

Invention and Innovation – New roof concepts for large sports stadia

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Knut Göppert, born 1961, received his civil engineering degree from the University of Stuttgart, Germany. He worked for schlaich bergemann und partner for 11 years before becoming Partner in 1998. Currently he is working on several stadium projects for the 2014 FIFA World Cup in Brazil.

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1. Introduction

In 2011, more than 235.000 patent applications were submitted to the European Patent Office. With 8600 applications, the technology group Siemens heads the field, as do German companies in general with a total of 581 patents per 1 million inhabitants. Among the top one hundred applications, there is not a single organization that works in the field of building construction. Are architects and structural engineers any less innovative or less talented? Is there no "Gyro Gearloose mentality" to be found in the planning offices and building sites of the world?

2. Main Topic

One comes a step closer to understanding the situation when one considers that patent registrations are most valuable in the context of protecting product innovations. For complex building projects such as first-class European stadia, this is not so relevant. And, what is perhaps more telling: the connection between invention, patents and innovation has quite simply not been recorded in terms of numbers.

Our building constructions are the product of a creative team process involving architects and other specialist engineers. In the course of this process, we are constantly developing innovations that are very often a unique solution and are not necessarily destined for industrial production. Our curiosity and enthusiasm for innovation leads to individual solutions for highly individual buildings. As part of this, new materials as well as patented building products are imaginatively brought together in a unique overall concept. As such, every ambitious building project can be seen as a prototype in which everything has to function properly the first time around. Consequently, a construction such as a stadium on the banks of the Vistula in Warsaw is not deemed an invention and does not need registering as a patent. It cannot easily be copied and will not be built in the same form again. And nevertheless it is full of innovations to be found not just in its design and planning but also in its assembly and manufacture.

2.1 National Stadium Bucharest

The stadium in Bucharest lies in one of the most earthquake-prone regions of Europe, with massive implications for the construction principle of the reinforced concrete stadium bowl. Lightweight, flexible roof constructions are in principle very well suited to resisting the effects of strong earthquakes.



Fig. 1 and 2: National Stadium in Bucharest and Olympic Stadium in Kiev

2.2 Olympic Stadium Kiev

The Olympic Stadium in Kiev, by contrast, is surrounded by a spectacularly slim upper tier from the nineteen-sixties. This was an existing element that needed to be carefully incorporated into the new stadium concept but was never originally designed to sustain the additional load of a roof construction.

2.3 National Stadium Warsaw

Seen from afar, as well as from within, the first thing one notices in the National Stadium in Warsaw is the seventy meter high, needle- like flying mast that is suspended vertically over the middle of the playing field. What may at first glance look like a spectacular gimmick reveals itself on closer inspection to be the heart of the world 's largest folding membrane roof over a stadium.

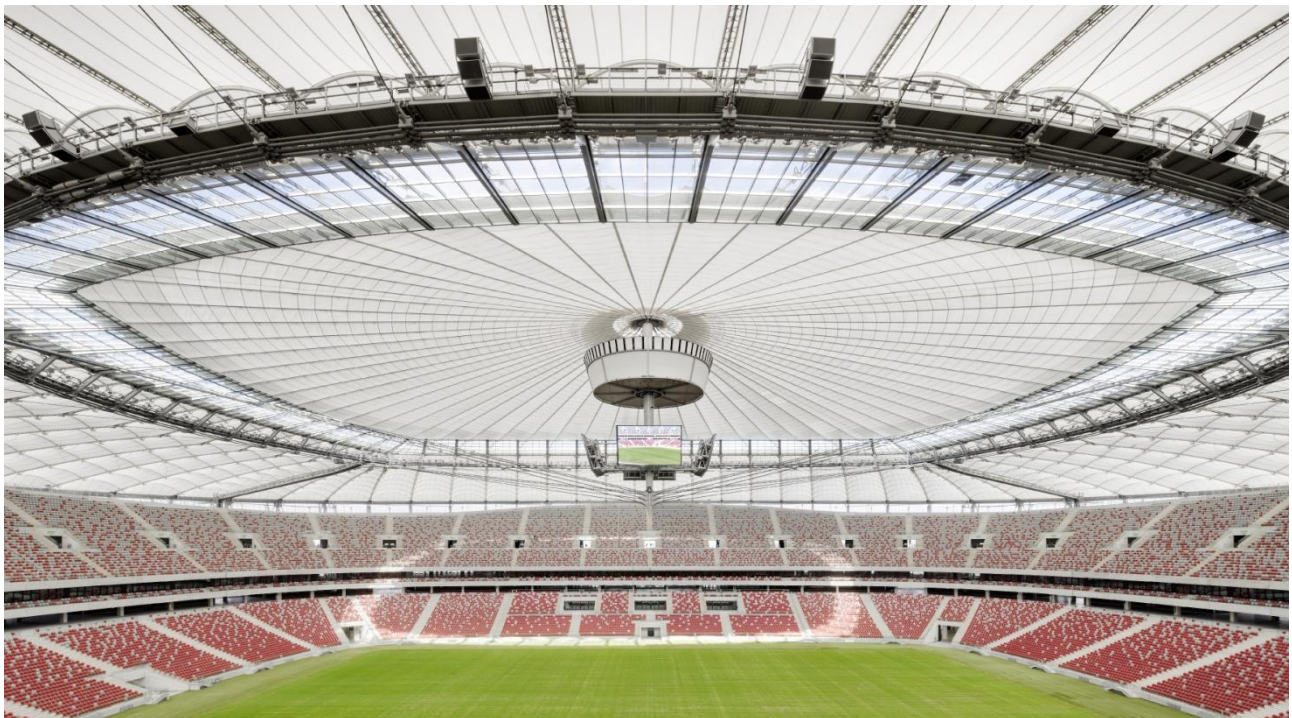


Fig. 3: National Stadium in Warsaw.