

BASICIS OF CIVIL ENGINEERING & MECHANICS

Course code:CV14/CV24

Credits:3:0:0

Topic Covered

Built Environment



Facilities Management

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.





ENERGY EFFICIENT BUILT ENVIRONMENTS

What will the European built environment look like in 2050? It is shaped by the effects of climate change, resource scarcity, changes in population, urbanization, and focus on health and wellbeing. Buildings integrate a vast amount of technology that connect buildings to information management and sharing platforms. Buildings have evolved into temporary storage of circular materials and products and have become datahubs that support optimal (energy) efficiency and wellbeing.



CLIMATE RESILIENT

Buildings are entirely climate resilient: green, energy neutral buildings that are designed to withstand floods and heat stress and that are part of climate resilient cities and urban areas.



FLEXIBLE BUILDINGS

Buildings will facilitate flexible use. They are adapted for changes in use on the short term, while being constructed for the long term. Smaller and flexible units will provide living spaces for the growing urban population.



COGNITIVE BUILDINGS

Buildings will be able to autonomously manage its internal climate (light, temperature, air) and efficiently adjust e.g. energy use by themselves. Cognitive buildings are connected to smart grids and are part of the IoT.



BUILDINGS FOCUS ON PERFORMANCE

The sustainability performance, energy performance, and other performances are central drivers for comfortable living and working, and also determine the value of a building.



ENABLING WORKING AND LIVING IN A 24-HOUR ECONOMY

In our 24-hour global economy buildings will provide combined working and living space. Leisure, sports, shops and other amenities are combined in buildings that provide 24-hour connectivity.



CIRCULAR BUILDINGS

Buildings are circular: built with reused materials and/or biobased materials, are modular and deconstructable. They have become a temporary storage of materials and products.



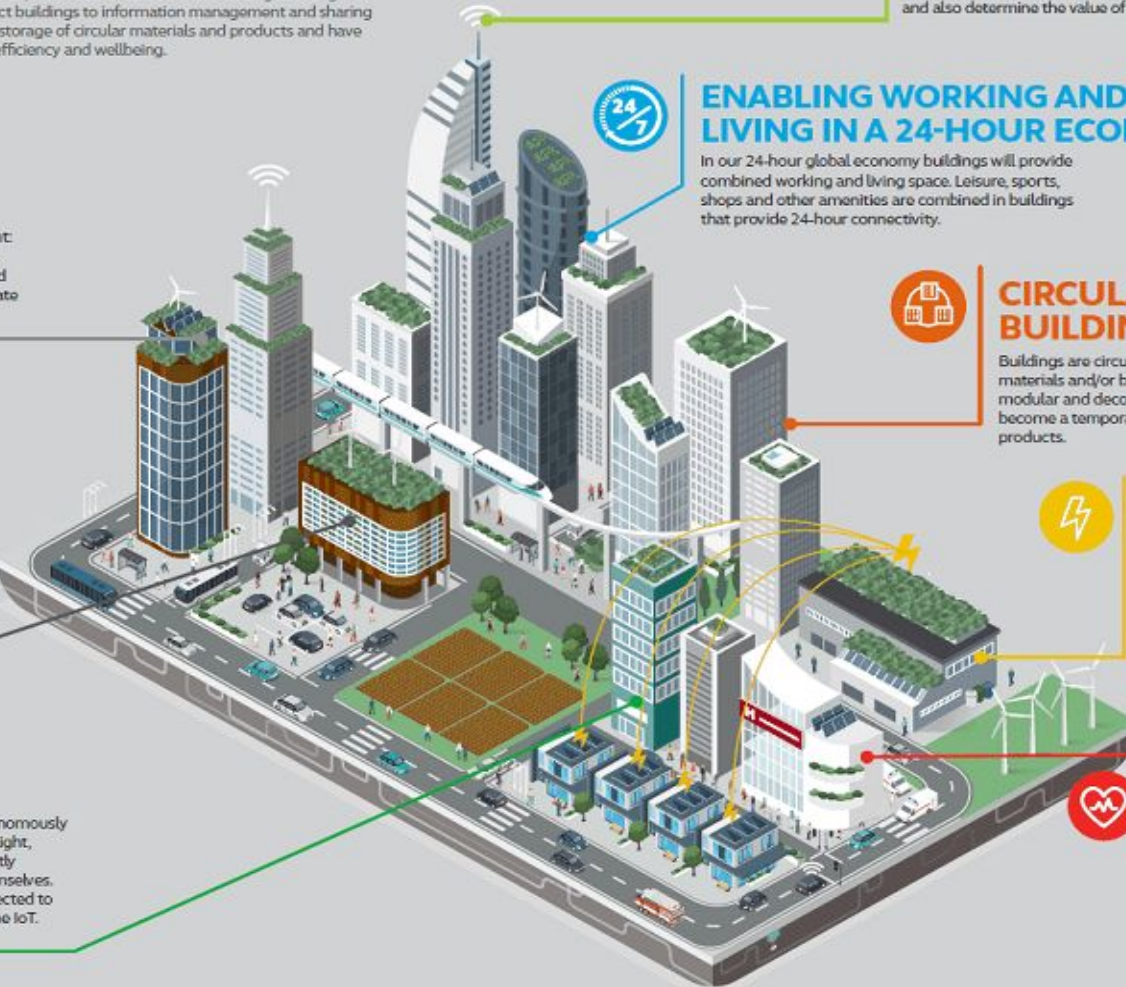
ENERGY POSITIVE

Buildings create energy through photovoltaic solutions and are highly energy efficient and independent of fossil fuels. Buildings are connected to a smart grid to share and store electricity and heat.



SUPPORT A HEALTHY LIFESTYLE

Buildings provide a healthy environment: healthy noise management, optimal temperature management, clean air and daylight. The design fully supports the wellbeing of its users.





LEED RATINGS- Leadership in Energy and Environmental Design

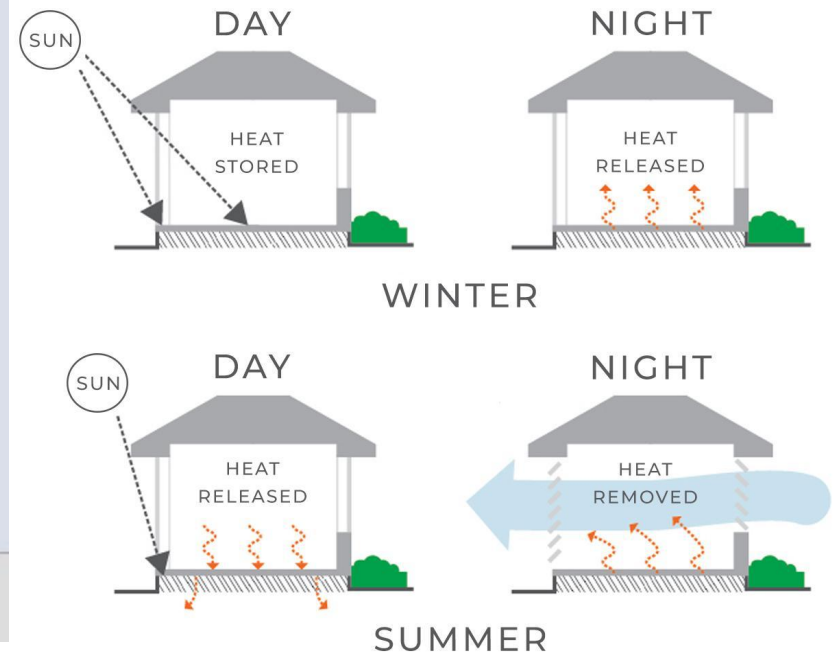
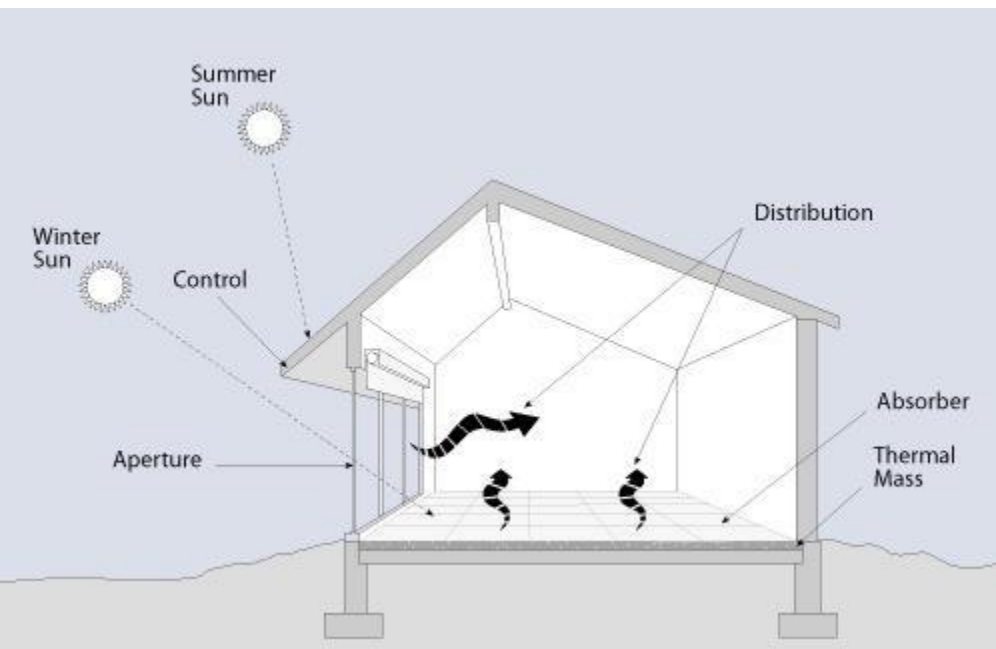
LEED Green Building Rating System is "the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings

LEED Credit Categories



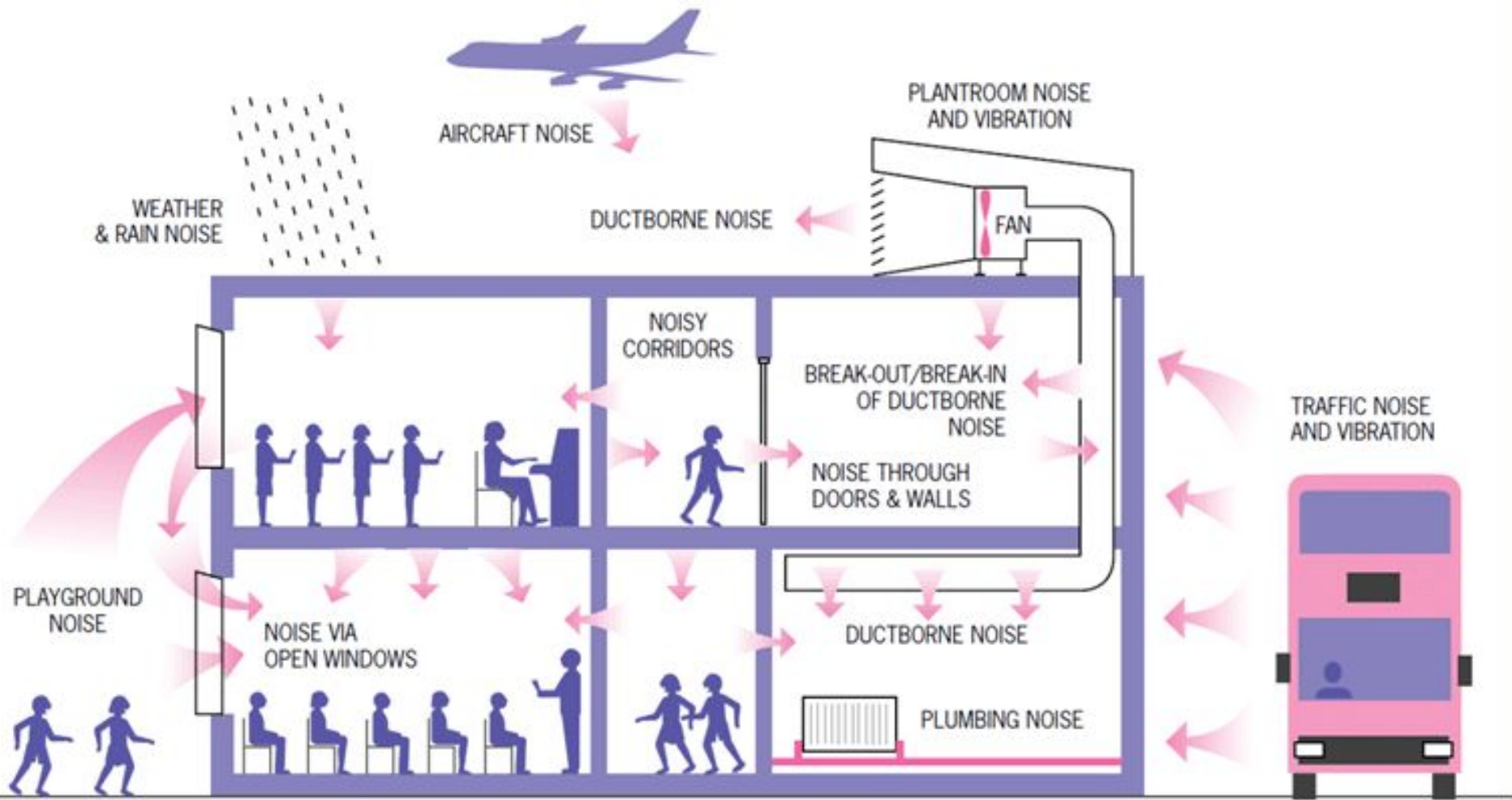


TEMPERATURE CONTROL IN BUILT ENVIRONMENT



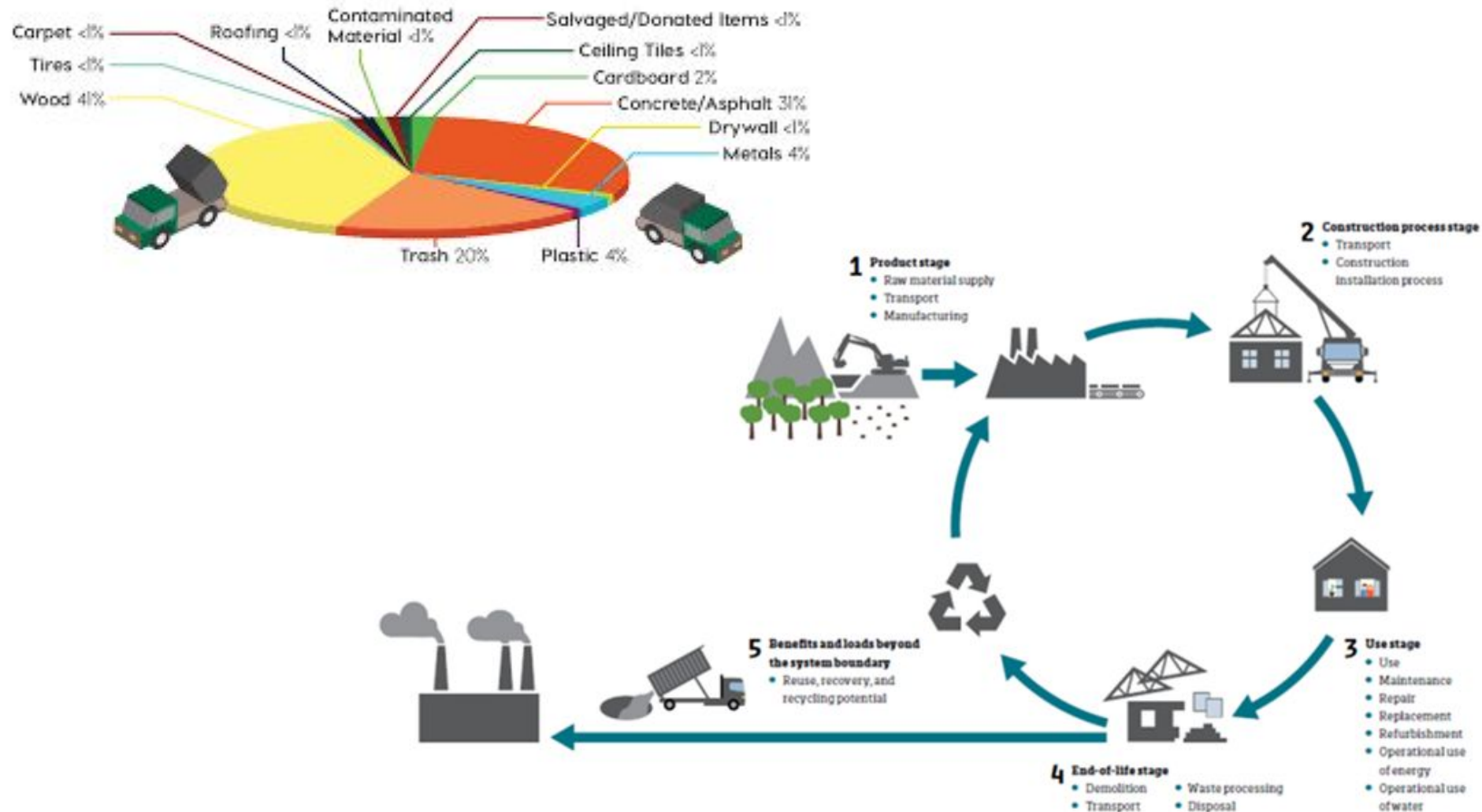


SOUND CONTROL IN BUILT ENVIRONMENT





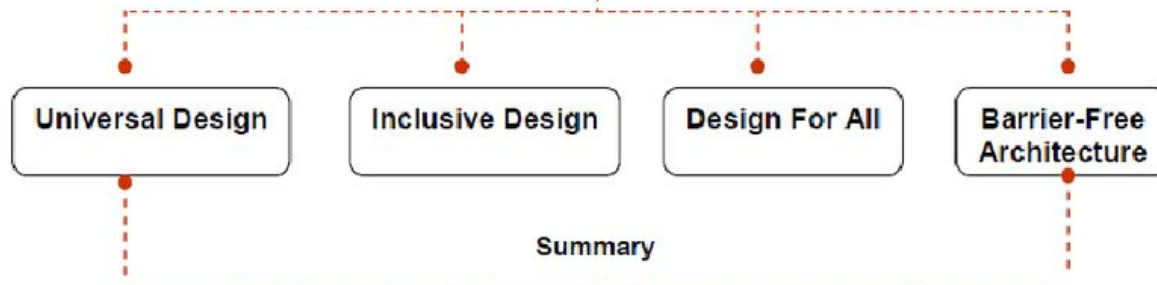
Recycling of Building Materials





BARRIER FREE BUILT ENVIRONMENT

Designing Barrier Free Environment



Approaches to the design of environment product and services to be useable by as many people as possible regards of ages, ability or situations , Asiah , 2006



Accessible
environment design



Industrial
design

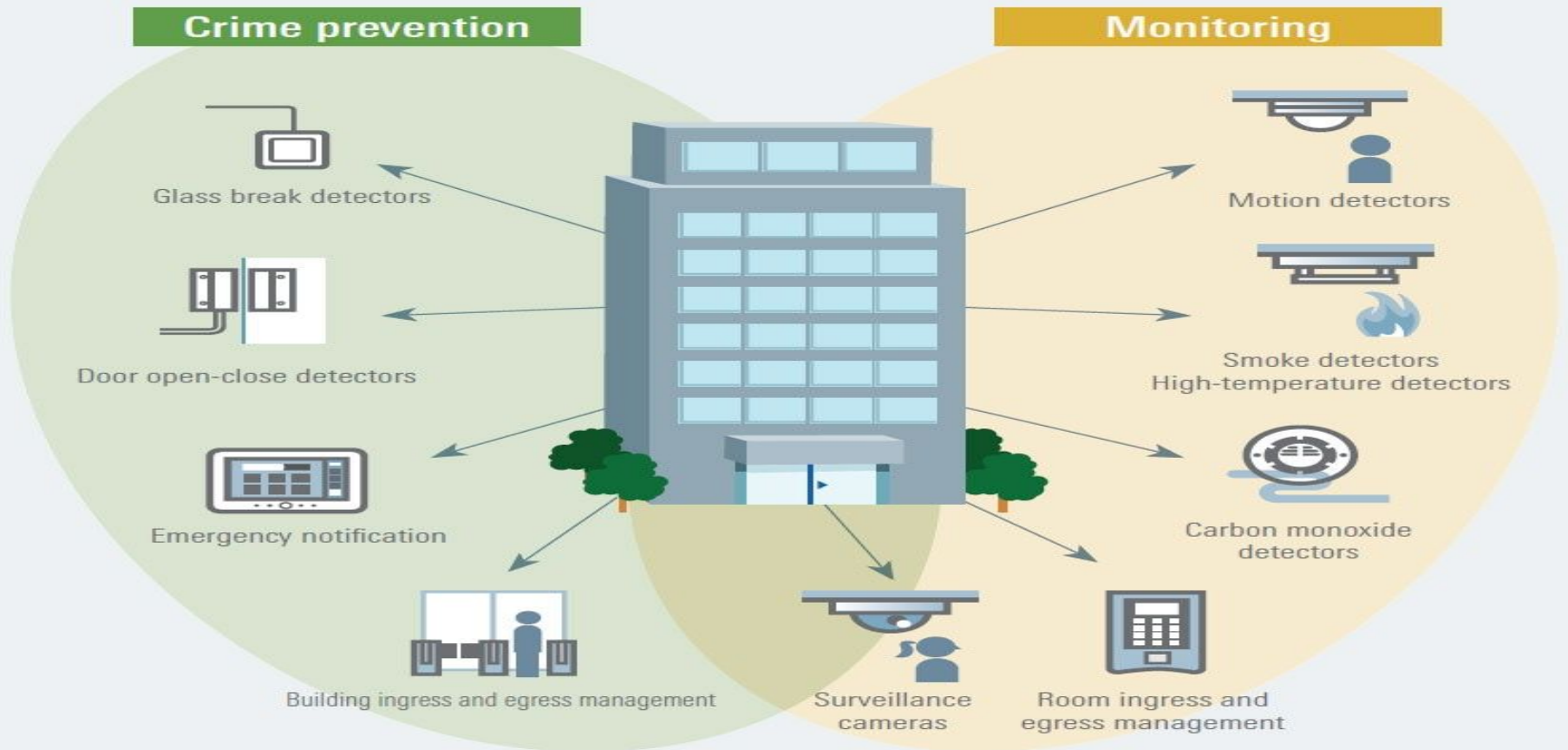


Electronic
accessibility



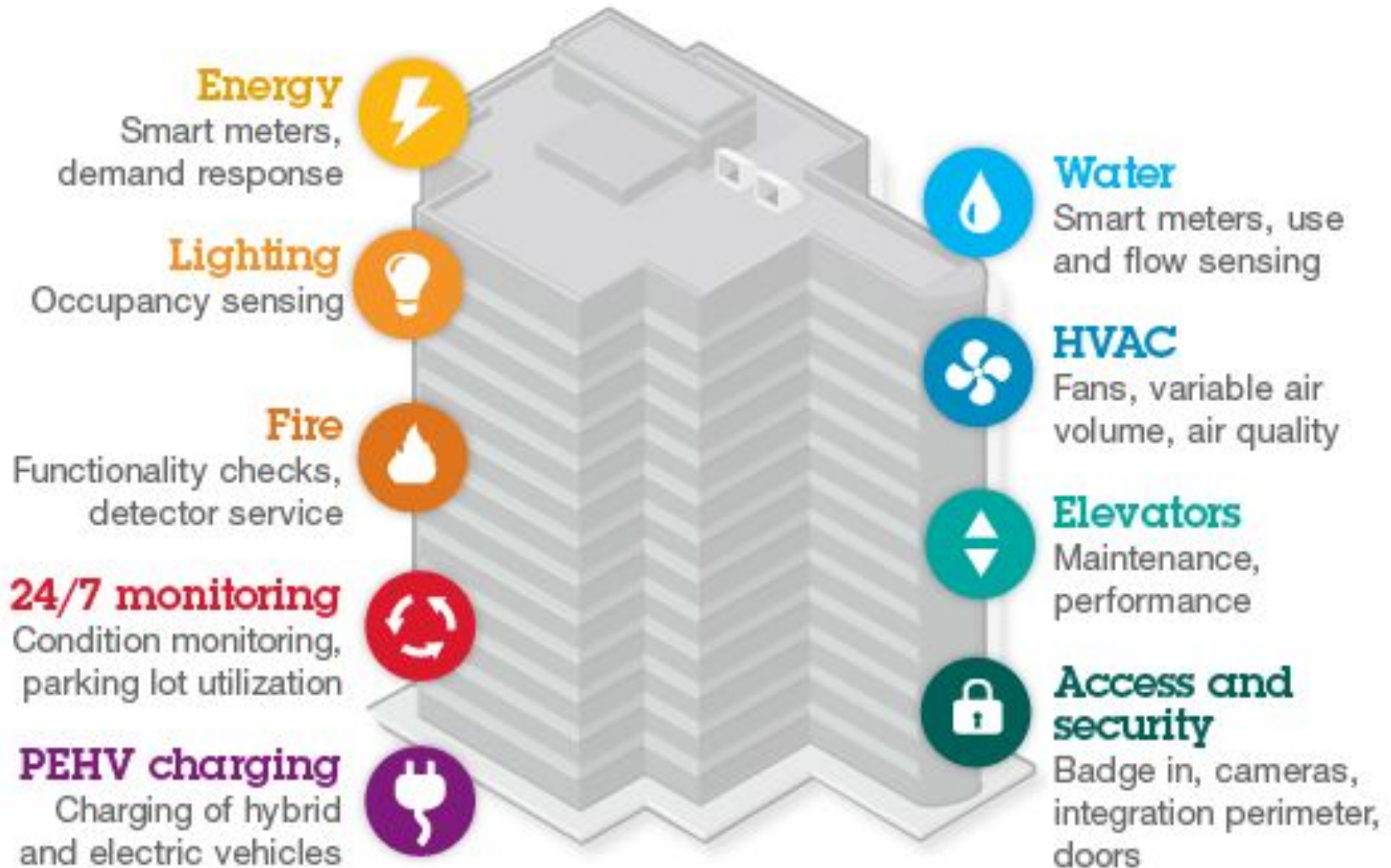


SECURITY SYSTEMS





Smart/Intelligent Buildings





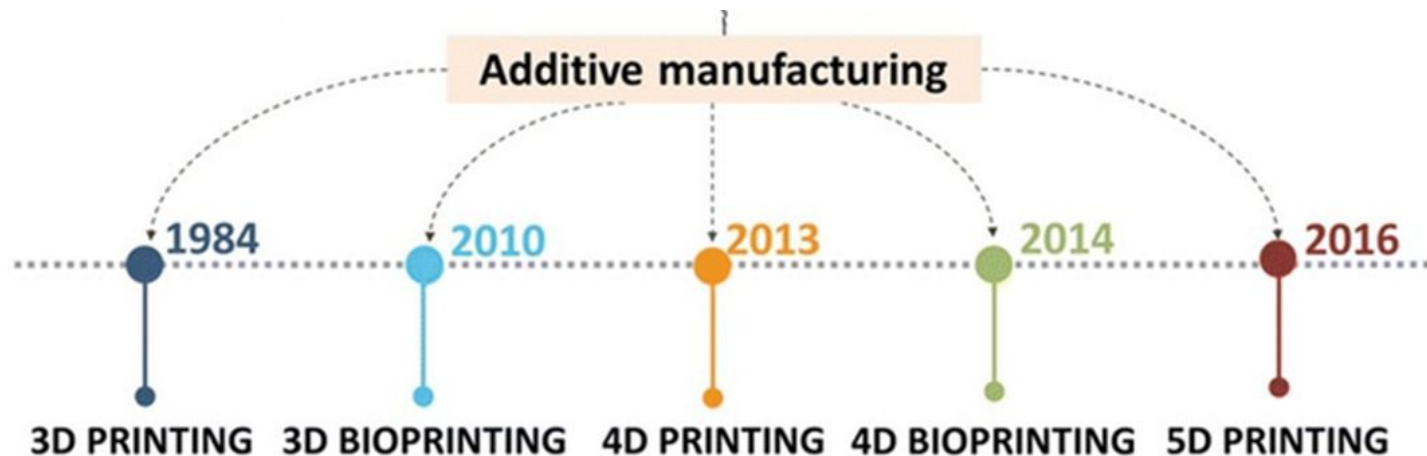
3D Printing:

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file.





- In today's world there is a need to manufacture in the quickest way possible.
- There are two methods of manufacturing, Additive manufacturing (AM) and Subtractive manufacturing (SM).



- 3D printing is one such process of making 3D solid objects from a digital file which is additive manufacturing.
- AM technologies were initially developed in the 1980s and have already been successful.
- Compared to conventional construction processes, the application of 3D printing techniques in the construction industry offer excellent advantages, and hence there is a need to understand more in order to successfully implement it in construction.



Significance of 3D Printing:

- Reduction of cost by eliminating expensive formwork.
- Reduction of injury rates by eliminating dangerous jobs (i.e. working at heights)
- Creation of high end technology jobs.
- Reduction of onsite construction time by operating at constant rate.
- Minimizing the chance of errors by highly precise material deposition.



- Increasing sustainability in construction by reducing wastages of formwork.
- Increasing architectural freedom, which would enable more sophisticated designs for structural and aesthetic purposes.
- Accurate analysis of scaled models (structures) experimentally before construction.



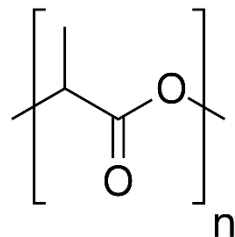
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DEPARTMENT OF
CIVIL ENGINEERING

Course: Basics of Civil Engineering &
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PLA

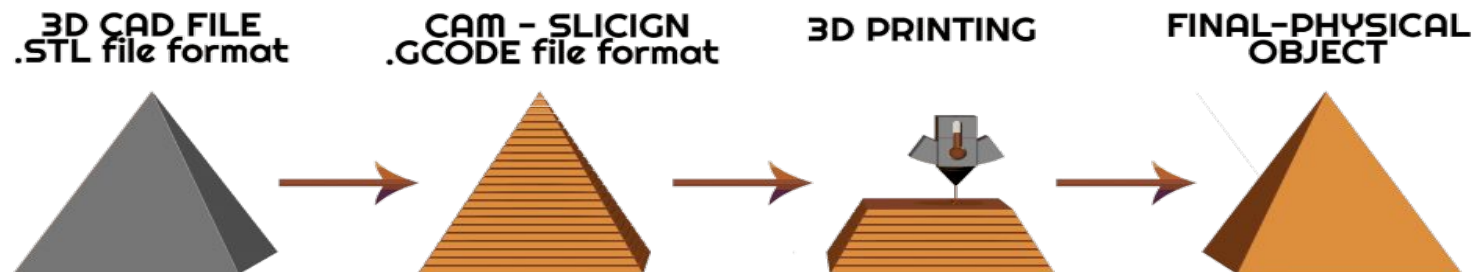


CEMENT - OPC



3D PRINTING PROCESS

- A 3D design is created in a design tool such as Autodesk Fusion 360 , 3DS Max, Sketch-Up , SOLIDWORKS and exported as a .OBJ file.
- The design (.OBJ) File is then sliced into layers in a slicing software such as Slicer3D, Cura etc.
- The slicer software then exports the file into a machine understanding format i.e G- Code. Which is X-Y-Z axis movement.
- With repetitions of these deposition process a 3D model is created.





TOP FIVE APPLICATIONS OF 3D PRINTING

1. EDUCATION: to create prototypes without the need for expensive tooling.



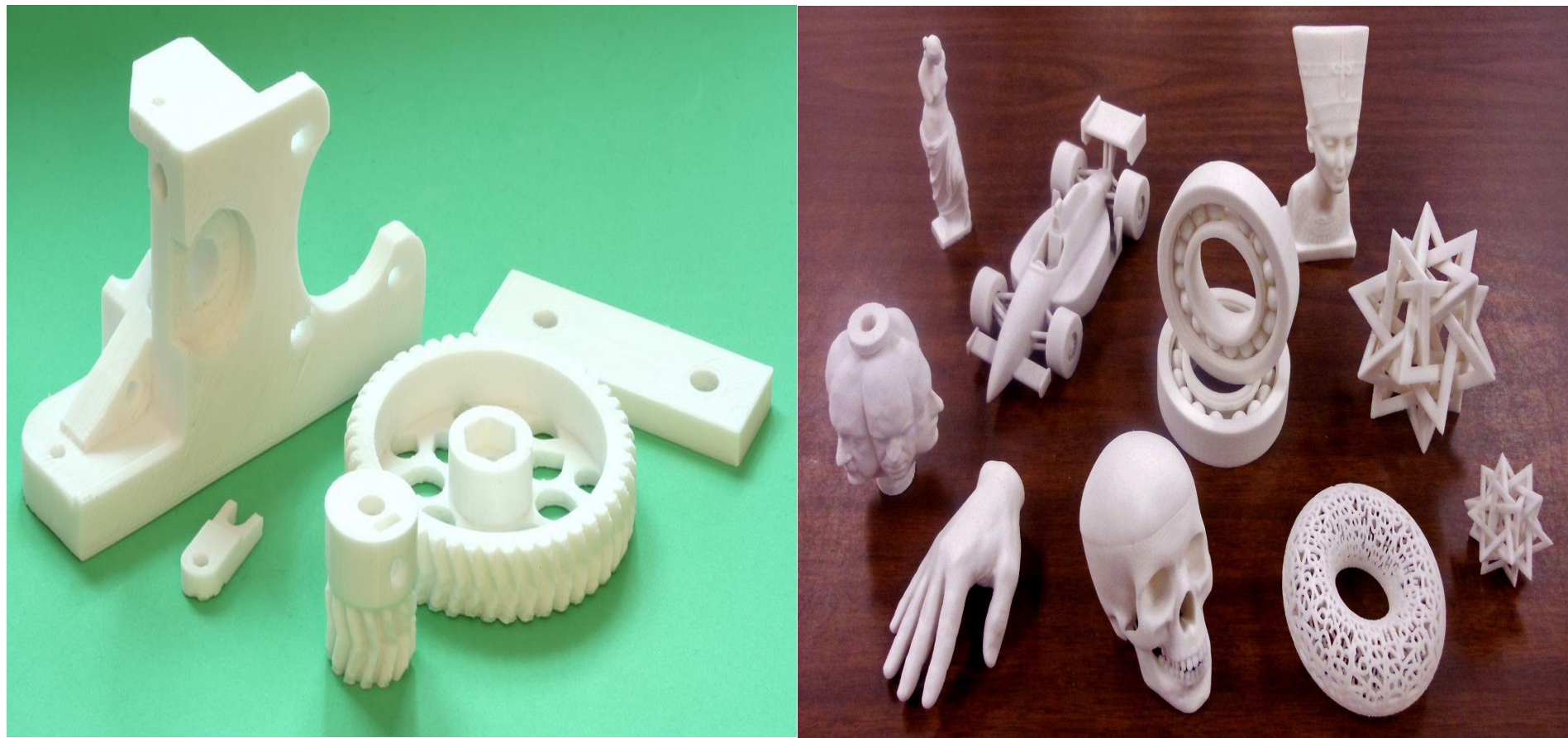


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2. PROTOTYPING AND MANUFACTURING





3. MEDICINE

Hospitals are increasingly turning to 3D printing uses in medical, such as in orthopedics, surgical implants, and custom surgical instruments.

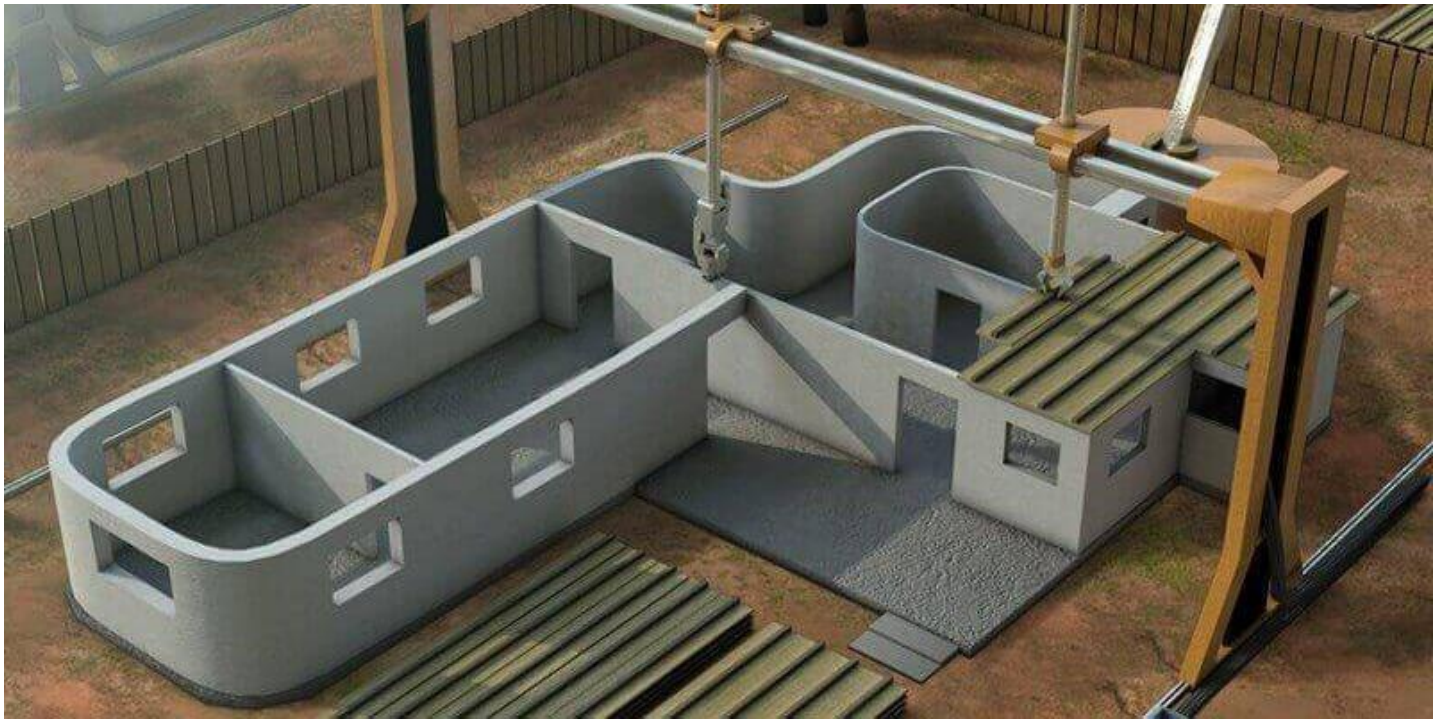
Dentures are now 3D printed, and dental crowns are molded using castable resins for perfect fitting crowns. 3D printing is also used to create retainers and aligners.





4. HOUSES, BRIDGES CONSTRUCTION

In the midst of a worldwide housing shortage, concrete 3D printers offer super fast, cheap, and automated housebuilding. Entire concrete house chassis can be built in just a day, key for creating basic shelters for those who have lost their houses during natural disasters like Earthquakes.





5.ART AND JEWELRY

Hospitals are increasingly turning to 3D printing uses in medical, such as in orthopedics, surgical implants, and custom surgical instruments.

