R&D | Healthcare / Pharmaceuticals | Defect detection / product inspection | Supervised Learning

Developing a Data-Driven Strategy for In-Process Quality Assurance for Additive Manufacturing

stryker

BUSINESS PROBLEM

Stryker has seen high growth in additive manufacturing as it enables more complex designs that yield better patient outcomes. However, additive in the medical space requires important and labor-intensive testing to ensure every product is safe for use. Testing takes place after parts are finished, days after the build starts, creating a pool of WIP inventory. Problems that are identified may render parts that have been built on the same machine since as scrap. Stryker seeks to build a strategy for the high volume of data generated during the build process to develop in-process quality checks and in-process feedback before testing occurs.

APPROACH

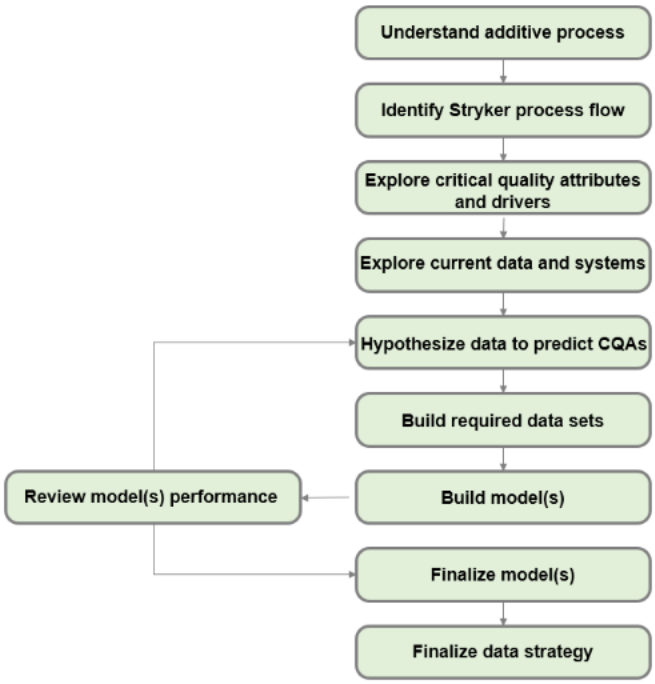
First, understand the key critical quality attributes required for a part to pass quality checks. Then, explore the factors that drive those attributes and use data to explore the relationships between them. Finally, identify data significant for predicting quality attributes or gaps in current data.

DATA SOURCES

Environmental data from additive machines (sensor-based), build attributes (software-generated), input material data, post-processing data

Data Types and Format

time-series data and categorical data



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IMPACT

In-process QA will allow Stryker to generate less scrap, ultimately reducing the amount of raw material needed. Removal of some testing equipment will act as an increase in capacity as additional floor space is freed, allowing for additional additive manufacturing machines.

DRIVERS	Enabling less variation in daily operations as well as an increase in effectively capacity
BARRIERS	Working across multiple data systems/lack of centralization, data stored across a variety of formats
ENABLERS	Clear ownership of areas of operations, clear scope
ACTIONS	Key actions included meeting with team members across Stryker's additive operations to leverage area expertise, incorporating feedback early, and building relationships
INNOVATION	Leveraging data and data science for prediction of manufacturing outcomes
IMPROVEMENT	Using a data science solution will enable reduction in quality testing volumes and improve throughput
BEST PRACTICES	Spend significant time talking to data and process owners, who can explain nuances of different trends. Ask individuals who work on the floor what happened on specific days where data clearly differentiates from average. Discuss thought processes with experts, and return to underlying science (thermodynamics, fluid mechanics) when considering results
OTHER APPLICATIONS	Other applications include quality assurance across different manufacturing processes outside of additive