



PROCESS ENGINEERING IN
CONSTRUCTION



SERVICE OFFERINGS

Promote efficiency and quality in the construction industry

Fraunhofer Italia develops **methods and strategies for the construction industry to improve the performance and efficiency of processes** during the design, construction, and occupancy phases of a building project. They aim at increasing the productivity and the quality of both new and existing buildings. The team **Process Engineering in Construction supports companies and professionals** who want to increase their innovation potential in order to maintain the industrial competitiveness. According to the specific needs of our clients, we provide the following applied research services:

- Development and implementation of **methodologies for the optimization of the construction process**;
- Introduction and implementation of **Building Information Modeling (BIM)** methods and tools;
- Development of concepts and **strategies for the Facility Management**;
- **Digital design and engineering** of new products by using parametric design techniques;
- Implementation of **digital technologies** such as Virtual Reality and Augmented Reality.

FRAUNHOFER ITALIA

...we optimize your process

Contact

Fraunhofer Italia Research S.c.a.r.l.
Via A. Volta 13 A
39100 Bolzano
Italy

Tel.: +39 0471 1966900
E-Mail: info@fraunhofer.it
Web: www.fraunhofer.it

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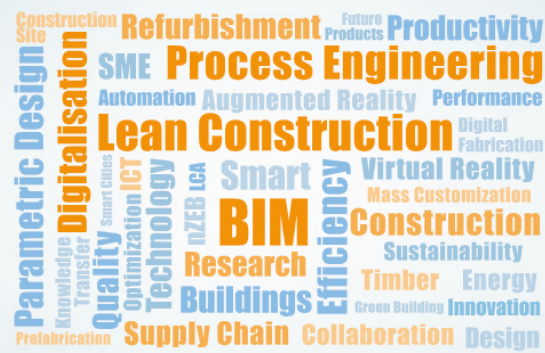


CHALLENGE

The construction industry has to face an **increasingly growing challenges, especially, in relation to costs, project management as well as to sustainability and quality**. To tackle these challenges, **efficient processes** as well as **innovative technologies** and **organization strategies** are required in order to deliver tangible, economic and competitive solutions.

The main challenges

- **Fragmentation of the AEC sector**, characterized by small and medium-sized enterprises ;
- **Lack of communication** between the different stakeholders involved in the construction process;
- **Increasing complexity** of the construction products;
- **Growing competition** at the international level;
- **Low control of the effective Time Management** during the construction phase;
- **Difficulty with forecasting and controlling** of the project budget and the return on investment.



RESEARCH FOCUS

The **Process Engineering in Construction** team focuses its research on the **development of innovative, affordable and market-oriented solutions** in the following fields:

- The **organisation and the optimization of the construction processes** by adapting methods from the industrial sector;
- The **digitalisation and the automation of the design, engineering and construction phases** through the use of parametric software and digital technologies.

Trends in the construction industry

Fraunhofer Italia aims at fostering the innovation potential of small and medium-sized enterprises according to the most important trends of the construction industry:

- Environmental sustainability;
- Energy efficiency;
- Lean management of the construction process;
- Production of a high-quality and custom products at the lowest possible cost;
- Digital technologies.

INDUSTRIAL ORGANIZATION OF THE CONSTRUCTION SITE

The **industrial organization** of the construction site adopts **concepts from the industrial sector** to create structured, rational and standardized processes. These concepts are applied especially to construction activities that create added-value and allow to:

- Optimize resource allocation;
- Extrapolate reliable data on the construction progress;
- Manage the available budget effectively;
- Improve the management of the interface between suppliers, production and construction;
- Eliminate unnecessary and expensive storage costs.

Project example of industrial research:

The main objective of the project is to organize and optimize the façade installation in order to ensure a precise control of the construction progress. Firstly, the optimised schedule of construction tasks is elaborated and afterwards, a prototype for controlling and updating of the schedule during the façade installation is developed.



DIGITAL DESIGN AND ENGINEERING

Parametric and Generative Design techniques support the development of a **variety of optimised design or product solutions** according to specific customers' needs and allow to:

- Automate the design and the production processes, enhancing the flexibility and the customisation of the product as well as reducing costs, time and possible errors;
- Optimize the stages of digital production through the collaboration with machines in the production system;
- Facilitate the implementation of digital and automated processes in the production system.

Example of collaboration project:

"RiFaRe" is an industrial cooperation project between several companies in South Tyrol. The aim of the project is to develop an innovative timber-based prefabricated element for the energy refurbishment of the existing buildings' façades. This element is suitable for the energy refurbishment of the Italian building stock, guaranteeing a high quality of the refurbishment within a short time frame.



IMPLEMENTATION OF DIGITAL TECHNOLOGIES

The implementation of **digital technologies** in the construction industry will transform the paper-based processes into digital and automated processes. The **digitalisation will change radically the construction industry, making it smarter and more efficient** by using technologies, such as **BIM, Augmented Reality, Virtual Reality and Internet of Things**. This will lead to:

- More efficient processes along the building life cycle;
- Better communication and collaboration between stakeholders involved in the building supply chain by real-time sharing of information and know-how;
- More efficient quality check and control of the construction progress.

Project example of an EU research project:

"ACCEPT" is a European project aiming at developing digital applications for the quality control and the work coordination on the construction site. Innovative technologies, such as smart glasses, are adopted within the project in order to have a real time visualization of the information and instruction needed to control the expected quality and the energy efficiency.

