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Cover story

Sir Henry Bessemer, F.R.S. (1813-1898), an English inventor and engineer, invented the first process for mass-producing steel inexpensively. An American, William Kelly, had held a patent for "a system of air blowing the carbon out of pig iron" a method of steel production known as the pneumatic process of steelmaking. Air is blown through molten pig iron to oxidize and remove unwanted impurities. Bankruptcy forced Kelly to sell his patent to Bessemer, who had been working on a similar process for making steel. Bessemer patented "a decarbonisation process, utilising a blast of air" in 1855. Modern steel is made using technology based on Bessemer's process. Bessemer was knighted in 1879 for his contribution to science. The "Bessemer Process" for mass-producing steel, was named after Bessemer. This process was essential to the development of skyscrapers. Official information shows that the "invention" of the skyscraper lies with George A. Fuller (1851-1900). He worked



on solving the problems of the "load bearing capacities" of tall buildings. Using Bessemer steel beams, George Fuller created steel cages that supported all the weight in tall buildings in the Tacoma Building built by him in 1889. It was the first structure ever built where the outside walls did not carry the weight of the building. The next one was the Flatiron Building, one of New York City's first skyscrapers on Broadway and 23rd Avenue, built in 1902 by Fuller's building company. However, it is possible to find information also that Chicago first adopted the use of steel loading-carrying structures with the construction of the Home Insurance Building in 1885 at LaSalle and Adams Street. A steel frame supports the entire weight of the walls instead of the walls themselves carrying the weight of the building which was the usual method at the time. The architect of this building was William LeBaron Jenney. This building was the world's tallest building from 1885-1890, replaced by New York World Building, but was demolished in 1931 for the construction of Field Building known at present as the LaSalle Bank Building. In the lobby in this place, where the Home Insurance Building once stood, there is a plaque with the following text: "This section of the Field Building is erected on the site of the Home Insurance Building which structure, designed and built in eighteen hundred and eighty four by the late William LeBaron Jenney, was the first high building to utilise as the basic principle of its design the method known as skeleton construction and, being a primal influence in the acceptance of this principle was the true father of the skyscraper, 1932". The term "skyscraper" was first used during the 1880s, shortly after the first 10 to 20 story buildings were built in the United States. Combining several innovations: steel structure, elevators, central heating, electrical plumbing pumps and the telephone, skyscrapers came to dominate American skylines at the turn of the 19th and 20th centuries. The world's tallest building when it was opened in 1913, architect Cass Gilbert's Woolworth Building was considered a leading example of tall building design.

At present the newest architectural trends, independently from building skyscrapers concern the conception of intelligent that is highly technically advanced building in which the achievements both of automation and robotics and applied computer science and also contemporary materials engineering, mainly in the range of smart materials and materials processing technologies and nanotechnologies connected with them are applied. The idea of an intelligent building and its management system appeared in 1980s in industrial spheres of the United States as a consequence of control systems of automated production and the optimal conditions of the growth of cultivated plants. Technologies and solutions which were worked out in that field till the end of 1990s, enabled to apply them in the management of residential family and multi-family buildings and also office ones. The intelligent building is equipped with a system of detectors and management system integrated with installations being in it. Signals coming from various system elements, ensure the possibility of the system reaction on changes of external and internal environment in order to improve the building functionality and the safety of building, people and property being in it and in order to lower the costs of its exploitation and possible modernisation. It ensures the improvement of comfort of people being inside a building and in its surrounding. In intelligent buildings building management system ensuring integration, control, optimisation and reporting among others of: data communication networks, internal and external lightning depending on the presence of persons in rooms and movement and light intensity, heating of separate rooms, ventilation, air conditioning and filtration depending on concentration of carbon dioxide and their humidity, presence of persons, protection of existence and property, alarm and monitoring of human and property safety, fire system, access control, emergency power supply, weather forecasts, remote control of household, audiovisual and other everyday equipment is applied. Moreover, the intelligent building should be fitted to each its user separately. The personification is ensured by adaptive learning or a direct system programmed by an operator taking into consideration needs and expectations of each user. For example depending on individual liking of a given user, the system can switch on or off the lights, when a user falls asleep. It is difficult to imagine the building of contemporary skyscrapers not taking into consideration the conception of an intelligent building. It is simply impossible. It is thanks to the development of the constructions of skyscrapers, the conception of an intelligent building develops. In turn it ensures a dynamic progress both in the development of structural materials, mainly steels but also alloys of aluminium, magnesium and many other engineering and building materials, including numerous materials used for making internal installations, and also very many kinds of smart materials, applied in building management system and in detectors cooperating in it. Contemporary skyscrapers impress with its technical level, huge cubage and their imposing height.