SENSORTHERM
MEMBER OF THE NYNOMIC GROUP

HIGHSPEED Pyrometer Systems

- Laser Application Monitoring
- Laser Power Control

HELISYS

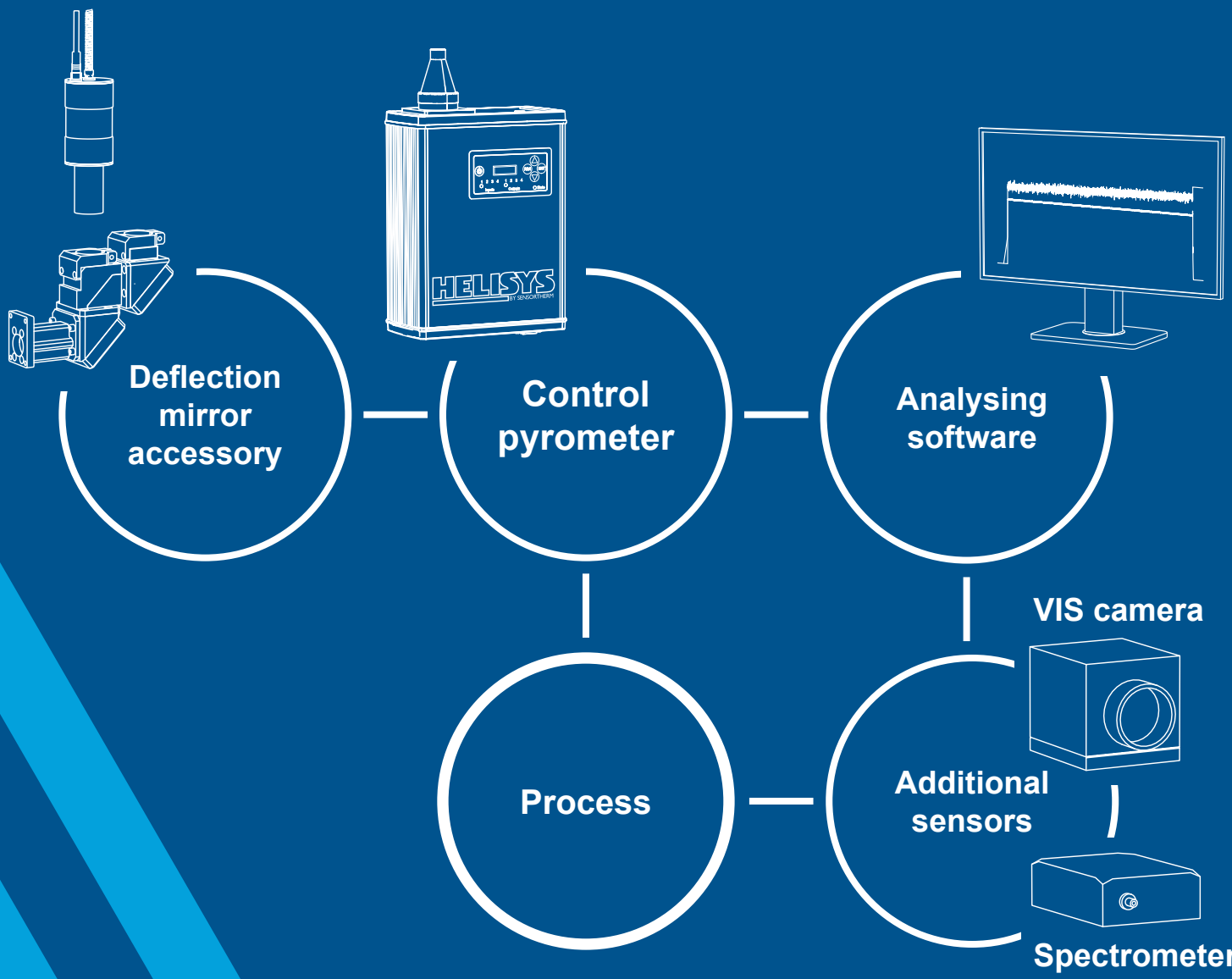
BY SENSORTHERM

The HELISYS System

Ultra-fast infrared temperature measurement devices optimized for use in additive manufacturing processes.

They optimize all laser-based applications by either monitoring processes or controlling them to a setpoint in near real-time based on the measured temperature.

The H4 measures, thinks and acts directly in the housing and passes the finished correction signal (an analog 0–10 V signal) directly to the laser.



HELISYS BY SENSORTHERM

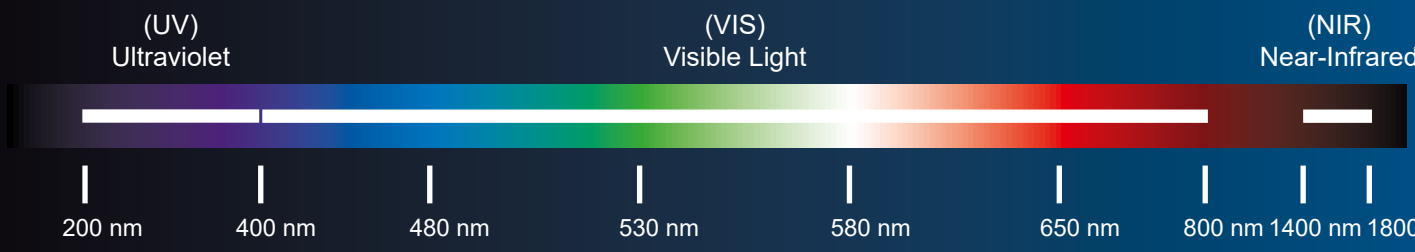
The HELISYS laser monitoring and control systems

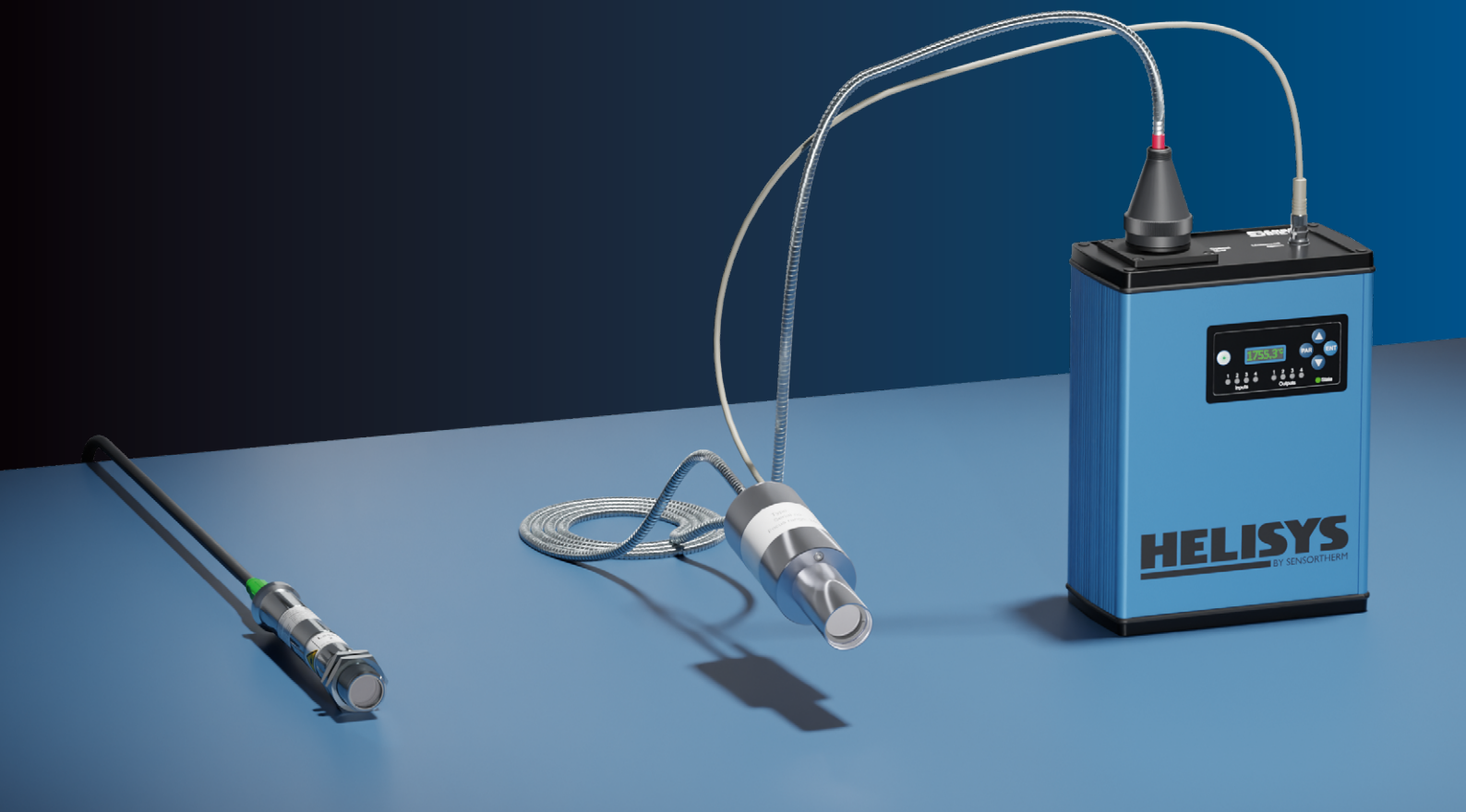
- **Can be integrated into existing laser heads**
- **Measures the melt pool temperature directly at the laser impact point**
- **Controls laser power at points where the laser would otherwise burn the material during changes in direction**

Spectroscopy
Find errors on a surface
200-400 nm (UV)

Visual camera
400-800 nm (VIS)

Pyrometry
Melt pool temperature
1400-1800 nm (NIR)





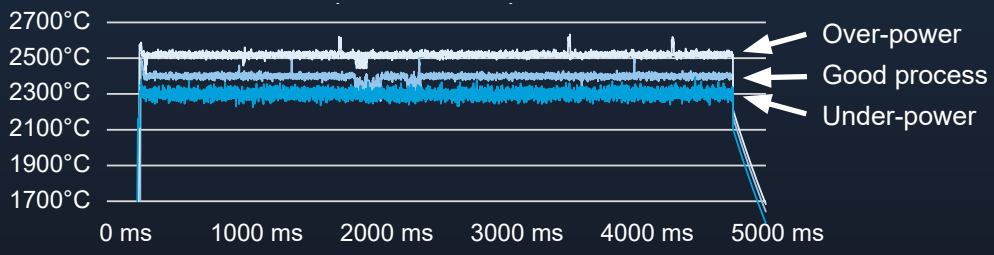
High-speed laser cladding – Ultra-Fast & Flawless Coatings

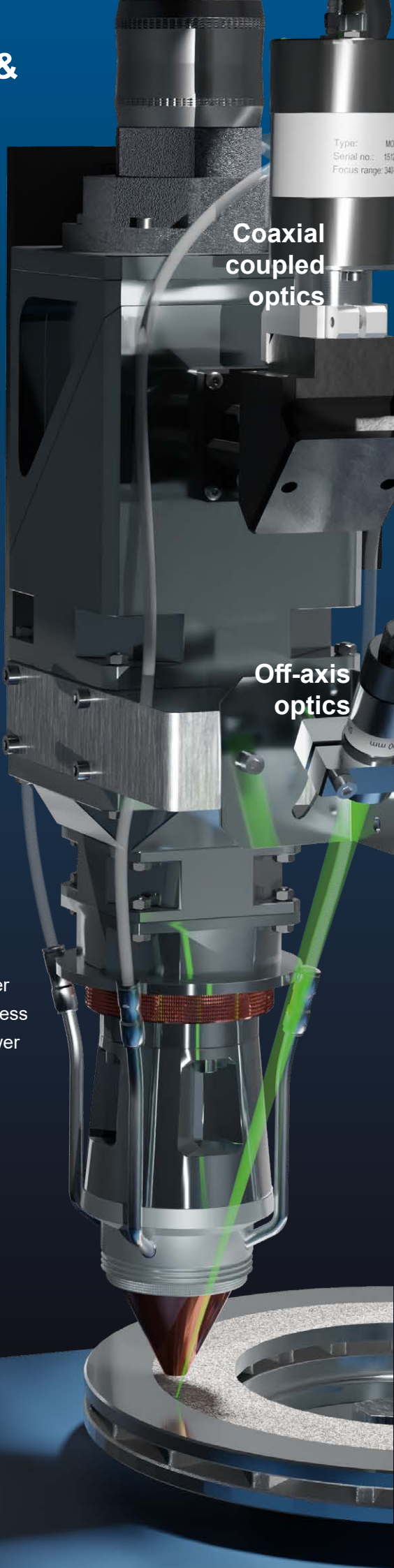
Ultra-fast coating, perfectly controlled: *The H4 controls melt pool temperatures in microseconds even at extreme feed rates – ensuring flawless, ultra-thin protective layers.*

- **Prevents thermal overheating** of the underlying substrate material.
- **Matches energy input precisely** to the dynamic high-speed powder flow.
- **Ensures uniform layer thickness** and a flawless metallurgical bond

Highspeed cladding temperature **off-axis** (dirty surface)

Highspeed cladding temperature **coaxial**





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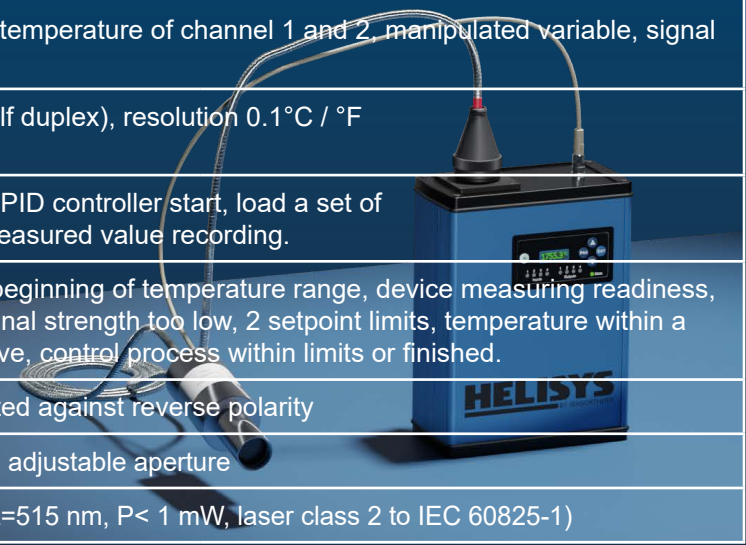
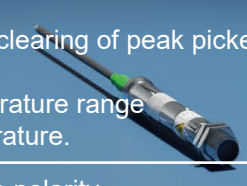
Technical Data H4 (2-color pyrometer)

Model	H422	H433
Temperature range	700 – 2300°C	
Spectral range	1.4 – 1.8 µm	1.6 – 2.1 µm
Detector	2 x InGaAs	
Response time t_{90}	50 µs (20kHz), adjustable up to 10 s	
Exposure time	25 µs	
Controller sampling time	25 µs to 25 ms (in 10 µs selectable)	
5 analog outputs	0–10 V DC, load > 100 kΩ, resolution 0.0016% of the (adjusted) temperature (sub) range (16 Bit). 2-color temperature, 1-color temperature of channel 1 and 2, manipulated variable, signal strength.	
Serial interfaces	■ RS485 (4.8–921.6 kBd, half duplex), resolution 0.1°C / °F ■ Ethernet (100 Mbit/s)	
4 digital inputs (via supply voltage)	Laser targeting light on / off, PID controller start, load a set of parameters, start / stop of measured value recording.	
4 digital outputs (max. 100 mA)	Limit switch, exceeding the beginning of temperature range, device measuring readiness, device over-temperature, signal strength too low, 2 setpoint limits, temperature within a setpoint band, controller active, control process within limits or finished.	
Power requirement	24 V DC, max. 2.5 A; protected against reverse polarity	
Motorized focus optics	340 to 3000 mm focus range, adjustable aperture	
sighting method	Laser targeting light (green, λ=515 nm, P< 1 mW, laser class 2 to IEC 60825-1)	



Technical Data HF (1-color pyrometer)

Model	HF18	HF23
Temperature ranges	100 – 700°C 150 – 900°C	50 – 600°C
Temp. sub ranges	Any temperature sub-range adjustable within the temperature range (minimum span 50°C)	
Spectral range	1.65–2.1 µm	2–2.6 µm
Detector	InGaAs	InGaAs
Response time t_{90}	100 µs (10 kHz), adjustable up to 10 s	
Analog output	0 or 4–20 mA, max. load: 500 Ω, resolution 0.0015% of the (adjusted) temperature (sub) range (16 Bit).	
Serial interface	RS485 (4.8–921.6 kBd). Resolution 0.1°C / °F	
Inputs / outputs	2 digital inputs/outputs, each configurable as input or output: ■ Digital input (via supply voltage): laser targeting light on/off, clearing of peak picker, load a set of parameters. ■ Digital output (max. 50 mA): limit switch, beginning of temperature range exceeding, device measuring readiness, device over-temperature.	
Power requirement	24 V DC (18–30 V DC), max. 12 VA; protected against reverse polarity	
Sighting	Laser targeting light, green: λ=515 nm, P< 1 mW, laser class 2 according to IEC 60825-1	

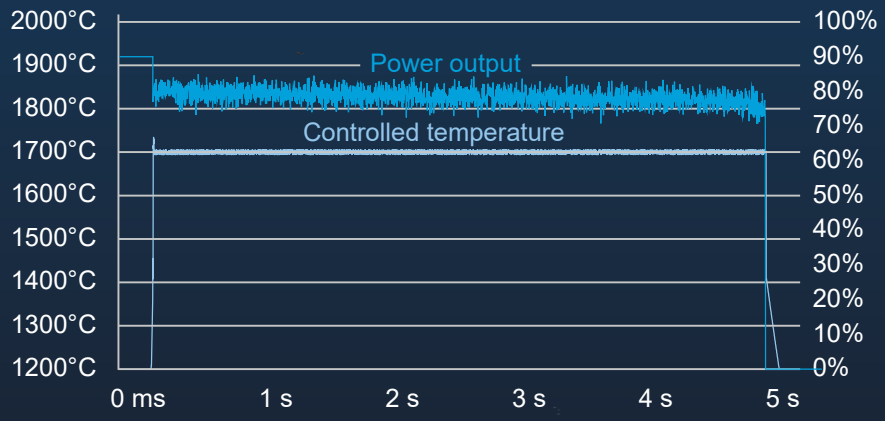


LMD – High-Precision Metal Deposition

Consistent quality with every track: Whether for repair or 3D shaping, the integrated PID controller prevents heat accumulation as part height increases, securing a homogenous microstructure.

- **Minimizes residual stress** and thermal distortion in the component.
- **Guarantees optimal fusion** between the deposited metal and base material.
- **Maintains consistent track width** and height throughout the process.

Laser metal deposition temperature
coaxial coupled, PID controlled



The surface temperature is extremely constant because the PID controller continuously adjusts its power output to the heating component.

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LPBF – Intelligent Powder Bed Control

Real-time control in the powder bed: Eliminate scrap at overhangs and sharp corners – the H4 adjusts laser power in-track and in real time to match local thermal conditions.

- **Eliminizes temperature drift**
  during long, complex build cycles.
- **Optimizes melt pool stability**
  via ultra-fast, real-time power adjustment.
- **Prevents critical defects**
  like micro-cracks and structural delamination

Example of the temperature distribution
of our LPBF printed logo

HELISYS
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