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CONFERENCE OMAINTEC 2025 EXHIBITION FM

المؤتمر الدولي الثاني والعشرون لإدارة الأصول والمرافق والصيانة

The 22nd International Asset, Facility & Maintenance Management Conference

Digitization - Excellence - Sustainability

Saudi Arabia's Industrial Future with 3D Printing & Digital Solutions

By Ehab Bassam

26-28 January 2025
The Ritz-Carlton Jeddah, Kingdom of Saudi Arabia

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Who Am I ?

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Ehab Bassam

- Mechatronics Engineer
- Additive Manufacturing Expert
- Business Development Manager
- Science Content Creator
- Obsessed with Astronomy & Physics

INTRODUCTION TO 3D PRINTING AND 3D SCANNING.

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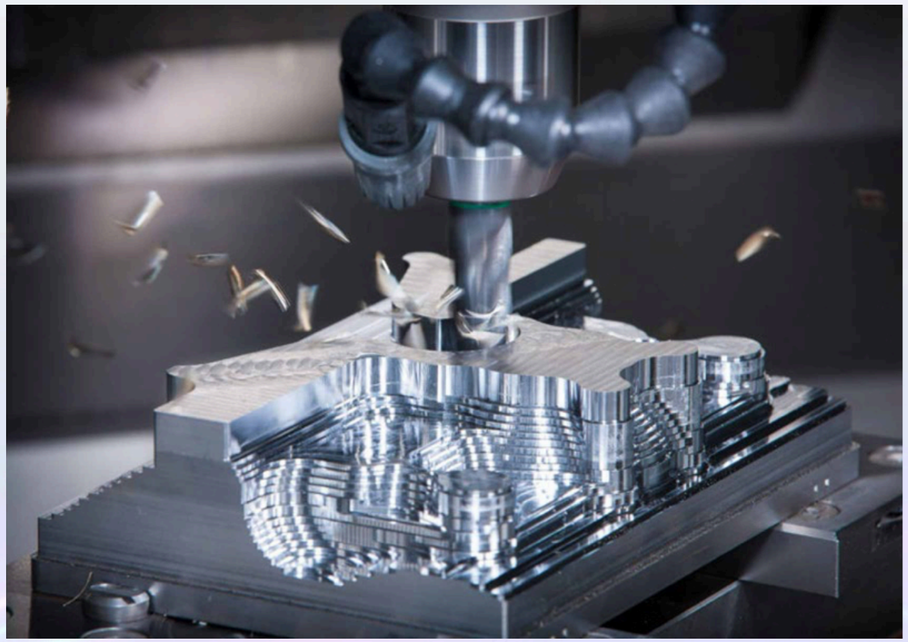
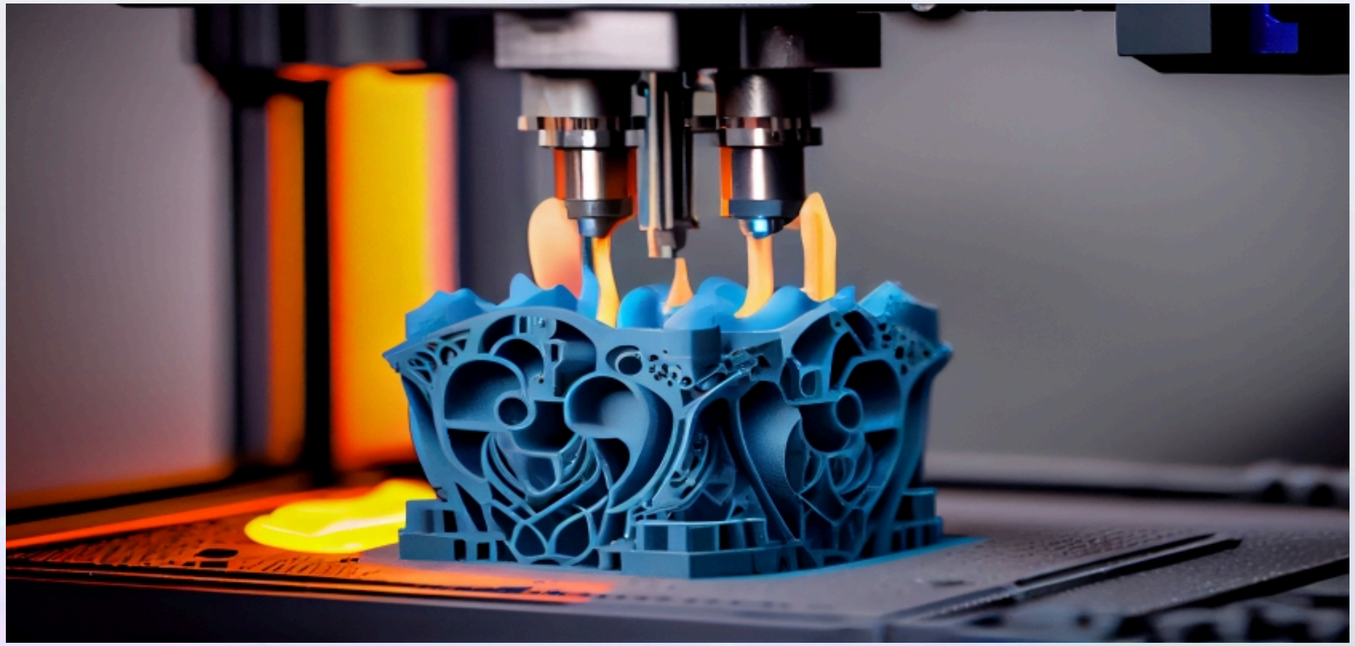
WHAT IS SUBTRACTIVE MANUFACTURING ?



WHAT IS ADDITIVE MANUFCATURING?



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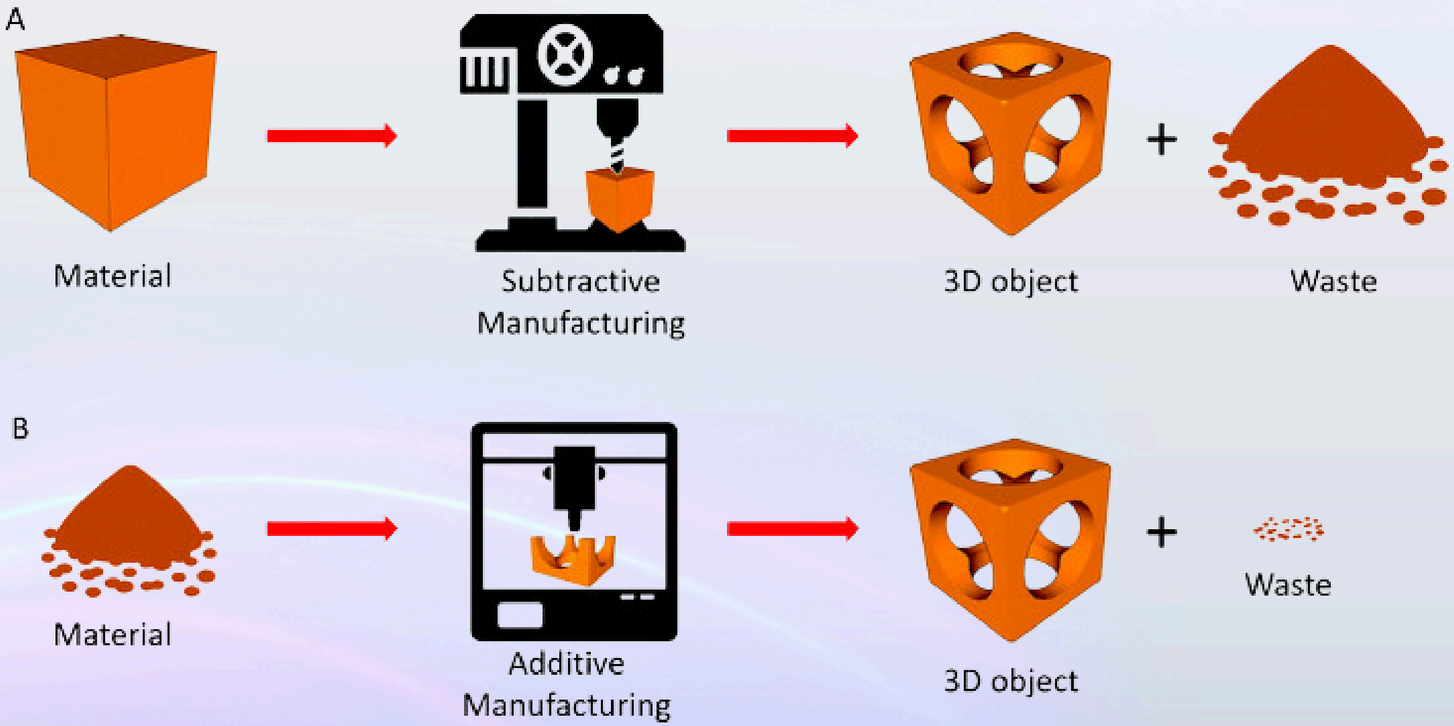
ADDITIVE VS SUBTRACTIVE MANUFACTURING



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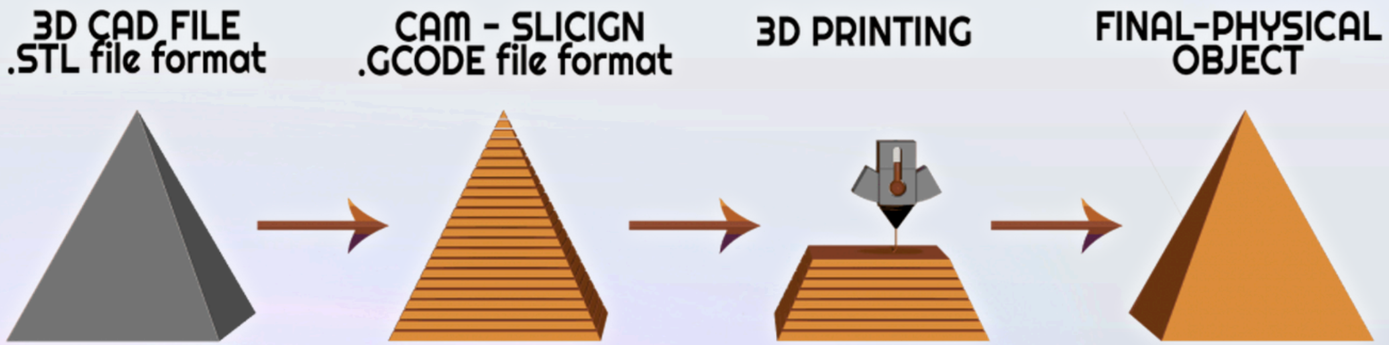
مؤسسة ولي العهد
Crown Prince Foundation

THAT DOESN'T MEAN WE NO LONGER NEED SUBTRACTIVE TECHNOLOGIES.

BUT NOW LETS FOCUS ON 3D PRINTING...

WHAT IS 3D PRINTING ?



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ADDITIVE MANUFACTURING TECHNOLOGIES

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WE WILL TALK ABOUT THE MOST COMMON TECHNOLOGIES OF 3D PRINTING

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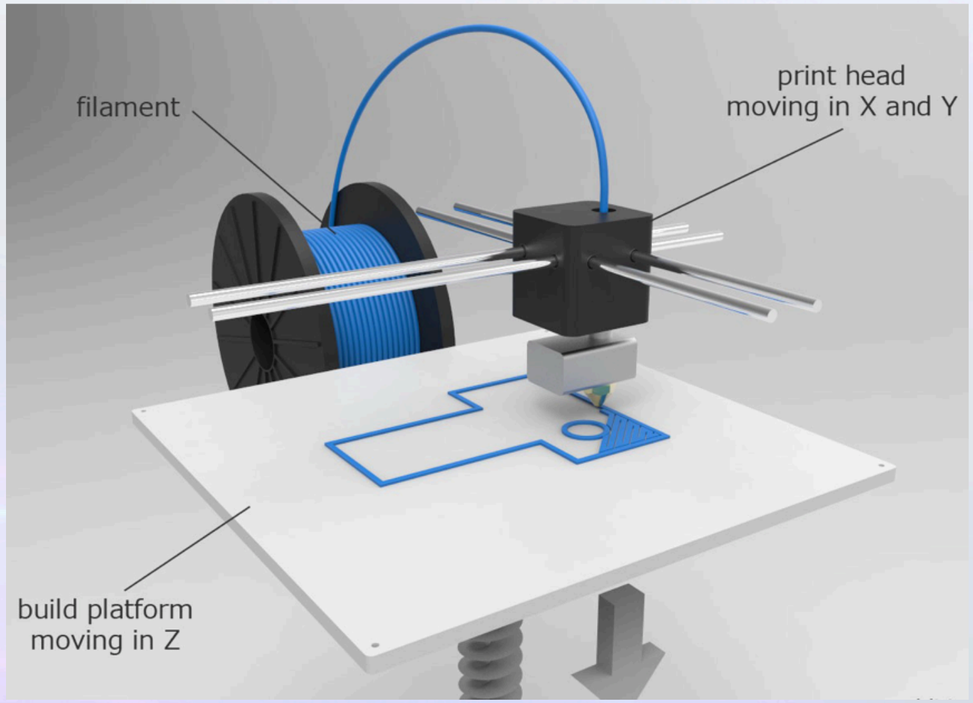
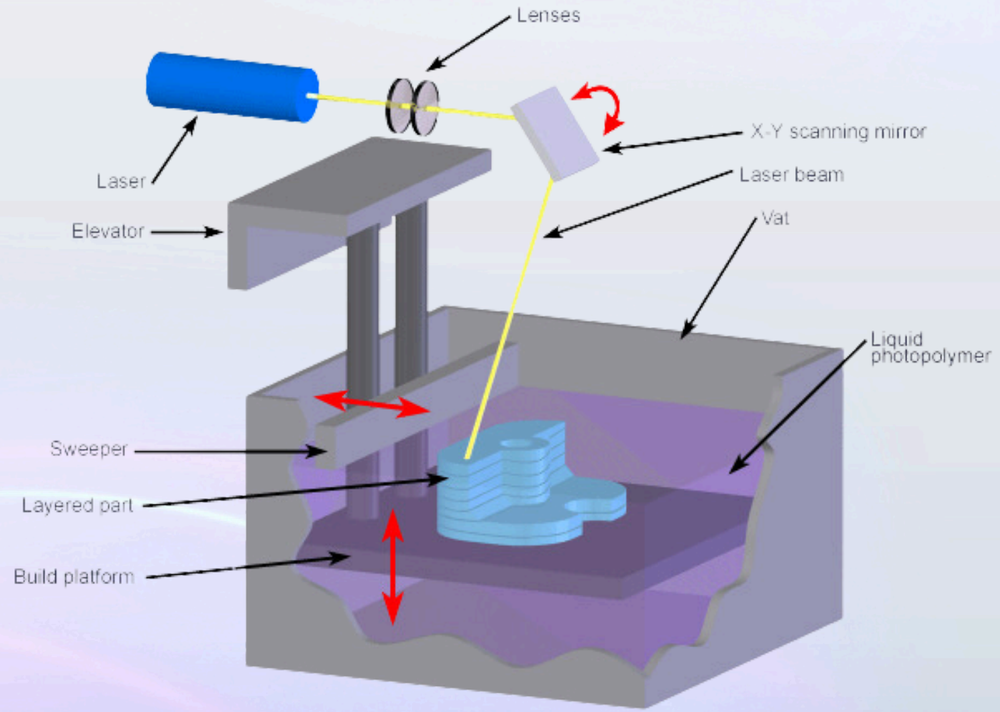
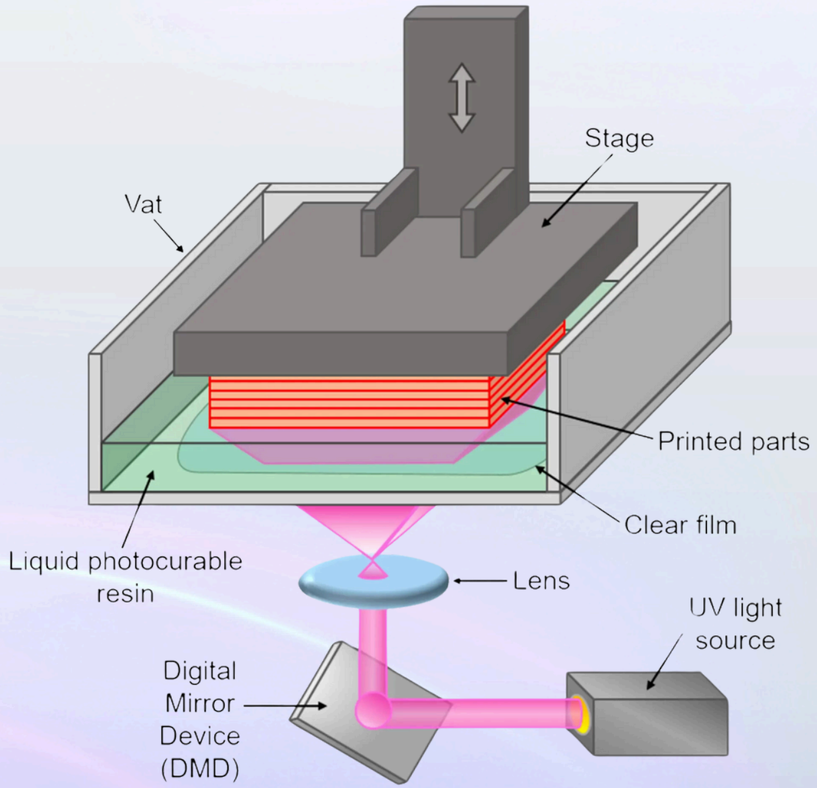
Fused deposition modeling (FDM) Or (FFF)



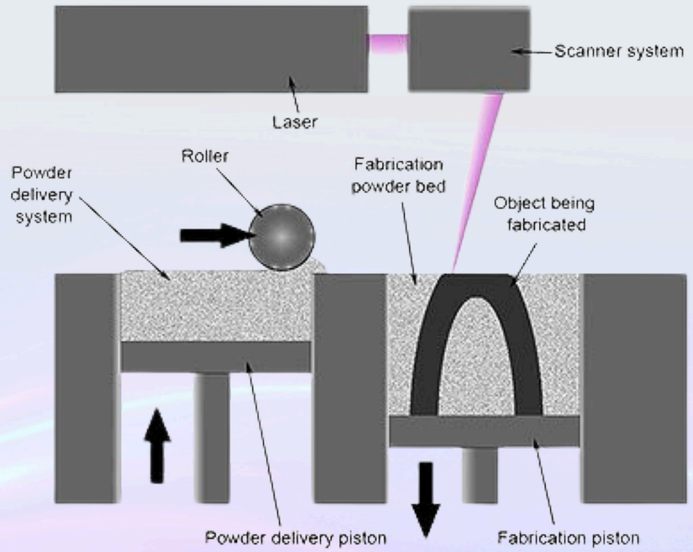
Stereolithography (SLA)

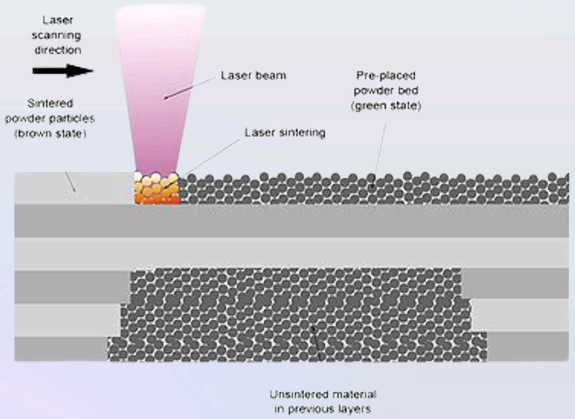


Digital Light Processing (DLP)



Selective Laser Sintering (SLS)





Material Used in 3D Printing

- For **plastics**, we've got materials like **PLA**, **ABS**, **PETG**, **nylon**, **polycarbonate**, **TPU**, **PEEK**, and **PEI**. Each has its own properties and applications, like flexibility, strength, or heat resistance.

- For **metals**, there's **aluminum**, **titanium**, **stainless steel**, **cobalt-chromium**, **Inconel**, and even **gold** and **silver** for specific applications. Metal 3D printing is mostly done through SLM or DMLS technologies.

- For **composites**, you'll find materials like **carbon fiber-reinforced plastics**, **fiberglass composites**, and even materials mixed with **wood** or **ceramic** particles for aesthetics or specific strength needs.

- And in others, there's **glass**, **ceramics**, **concrete** for construction, and even **bio-materials** like **hydrogels** and **tissue** scaffolds for medical use.

3D SCANNING & REVERSE ENGINEERING

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Engineering

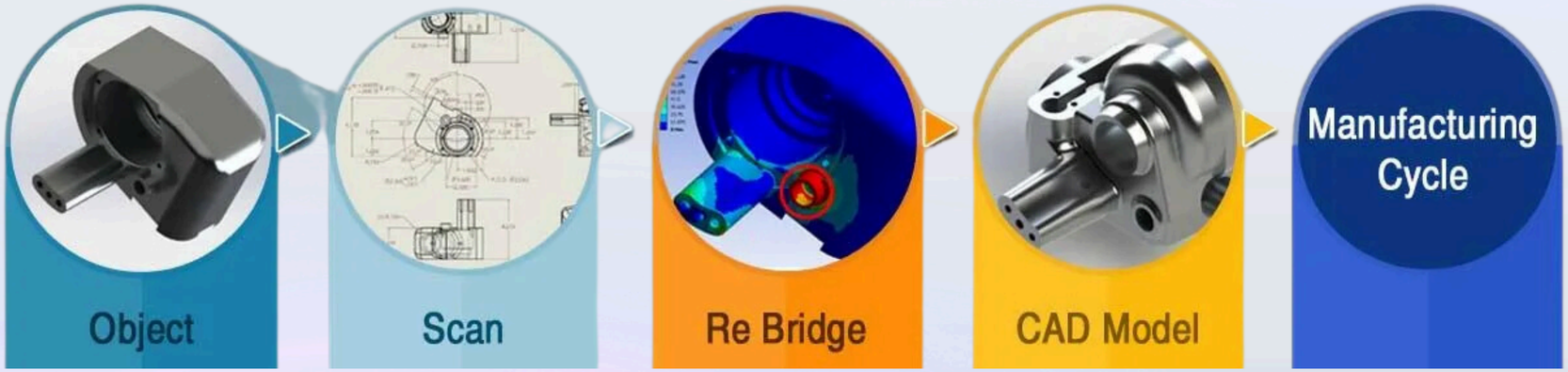
Following a recipe to bake a cake from scratch.

VS

Reverse Engineering

Tasting a cake to figure out its recipe.

REVERSE ENGINEERING PROCESS



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3D SCANNING TECHNOLOGIES

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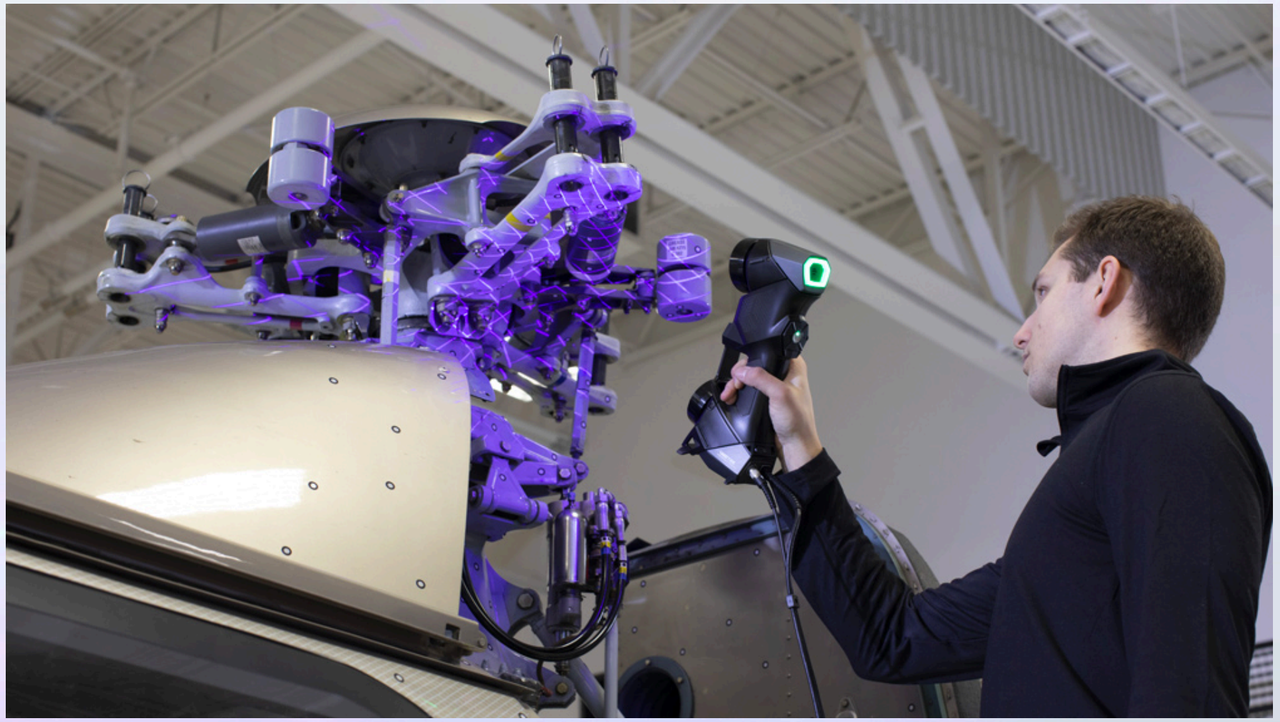
Handheld Laser 3D Scanning



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Handheld LED 3D Scanning

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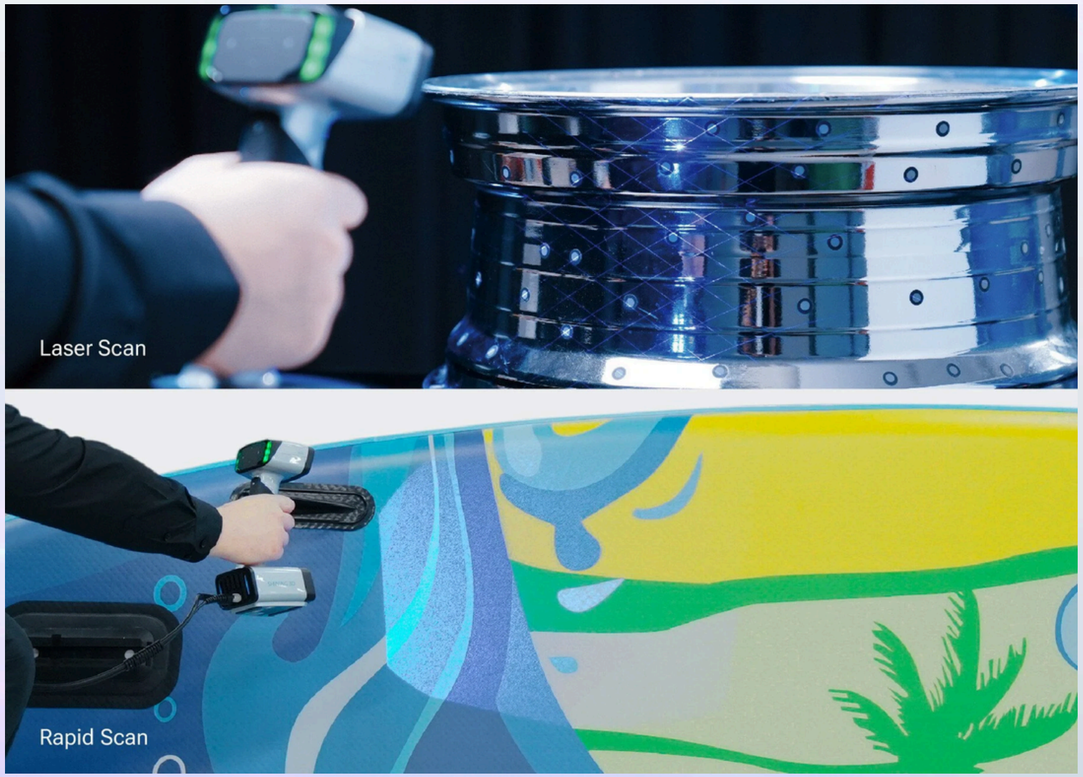
Handheld Hybrid 3D Scanning



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Fixed 3D Scanning

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OTHER 3D SCANNING STYLES & TECHNOLOGIES

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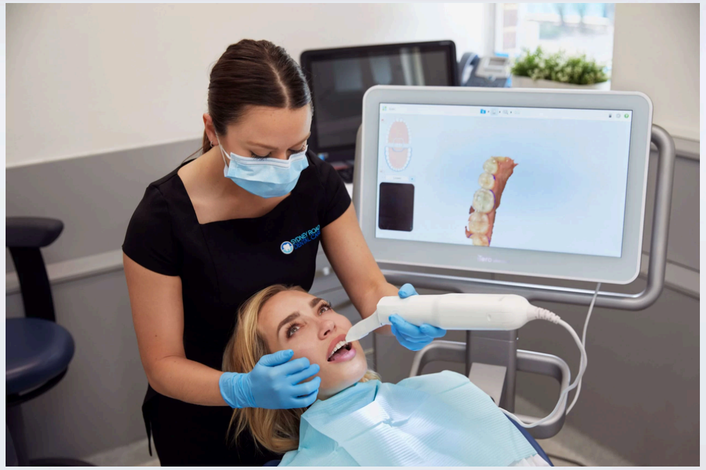

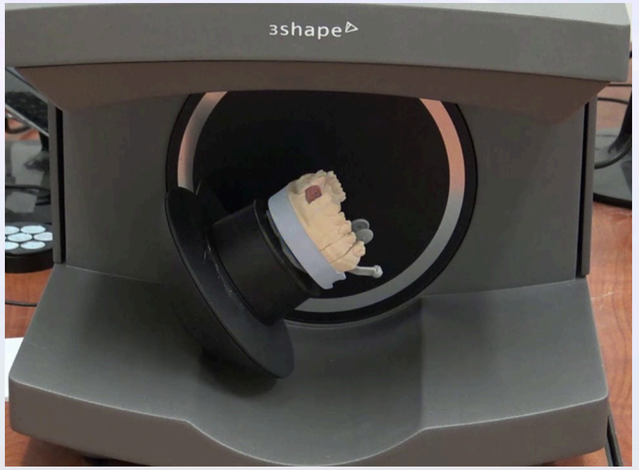

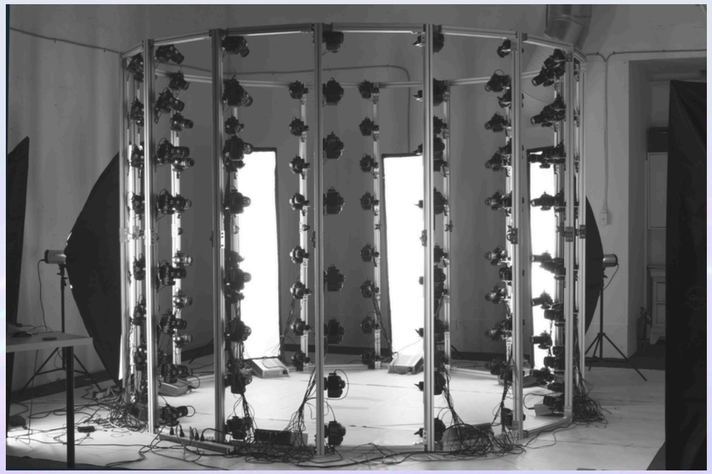

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GLOBAL & LOCAL INDUSTRY TRANSFORMATION WITH 3D TECHNOLOGY.

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Jewellery Industry

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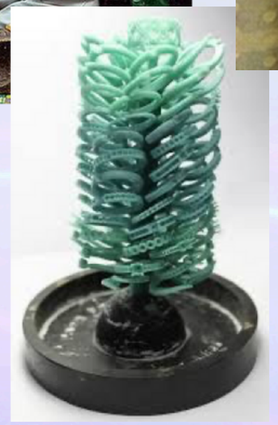
Traditional Manufacturing



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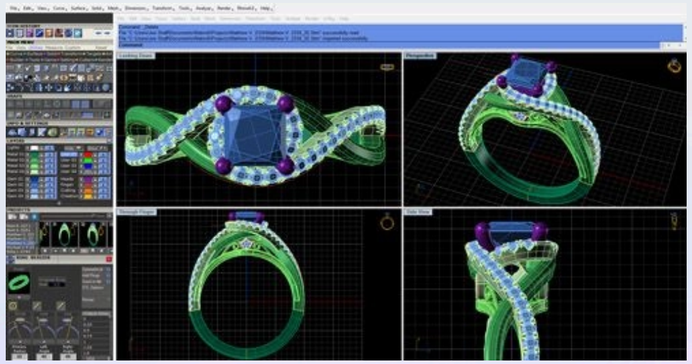
Modern Manufacturing



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Modern Manufacturing

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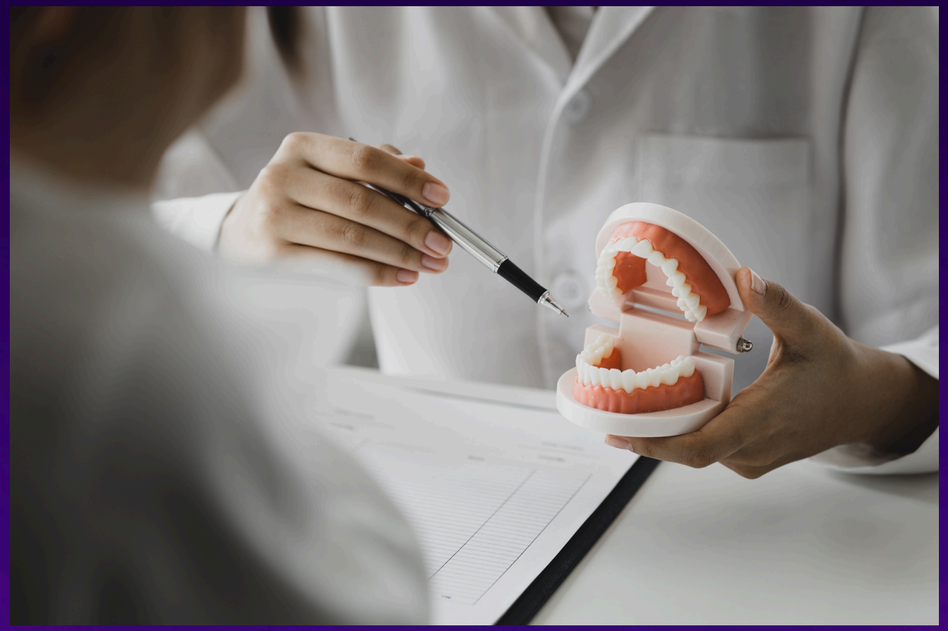
Dental Industry



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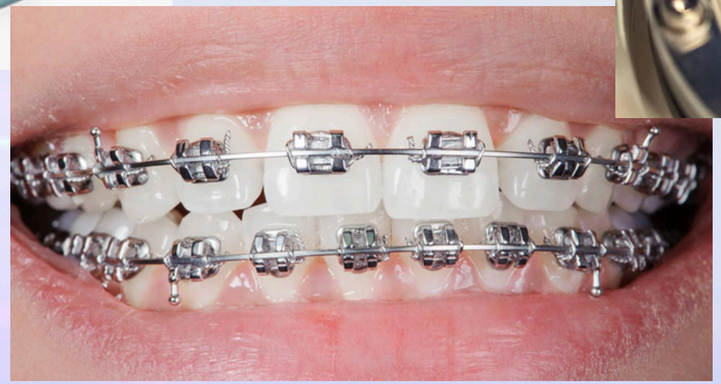
Traditional Manufacturing



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Modern Manufacturing

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Crown & Bridge

Surgical Guide

Splint

Snap On Smile

Working Model

Clear Aligner

Dental Cast

Temperory & Permenant

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Medical & Healthcare Industry

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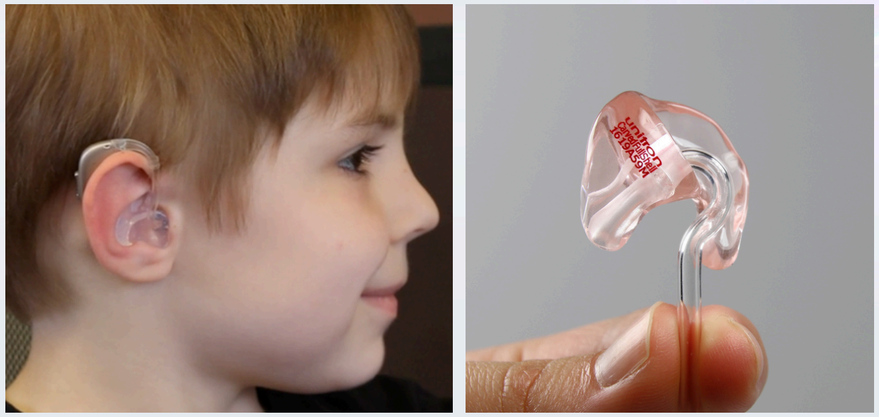
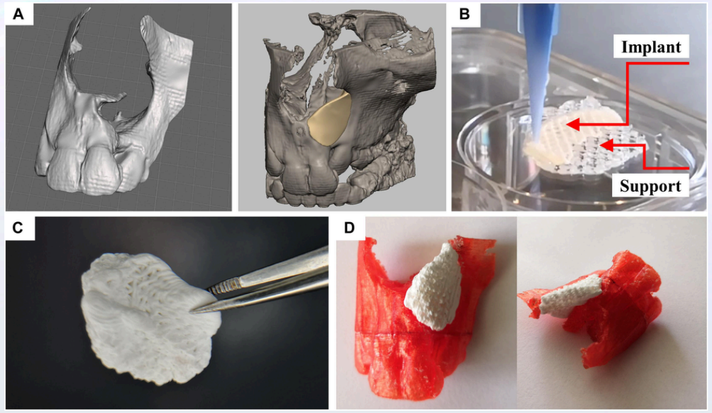


Audiology



Bone Regeneration

Pre-surgical Model

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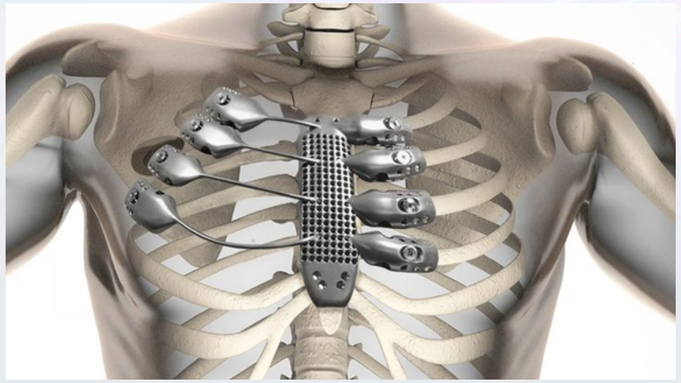
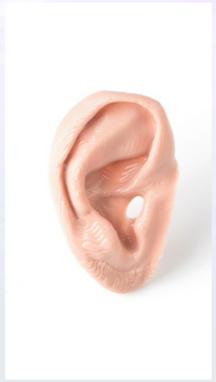



Maxillofacial Prosthetics\ Medical Implants\ Prosthetics

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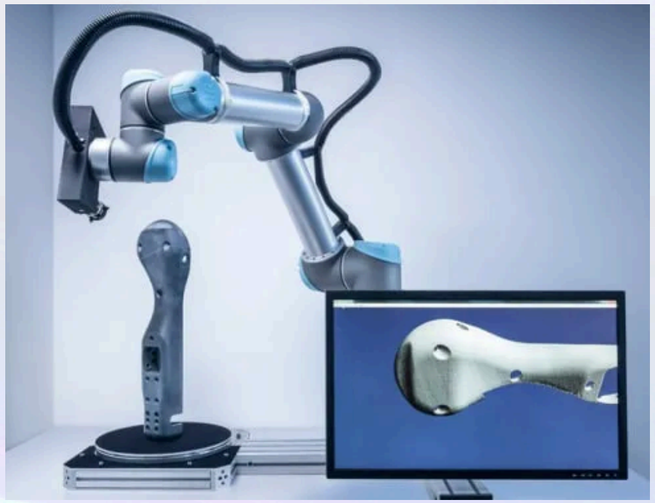

3D Scanning

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Indsutrial & Manufacturing

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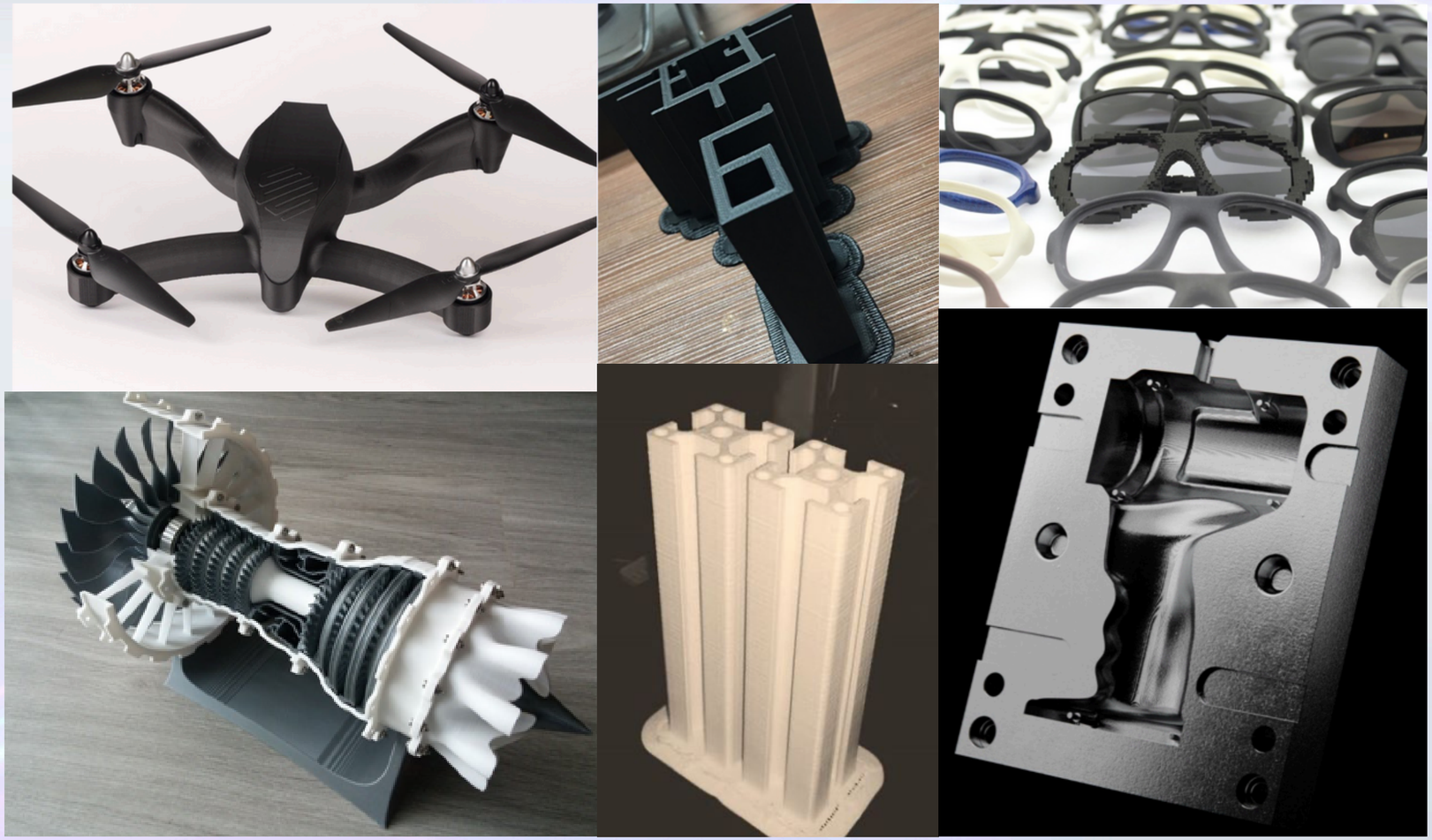
3D printers have a wide range of industrial applications, including:

- Spare parts
- Prototypes
- Molds & Inserts
- Mass Customization
- Functional end-use parts
- Jigs & Fixtures.
- Customized Tooling



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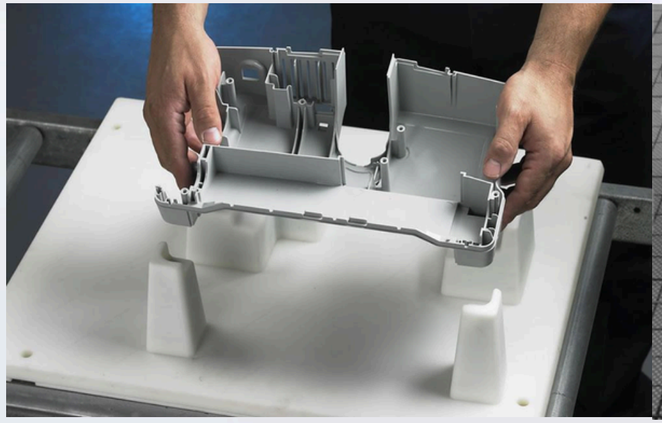
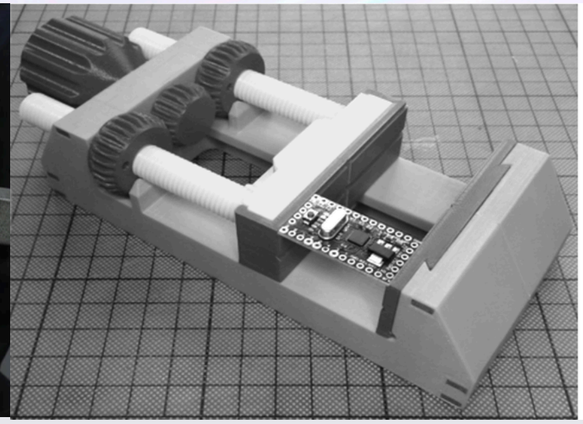
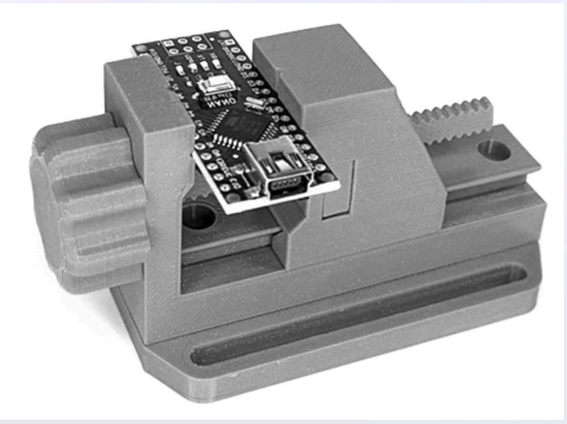


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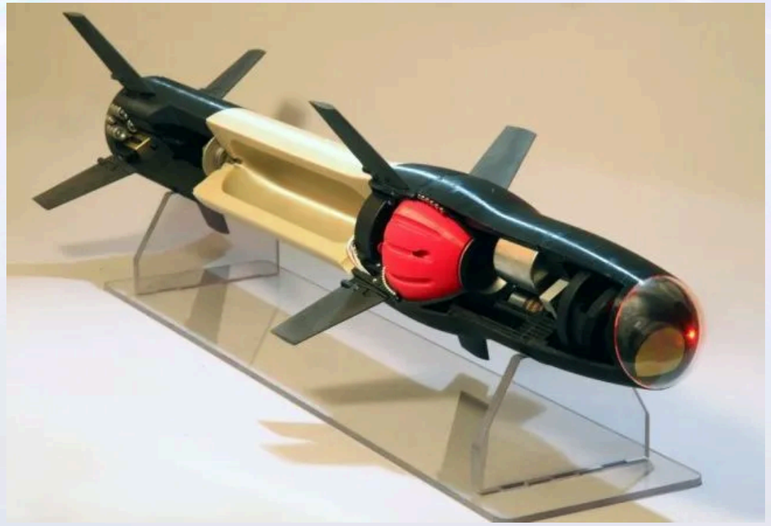

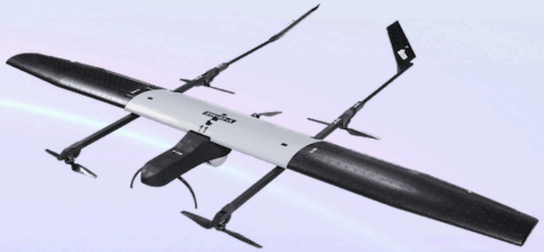

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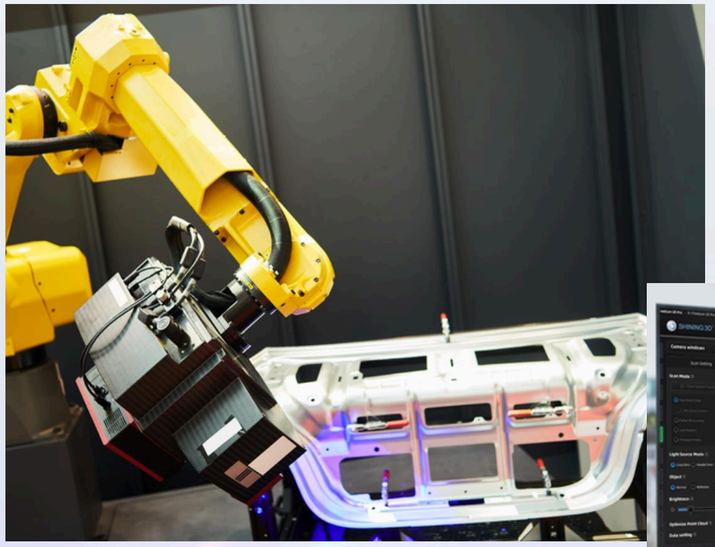
3D Scanners Industrial Applications



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Educational \ R&D

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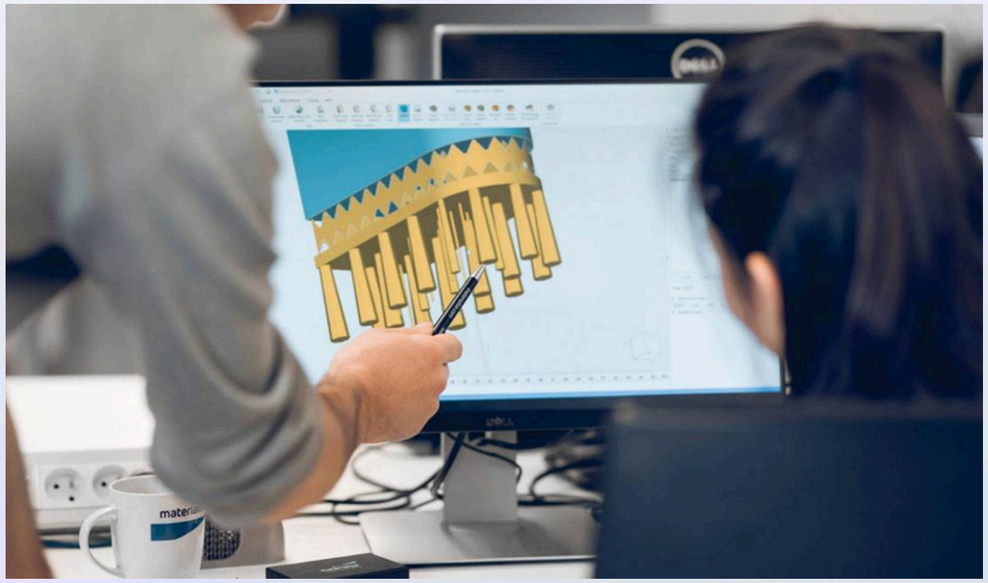
Education



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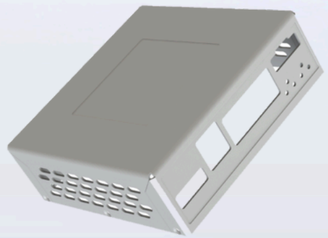
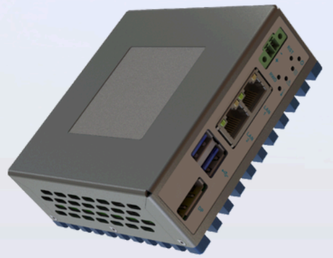
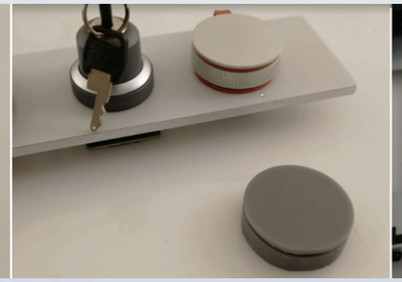
Research & Development

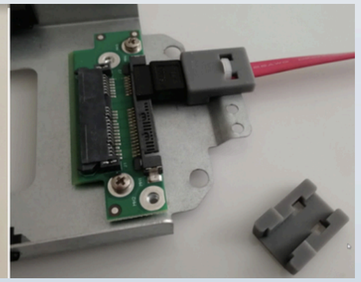
Advantages of in-house 3D Printing in R&D:

- Speed of Development
- Material Options
- Costs and Budgeting
- Refining Design Specification
- Engineering prototypes and Product Validation Testing









Architecture & Art

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Architectural Scale Models

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3D Concrete Printing

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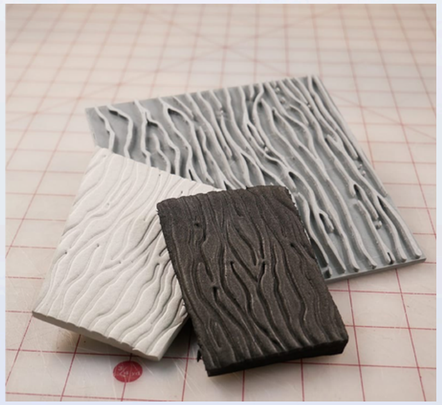
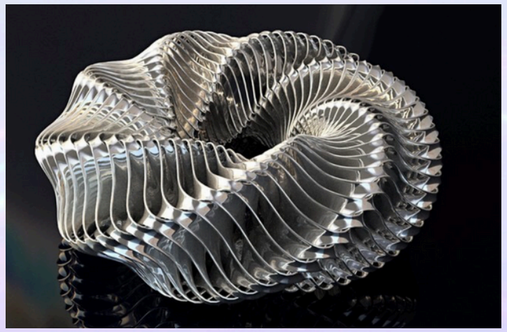
Art





DIGITAL TRANSFORMATION IN LOGISTICS AND WAREHOUSING

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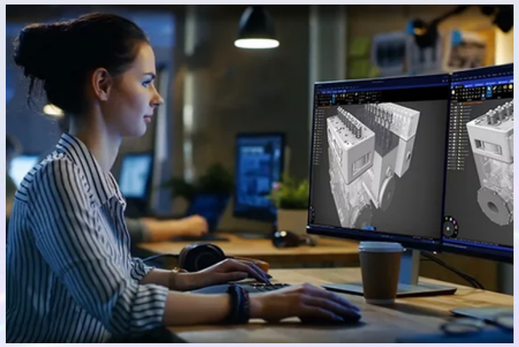
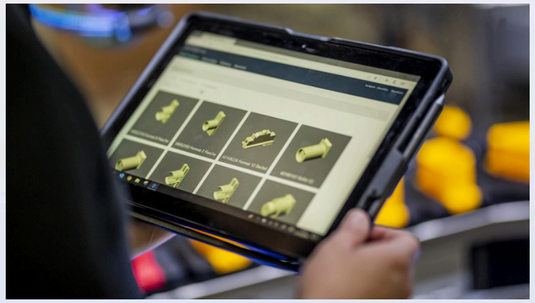
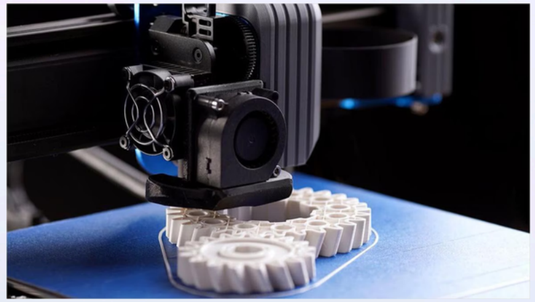
3D Scanning



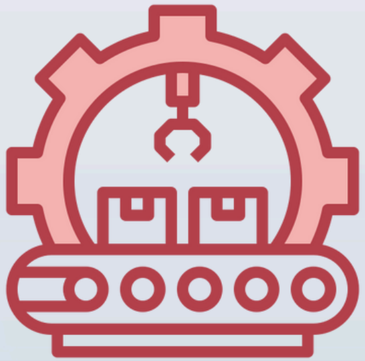
3D Design



Cloud Library or Digital Warehouse



3D Printing



Or Other Machinery

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Advantages of 3D Printing in Logistics

1. **Reduced Inventory:** Manufacture on demand, minimizing storage costs by storing only raw materials and finished products temporarily.
2. **Smaller Storage Needs:** Less stock requires less storage space, ideal for small and medium businesses.
3. **Fewer Shipments:** Localized production reduces shipping distances, cutting pollution and costs.
4. **Faster Deliveries**: Simplifies manufacturing processes, enabling quicker production and distribution.
5. **Fewer Returns:** Personalized products enhance customer satisfaction, reducing return rates.

“Wars have been won or lost primarily because of logistics”

-Dwight D.Elsenhower

ALIGNMENT WITH SAUDI 2030 VISION

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3D Printing & 3D Scanning in Alignment with Saudi Vision 2030

Economic Diversification & Technological Innovation

- Saudi Vision 2030 emphasizes reducing dependence on oil by fostering a knowledge-based economy.
- 3D printing and scanning support innovation in advanced manufacturing, construction, and automotive industries, creating new revenue streams and job opportunities.
- These technologies drive the adoption of Industry 4.0 practices, enhancing global competitiveness.

Sustainability & Environmental Goals

- 3D printing minimizes material waste compared to traditional manufacturing methods, supporting Vision 2030’s sustainability objectives.
- Enables the production of lightweight, durable materials that reduce energy consumption.
- Promotes eco-friendly construction methods, including 3D-printed buildings and structures.

ADVANTAGES & CHALLENGES OF 3D PRINTING

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Advantages of 3D Printing

1. Customization

- Easily create unique, tailored products to meet specific customer or industry needs.

2. Cost-Effectiveness

- Reduces material waste through additive manufacturing.
- Lowers production costs for small batches or prototypes.

3. Speed

- Rapid production of prototypes and finished products compared to traditional methods.
- Accelerates product development cycles.

4. Flexibility

- Designs can be modified quickly without the need for new tools or molds.

5. Sustainability

- Minimizes waste and enables local production, reducing transportation-related emissions.

Challenges of 3D Printing

1. Limited Materials

- Fewer material options compared to traditional manufacturing.
- Some materials lack the required strength or durability for specific applications.

2. Initial Investment Costs

- High cost of 3D printers and maintenance.
- Advanced printers for industrial use are expensive.

3. Speed Limitations for Mass Production

- Slower than traditional manufacturing for large-scale production.

4. Quality Control Issues

- Surface finish and mechanical properties may vary.
- Challenges in meeting consistency standards.

5. Intellectual Property Risks

- Designs can be easily copied and shared, posing a risk to proprietary products.

GLOBAL SUCCESS STORIES

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Global Success Stories

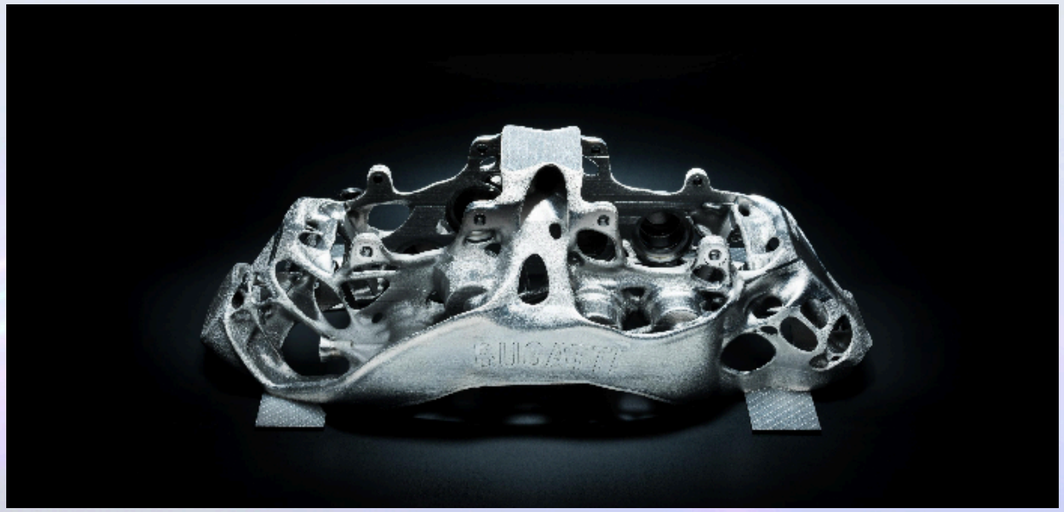
Aerospace: GE Aviation:

- GE Aviation’s 3D-printed fuel nozzles for jet engines reduced weight by 25% and consolidated 20 parts into 1, leading to improved fuel efficiency and reduced costs.

Global Success Stories

Automotive: Bugatti:

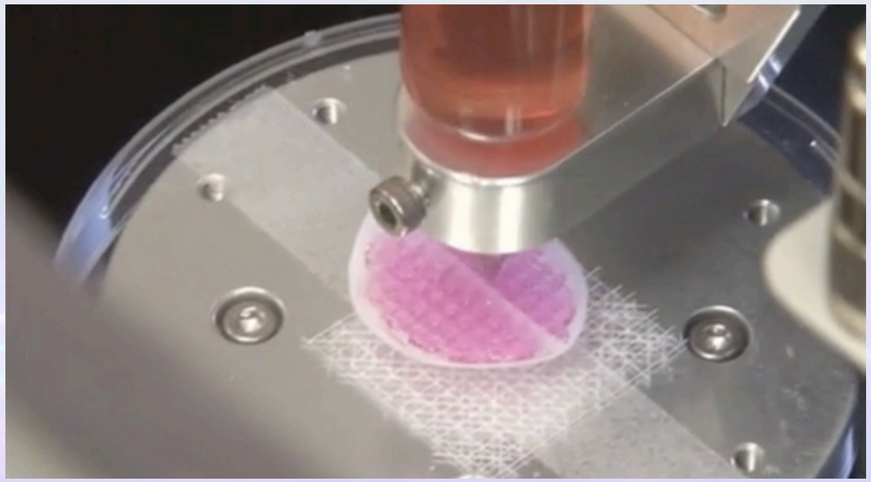
- Bugatti leveraged 3D printing to produce lightweight titanium brake calipers, pushing the limits of traditional manufacturing.

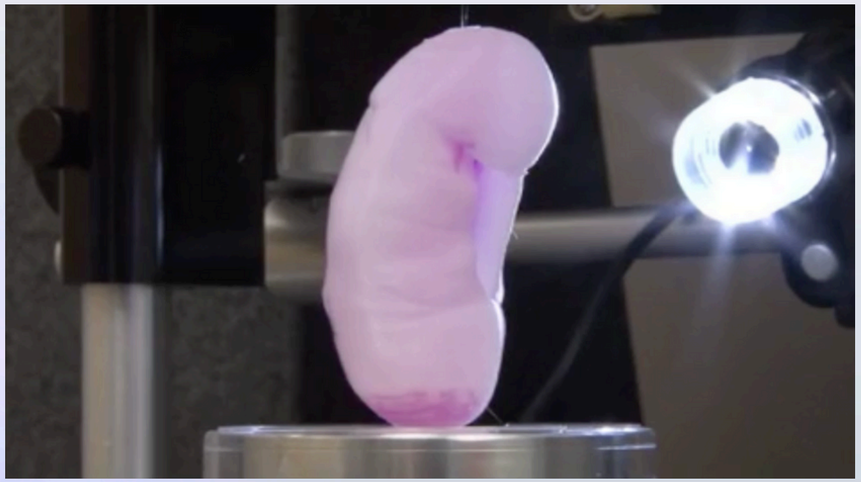


Global Success Stories

Healthcare: Wake Forest Institute for Regenerative Medicine:

- Successfully bioprinted functional miniature human kidneys, opening new doors for transplant innovation.





Global Success Stories

Construction: ICON (USA):

- 3D-printed affordable homes in under 24 hours using sustainable materials, addressing housing crises in Mexico and the U.S.

Global Success Stories

Fashion: Adidas Futurecraft 4D:

- Adidas created a series of 3D-printed midsole shoes, combining performance and style with cutting-edge tech.

Q&A SESSION

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