

**Appolo workshop 5.6.2015**

Lappeenranta University of Technology

# **Process monitoring with CAVILUX laser illumination**

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3. Solutions for R&D
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## 1. Company and technology

# Cavitar in general

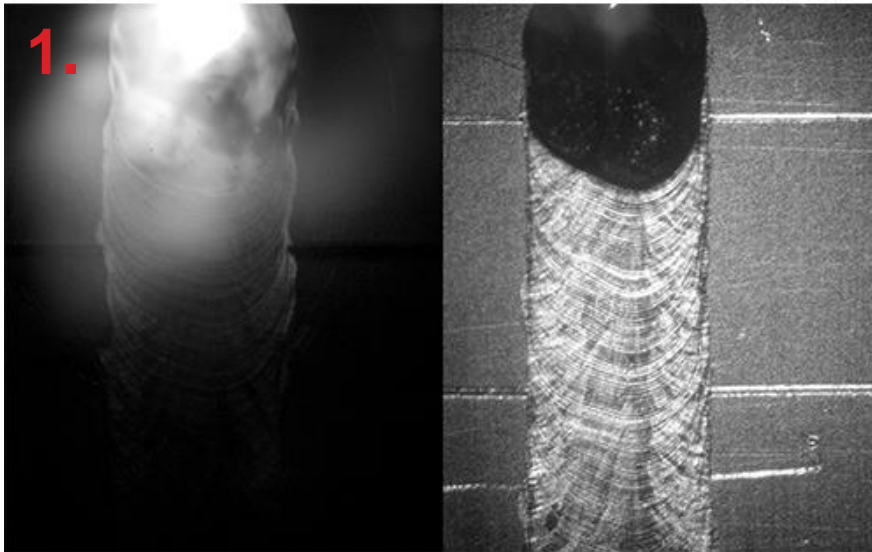
- Established in 2004, Located in Finland
- Designs and manufactures intelligent laser illumination solutions for monitoring and control of industrial processes and for R&D purposes
  - Distributors in 25 countries
  - Direct sales to OEMs and integrators
- Intelligent laser illumination and monitoring solutions
  - Enables the monitoring of many new industrial processes that has been difficult or impossible before
  - Increases information content in the images



## 1. Company and technology

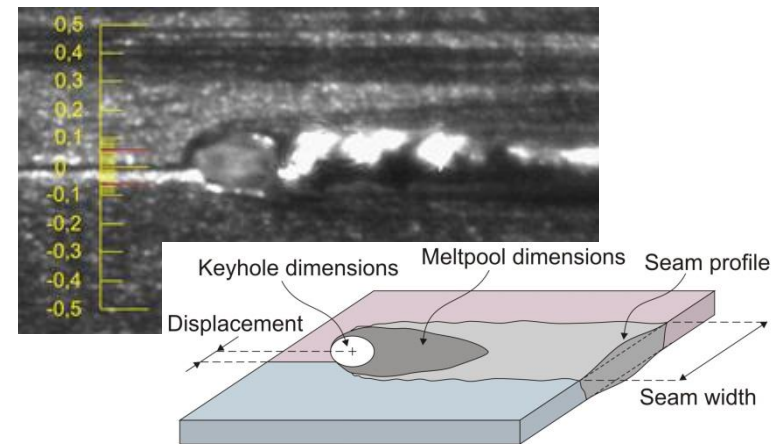
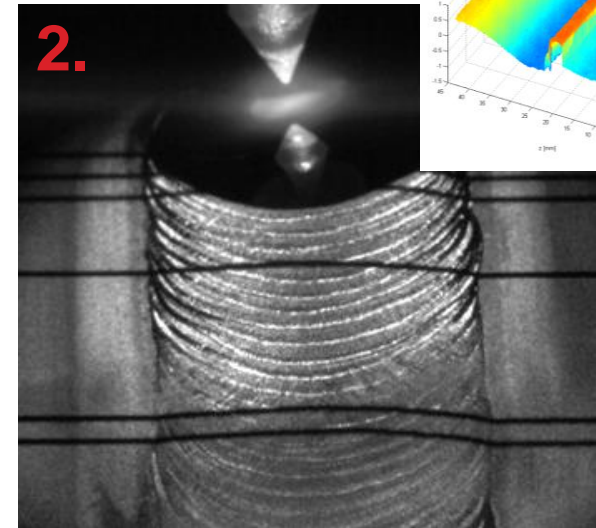
# CAVILUX monitoring technology

1. Clear view through heat
2. High quality image and possibility for simultaneous measurement
  - position, dimensions, shape
  - topography
  - micro and macro defects
3. Possibility to use high speed visualisation when needed (process development)



Laser welding without and with laser illumination (Nobby Tech)

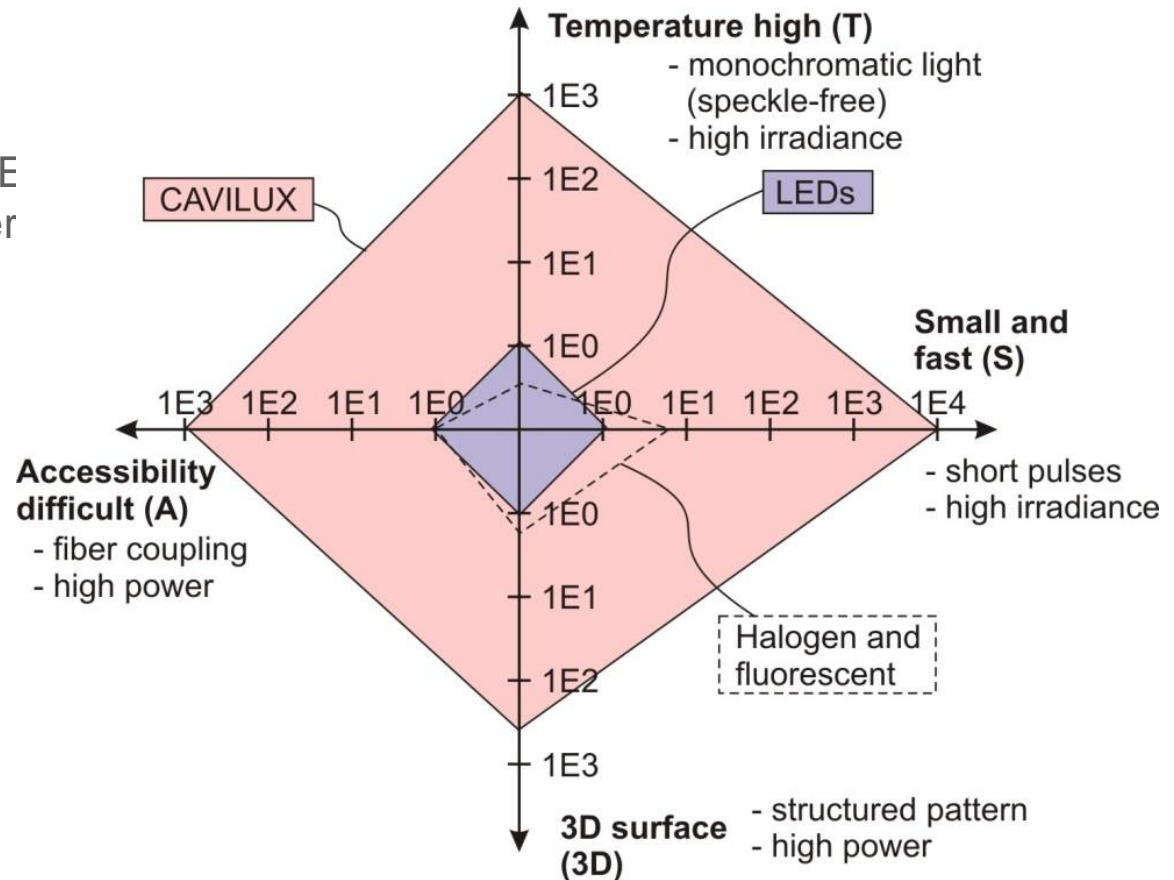
See video: <https://www.youtube.com/watch?v=552J041Ji-o>



# Technology, applications and benefits

## Laser and LED comparison

Performance and applicability comparison of state-of-the-art LE light sources and CAVILUX laser illumination.



In several industrial applications, CAVILUX technology offers 1000 times better properties than the best LED light sources. This has remarkable practical possibilities and benefits for process monitoring.



## 2. Monitoring solutions

# Monitoring of orbital welding (oil and gas)

Customer: Serimax Group

Solution: CAVILUX solution integrated by customer

Purpose: Remote control of EXTERNAX welding equipment (live video)



## 2. Monitoring solutions

# Monitoring of GMAW Gladding

Customer: Global player in nuclear primary components

Solution: CAVILUX Welding Monitoring system

Purpose: Operator displays (live video), recording of whole welding process



### SENSORS

- Integrated camera and laser
- Protected against spatter
- Water or air cooled
- Easy to maintain

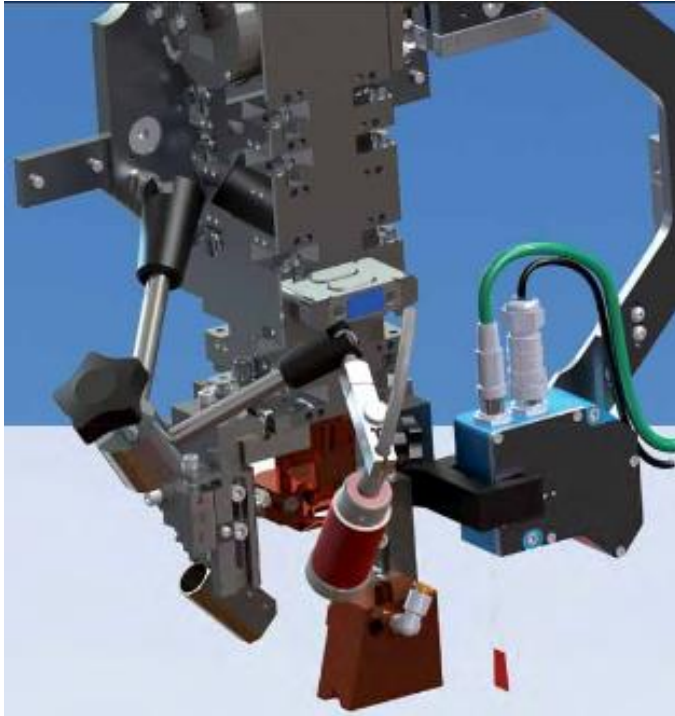


### SYSTEM

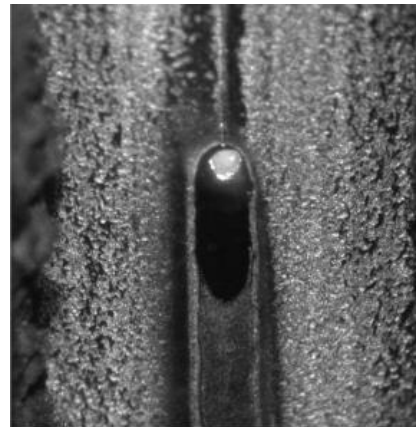
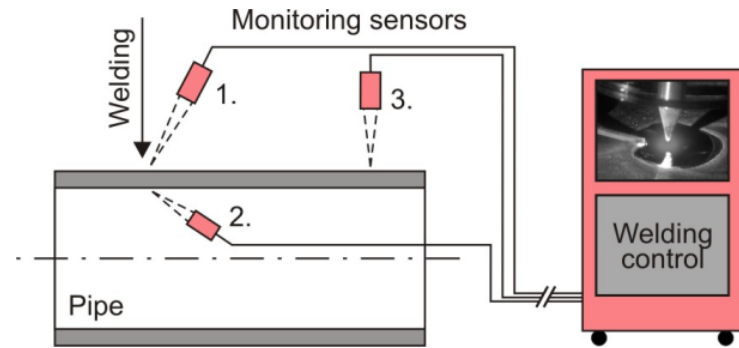
- Sensors and control unit
- Touch displays
- Industrial computers
- Chiller
- UPS battery backup

## 2. Monitoring solutions

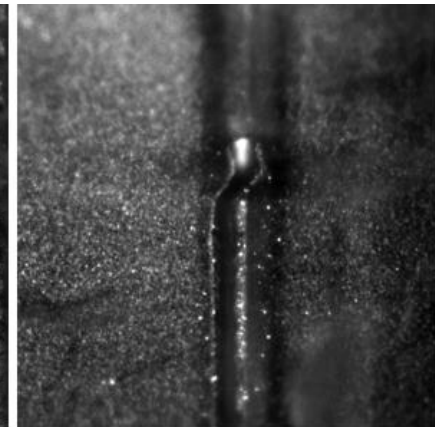
# Monitoring of laser welding



TTM is using CAVILUX technology in order to monitor meltpool properties in laser welding.  
(Coaxial camera + off-axial laser)



1. Top sensor



2. Root sensor



### 3. Solutions for R&D

## Diagnostic tools for welding process development

Customer: R&D centers worldwide

Solution: CAVILUX HF + high speed camera

Purpose: process development and measurement

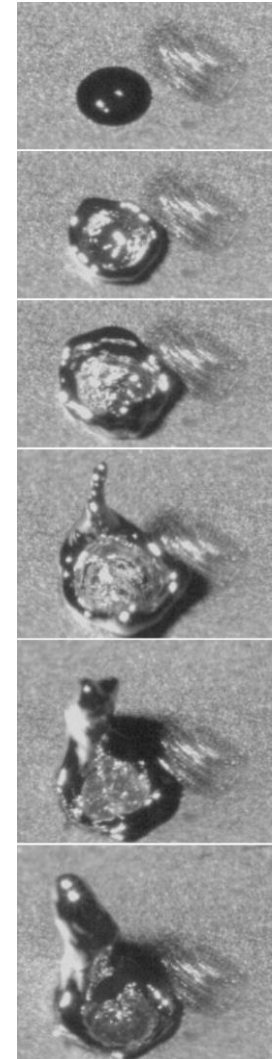


See video: <https://www.youtube.com/watch?v=WM8XiIVCAvA>



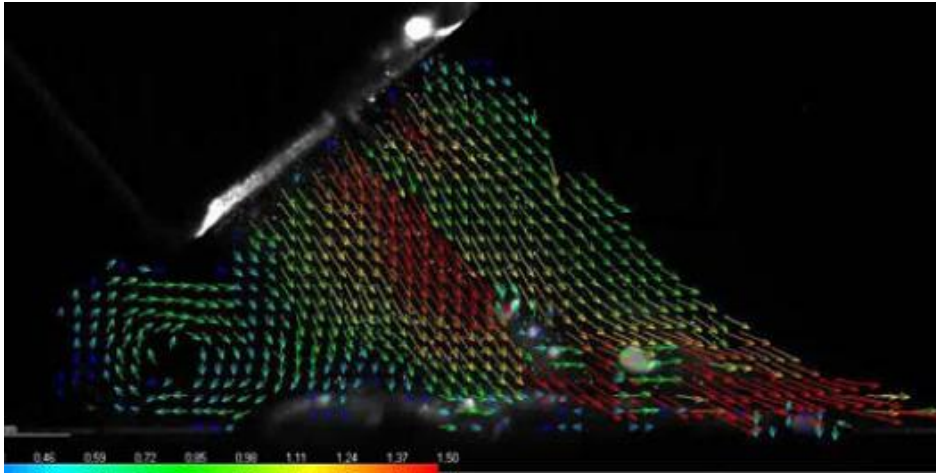
CAVILUX HF (High Frequency model)

- for high-speed and ultra-high speed applications
- fiber coupled with 500 W output power
- wavelength 810 nm or visible 645 nm (300 W)
- up to 400.000 Hz and 10 MHz in bursts

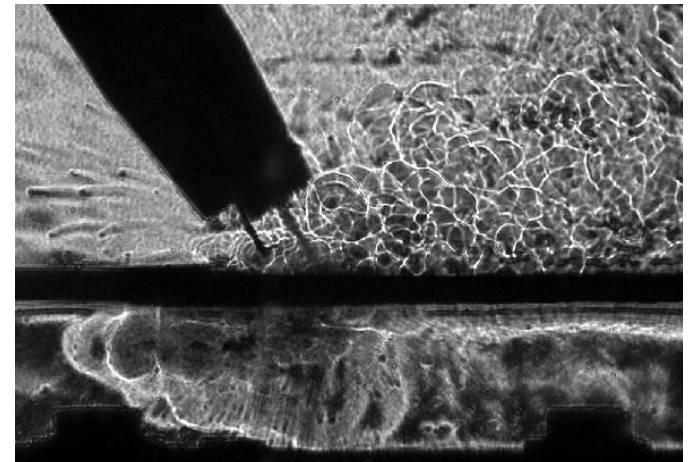
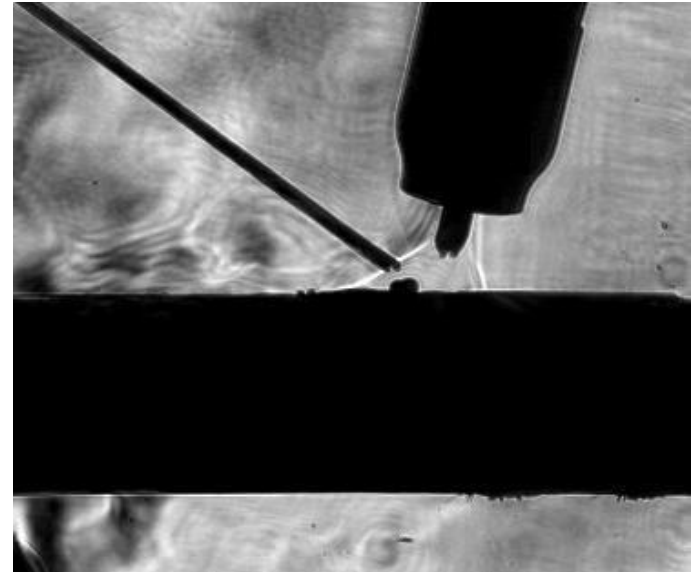


### 3. Solutions for R&D

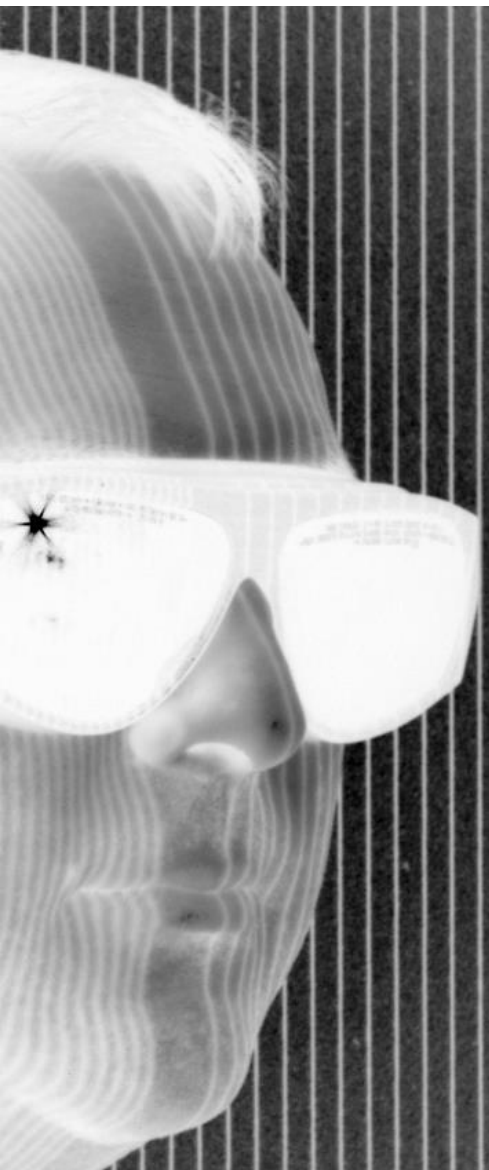
## Diagnostic tools for welding process development



Vector fields in GMAW nozzle  
Technische Universität Dresden



Shielding gas  
in welding  
Lappeenranta Univ. Tech.



# See what you have missed

## Videos

[www.youtube.com/watch?v=je8VghtYo5o](http://www.youtube.com/watch?v=je8VghtYo5o)

[www.youtube.com/watch?v=fcTeTJMEgpl](http://www.youtube.com/watch?v=fcTeTJMEgpl)

[www.youtube.com/watch?v=hFdAn8VS7IY](http://www.youtube.com/watch?v=hFdAn8VS7IY)

[www.youtube.com/watch?v=WM8XiIVCAvA](http://www.youtube.com/watch?v=WM8XiIVCAvA)



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