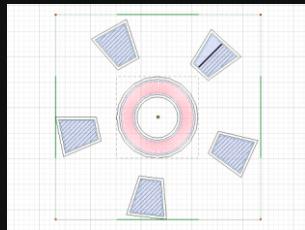


# Develop your own toolpathing kernels with the Advanced Toolpath Utility

Supercharge your process development.

Commercialize to a mass market. **Own your IP.**



## Custom-made Toolpathing Kernels at your Fingertips

- ▶ Optimize your printing performance with tailored toolpathing strategies.
- ▶ Balance build speed and part quality through adaptive parameters.
- ▶ Export build data directly to most of the standard Metal LPBF machines in the market.
- ▶ Define setting schemas to steer the end user's influence on the print process.

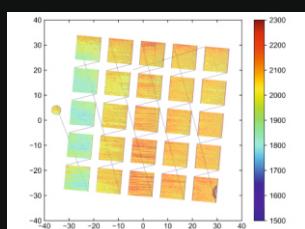
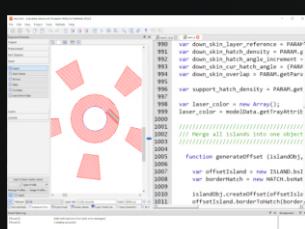


Image courtesy of Laser Application Center, University Aalen

## The Ultimate Toolkit for your Production and R&D alike

- ▶ Made by real users of most of the commercially available equipment, it addresses all your toolpathing pain points - from qualification over quality to throughput.
- ▶ As a Production OEM, optimize each product with a geometry-driven laser recipe, while enhancing throughput, quality, and reliability.
- ▶ As a Material vendor, swiftly discover process windows with easy DoE automation.
- ▶ As a Machine builder, stop struggling with a non-optimal data preparation pipeline.



## An Efficient Development Environment

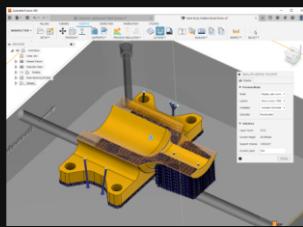
- ▶ Use a JavaScript language environment to control laser power and timing down to the vector level.
- ▶ Evaluate your build file and its properties interactively with the real-time vector preview.
- ▶ Debug your custom scripts in canvas to evaluate which choices are made when and why.
- ▶ Choose from an existing exporter library or implement your own.



Image courtesy of Fraunhofer IGCV

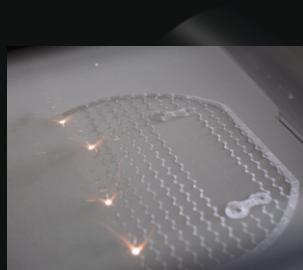
## Proven Technology, Trusted by Many

- ▶ The Advanced Toolpath Utility has been driving the most successful industrial applications in AM for over a decade. From dental to race car parts. From implants to rocket engines.
- ▶ Many established machine tool builders rely primarily on the Autodesk technology stack to maintain their competitive edge and keep control of their intellectual property.
- ▶ For process research, it has repeatedly shown to reduce development time from months or weeks down to days or hours.



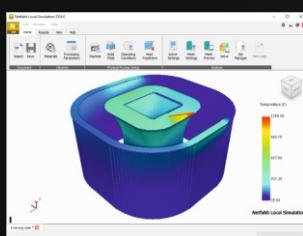
## Seamless CAD/CAM Integration and Mass Market Deployment

- ▶ Offer your customers an industry-leading software stack from CAD to printed part at an unbeatable price - tailored to your technology needs.
- ▶ Keep your investment at a minimum and save millions of dollars and years in time-to-market.
- ▶ Safeguard your proprietary knowledge by sharing it only in encrypted archives.
- ▶ Commercialize your development directly to thousands of customers, under terms you define.
- ▶ Control the exposure of capabilities down to the individual license holder.



## Multilaser Efficiency and Collision Detection

- ▶ Leverage state-of-the-art laser splitting capabilities for superior multi-laser results.
- ▶ Dynamically change the hatching structure to adapt to laser zone restrictions.
- ▶ Use accurate timing predictions in order to maximize machine efficiency.
- ▶ Visualize smoke in the build chamber in real time and predict potential atmospheric interactions of the lasers.



## Process Simulation and Volumetric Adaptivity

- ▶ Modulate properties like laser power or hatching directionality by volumetric fields.
- ▶ Modify toolpaths by mechanical FEA results, geometric distances or gradients.
- ▶ Combine toolpath generation with Autodesk's industry-leading thermo-mechanical process simulation capabilities
- ▶ Ship your novel R&D ideas directly to your customer base within weeks. From support-less printing to multi-material parts, from implicit geometries to grain-structure optimization.



## Seamless Integration with your Machine Control Stack

- ▶ While supporting many proprietary vendor formats, the Advanced Toolpathing Utility does not end at the build file.
- ▶ With a natural integration into Autodesk's free-to-use Machine Control Framework, you obtain direct control over the laser with accuracy of a few microseconds.
- ▶ Transport meta data from the CAD system to the mirrors with a minimal investment in software development - saving you millions of dollars in R&D expense.
- ▶ Autodesk Fusion's extensive Python scripting and C++ automation capabilities streamline your operation into one-click-workflows with a great user experience - locally or in the cloud.



Contact us for our Hardware Partner Program.

