4. Endüstri Devrimi- Malzeme Mühendisliği

Doç.Dr.M.Özgür Seydibeyoğlu

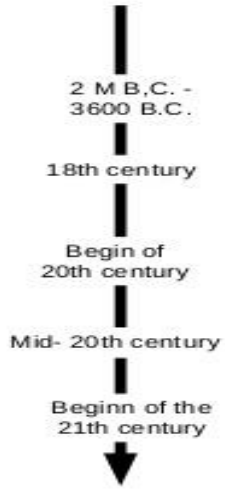
Izmir Katip Çelebi Üniversitesi, Malzeme Bilimi ve Mühendisliği Bl.

ODTÜ Metalurji ve Malzeme Mühendisliği Bölümü 50. Yıl Sempozyumu
29 Haziran 2016

4. Endüstri Devrimi

Industry 4.0 - Introduction

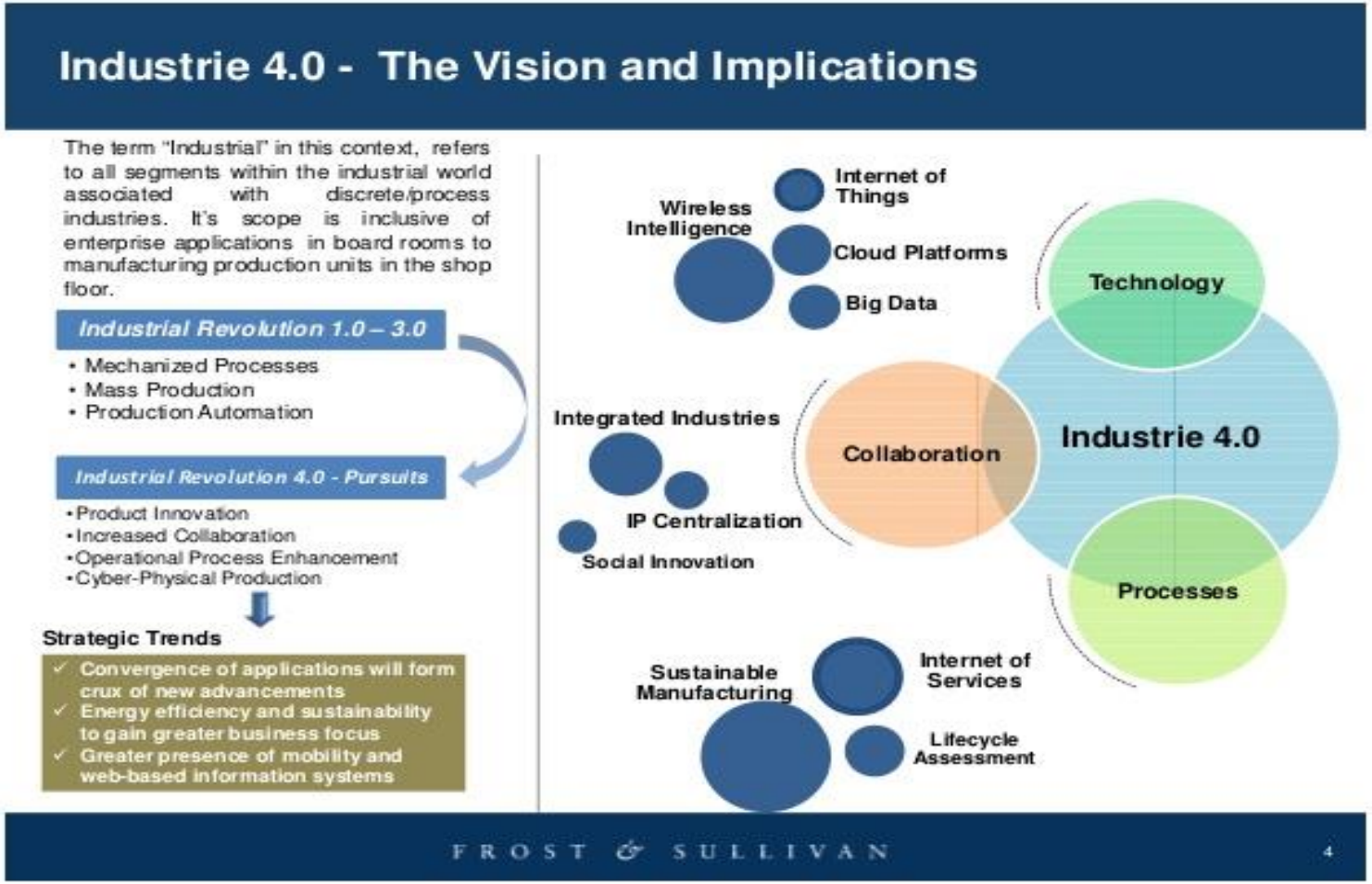
- Industry 4.0 = new (fourth) industrial revolution
  - Tools and metallurgy
  - 1st industrial revolution: mechanization of production (James Watt: steam power, 1764)
  - 2nd industrial revolution: mass production (Henry Ford: assembly line for Model T, 1908)
  - 3rd industrial revolution: digitization / automation (Konrad Zuse: Z3 computer, 1941)
  - 4th industrial revolution: smart automation (IoT / IoE, CC, ES/CPS, BD, BI, ML, robots)



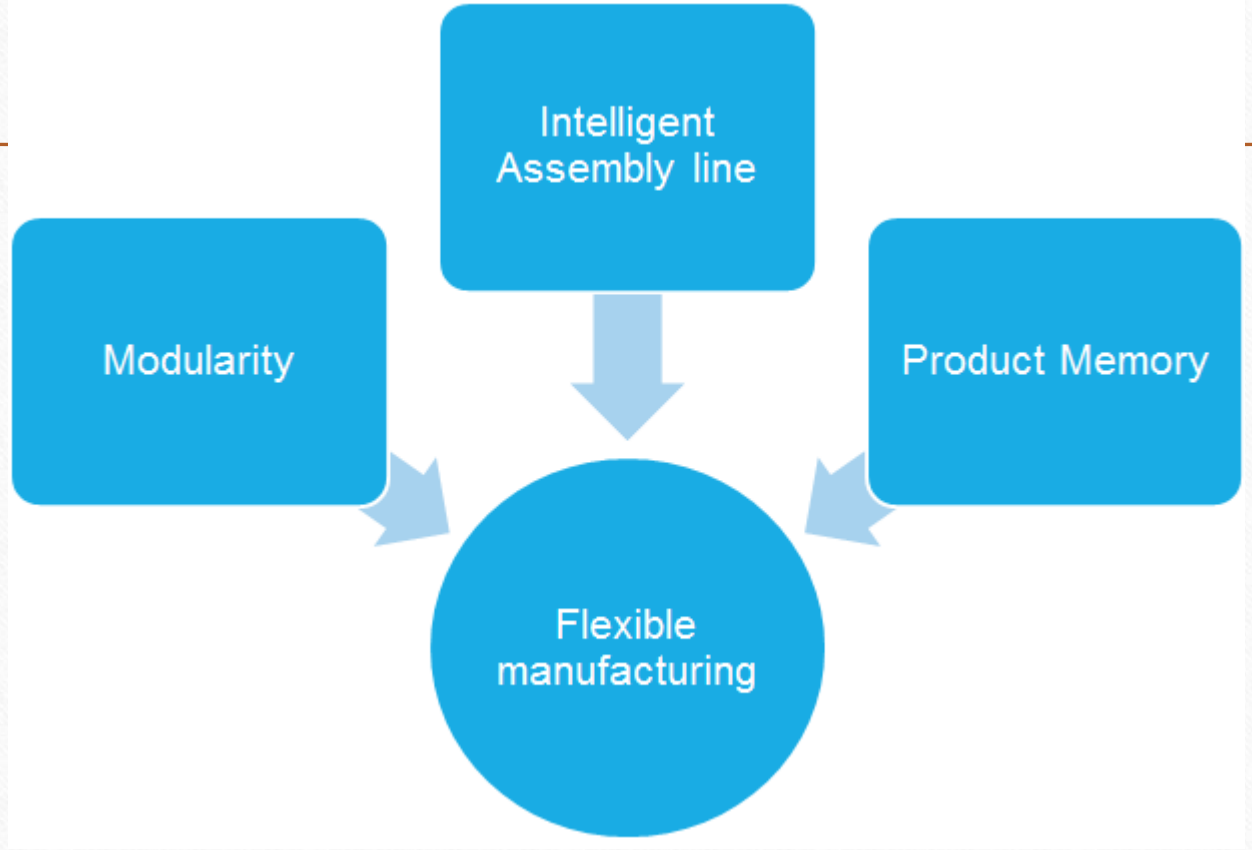
Endüstri 4.0

Autonomous robots
System integration
Internet of Things
Simulation
Additive manufacturing
Cloud computing
Augmented reality
Big data
Cybersecurity
Industry 4.0

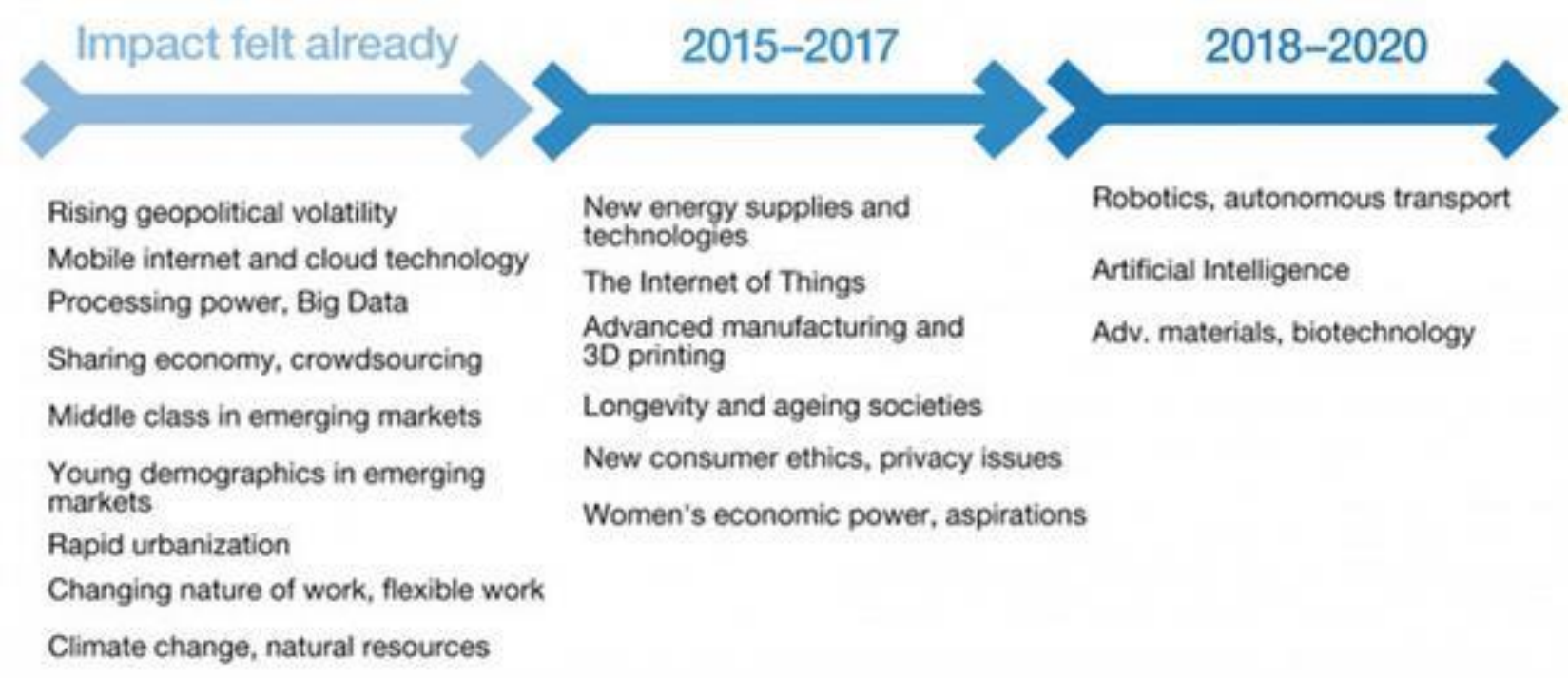
Endüstri 4.0


Industrie 4.0 - The Vision and Implications
The term "Industrial" in this context, refers to all segments within the industrial world associated with discrete/process industries. It's scope is inclusive of enterprise applications in board rooms to manufacturing production units in the shop floor.
Industrial Revolution 1.0 – 3.0
• Mechanized Processes
• Mass Production
• Production Automation
Industrial Revolution 4.0 - Pursuits
• Product Innovation
• Increased Collaboration
• Operational Process Enhancement
• Cyber-Physical Production
Strategic Trends
✓ Convergence of applications will form crux of new advancements
✓ Energy efficiency and sustainability to gain greater business focus
✓ Greater presence of mobility and web-based information systems
Internet of Things
Wireless Intelligence
Cloud Platforms
Big Data
Technology
Integrated Industries
Collaboration
Industrie 4.0
IP Centralization
Social Innovation
Processes
Sustainable Manufacturing
Internet of Services
Lifecycle Assessment
FROST & SULLIVAN
4

Endüstri 4.0


Intelligent
Assembly line
Modularity
Product Memory
Flexible
manufacturing

Değişiklikler



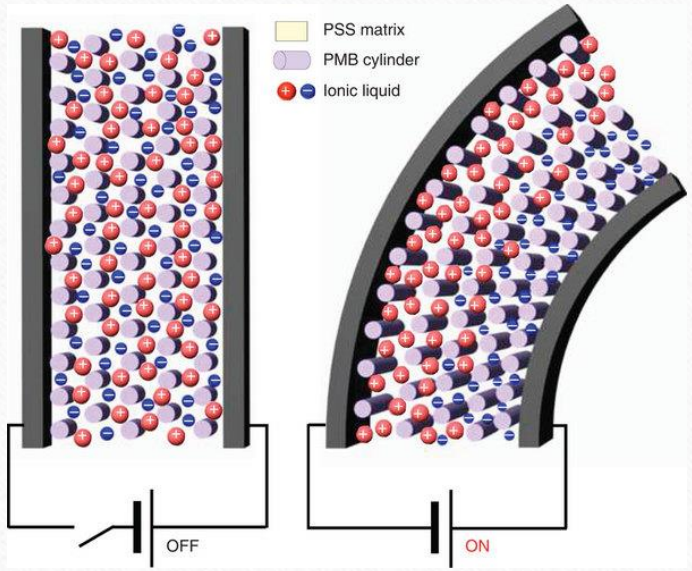
Driver of Change	Rated as Top Trend	Expected Timeframe	Condensed Notes
Mobile internet and cloud Technology	34%	2015-2017	Rapid spread of internet-based service models
Advances in Computing Power and Big Data	26%	2015-2017	Ability to handle the unprecedented flood of data
New Energy Supplies and Technology	22%	2015-2017	New technologies like fracking and new energy supplies will have profound geopolitical and environmental repercussions
Internet of Things	14%	2015-2017	Remote sensors
Crowdsourcing and Peer-to-Peer Platforms	12%	Impact Felt Already	With peer-to-peer platforms,
Advanced robotics and Autonomous Transport	9%	2018-2020	Robots more practical than humans in manufacturing and service jobs.
Artificial Intelligence and Machine Learning	7%	2018-2020	Voice recognition
Advanced Manufacturing and 3D printing	6%	2015-2017	On demand production has far-ranging implications
Advance Materials, Biotechnology, Genomics	6%	2018-2020	Life science breakthroughs medicine and agriculture. Bio-engineering, pharmaceuticals, plastics and polymers, biofuels.

http://globaleconomicanalysis.blogspot.com.tr/2016/01/fourth-industrial-revolution-robots.html

Yeni Malzemeler, Sensörler ve Robotik

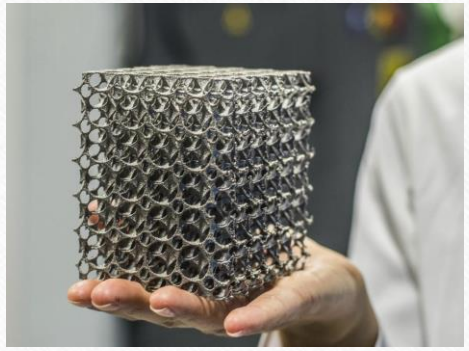
Smart Materials: The materials are attached with sensors that can enable to track their location. RFID tags are widely used for this purpose. In certain cases, the material containers can also have weight sensors which will give real time data of the amount of material available. One of the applications for is smart replenishment of materials. It will be useful in inventory management and supply chain management.

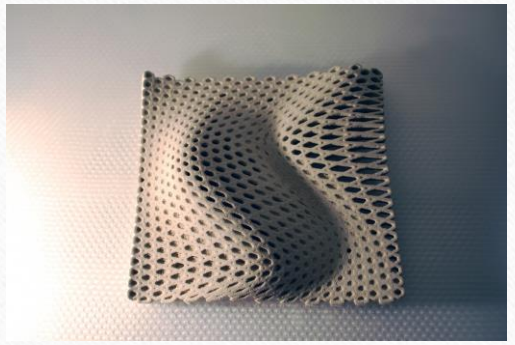
Actuators

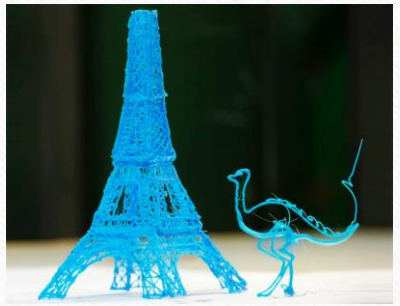


3D/4D Printing

- Gıda Endüstrisi
- Metaller
- Seramikler
- Polimerler
- Medikal Ürünler

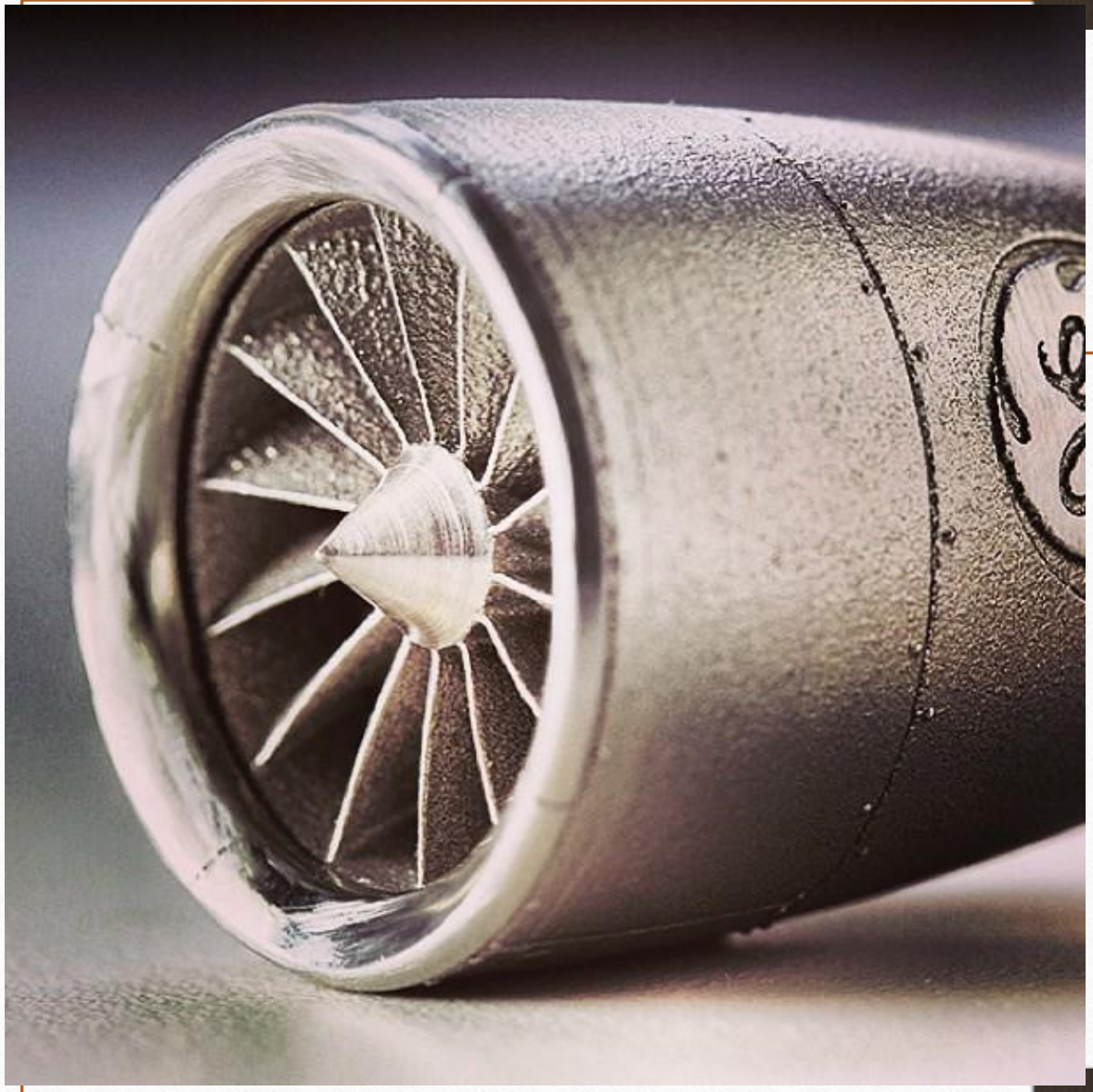






3D PRINTING
FOR PLASTICS PROCESSORS 2016

INDUSTRY 4.0
FOR PLASTICS PROCESSORS 2016



3D Metal Üretimi

3D Seramik Üretimi

https://www.youtube.com/watch?v=yk4MuirLxYs

4D Printing

Important Aspects of 4D Printing

4D Printing

Simulation Software

Multi materials printer

SMART materials

Simulation software for self-assembly and design constraints optimization.

- Autodesk
- CATIA
- Open Source

3D printer with capability to print multiple SMART materials

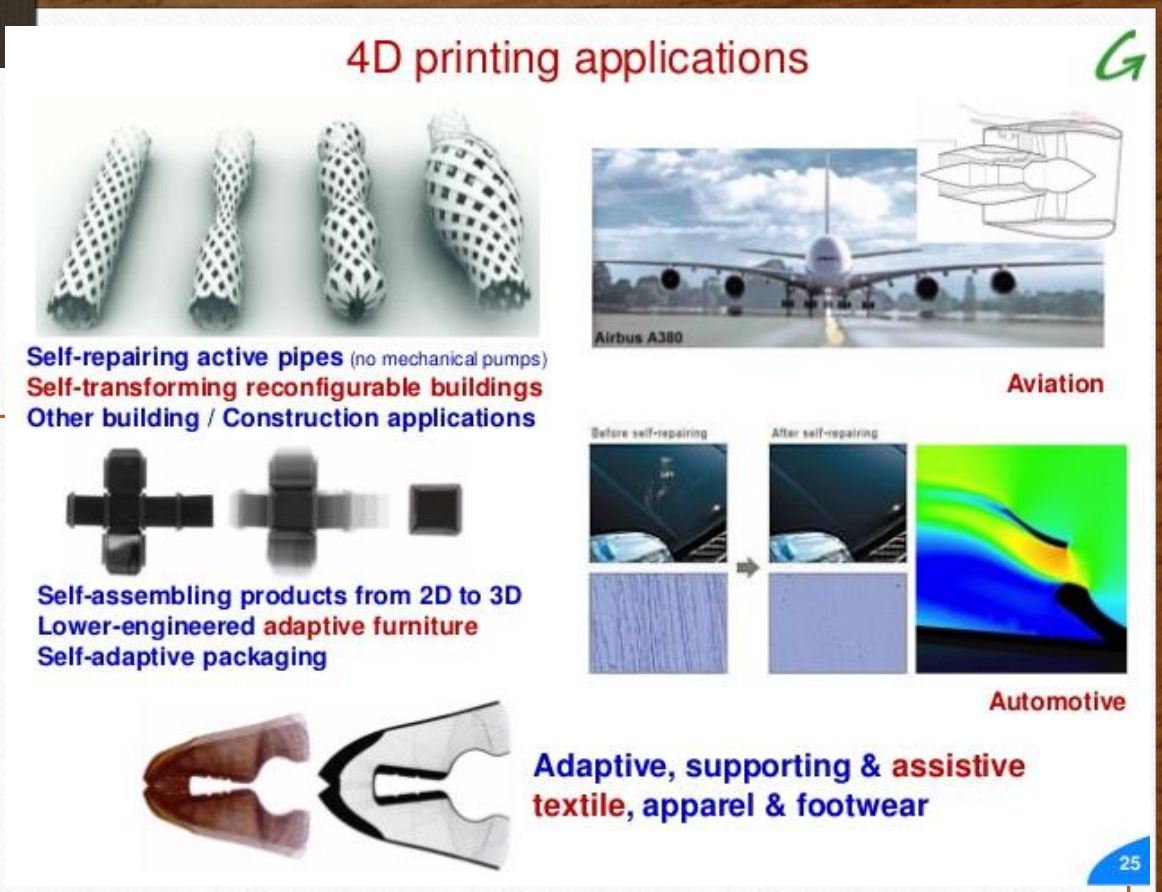
- Stratasys
- ROVA
- SolidView
- GeoMagic

Materials that change shape upon external stimuli

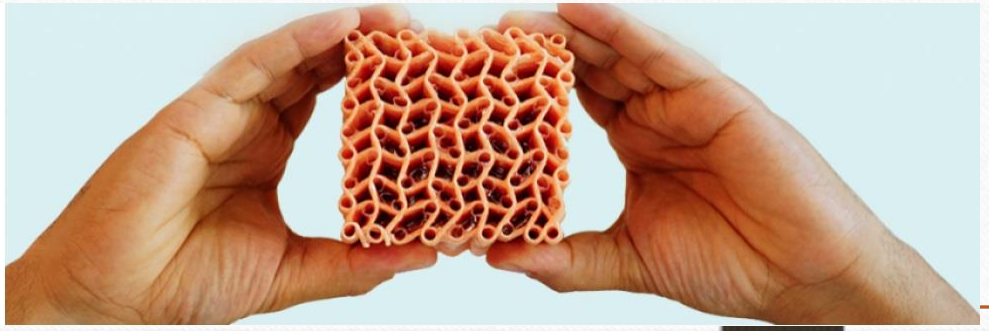
- Shape memory alloy
- Self healing materials

4D Printing

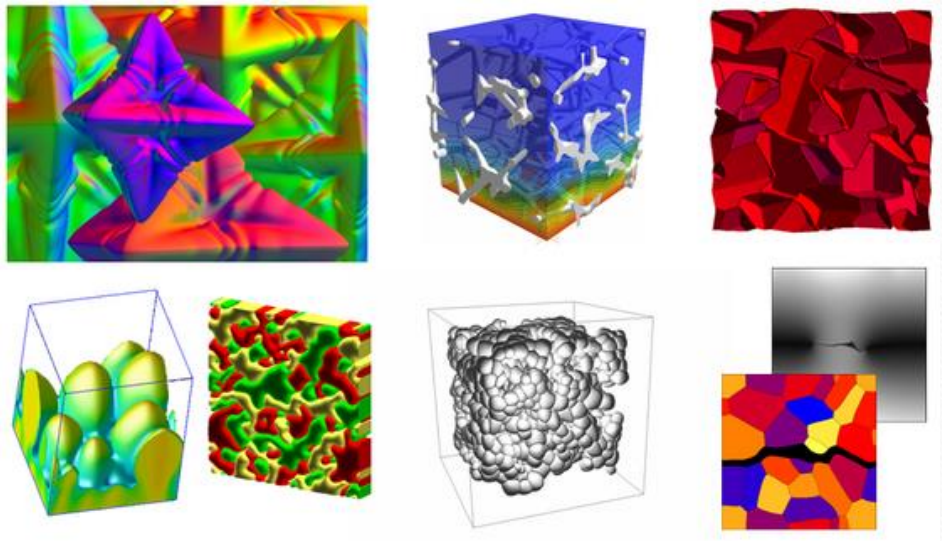
https://www.youtube.com/watch?v=mQvLywPv8pM

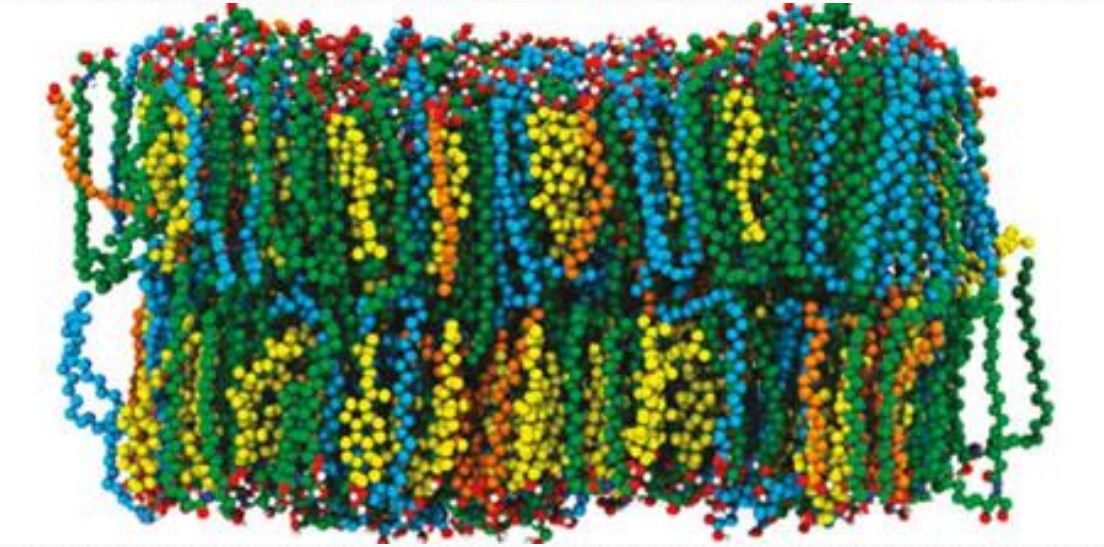


4D Printing & Meta Materials Conference



Simulasyon, Modelleme





Biyopolimer ve Biyokompozitler

https://www.youtube.com/watch?v=BbjqpVJJsL0

The Graduate Filmi, 1967, Yeni İş Alanı, Plastikler

Araba Parçaları

Arabadaki Plastikler

Tarımsal kompozitler

Tarımsal Kompozitler

Soya Poliüretan

Ford mustang

Sonuç

- Yeni akıllı malzemeler
- Sensör malzemeler
- Kendi kendini tamir eden malzemeler
- 3D yazıcılar
- Simulasyon
- Biyoekonomi ve biyolojik kökenli malzemeler…