to know: 1) what are the size of features used by examiners for comparison, 2) at what resolution do examiners lose the ability to discern the ground truth regarding source attribution, and 3) what resolution range (lateral and vertical) is recommended to digitize these features with sufficient fidelity.

#### 3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

As the Firearms and Toolmarks OSAC subcommittee writes standards on 3D instrumentation and VCM, having research that provides recommendations about resolution requirements would be helpful to both laboratories and manufacturers.

3c. In what ways would the research results improve services to the criminal justice system?

Standardize/provide best practice recommendations for VCM resolutions

4. Status assessment (I, II, III, or IV):

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

*This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.*

**Approvals:**

Subcommittee	Approval date: <input style="width: 100px; text-align: center;" type="text" value="5/4/2018"/>
<i>(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)</i>	

SAC		
1. Does the SAC agree with the research need?	Yes <input checked="checked" style="width: 20px; text-align: center;" type="checkbox" value="x"/>	No <input style="width: 20px;" type="checkbox"/>
2. Does the SAC agree with the status assessment?	Yes <input checked="checked" style="width: 20px; text-align: center;" type="checkbox" value="x"/>	No <input style="width: 20px;" type="checkbox"/>
If no, what is the status assessment of the SAC:	<input style="width: 100px;" type="text"/>	
Approval date:	<input style="width: 100px; text-align: center;" type="text" value="5/4/2018"/>	
<i>(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)</i>		