D41 Void Analysis in the Inside of Arc Melting Using 3D X-Rays

Young Jin Cho, National Forensic Service, Wonju-si, Gangwon-do 26460, SOUTH KOREA; Dong Gyu Lee, MA, National Forensic Service, Wonju-si 26460, SOUTH KOREA; Sun Jae Kim, MA, National Forensic Service, Wonju-si 26460, SOUTH KOREA; Jong Teak Park, MA, National Forensic Service, Wonju-si 26460, SOUTH KOREA; Jae-mo Goh, PhD, National Forensic Service, Wonju-si, Gangwon-do 26460, SOUTH KOREA; Nam-Kyu Park, PhD, National Forensic Service, Wonju, SOUTH KOREA*

Learning Overview: After attending this presentation, attendees will better understand the feasibility of using 3D X-rays as a tool for the Void analysis of molten marks.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by introducing an effective tool for the Void analysis of molten marks.

The arcing damage to electrical copper wires is often found at a post-fire scene where the electrical installation was energized during the early development of the fire. This damage can be useful to the investigation as it can provide reliable data to establish a fire's area of origin.

The primary arc melting refers to the arc melting acted as a cause of a fire, and the secondary arc melting refers to the arc melting formed while the insulated covering of electric wires is combusted after a fire breaks out. Since being able to distinguish the primary arc melting from the secondary arc melting means that it is possible to judge clearly whether it is acted as a cause of a fire or not, it could be very assistive in investigating causes of a fire. However, a definite method to discriminate this does not exist yet.

Researchers have studied diverse methods in order to distinguish the primary arc melting from the secondary arc melting for decades in the past, and one of those methods is to analyze the void inside the arc melting. It is said that the primary arc melting can be distinguished from the secondary arc melting by analyzing the number of voids, the size of voids, the location of voids at the cross section etc. but since the results of each researcher are different, it is also difficult to apply to actual situations.

The method analyzing voids can be used for researches to distinguish the arc melting from the fire melting apart from discrimination of the primary arc melting from the secondary arc melting.

To examine Void in the inside of molten marks, metallurgical analysis can be used. However, this method takes too much time due to many stages (cutting, molding, grinding, polishing, and etching), and it is only capable of observing one cross section.

This study, using Void analysis among the functions of software enabling 3D X-rays, determines that it is possible to easily and quickly interpret the proportion of Void in the volume of molten marks, the distribution of Void, and the diameter of Void. In addition, this study also shows that using the function of Void analysis should be much more precise and efficient than the method of physical cutting.

Void Analysis, 3D X-Ray, Molten Mark