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Passed with flying colors: New house constructed from precast concrete elements withstands even the millennium earthquake

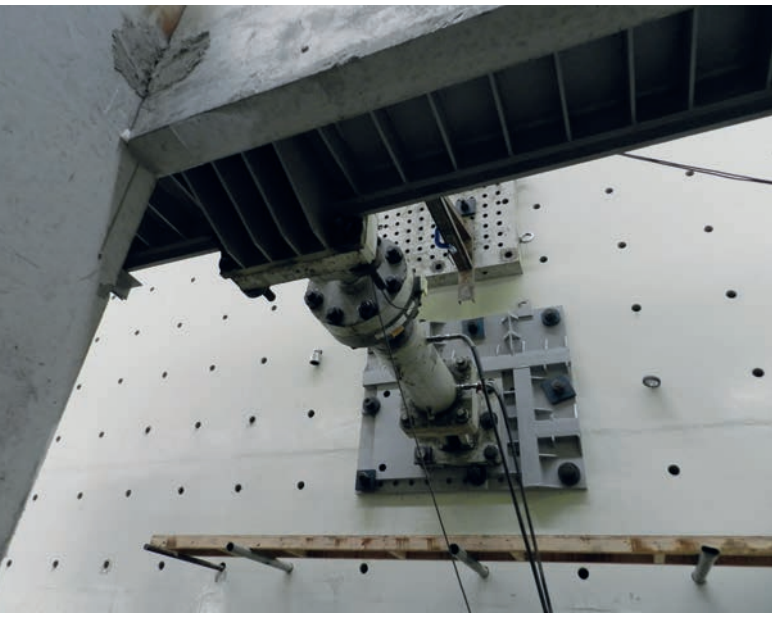
The Pacific Ring of Fire is a volcanic belt, which rings the Pacific Ocean on three sides for a length of over 40,000 km. The friction of the tectonic plates makes this region a zone of frequent earthquakes, which in recent past have caused large numbers of buildings to collapse and this is a permanent threat for the people living in these regions. Indonesia with its population of more than 250 inhabitants and millions of tourists, who come to visit each year, is one of the most severely affected countries in this region.

Therefore it was all the more important for the leading property developer, PT Modernland, which is a member of the Modernland Group and which has recently entered the field of precast concrete element manufacture, to make the topic of earthquake-proof construction a central aspect in the planning of its new precast concrete element premises and of its overall projects. As well as planning for the eventuality, the company insisted on an actual seismic test on a test building at a construction material testing laboratory in Bandung. Modernland manufactures the precast elements for this in its new plant with a carrousel plant from the Eilenburg-based machine manufacturing specialist Ebawe, which belongs to the Progress Group, one of the leading suppliers of machinery and complete solutions to the precast industry. The aim of the test was to analyze the behavior of the house under extremely high seismic activity, in order to be able in the future to offer its customers a safe precast concrete element house or construction system with load-bearing walls.

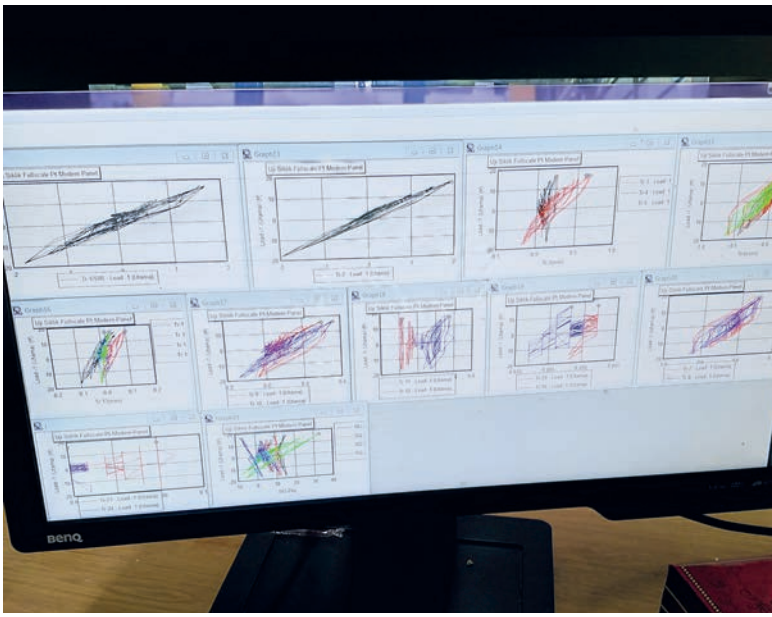
The test simulates three earthquake magnitudes. In the first test phase the house was subjected to seismic activity of the type, which occurs every 500 years. In the second test phase the house was tested against the type of earthquake, which occurs on average every 2,500 years; this corresponds to a magnitude of more than 8 on the Richter scale. Potentially in a third and last phase, if this is possible, the house will be tested up to the total static yielding point or to the maximum of the laboratory's testing capacity.

The property developer PT Modernland has made the topic of "earthquake-proof construction" a central aspect in the planning of its new precast concrete houses and overall projects.

A test building made of precast concrete elements was subjected to a seismic test at a building materials testing body.



The sample house was subjected in the test to stresses corresponding to those of an earthquake of a size that occurs on average every 2,500 years – equivalent to a strength of more than 8 on the Richter scale.



Even under the highest test load, the precast concrete sample house withstood the seismic forces and convinced with the classification I.O. (Immediate Occupancy)

In preparation for the tests, during production more than 200 load meters were integrated into the various precast concrete elements, in order to provide the laboratory with a flow of data during the tests. Numerous cameras in the interior and on the exterior of the house allowed the scientists to see what was happening as the test progressed. The seismic magnitudes were simulated with the aid of a hydraulic system, which provided the energy for the different loading conditions.

The test result was positive. The sound, considered static planning and technology of the building, together with the professional production of the house in PT Modernland's new EBAWE precast concrete plant produced the result that even in the case of the earthquake of the type, which occurs only every 2,500 years, the building showed only minor damage in the form of hair-line cracks and local spalling in the assembly gaps in the outer wall of the building. There was at no time any risk to persons. Even in the case of the heaviest test loading the house withstood the seismic forces. On conclusion of the „Earthquakes every 2,500 years" test stage the test building passed with flying colours with a classification of I.O. (Immediate Occupancy).

The positive test results mean that PT Modernland will in the future be one of the first companies in Indonesia to be authorised to construct multi-storey precast concrete element buildings with load-bearing walls. This successful earthquake test has confirmed and boosted confidence both within the company and among its potential customers in the possibilities for safety opened up by constructing with precast concrete elements. ■

FURTHER INFORMATION

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