SUPSI

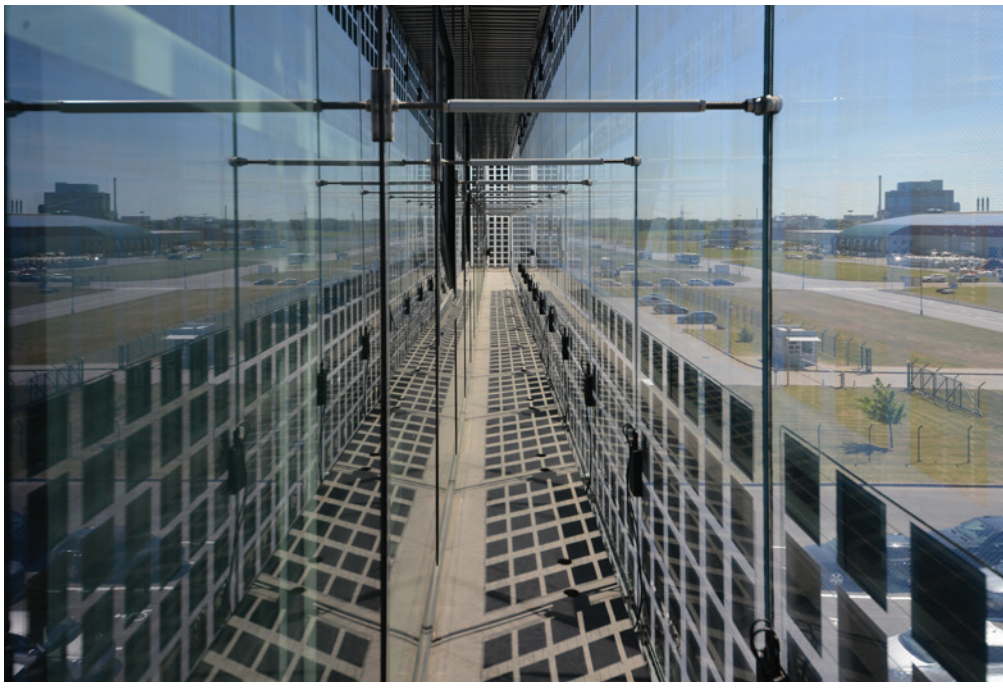
SmartFlex

Axis 2 – Energy systems

Interview with Francesco Frontini, Director of the SmartFlex project

Tell us briefly about the project, starting with the problem tackled.
In Switzerland, more than 40 per cent of energy consumption and CO2 emissions harmful to the environment is caused by the construction sector. So how can a building be made more efficient, or even turned into an energy producer? One possible option is to integrate photovoltaic systems into the building envelope, transforming the skin of our homes and offices from architectural protective elements into energy producing systems.
The aim of the SmartFlex project was to develop and demonstrate the utilisation of photovoltaic systems (Building Integrated PV or BIPV) in the building envelope, with aesthetic features that are customisable, efficient and low cost. The project, which involved selected partners in the research, building production, automation and energy sectors, defined an integrated approach to the entire value chain, by formulating new product and process solutions, and constructing demonstration installations.

What initial results have been obtained?
The research project, financed by the European Commission, ended recently, and its greatest result was the construction of a photovoltaic façade for an office building in Klaipeda, in Lithuania. In fact, in the final year of the project a second skin was mounted onto an existing building belonging to one of the project partners, with the aim of improving its passive performances (thermal and phonic transmittance), and turning the vertical envelope into a real electricity generating plant, thanks to the photovoltaic cells integrated into the glass. In order to achieve this outcome, the team spent three years studying and testing new technologies: solar cells and their lamination in the façade element, and glass moulding technology for camouflaging the cells, adding colour to the façade while also making it aesthetically and architecturally interesting.



What are the strong points of the project? And the problems?
Thanks to the participation of the various partners, the SmartFlex project can be described as pioneering in the field of coloured photovoltaic cells and their integration into facades. When the project began there were no real regulations governing the integration of active solar systems (such as photovoltaics) into building envelopes, and the experience acquired from the small number of installations executed did not provide sufficient information regarding the durability and efficiency of these systems. Photovoltaics were born with the sole objective of providing clean and renewable electrical energy in an efficient manner. When these systems are integrated into façade elements, or as solar tiles on the roof, the photovoltaic module must support various mechanical stresses and – in addition to electricity production over a period of time – must also ensure the safety of people and the thermal performance of the building envelope. The project therefore developed a series of procedures based on practical experiments conducted in the ISAAC laboratory in order to test the performances of these multi-functional systems, while also providing constructive information that can be used in the formulation of new international regulations, such as EN50583 Photovoltaics in buildings.

Do you remember anything interesting, amusing or unusual that occurred during the project?
The distinctive feature of this project was that the multi-year photovoltaic module experience of the research group had to be adapted to a much more complex and specific building product. I remember when the first façade module arrived to be tested in our laboratories: as well as being rather difficult to transport (three meters tall, one and a half metres wide), the module required various adjustments to be made to our instruments, creating a certain amount of panic among the ISAAC technicians and researchers.

Could other projects develop from this one?
Of course. This experience has allowed the researchers to develop a number of interesting ideas for turning photovoltaic modules into true building products. We would like to develop these ideas with local the industry, also involving construction sector experts.

Apart from you, who else was on the project team?
The SmartFlex project involved a number of international experts operating in the construction sector. The SUPSI group included ISAAC technicians and researchers, and particularly the Innovative Envelope (Involucro innovativo - BIPV) and Photovoltaic Systems Quality (Qualità dei sistemi fotovoltaici - QSF) teams.

Project type: external project
Financing body: FP7 European Union programme
Project partners: ProTech (Lithuania), Creative Amadeo (Germany), Glassbel (Lithuania), Via Solis (Lithuania), Sunbeam Communication (Germany), Mondragon Assembly (Spain), PI Berlin (Germany)