

Отже, приведення будівництва до автоматизації процесів, є однією з ланок на шляху роботизації галузі, що має на увазі збільшення ефективності застосування природних ресурсів, зменшення часу на реалізацію об'єкта та підвищення його технологічної ефективності та якості.



Рис. 1. Монтажні схеми кранів

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PRINCIPLES OF SUSTAINABLE CONSTRUCTION

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As the population grows civilization must find ways to expand without depleting resources allowing later generations to live comfortably. Green building is an idea evolving from this need. One concept of green building is sustainable construction. This is an on the rise eco-friendly method of construction intended to reduce negative impact on our environment throughout the building process and a structures life cycle. Obtaining sustainable developments calls for strict coordination from the architects, engineers, and owners. The process begins with locating a site best fit for the project. During construction there will be change to the surrounding ecosystem. Good planning can play down effects of developing land. Designers utilize natural resources to minimize damage to environment. The sun and wind can be energy sources in a building. Specialist in heating and air, water, and electric install systems to reduce energy use. With a little more time and planning sustainable construction can help ensure the population develops responsibly bettering the environment for the future population.

The construction industry is responsible for consuming around 40% of world resources and energy and emits almost 40% Green House Gases. Construction has been identified as the first sector to require specific attention in meeting the sustainable agenda. There are several reasons for this. First, in sustainable development

terms, construction is consistently responsible for some of the most profound negative impacts. The construction industry consumes more raw materials than any other industrial sector and is responsible for a significant proportion of Europe's waste stream. [2].

It is therefore of paramount importance that the construction industry regulates itself to rid itself off the entire negative connotation when the agenda of sustainability is discussed. In practical terms, sustainable construction can be reduced to three important messages for the way the industry should work. 1) Buildings and infrastructure projects should become more cost effective to produce and run. 2) Construction projects should contribute positively to their environment, using materials and systems that are easily replenished over their full life cycle. 3) Contractors and clients should, wherever possible, create higher standards of respect for people and communities involved with the project, from the site workers through to the final community of users.

The terms high performance, green, and sustainable construction are often used interchangeably; however, the term sustainable construction most comprehensively addresses the ecological, social, and economic issues of a building in the context of its community. Sustainability can be defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is based upon three components: economic growth, social progress and environmental protection. In 1994, CIB, an international construction research networking organization, defined sustainable construction as "creating and operating a healthy built environment based on resource efficiency and ecological design." The CIB articulated seven Principles of Sustainable Construction, which would ideally inform decision making during each phase of the design and construction process, continuing throughout the building's entire life cycle. These factors also apply when evaluating the components and other resources needed for construction. The Principles of Sustainable Construction apply across the entire life cycle of construction, from planning to disposal (here referred to as deconstruction rather than demolition). Furthermore, the principles apply to the resources needed to create and operate the built environment during its entire life cycle: land, materials, water, energy, and ecosystems. The Seven Principles of Sustainable Construction are as follows:

- reduce resource consumption (reduce);
- reuse resources (reuse);
- use recyclable resources (recycle);
- protect nature (nature);
- eliminate toxics (toxics);
- apply life-cycle costing (economics);
- focus on quality (quality).

The main focus of these seven principles is a resource-conscious design mentality that is essential in sustainable construction [3]. The aim of sustainable construction is to ensure the building and construction methods are cost-effective, durable and reduce the overall effects on the environment and human health with a central focus on efficient use of energy and resources, water preservation, improved occupational health, and reducing pollution and wastage with respect to the seven principles of sustainable construction.

There are some sustainable construction technologies which are of great interest and are being widely implemented all over the world.

1. Solar power. Solar power has been increasingly exploited as a sustainable construction technology. In green construction, it is utilized in two ways. One pertains to active solar power and the other is passive solar power. Active solar power is the use of functional solar systems that absorb the sun's radiation to cater for heating and electricity provision. It reduces the need for the use of electricity or gas.

The upfront installation costs are higher but in the long-term it saves on energy bills and aids in reducing greenhouse gas emissions from non-renewable energy sources like fossil fuels. On the other hand, passive solar power is a design that uses the sun's rays to warm homes through the strategic placement of windows and the use of heat-absorbing surfaces. The windows let in energy and the heat absorbed reduces the need for warming the house during cold periods such as winter.

2. Biodegradable materials. The use of biodegradable materials is an eco-friendly means of making construction sustainable. Most traditional construction methods lead to accumulation of waste products and toxic chemicals, majority of which take hundreds of years to degrade. And even if they degrade, it contaminates and harms the environment. Biodegradable materials such as organic paints therefore aid to limit the negative impacts on the environment as they easily breakdown without the release of toxins. The use of biodegradable materials for building foundation, walls and insulators are also part of sustainable construction technologies.

3. Green insulation. Insulation is among the greatest concerns when it comes to construction of buildings and homes. However, most people don't know that insulators are simply wall filters which don't need to be made from expensive and highly finished materials. On this basis, the use of green insulation has proven to be a sustainable construction technology as it eliminates the need of high-end finishes made from non-renewable materials. Green insulation offers a solution by making use of old and used materials such denim and newspaper. In other words, it utilizes recycled material to line the walls.

4. The use of smart appliances. Homes and commercial buildings consume most of the world's energy and for this reason; it has necessitated the use of smart appliances as part of sustainable construction technologies.

The sustainable construction technologies emphasize on the installation of energy saving and self-sufficient appliances. SmartGrid dishwashers, refrigerators and washing machines are examples of such sustainable technologies. The technology is oriented towards establishing zero-energy homes as well as commercial buildings.

5. Cool roofs. Cool roofs are sustainable green design technologies which aim at reflecting heat and sunlight away. It aids in keeping homes and buildings at the standard room temperatures by lowering heat absorption and thermal emittance. The design makes use of reflective paints and special tiles which absorb less heat and reflect away most of the solar radiation. For instance, cool roofs can reduce temperatures by more than 50 degrees Celsius during summer. Cool roofs therefore minimize the dependence on air conditioning and in turn, reduce energy use which translates into decreased cumulative greenhouse gas emissions from power plants.

6. Sustainable resource sourcing. Sustainable resource sourcing as the name suggests is a prime example of sustainable construction technology because it ensures the use of construction materials designed and created from recycled products and have to be environmentally friendly. In most cases, agricultural wastes or by-products are used to produce the construction materials. Overall, the materials are remanufactured, recycled, recyclable, and obtained from sustainable sources.

7. Low-energy house and Zero-energy building design. Sustainable construction technologies typically include mechanisms to lessen energy consumption. The construction of buildings with wood, for instance, is a sustainable construction technology because it has a lower embodied energy in comparison to those build of steel or concrete. Sustainable green construction also makes use of designs that cuts back air leakage and allows for free flow of air while at the same time using high performance windows and insulation techniques. These techniques are meant to reduce the dependence on air conditioning and interior heating. Further, the strategic placement of windows is another technique that encourages day-lighting thereby minimizing the need for electric lighting in the course of the day. The use of renewable energy such as solar for lighting and water heating is also part of low-energy house and zero-energy building design. The initial costs of setting up zero-energy buildings may be high, but they pay off in the long-term.

8. Water efficiency technologies. There are several water efficient technologies used, which are all part of sustainable construction technologies. Essentially, the technologies encompass re-use and application of efficient water supply systems. Examples include the use of dual plumbing, greywater re-use, rainwater harvesting and water conservation fixtures. These methods ensure that water is adequately managed, recycled and used for non-portable purposes like washing cars and flushing toilets. Dual plumbing, for instance, decreases sewer traffic and enhances the potential of re-using water on-site. On the other hand, rainwater harvesting provides water for multi-purpose usage and might also be stored for future use. In general, the water efficiency sustainable construction technologies lower water usage costs and help in water conservation. In urban areas, the technologies intend to lower water wastage by 15% to address fresh water shortages.

It seems that as a whole, the industry is becoming more committed to taking responsibility for its environmental impact.

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ВИДИ ТА ОСОБЛИВОСТІ ПІДПІРНИХ СТІНОК

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Досить часто будівельники на майданчиках зіштовхуються з проблемою утримання ґрунтового масиву у рівновазі. В таких випадках є необхідність посилення ґрунту. Це особливо актуально при будівництві на ділянках з природним або штучним ухилом, складним рельєфом. Вирішити це питання можна застосувавши підпірні стіни.

Будівництво підпірних стін здійснюють з метою укріплення і захисту від сповзання і обвалення ґрунту на крутих схилах або стрімких земних поверхнях. Їх можна також використовувати як декоративні елементи ландшафтного дизайну на ділянках з великим перепадом висот. З досвіду інженерів-будівельників можна стверджувати, що обов'язкове будівництво таких стінок потрібно на ухилах ґрунту понад 8%. Особливо такі споруди необхідно розташовувати на ділянках, розташованих поблизу ярів і водойм, для зміцнення схилів, запобігаючи сповзання ґрунту від дощової і талої води.