

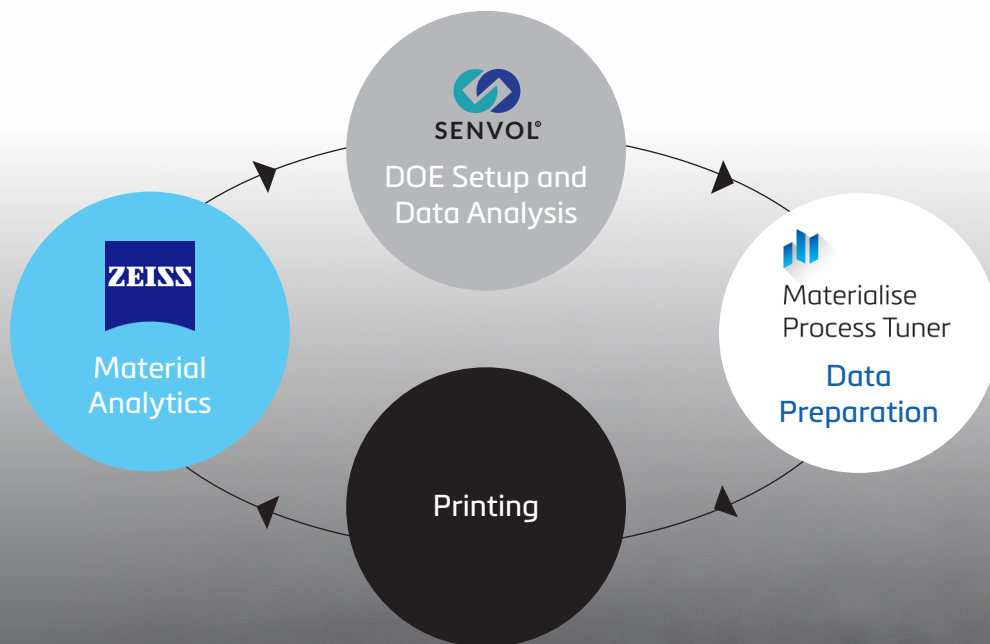
Rapidly Qualifying New Alloys for Laser Powder Bed Fusion

Industry collaboration for an end-to-end parameter development workflow

Since 2014, Rosswag Engineering has qualified over 40 metal materials for laser powder bed fusion and produced more than 60,000 parts, but the qualification process required too much manual work. Rosswag needed **four major workflow improvements to streamline the qualification processes for enabling new materials and applications for the industry:**

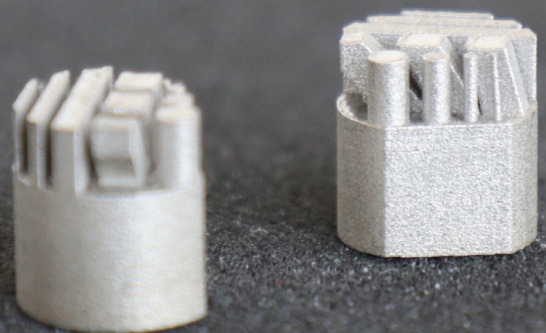
- 1 Fast and intelligent design of experiments (DoE) setup
- 2 Automated data preparation and early detection of unwanted test coupons
- 3 Swift, consistent, and multi-level test coupon characterization
- 4 Comprehensive and quick process modeling

This is where **Senvol**, **Materialise**, and **ZEISS** joined the collaboration and contributed specialized solutions to support Rosswag.



"Collaborations like this are crucial for the quick industrialization of additive manufacturing. It's great to work with others in the industry who want to push the limits of this amazing technology."

Philipp Schwarz,
Business Development Manager at Rosswag.



Improvement 1

Fast, intelligent DoE setup

There is a lot of trial and error in the research phase of conventional DoE setups, based on the user's knowledge and experience. However, with data-driven machine learning software **Senvol ML™**, the Rosswag team can very quickly establish efficient DoEs that will minimize the number of empirical specimens and builds needed.

Improvement 2

Automated data prep and early detection

Once a DoE is ready, the team needs to prepare a build platform, slice it, and send it to the printer — a tedious process prone to human error. **Materialise Process Tuner (MPT)** automated this step, saving Rosswag 20 hours of engineering time per month.

With MPT's Finite Difference 2D melt pool simulation, the software also detects lack of fusion and overheating in the test coupons before printing, ultimately reducing the number of builds needed to reach the process window.

Improvement 3

Swift, consistent, multi-level test coupon characterization

Traditional parameter development involves characterizing hundreds of coupons over multiple

builds. This is currently slow, non-reproducible, and produced significant measurement bias. **ZEISS AM parameter** is an automated workflow using automated CT scanning and image analysis to produce consistent results.

Novel test coupon geometry enables simultaneous parameter optimization of bulk density, geometric deformation, and porosity geometric features such as thin walls, inclines, bulk, and contour regions within a single build. This novel workflow combined with the rich analysis of ZEISS AM parameter enabled Rosswag to significantly reduce time, costs, and the number of builds needed to determine the optimum print recipe.

Improvement 4

Comprehensive and quick process modeling

For traditional parameter optimization efforts, it is difficult to understand the impact of each combination of process parameters on the resulting material properties. This is particularly true given a limited quantity of empirical data. Rosswag uses **Senvol ML™**, however, to quantify complex and interdependent parameter signature property performance (PSPP) relationships.

Senvol ML™ is particularly adept at analyzing numerous changing parameters at once and determining what process parameters need to be used in order to achieve a given set of performance requirements.

Learn more about the collaborators

