QUALITY-DRIVEN OPTIMIZATION

RESOURCE EFFICIENT PARAMETER DETERMINATION FOR LARGE-SCALE AM

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Motivation.

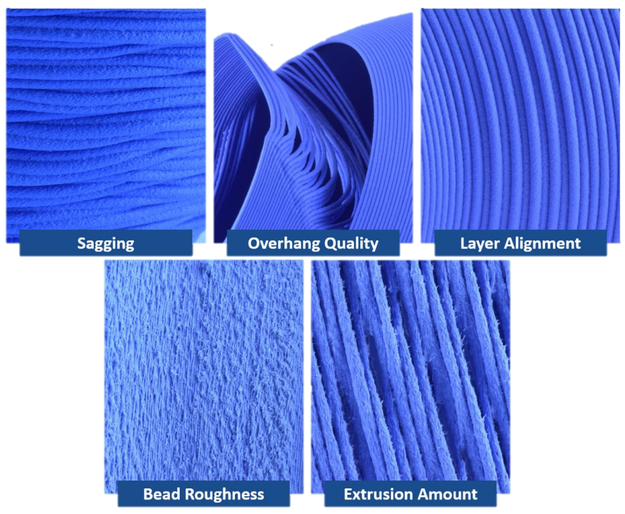
Printing settings, including temperature profiles, bead geometry, and speed, significantly affect the performance of parts in large-scale extrusion additive manufacturing. Qualifying a new material can be challenging due to the difficulty in determining the correct values for reliable performance assessment. A proposed method focuses on easily measurable aspects of the specimens to establish initial parameter values before further qualification and testing.

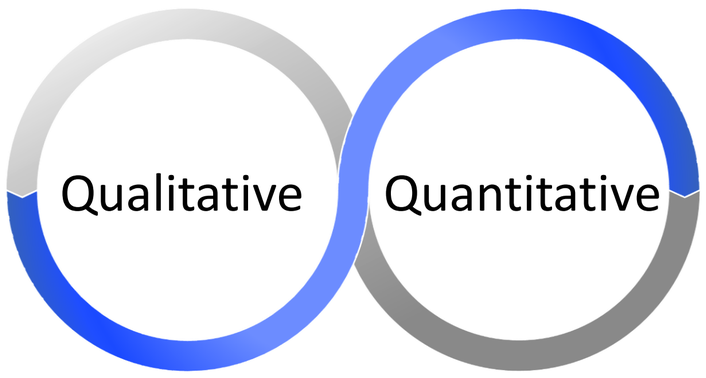
QUALITY DEFINITION AND EVALUATION

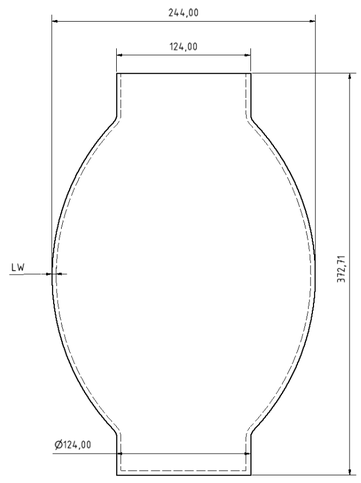
- **Optimization** and parameter tuning schemes based solely on mechanical properties often neglect other important aspects of part **performance**.
- **Quality** was defined using a combination of criteria, relevant to the material's intended use.
- **Weights** were assigned to reflect each criterion's importance.

Impact on material qualification

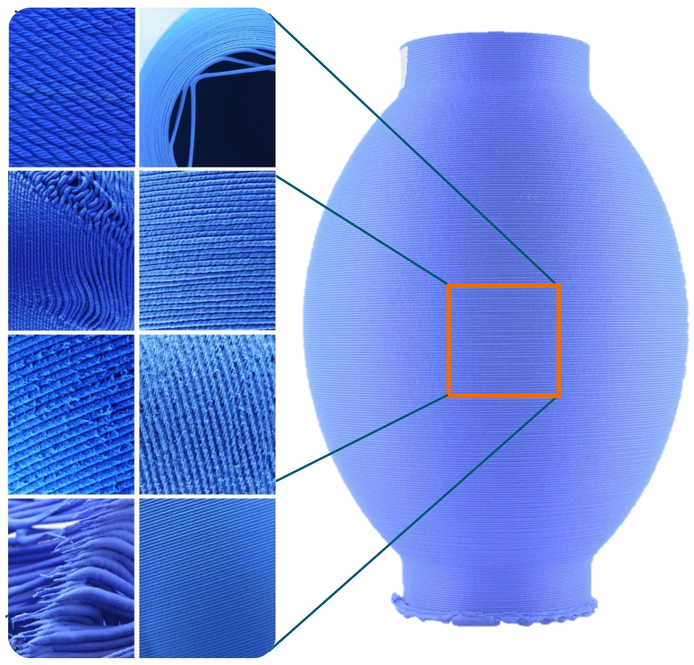
- Cost ↓
- Surface quality ↑
- Resources and time ↓

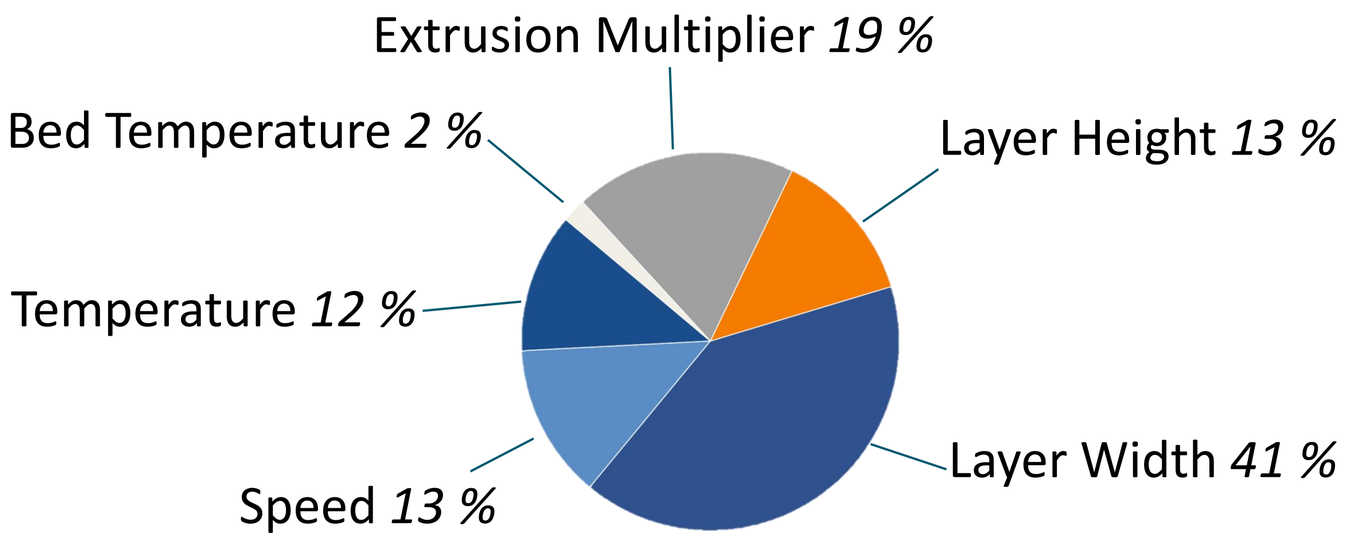






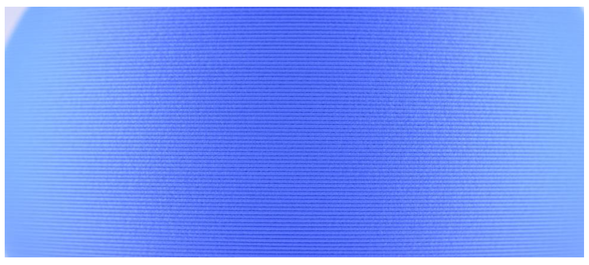
PARAMETER INFLUENCE ON QUALITY



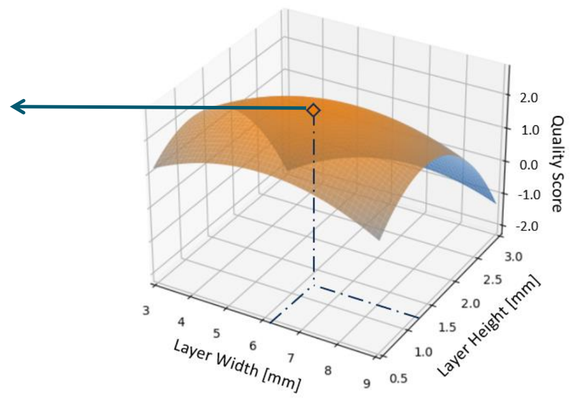


OPTIMIZATION AND TESTING

- **Layer Height** and **Layer Width** were chosen for further testing.
- 9 parameter combinations and 15 specimens were printed.



- ✓ High surface quality
- ✓ High accuracy (< 2%)
- ✓ Excellent layer alignment



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