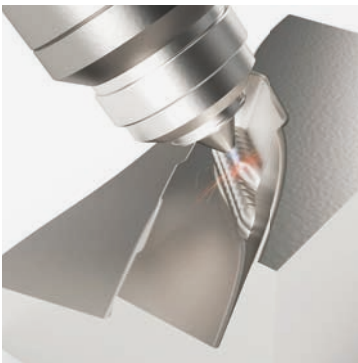




ModuleWorks
Get There Faster.

Laser-Aided Manufacturing Component

ModuleWorks offers an advanced programming environment for laser-aided processes, including laser cladding, laser cutting and laser hardening. Each process requires its own dedicated features, for example, laser cladding requires a constant stepover and a sophisticated layer management system. ModuleWorks offers process parameters for each laser-aided process as well as geometrical simulation of the laser additive and laser cutting processes with full collision avoidance, toolpath planning and automatic link motions between operational machining motions.



Laser Cladding

Laser cladding supports multiple layers and maintains a constant stepover on the surface of each layer. Due to the complexity of the nozzle and the machined parts, the laser cladding component offers automatic collision avoidance and automatic link motions without manual interaction.



Laser Cutting of a Sheet Metal

Laser cutting supports simple 2D input geometries as well as complex input geometries that are used for 5-axis machining. Special process parameters such as pierce points are also supported.



Laser Hardening

Laser hardening automatically determines the hardening path on curved surfaces and the laser spot width. Similar to welding, the software automatically checks for collisions and handles non-cutting moves.

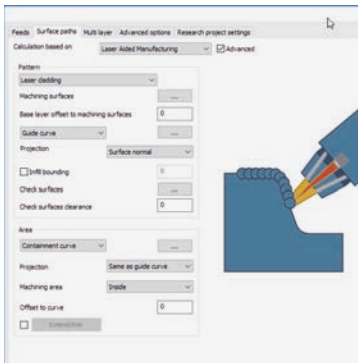
Fact Sheet: Laser-Aided Manufacturing Component

Laser Cladding

The laser cladding toolpath is optimized for multi-axis, multi-layer additive processes. It can be used with hybrid machine tools, in robotic systems, and in powder nozzle additive manufacturing systems. Typical laser cladding applications include repairing and rebuilding the worn surfaces of pre-machined metal forms, such as metal forming dies for car body sheets.

ModuleWorks laser cladding offers:

- Advanced laser cladding on free-form surfaces and scanned mesh data
- Full 3D offsets of the machining surface
- Accurate 3D stepover of weld slices
- Automatic collision avoidance as part of toolpath planning



User Interface Example

Key Benefits

- Simple generation of input data
- Gap-free weld pool
- Multi-layer support
- Data definition per layer



Laser Cladding

General Features

- Flexible toolpath pattern definition using drive curves or a drive mesh
- Cladding area definition using a closed containment curve or closed body mesh
- Simple definition of toolpath sorting
- No manual adjustments required



Additive Manufacturing of a Blisk

Machining Highlight

- 5-axis additive manufacturing
- Automatic collision avoidance for toolpath and link motions without manual interaction
- Full control over each weld slice in the cladding process

Laser Cutting

Laser cutting uses high-power laser beams to cut off and cut out metal sheets or tubes. ModuleWorks provides advanced toolpath calculations that drive machine tools with process-relevant parameterization for 2-,3-,4- and 5-axis machining including full collision checking. Users can perform a full 5-axis machine simulation of the toolpath, the part, cut material and detection of chunks.

Key Benefits

- State-of-the-art technology
- Proven in the laser industry
- Easy to use
- Cost-effective implementation

General Features

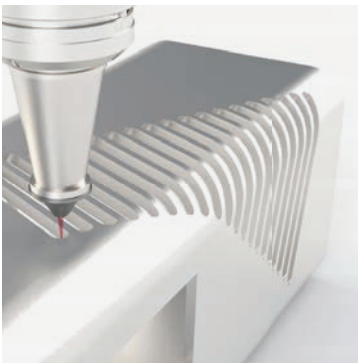
- 2-axis for cutting out patterns
- Rotary machining for cylindrical parts
- 5-axis for trimming and de-flashing

Machining Highlight

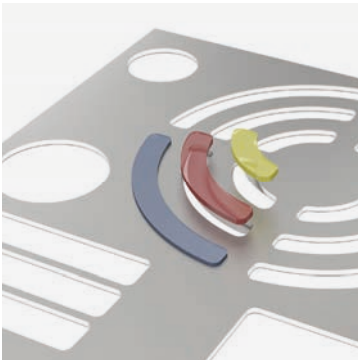
- Simulation of material removal and chunk detection
- Full collision avoidance between the fixture, raw material and laser head
- Automatic linking motions for cut slices
- No manual toolpath editing required



Metal Sheet Cutting



Tube Cutting



Metal Sheet Cutting

Fact Sheet: Laser-Aided Manufacturing Component

Laser Hardening

Laser hardening is a surface treatment process. The laser heats up the metal surface to the point where the atomic structures of the metal change. After cooling down, the surface is harder than before and withstands greater mechanical forces.

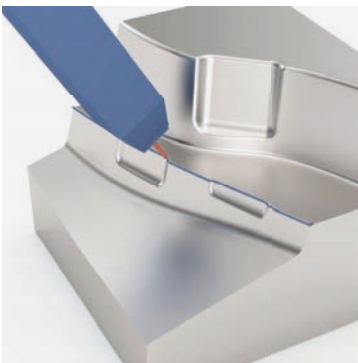
ModuleWorks provides advanced toolpath calculations that drive machine tools with process-relevant parameterization, such as single- and multi-slice toolpaths, control of the beam width and penetration, and temperature guidance for pyrometer usage.



Hair Dryer Mold

Key Benefits

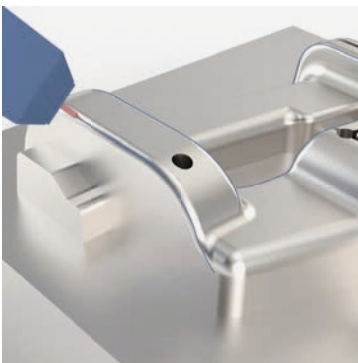
- Regional hardening of part surfaces without global treatment
- Detection of medial curves for guiding the laser head
- Easy to use parameter settings
- Machining of complex surfaces without manual toolpath editing



Form Part

General Features

- The part can be a scanned mesh or a CAD surface
- Toolpath pattern definition using guide curves or medial curves
- Multi-slice function for regions bigger than the laser spot width
- Automatic collision avoidance and link motions



Medial Axis on Edge

Machining Highlight

- Automatic medial curve detection
- Automatic laser spot width calculation
- Maximum penetration depth detection

For information on other CAD/CAM components, including 3-Axis- and 5-Axis toolpaths, visit: www.moduleworks.com

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