

Industrial Keynote

Advancing quality assurance in medical additive manufacturing: a holistic data management perspective

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In the field of additive manufacturing (AM), ensuring the highest quality of end products is crucial, particularly within the medical sector. [1] This quality depends, among other things, on the properties of the raw materials used, in addition to process influencing variables and post-processing steps. A holistic data management approach is essential to achieve consistent quality and efficiency. This approach integrates comprehensive data collection and monitoring across various aspects, including material properties, manufacturing processes, and product quality.

One example aspect of holistic data management, which will be explored in the Industrial Keynote, is tracking the aging and composition of metal powders, such as titanium, commonly used in AM. The characteristics of these powders can change over time due to exposure to the AM process and environmental factors. By consistently monitoring these properties, companies can understand how the powders change and take proactive measures to prevent degradation. This approach also enables informed decisions on powder reusability, optimizing resource use and reducing waste. A holistic approach to data management goes beyond monitoring individual areas, such as powder material properties, to include advanced monitoring techniques for the entire manufacturing process and product quality. By using well-managed data sets, AM users can optimize their printing processes to improve cost efficiency, quality and reproducibility. Historical data also helps to identify and eliminate production bottlenecks and reduce costs. They also support compliance with certification requirements. Continuous tracking and adjustment ensure consistent production quality that is scalable to other printers. Effective data management also preserves institutional knowledge and supports the training of new professionals, ensuring that valuable knowledge remains within the company.

This comprehensive approach to data management highlights the importance of integrating detailed data collection and analysis into the various aspects of the additive manufacturing process. In this way, companies can establish a robust quality management system to increase efficiency and quality. This is particularly important for medical applications to ensure the production of safe, reliable and high-quality medical devices and implants.

AUTHOR'S STATEMENT

Conflict of interest: P. N. J. Lindecke is employee of amsight GmbH, Hamburg, Germany; J. Eggert is employee of implantcast GmbH, Buxtehude
Informed consent was obtained from all individuals included in this study.

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