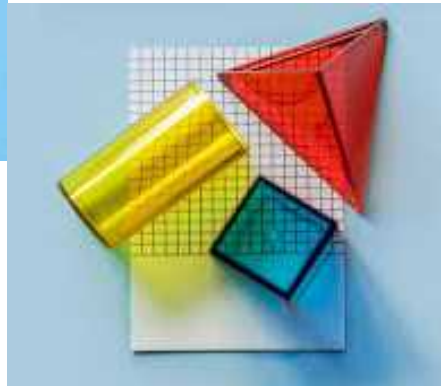




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Erasmus+ Call: 2019 - KA2 -



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This project is funded by the European Union.



3D printing technology aims students understanding maths and recycling procedure

*Curricula 1: 3D Printing Technology and Application  
"3D Printing Applications"*

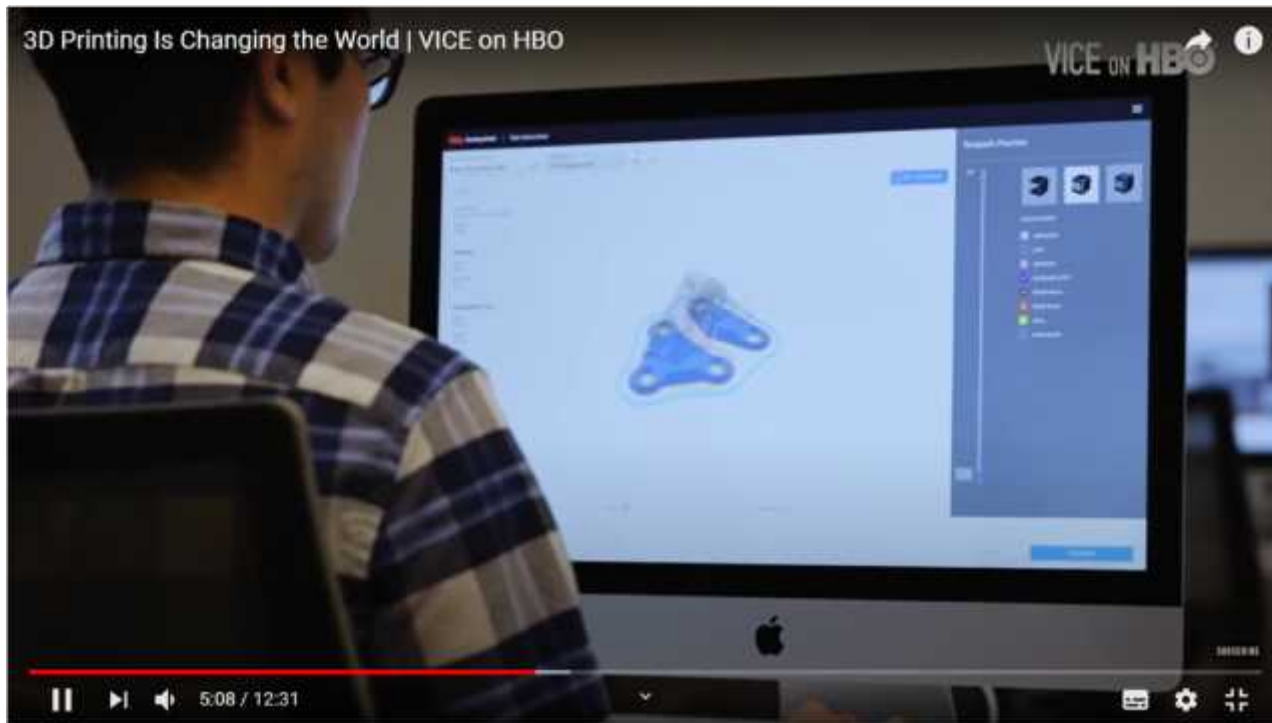
Output 3 (O3) - 3D Printing and Maths

# Description



In recent years, with improvements and variations in the technologies of both the machines and materials used in them, costs have been coming down, making 3D printing more accessible and cost-effective, in industry and education. In this session, the applications of the 3D printing will be given along with its offered benefits for each field.

# 3D Printing is Changing the World



Youtube. Vice News. "3D Printing Is Changing the World | VICE on HBO".2020



# 3D Printing applications



- Architecture and Construction
- Maritime Industry
- Healthcare and Medical
- Mechanics
- Food Industry
- Education
- Aeronautics and Space
- Electronics
- Drones
- Energy
- Automotive
- Textile and Fashion
- Robotics
- Optics
- Entertainment & Broadcasting
- Jewelry
- The Toy Industry
- Marketing

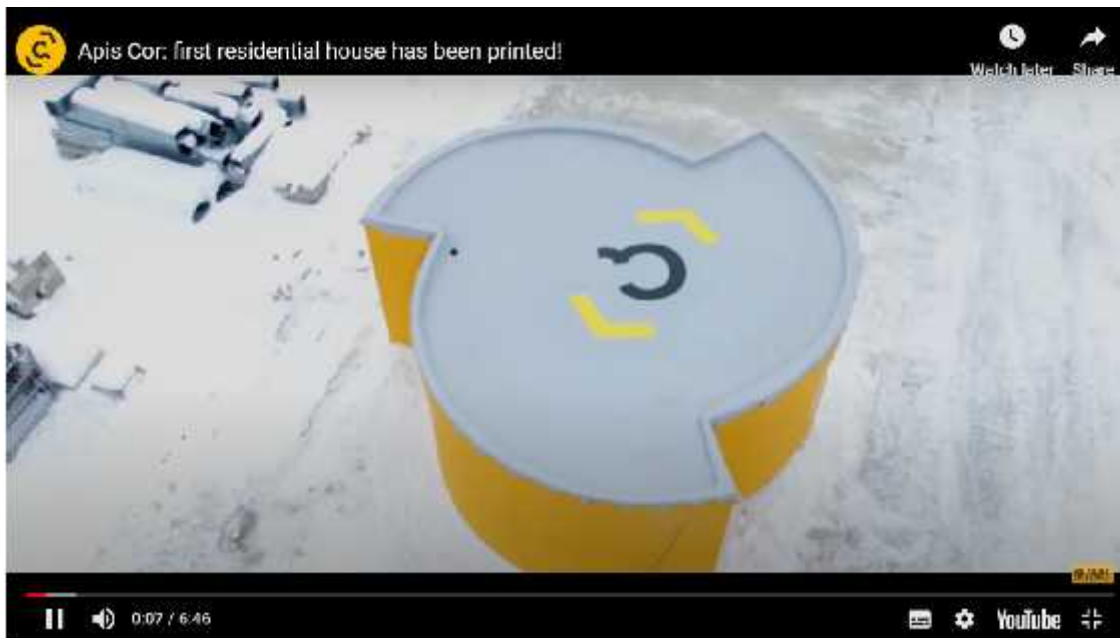
# Architecture and Construction (1/2)



- 3D printing for architecture is a growing application of additive manufacturing. Concrete structures, and 3D printed houses, for instance
- 3D print architecture monochromatic models in large sizes: up to 27” in a single run
- While 3D printing has already revolutionised the production of architectural models, advancements with the technology are pushing the boundaries of what is possible within the construction industry



# Architecture and Construction (2/2)



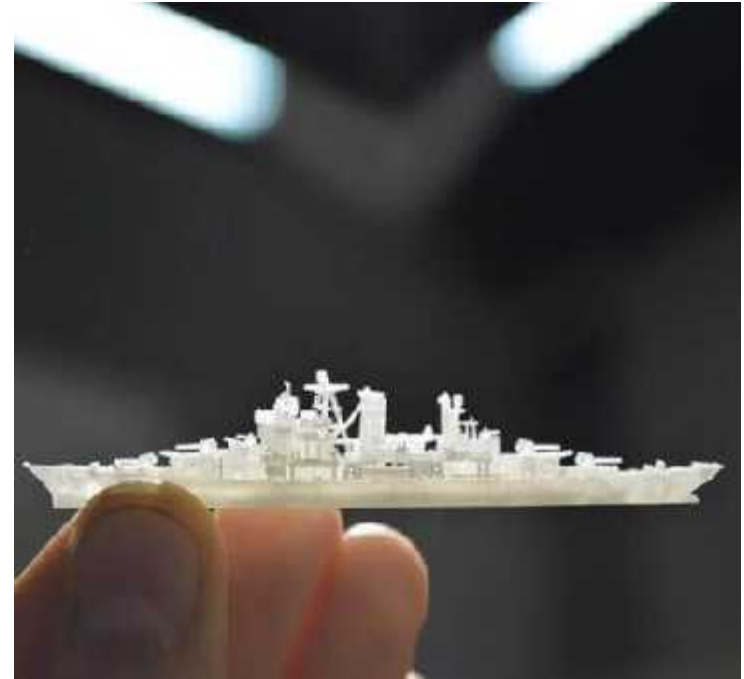
Youtube. Apis Cor. "Apis Cor: first residential house has been printed!".2017



# Maritime Industry



- Design cutting-edge boats can be created with 3D printing
- Without the restrictions associated with conventional production methods complex structures can be created aiming to cut weight, gain strength and reduce costs
- Testing various versions, even if they are quite similar is possible for a reasonable cost



# Healthcare and Medical



- 3D printers could also print out anatomical replacements needed for surgery, which would have a significant impact on surgical procedures going forward
- 3D printed medical devices: create custom-made products for the patients
- 3D printing can be used as educational material or to prepare for surgery
- Rapid prototyping can replace some time-consuming manual processes through 3D Printing Dentistry. 3D printing technology can reduce the time of treatment, make it more efficient, less traumatic and expensive





# Mechanics



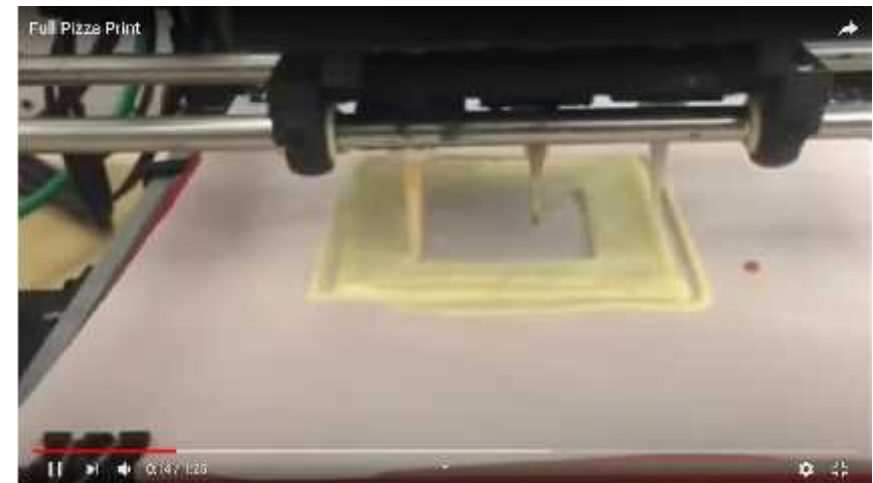
- Thanks to 3D printing, the time required for manufacturing has shortened significantly
- The level of accuracy is getting more precise every day
- Additive manufacturing is used in all kinds of engineering, including mechanical
- 3D printing in metal makes it possible to create objects with a complicated shape that is “impossible” to make, or too expensive to produce using other manufacturing technologies



# Food Industry



- The Foodini machine combined 3D printing technology and beloved food staples like pizza, pasta, and burgers
- The BeeHex 3D printer treated the NASA astronauts to a delicious pizza courtesy of its printing technology
- Normally 3D printers use material from one cartridge, but in the case of the food experiment the printer relies on multiple cartridges at once to combine materials like the dough, cheese and sauce



Youtube. Full Pizza Print.2013

# Education (1/2)

- More and more schools are incorporating 3D printing into their curriculum as tools to better prepare kids for the future
- 3D printers can be found in public libraries already
- Most universities have at least one (if not several) 3D printers for students to use for classes or their own projects
- Not only do 3D printers allow students to create in completely new ways, but there's also a lot of potential for educational models, from frog dissection kits to creating tessellations, free models are available on STL file repositories that can be used to educate



# Education (2/2)



Youtube. Futurism. "MIT Can 3D Print a Building in Hours".2017



# Aeronautics and Space



- Aerospace is pioneering the additive manufacturing revolution
- From lightweight components to series production, creating the next generation of high-performance aircraft is becoming more cost-effective thanks to AM
- 3D printing will change the way humans travel and could even extend the duration of missions to the International Space Station and plans to Mars
- Whether a component on a ship was damaged during a mission or an astronaut researchers needs a new tool, 3D printing an object is far better than either carrying extra weight on a mission or requesting the needed tool, thousands of miles away



# Electronics

- 3D printing will enable people to quickly create prototypes during the development phase and therefore complete the projects quicker
- 3D printing allows the creation of parts in the R&D phase to validate the mechanical concepts and get the perfect piece quickly
- 3D printing allows to produce complex parts which may be essential for the proper functioning of the creations in the high tech industry
- Headphones were created using a complex design based on the patterns from a butterfly's wing



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# Drones

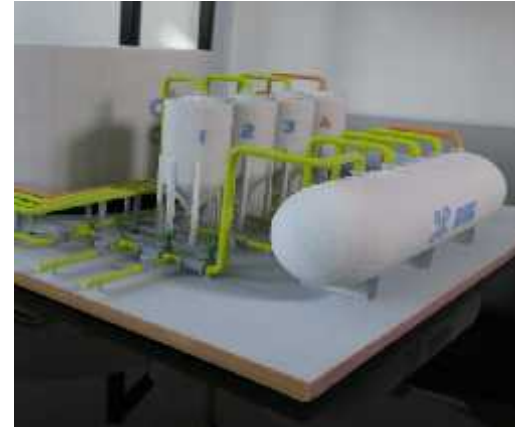


- Drone part designs can be easily upgraded and further developed to improve the performance of a quadcopter
- Almost every part of a drone can be 3D printed except the electronic components
- 3D printing can be used to create customised equipment, from 3D printed drone airframes tailored to the specific function to customised garments for soldiers with built-in sensors and antennas
  
- Ultimately, the technology could provide more flexibility and functionality in the battlefield with on-demand and localised manufacturing



# Energy

- Create electronic cases easily
- Fast and easy prototyping and testing
- Demonstration models to promotion ideas





# Automotive



- For the automotive industry recent advances in Additive Manufacturing (AM) have opened doors for newer, more robust designs; lighter, stronger, and safer products; reduced lead times; and reduced costs
- In 2015, the annual Wohlers report stated that the automotive industry accounted for 16.1% of all AM expenditure
- While automotive original equipment manufacturers (OEMs) and suppliers primarily use AM for rapid prototyping, the technical trajectory of AM makes a strong case for its use in product innovation and direct manufacturing in the future



# Textile and Fashion

- Fashion designers are using this technology to test and prototype their designs, a process that originally was expensive and inaccessible for those just entering the fashion world
- High fashion designers like Anouk Wipprecht and Iris Van Herpen have created entire collections of wearable clothing using 3D printers
- While on the commercial side of things, footwear companies like Adidas have incorporated 3D printing in their latest sneakers



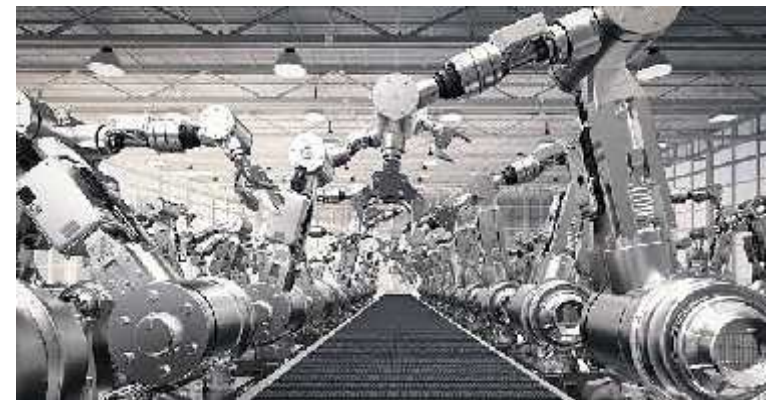
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# Robotics

- 3D printing combined with industrial robots could be a novel yet promising approach to manufacturing
- Two main drivers are pushing its development: the need to additively create large objects more accurately and repeatedly, and also the opportunity to achieve more automated and integrated production with 3D printing
- As manufacturing technologies evolve, this combination could be one of the solutions to the growing move towards greater digitisation and smart manufacturing



# Optics



- Various kinds of methods are used in additive manufacturing, which are mainly implemented for mechanical applications
- Nevertheless, this technology enables a wide variety of new design possibilities for optical components as well
- Even some industrial applications of additive manufacturing in the field of optics can be found, as new complex optical components with highly functional integration are possible.



# Entertainment & Broadcasting



- 3D printing has taken off in film production, as it provides a way for filmmakers to create realistic and detailed props
- A great example is Black Panther.
- Thanks to the freedom of design afforded by 3D printing, costume designers, Ruth E. Carter and Julia Koerner were able to create the impressive crown and a curved mantel worn by Queen Ramonda (played by Angela Bassett), blending the elements of traditional African style and futurism
- The benefit of 3D-printed props is reducing the cost of highly expensive visual effects
- This is because in some cases, 3D printing props is a cheaper and potentially faster alternative to creating computer-generated images



# Jewellery

- 3D printed jewellery has become a popular niche for those searching for a unique look
- With the introduction of 3D printers, jewellery-makers can experiment with designs not possible using traditional jewellery-making methods
- In addition, 3D printers make it cheaper to produce individual, unique pieces of jewellery or customize pieces for customers
- Jewellery is especially popular on 3D printing sites where people can order jewellery in PLA, gold, or even platinum. From rings to necklaces to earrings



# The Toy Industry



- With the cost of desktop 3D printers falling and the emergence of online platforms enabling consumers to share 3D printable designs, the toy industry could see a more “DIY” approach to manufacturing toys
- A study conducted by Michigan Technological University and London-based company MyMiniFactory suggests that 3D-printed toys could save consumers millions of dollars per year
- But 3D printing offers other benefits in addition to reduced costs: consumers can also customise toys or create new toys that are not commercially available. Looking ahead, we may even see some toy manufacturers selling 3D designs to consumers instead of the finished products



# Marketing

- The marketing industry is huge, and 3D printing has had an enormous influence on it, especially when we talk about advertisement campaigns and making demonstrative presentations. It is better to see once than to hear one hundred times
- With 3D printing, marketing and advertising agencies can have all the benefits of the product “visibly,” even if it doesn’t yet exist



Youtube. Massivit 3D Printing. “Introducing - Large format 3D printing for visual communications”.2016



# COVID-19

- With the COVID-19 outbreak snowballing its way across the globe, medical supplies such as face masks, respirators and ventilators have become scarce and this shortage has prompted action by the 3D printing community and aficionados
- From specialised masks to various breathing apparatus, 3D printing is helping people to think 'out of the box' and share their designs for free in the hope that it will help lower the infection rate



# 3D Printing Industry



Youtube. Alux.com. "15 Things You Didn't Know About the 3D Printing Industry".2019



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# The future of 3D printing

- At this point, the possibilities seem endless for 3D printing, as other industries are exploring this technology.
- The pharmaceutical industry is looking into using specialized 3D printers that can design pills.
- Consumers may be able to print clothes, household items, and jewellery.
- Food may one day be printed with ingredients that can be extruded through a nozzle including sugar, cream, cheese, and flour.
- The automobile industry could benefit from printing car parts on demand.
- For several of the industries listed above, the advantages of 3D printing are still beginning to be explored
- As the knowledge of the technology increases, it's clear that 3D printing has the potential to transform the way in which products are produced and distributed and as the additive manufacturing continues to evolve, the value of the technology will only continue to expand.





Thank you!!

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