

INTELLIGENT BUILDINGS AND SMART SPACES

Customer Success Story

Centre for Advanced Laser Applications Garching, Germany

Enabling Safe, Efficient Laser Research with Centralized Control and Real-Time Visualization

The [Centre for Advanced Laser Applications \(CALA\)](#) is a research facility located on the Research/High Tech Campus in Garching, Germany. As a location for interdisciplinary top-level research, CALA offers international physicists, physicians, and biologists a unique array of state-of-the-art laser technologies. These scientists and researchers aim to develop sensitive and cost-efficient laser-based methods for the detection and therapy for cancer and other chronic diseases.

Their hope is to develop early diagnosis as a key to the successful treatment of these illnesses. They are also focusing on high-intensity X-rays for diagnostic biomedical imaging; laser-generated proton and carbon-ion beams for tumor therapy; and high-resolution laser-based infrared spectroscopy for blood and expired air analysis with the goal of providing risk-free screening procedures. Lastly, CALA research is concerned with maximizing patient health potential and recovery chances.



Photo Credit: Hannieh Fattahi

Key Points

- **Centralized monitoring and control of two high-powered laser systems and five experimental stations to support safe, coordinated research operations.**
- **Implemented real-time status displays and access controls to prevent unauthorized entry into active experimental areas and avoid conflicting laser operations.**
- **Enabled precise experiment configuration and automated data logging with GENESIS, supporting detailed analysis, traceability, and repeatable research.**

The Challenge

Two high-tech laser sources, the ATLAS-3000 and the PFS-Pro, are installed in the state-of-the-art experimental hall. The world's first commercial Munich Compact Light Source (MuCLS) - a combination of a compact electron accelerator and lasers for generating X-rays - is currently being operated at the IMETUM at the Technical University of Munich. While the X-ray source of MuCLS is directly connected to the experimental area, the ATLAS and the PFS-Pro are spatially separated from the five experimental stations, the so-called caves, since ionizing radiation is generated at these locations and thus requires appropriate shielding.

The laser beams are directed into the desired cave via a sophisticated evacuated tube system with various vacuum chambers and adjustable mirrors. To ensure that the mirrors can be precisely adjusted and that no accidents occur while handling the lasers, CALA wanted a system to manage and control all aspects of the facility.

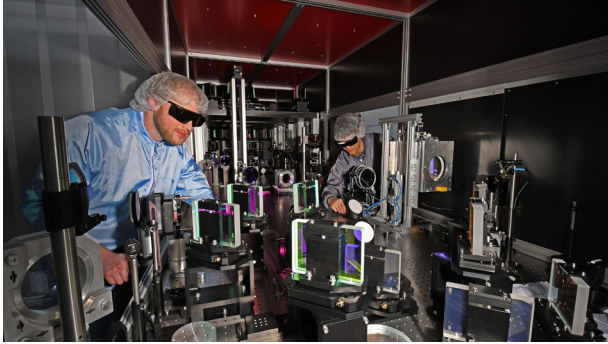
CALA selected system integrator [MESALOGIC](#) for its expertise in network infrastructure, SCADA, remote alarm management,

and GENESIS. MESALOGIC's team of automation, information, and electrical engineers brings extensive experience in industrial software and system integration.

MESALOGIC collaborated with HIMA Paul Hildebrandt GmbH to design a smart control and safety system for the joint research



CALA Control Center
Photo Credit: Mesalogic



CALA's ATLAS Laser
Photo Credit: Thorsten Naeser



Caves at CALA
Photo Credit: Mesalogic

project between Ludwig Maximilian University (LMU) and the Technical University of Munich (TUM). HIMA is a leading independent provider of industrial safety solutions, with more than 35,000 installations of TÜV-certified safety systems worldwide.

MESALOGIC then developed HTML5-capable visualization and control software tailored to CALA's demanding research environment.

Software Deployed

-  GENESIS
-  KPIWorX™

Realized Real-Time Benefits

The plant is coordinated from a central control center using two computers, allowing two project teams to work simultaneously without interference. GENESIS supports the management and monitoring of the experimental stations through several capabilities:

- **Access control:** Once a laser is assigned to one project team, the second team cannot access it. The same security measure applies to the five laser caves.
- **System visibility:** A complete status overview is displayed on a large information monitor and on panels beside each cave entrance, helping prevent unauthorized or accidental entry into an active experimental station.
- **Configuration and monitoring:** GENESIS is used to configure experimental station settings, with setpoints clearly presented through graphical displays.
- **Data logging and analysis:** User information, dates, times, and setpoints are automatically recorded, enabling detailed experiment analysis and providing comparative data for subsequent tests.
- **Digital signage:** KPIWorX dashboards automatically launch on industrial PCs installed beside each laser cave, displaying the status of the cave and the room housing the laser mirror.

Conclusion

CALA reports that the laser system and test center function as expected. Moreover, the researchers are pleased with the reliability and safety the GENESIS platform provides in allowing top-notch laser research to be carried out in a safe and efficient manner.

In addition, MESALOGIC and HIMA were able to rejuvenate the extensive technical infrastructure of the high-tech research facility with advanced MSR safety technology and smart control and visualization software.

“The GENESIS system has enabled us to create an ergonomic frontend for the control system and with KPIWorX, to create a smart digital signage solution for the entry to every experimental laser area.”

Adrian Schmidt
Managing Director
MESALOGIC GmbH

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