Project Report: **Digital Planning, Construction, and Operation of Alpine Photovoltaic Systems**

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Geomatics I Mechanical Engineering I Digital Construction I Building Information Modeling (BIM) I Quality Management I Digital Twin I Product Life Cycle Management (PLM)

Interim Manager: applied collaboration gmbh | Role: Project Manager Digitalization | Industry: Mechanical Engineering and Construction | Project Duration: 9 months I Project Completion: Jan 2025

Summary

- Digitalization of the value chain is a must for the realization of Alpine photovoltaic systems
- Industrial manufacturing and mechanical engineering meet construction – two worlds come together
- Zero tolerance for errors – Highest quality and complete traceability
- Foundation for further development established

Digitalization of the value chain is a must for the realization of Alpine photovoltaic systems

The construction of Alpine photovoltaic systems as part of the state initiative "Solarexpress" aims to increase winter electricity production in Switzerland, reduce electricity imports, and drive the energy transition.
Only through the digitalization of the entire value chain – from planning to construction to operation – can these systems be realized and operated economically, on time, and to the required quality.
The goal of the digitalization project was to create a Digital Twin that represents the optimal positioning of each individual solar table, of which there may be up to 5,000 in a single system. The focus was on economic efficiency, energy efficiency, material consumption, environmental impact, as well as efficient manufacturing, construction, and operation.

Industrial manufacturing and mechanical engineering meet construction – two worlds come together

A transparent project management approach (Hybrid Method – Stage-Gate and Agile) was used to drive the digitalization project efficiently with the various stakeholders, while simultaneously meeting the time-critical requirements of the ongoing Solarexpress projects. The core of the developed Information and Communication Technology (ICT) solution was a centralized, version-controlled data management system for the Digital Twin, built on a cloud-based Product Lifecycle Management (PLM) platform. This allowed the requirements and tools of industrial manufacturing in mechanical engineering, as well as those of construction with Building Information Management (BIM), to be unified on a common data platform. This way, all parties were speaking about the same thing.

Zero tolerance for errors – highest quality and complete traceability

Due to the high construction costs in the Alpine region, the limited construction time available each year, and the long operational lifespan of up to 60 years, the highest quality standards are critical in the planning, construction, manufacturing, processes, and their precise execution during the construction phase. The developed Digital Twin solution enabled seamless traceability of all changes, the provision of the "correct" manufacturing data for the production and construction of the solar field, as well as the capture of quality-relevant protocols and information through serial numbers during both the construction and operational phases.

Foundation for further development established

The developed digital solution enabled the successful planning and implementation of the first projects within the Solarexpress initiative. The Digital Twin and its data structure were designed to enable the direct implementation and utilization of experiences and improvements steps. The initially defined project scope and focused project management ensured transparent execution and a successful, measurable project completion. This allowed for a clear handover to the future project manager and provided a foundation for further development phases.

Projekt Stakeholder:

www.zendra.ch I www.xstatik.ch I www.reech.ch I www.infradigital.ch