**Materials and structure analysis research at the Faculty of Engineering and Information Technology of the UP also helps to prevent disasters**

In the future, accidents such as the red sludge disaster in Ajka in 2010 or the bridge collapse in Genoa in 2018 can be predicted thanks to modern material and structural analysis. The Materials and Structural Analysis - SMART Diagnostic Methods research group, established at the Faculty of Engineering and Information Technology of the University of Pécs, is researching and testing methods that help to increase and maintain the safety of our built environment. Using non-destructive methods, they are able to determine the structural safety and load-bearing capacity of structures and to determine the movement of structures without any physical impact on the structure. The research combines knowledge from frontier areas, enabling civil engineers to investigate structures using geophysical methods such as radar and, in the near future, satellite radar. This will enable them to determine precisely the changes in their position and to predict potential disasters by detecting displacements of up to millimeters.

In order to determine the structural safety, reliability, and load-bearing capacity of a building structure, it is necessary to know, among other things, the characteristics of the structure, its geometric and material properties, and the extent of damage and deterioration it has sustained during its existence. Today, a building is designed to last for about 50 years, but this does not mean that it will be demolished after 50 years, but rather that it will be rebuilt. To keep it that way, it is essential that professionals are aware of the extent of deterioration, and the defects - which can be determined by various specialized diagnostic methods. Magnetic or electromagnetic methods, endoscopic examinations, and special material testing procedures can be used to detect and identify internal damage, while 3D laser scanners, drones, and computer modeling programs can help to detect changes in the global structural condition. The combined use of several diagnostic techniques helps to determine the technical condition of the building and to find the right solution.

The Materials and Structural Analysis - SMART Diagnostic Procedures research group focuses on the development of building inspection and certification procedures that help to improve the safety of our built environment and to maintain it in an economical and environmentally responsible way. In addition to structural safety, an important part of their research is the assessment of the adverse effects of construction materials on human health and the reduction of environmental impact through the recycling of industrial and construction waste materials.

Another equally important area of research relates to the recycling of concrete waste. Currently, huge quantities of concrete waste are generated worldwide, and the storage and rational recycling of this waste are becoming increasingly problematic. The research team is developing a new materials testing and design methodology that is expected to enable this waste material to be reused much more efficiently than before. The primary expected outcome of the research is market exploitation, but new scientific results are also regularly published.

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