AMC
AMERICAN METALCASTING CONSORTIUM

DIGITAL SURFACE INSPECTION IMPROVES PRODUCTION LEAD TIMES

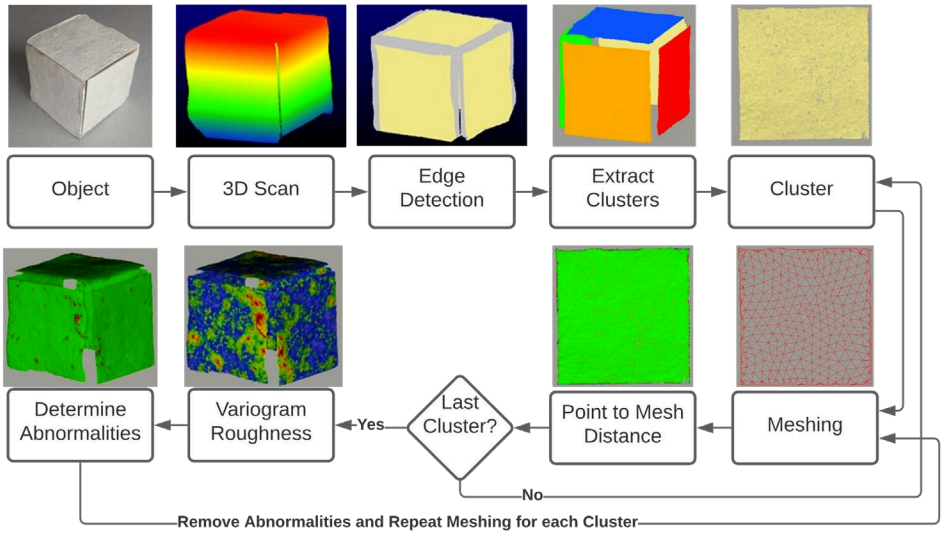
Introduction: Surface inspection of steel castings uses qualitative methods, leaving room for variation in interpretation. Standards used are the Alloy Casting Institute (ACI) Surface Indicator Scale, Manufacturer Standardization Society (MSS) SP-55 Visual Method, and American Society for Testing and Materials (ASTM) A802 that reference the Steel Castings Research and Trade Association (SCRATA) comparator plates. Some surface roughness inspection processes use the GAR Electroforming Cast Comparator C9. Other standards include ISO 11971 and BS EN 1370, which involve SCRATA and BNIF, as well as ASTM A997 for investment castings.

SUCCESS STORY

Problem: Visual inspection was identified as the most important factor causing production delays within foundry finishing operations. The inspection method currently relies on comparator plates or photos of casting surfaces which make it a very subjective process.

Solution: Under AMC's Innovative Casting Technologies (ICT) Program, Iowa State University is digitizing the surface inspection method to make the method more repeatable and reproducible. Using a variogram method, the laser scan point cloud data of castings are analyzed and used to calculate a surface roughness value.

Benefits: An objective surface inspection method reduces measurement error which leads to shorter production lead times and reduced costs associated with over-processing. This also helps foundries verify visual inspection results internally. A quantitative visual inspection method with improved gage R&R could also be leveraged to evaluate the effect of surface conditions on product performance and promote automation of the inspection qualification process.



Schematic Diagram of the Digital Surface inspection Process

"The Caterpillar Ground Engaging Tools product group has started using the SCRATA surface comparator plates for acceptance criteria. Compared to a prior methodology of measuring the indication, the comparator plates pose a challenge because they are strictly subjective." --Mike Thompson, Caterpillar

AMC AMERICAN METALCASTING CONSORTIUM

IOWA STATE UNIVERSITY

ATI Advanced Technology International

FOR MORE INFORMATION ABOUT AMC GO TO: AMC.ATI.ORG

This research is sponsored by the Defense Logistics Agency Information Operations, J68, Research & Development Office, Ft. Belvoir, VA. and the DLA Troop Support, Philadelphia, PA.