

LASER PROCESSES & SYSTEMS FOR MANUFACTURING MEDICAL IMPLANTS

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30+ YEARS OF INNOVATION AND PARTNERSHIP IN MEDICAL DEVICE MANUFACTURING



Medical Device Manufacturing

Market Aligned Solutions

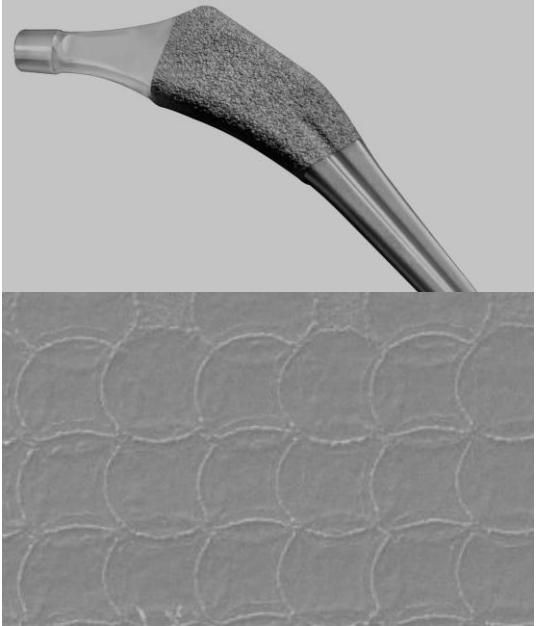
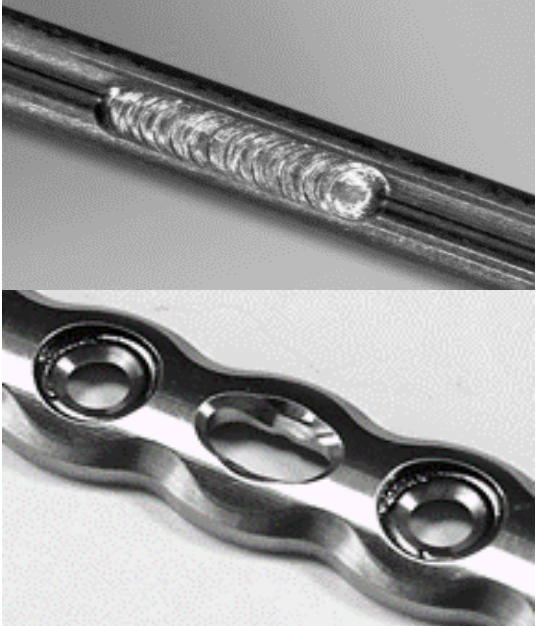
Laser, System & Process Innovation

Application Knowledge & Production Experience from > 6000 Systems in MDM

Global Support; 21 Applications Labs, 700+ Service Staff
18 Global Logistics Warehouses (GLS)



LASER APPLICATIONS FOR MANUFACTURING MEDICAL IMPLANTS



Cutting



Welding



Marking



Surface texturing

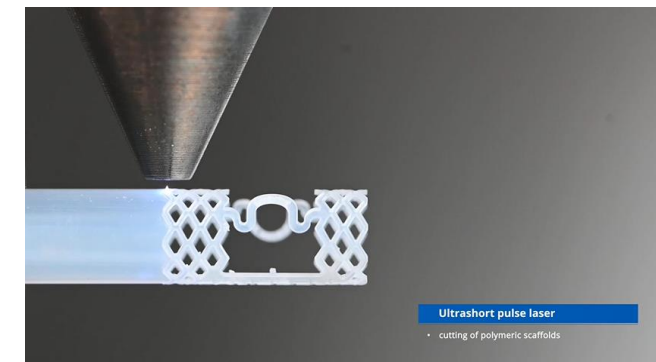
MICRO CUTTING LASERS AND APPLICATIONS

■ Two laser processes available:

- Fiber laser fusion cutting (μs , modulated cw)
 - Standard solution for metals (stainless steel, CoCr)
 - Typically providing higher processing speed
- Ultra-short-pulsed laser cutting (fs)
 - The only solution for bioresorbable polymers and magnesium, preferred for Nitinol
 - Reduced heat affected zones, offering smaller strut widths
 - Less post-processing effort
 - Growing share of femto vs. modulated-cw fiber laser
- Option: both processes in one machine
 - StarCut Tube Hybrid tube cutting system
 - Dry or wet cutting option
 - Auto tube loading



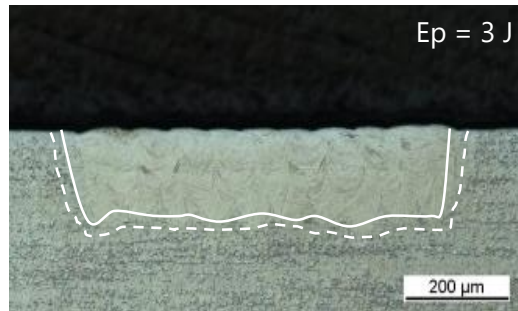
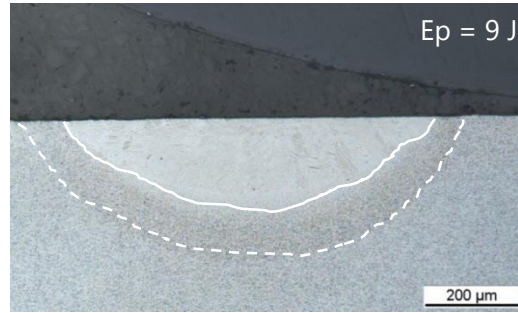
Tube cutting
for stents and
heart valves



MICRO WELDING SMARTWELD+ PROCESS OPTIMIZATION



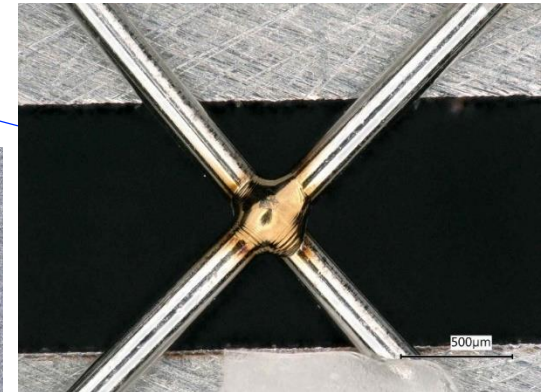
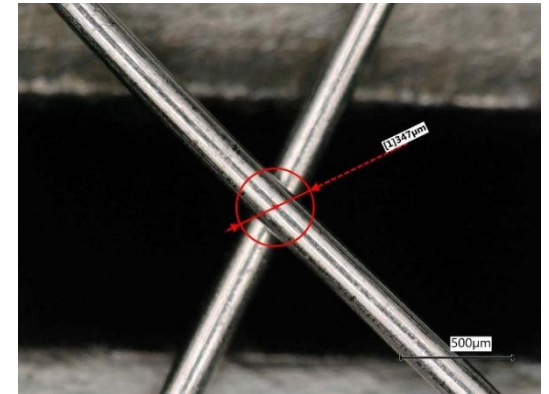
Cross section:
conventional pulsed laser
metal weld, spot size ~ 800 μ m



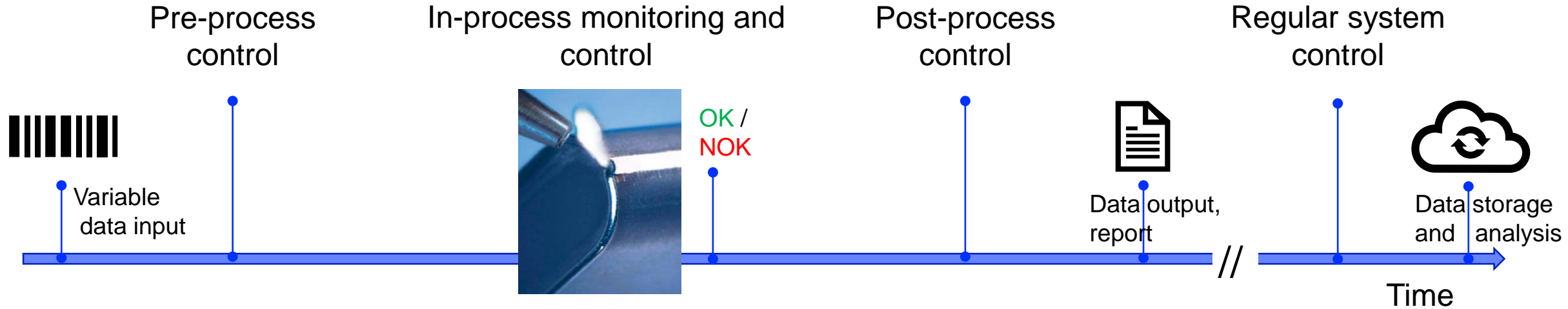
Cross section:
SmartWeld+ metal weld
with single mode laser, spot
size ~30 μ m



Welding of stainless steel
wire mesh,
Wire diameter 200 μ m
Laser spot size 30 μ m



CONTROL THE LASER PROCESS AT VARIOUS STAGES



- Visual sensing:
 - Part fit
 - Weld gap detection
 - Part position
 - Correct parts?
 - Part geometry
- Fixture sensing
- ...

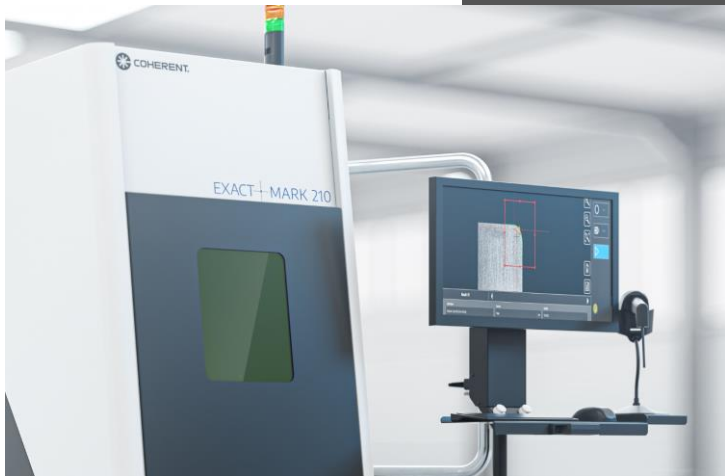
- Weld depth monitoring (OCT)
- Diode-based monitoring
- Acoustic monitoring
- Pyrometer-based laser power control
- Thermal imaging
- Height sensing
- Path deviations
- ...

- Weld geometry and alignment
- Marking code verification
- Visual process quality (w/ or w/o AI and machine learning)
- Thermography of the cool-down process
- Acoustic emissions
- ...

- Laser power validation and regulation
- Beam quality check
- System utilization
- System-to-system equalization
- ...

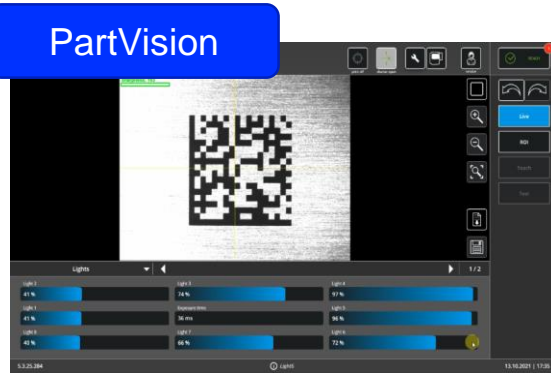
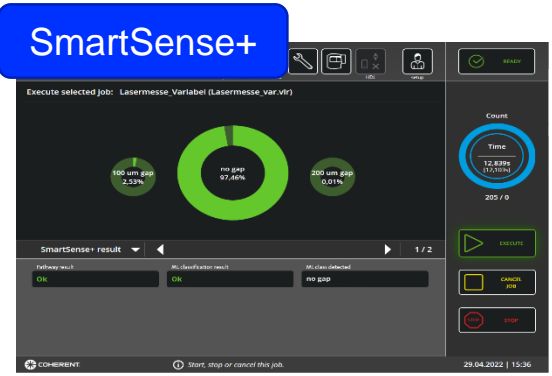
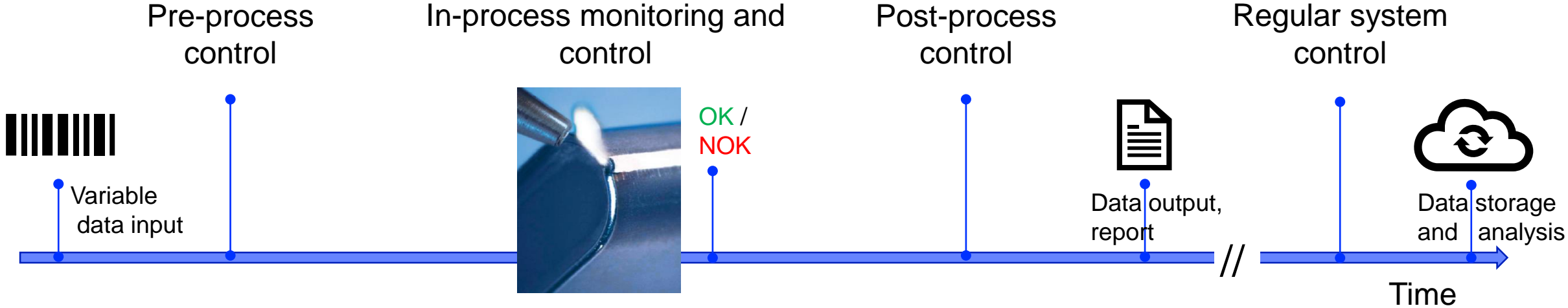
LASER FRAMEWORK SOFTWARE: PROCESS WORKFLOW - RECIPE

The screenshot displays the software interface for recipe generation. At the top, a navigation bar includes a menu icon, a back arrow, and a 'READY' status indicator. Below this, a 'Recipe generation' section contains four icons: an eye (representing vision), a database icon (representing data), a laser beam icon (representing process), and a camera icon (representing live view). A blue box labeled 'Drag-and-drop' is positioned above these icons, with a blue arrow pointing from it to the 'Laser process' icon. Below the icons are four blue boxes with white text: 'Pre-process vision task', 'Variable data', 'Laser process', and 'Live view on'. To the right of the main interface is a vertical toolbar with icons for 'Galvo', 'Vision', 'Data', 'CNC', and 'Live'. At the bottom of the interface, there is an 'Editor' section with a 'maintenance' button, a play button labeled 'Execute', an edit button, and a delete button. A footer note reads: 'Add, remove or edit recipe process steps.'



Exact2xx series

CONTROL THE LASER PROCESS AT VARIOUS STAGES



COHERENT