

Microstructure Informatics Cloud Computing (MiCloudTM) as a platform for ICME of titanium alloys

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Ayman Salem*, Joshua Shaffer, Richard Kublik, and Daniel Satko

Materials Resources LLC (MRL)

Dayton, OH, 45402, USA

e-mail: ayman.salem@ICMRL.net, web page: <http://www.ICMRL.com>

ABSTRACT

In the authors' opinion, a successful implementation of an ICME methodology requires the integration of microstructure information in computational tools that predict the performance of engineering products and simulate its dependencies on the manufacturing processes. Consequently, a suite of tools was developed for Integrated Computational Microstructure Research laboratory (ICMRL) and used in various research and commercial activities by MRL that includes the implementation of data science techniques to extract knowledge from microstructure data by employing signal processing, machine learning, pattern recognition and learning, visualization, predictive analytics, probability models, computer programming, data engineering, uncertainty quantification, and data warehousing.

This talk will summarize the evolution of a standalone tool kit (ICMRL) into cloud-based software as-a-service (SaaS) and Platform-as-a-service (PaaS) which enables global collaboration and efficient utilization of microstructure informatics for engineering products made by traditional thermos mechanical processing (MiCloudTM) and additive manufacturing (MiCloud.AM). Examples of various successful multi-organizational implementations will be given.