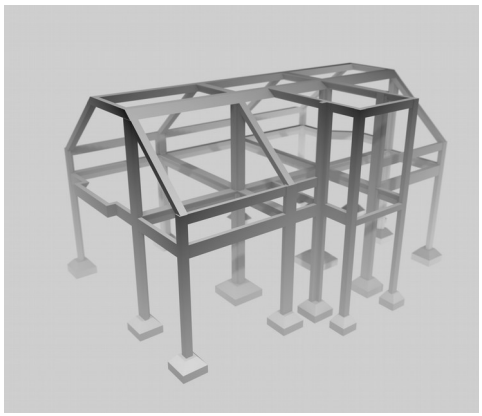
One of the buildings finished in SEWACO System in 2013

NEW BUILDING PREFABRICATION SYSTEM

The idea of the system consists in a set of large-format panels made of concrete mixed with Styrofoam, which allow for erecting buildings in the mullion-transom structural system, including single-family and multi-family housing projects. The basic element is an innovatively shaped, light composite box panel of 4 cm in wall and rib thickness, with in-built Styrofoam panels 22-30 cm thick, for constructing external walls, internal walls, ceiling slabs, roofing, and other. In turn, the external panels are two-layered (26 cm thick Styrofoam on the outside for low-energy buildings and 31 cm for passive buildings).



Laid on consecutive storeys, thanks to properly profiled concrete in the joint areas of two panels, external and internal wall panels form recesses allowing for performing load-bearing reinforced concrete structural piles at the construction site, without using additional boarding formwork. The walls of the building do not perform as structural elements, but merely act as external and internal partitions in the form of curtain walls. In their upper parts, external and internal panels have an in-built reinforced concrete beam, also serving as a lintel, which, together with the concrete of the tie beam executed at construction stage, constitutes an element of the nogging bearing the loads of the ceiling slabs as well as service loads of the structural piles.

In essence, a new system of erecting buildings was created, in which walls do not perform as structural elements, and the proper building structure consists in reinforced concrete piles performed at the construction site, transferring the loads of consecutive storeys of the building onto foundation slabs and nogging, identical on every storey. With such a concept adopted, each slab is self-load-bearing and calculated only as per their specific weight, the weight of assembly and service loads from one storey, each storey is self-load-bearing and does not bear the loads of the storeys above it.

This system allows for constructing layered wall profiles with thin-layer, concrete, box structure, identical for all storeys. Due to this fact, the system allows for designing and executing random window and door openings, including the performance of nearly entirely glass walls. Our current structural calculations provide for the construction of buildings up to 7 above-ground storeys, however, our company is still working on increasing this number.

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The concept specified above allowed us to create a type series of external and internal walls with storey heights and length up to 780 cm, as well as ceiling slabs with a span up to 780 cm, with linked balconies, eaves, canopies, etc.

SEWACO created a consortium with the Gdańsk University of Technology for the purpose of implementing original heating systems in the area of renewable energy sources, as well as to develop the system and optimize technical solutions, structural calculations and performance tests in terms of structure physics and product quality. The company has been developing the offer of system panels manufactured with the aim of leading to the industrialization of the construction of buildings, both for housing and commercial purposes. The National Center for Research and Development participates in the financing of a part of these works and research.

Production of prefabricates was launched by the company in the Tricity area. However, the company is planning to open several companies in the country.

SEWACO Sp. z o.o. has developed and holds several original and innovative solutions. These are:

- **INNOVATIVE STRUCTURE** of prefabricated panels, referred to as the "SEWACO System", featuring concrete box structure in composition with Styrofoam as a thermal insulation or filling layer, with a system for their assembly, dedicated to a wide range of buildings and other cubature structures. The structure of the panels and their method of assembly are protected by three national patent applications made in the Patent Office in 2011 and one international application. Moreover, several applications regarding the protection of utility and industrial models for particular system profiles were also submitted.
- **INNOVATIVE PRODUCTION METHOD** of SEWACO System panels, consisting in a specific, company-developed, relatively light system of universal forms for manufacturing profiles transferred from one station to another, forming a production line. Production lines are fully mobile, they can be randomly shifted, adapting them to local conditions, as well as quickly assembled and disassembled. The production of forms and devices for own purposes as well as for licensing purposes has been launched.
- **METHOD OF CONSTRUCTING FACTORIES** for producing SEWACO System panels. Apart from the realization of standard, permanent production halls with permanent production lines, or the realization of production in leased halls, the company has developed an original form of mobile, easy-to-assemble and inexpensive tent halls which are not fixed to the ground and which do not require long-term and costly legal procedures to enable assembly in a specific location. In the developed method of constructing factories, everything is mobile and modular at the same time, which allows for selecting the efficiency of production of the panels (50 to 500m2 of floor space a day) and the place of construction, also within a larger construction site, as well as maintaining short deadlines and low production commencement costs.
- **INNOVATIVE HEATING SYSTEMS** based on low-temperature heating systems in the form of surface heating panels in-built in the outer, concrete layer of the wall panels, which provide additional energy-saving heating and cooling effect.

Competitive advantages of the system:

- Energy-saving properties – external building partitions constructed in the SEWACO System offer the following thermal permeability indexes: U=0.11-0.15 kW/m2K. Such buildings consume less energy for heating, they are energy-saving or even passive. Moreover, it is also possible to install systems based on low-temperature heating and cooling of the walls in the profiles.

- Lower building construction and service costs. Lower building shell costs, efficient construction and lower amount of works at construction stage have beneficial effect on the building construction costs (approximately 20%).

- Pace – reducing the time (2 to 3 times) of completing the investment is essential for investors, since the investment enters the stage of use faster and, at the same time, generates fewer costs in the crediting process. An assembly team trained by the manufacturer may assemble the walls, the ceiling, lay the reinforcement and concrete the piles and tie beams of c.a. 100 m2 in total floor space, all in just one day.

- Quality of finishing – the panels are manufactured in steel forms, so their precision and smoothness is significantly improved compared to traditional techniques

Moreover, the factors contributing to the future competitiveness of our solutions are:

- Practically the entire building – roof-to-foundation - is prefabricated
- The system is solid, the perfect solution for the habits and technical culture of our clients
- Prefabricates may be equipped with ventilation or sanitary installation ducts, electrical installation channels and other ducts assumed in the design
- Consumption of materials is lower through, e.g. elimination of formwork in construction
- Easy to assemble, the number of “wet” works is reduced to pouring concrete for the piles and nogging constituting the structure of the building in recesses in between prefabricates
- Architectural freedom for the designers
- As early as in the assembly stage, the building is already insulated – allowing for carrying out works in the winter
- The scope of finishing works during construction is reduced to the minimum.
- Thermal bridges do not occur in the system,
- Building execution costs are very predictable, plus the use of proven materials neutral for the human health
- The possibility of erecting mobile production lines in the vicinity of project sites.

Construction of a building is similar to the assembly of applied load-bearing wall systems, however, the company developed detailed instructions for assembly, since several significant differences do occur. Traditional stretcher bars, suspensions, supports and ledgers for constructing ceilings are also applied in the assembly of the SEWACO system. Since there is no need to use pile, tie beam, beam, binding joist formworks, the pace of construction is higher. After assembling a storey or its significant part, on the very same day, the construction team may proceed to concreting. On the second day, the team may commence the construction of the next storey.

Our current calculations, analyses and tests in durability and structure physics have all confirmed the correctness of system assumptions, which allowed us to launch production and building construction. At this point, the company has implemented further research for the purposes of national and European certification. The company has completed several single-family buildings with flat and sloping roofs, and is currently in the progress of commencing the construction of 5-storey buildings with underground parking lots and elevators. All parties interested in cooperation in any projects are invited to contact us.