MATERIALS WEEK EUROPE

The next speaker is...

Thomas Batigne
Co-Founder & President
LYNXTER

Lynxter

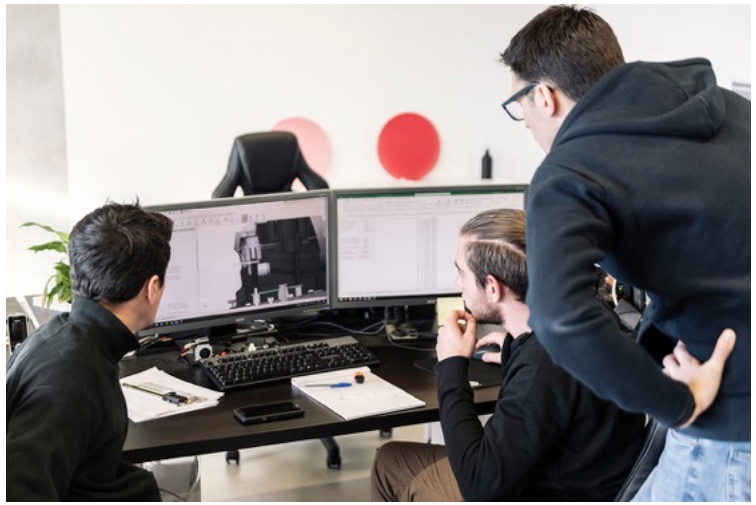
High Performance of LSR through the Flexibility of 3D Printing

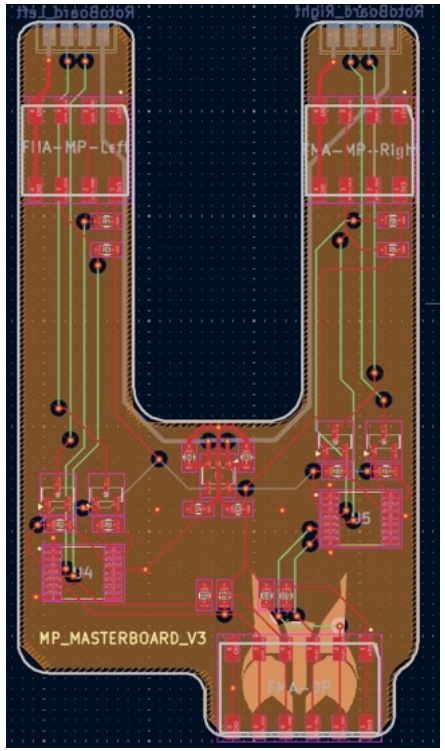
Scan below for Conference Agenda

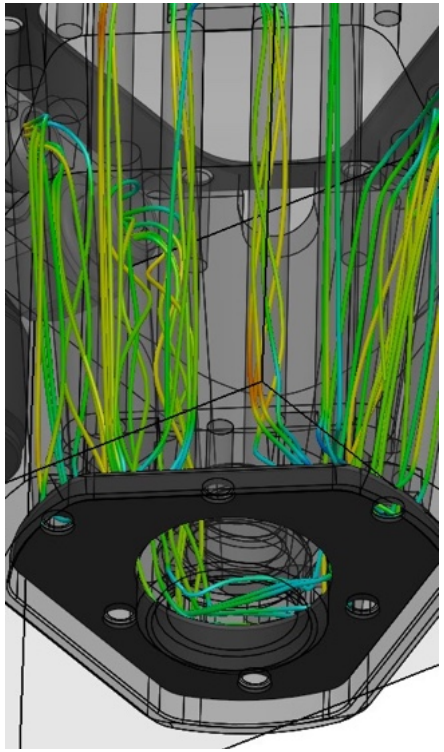
MISSION

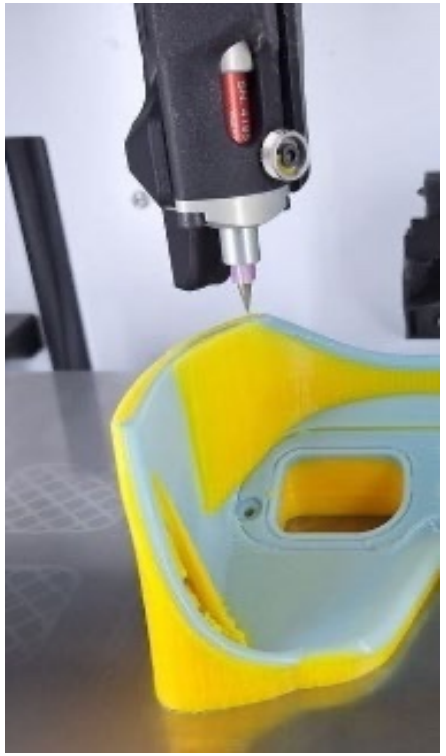
MAKE IT SMARTER

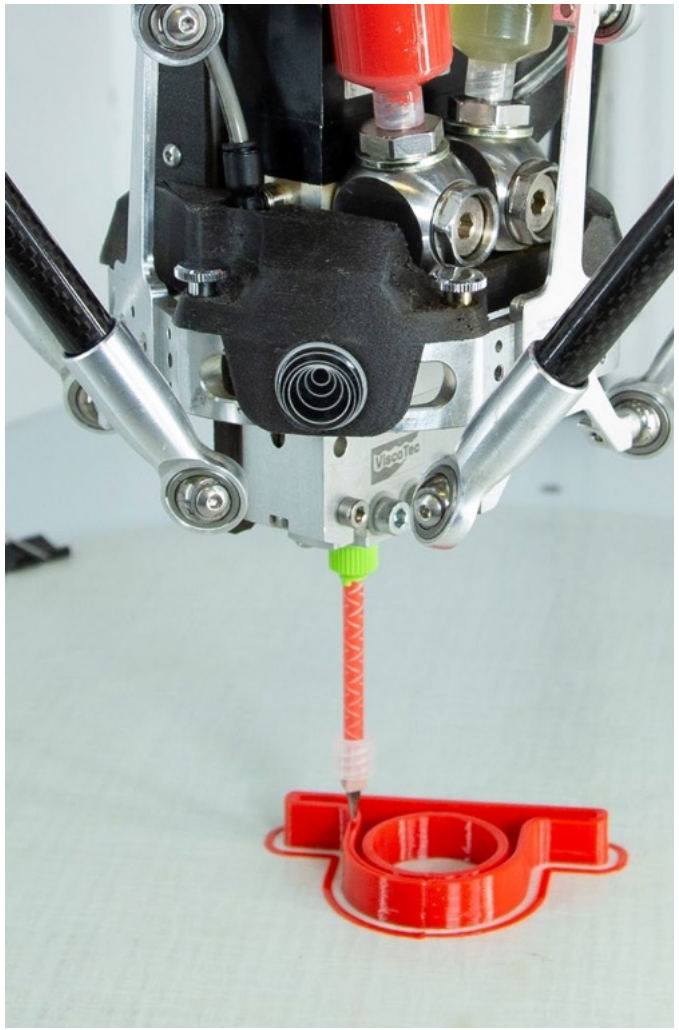
We help ingenious people bring their products to life, more intelligently, by inventing additive manufacturing solutions.

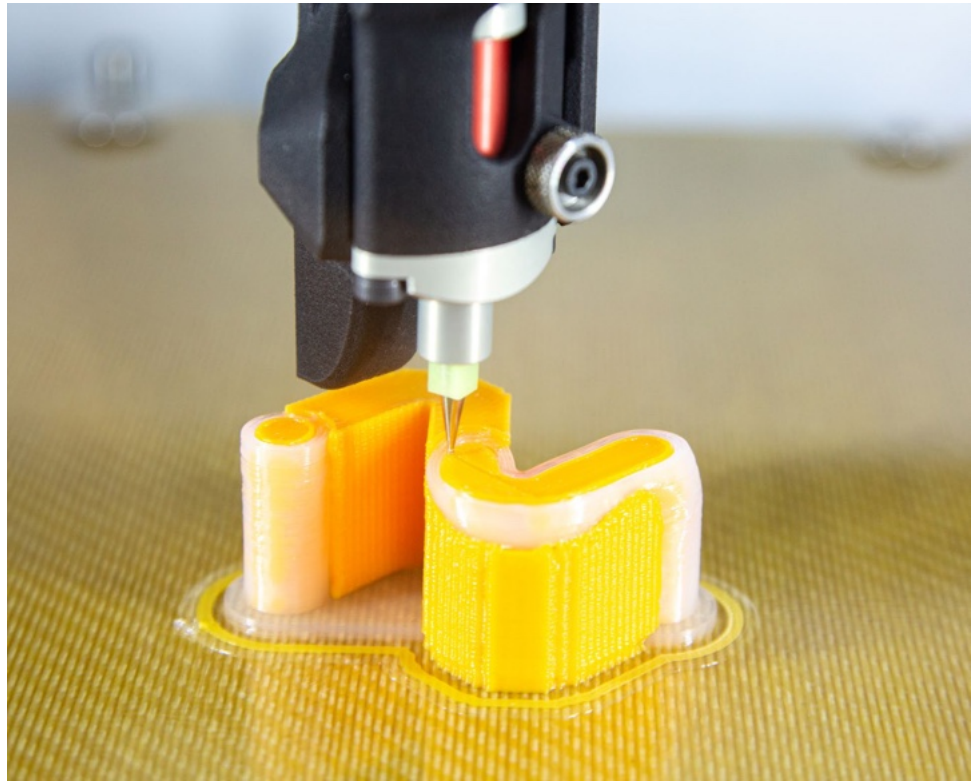


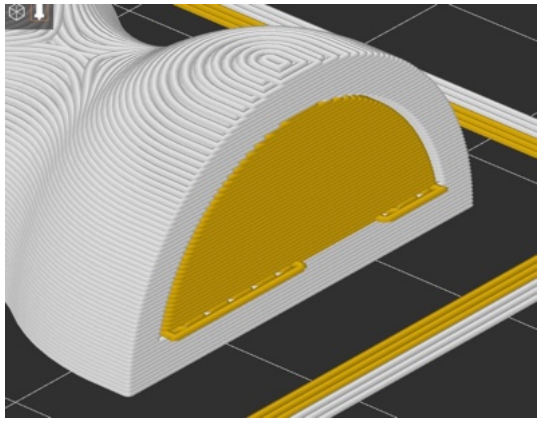


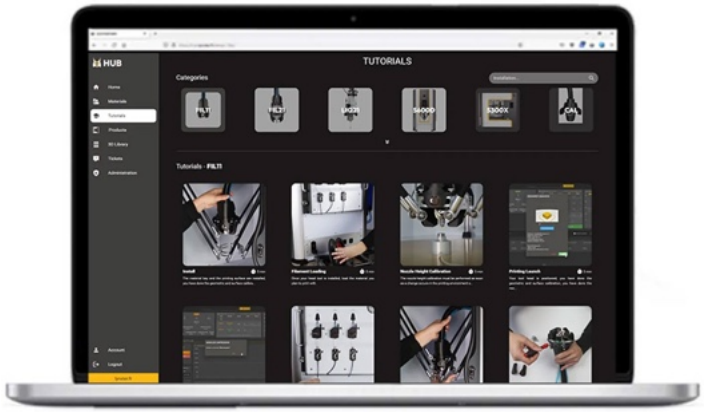












OEM - Serial & custom solutions

We are a seasoned industrial 3D printer manufacturer

SERIAL

A coherent, performance-oriented ecosystem of A.M. tools.

CUSTOM

Our expertise as leverage for application specific players.

mb therapeutics

Numbers

#1 Silicone 3D
Worldwide leader

43 countries
Worldwide presence

>66%
International sales

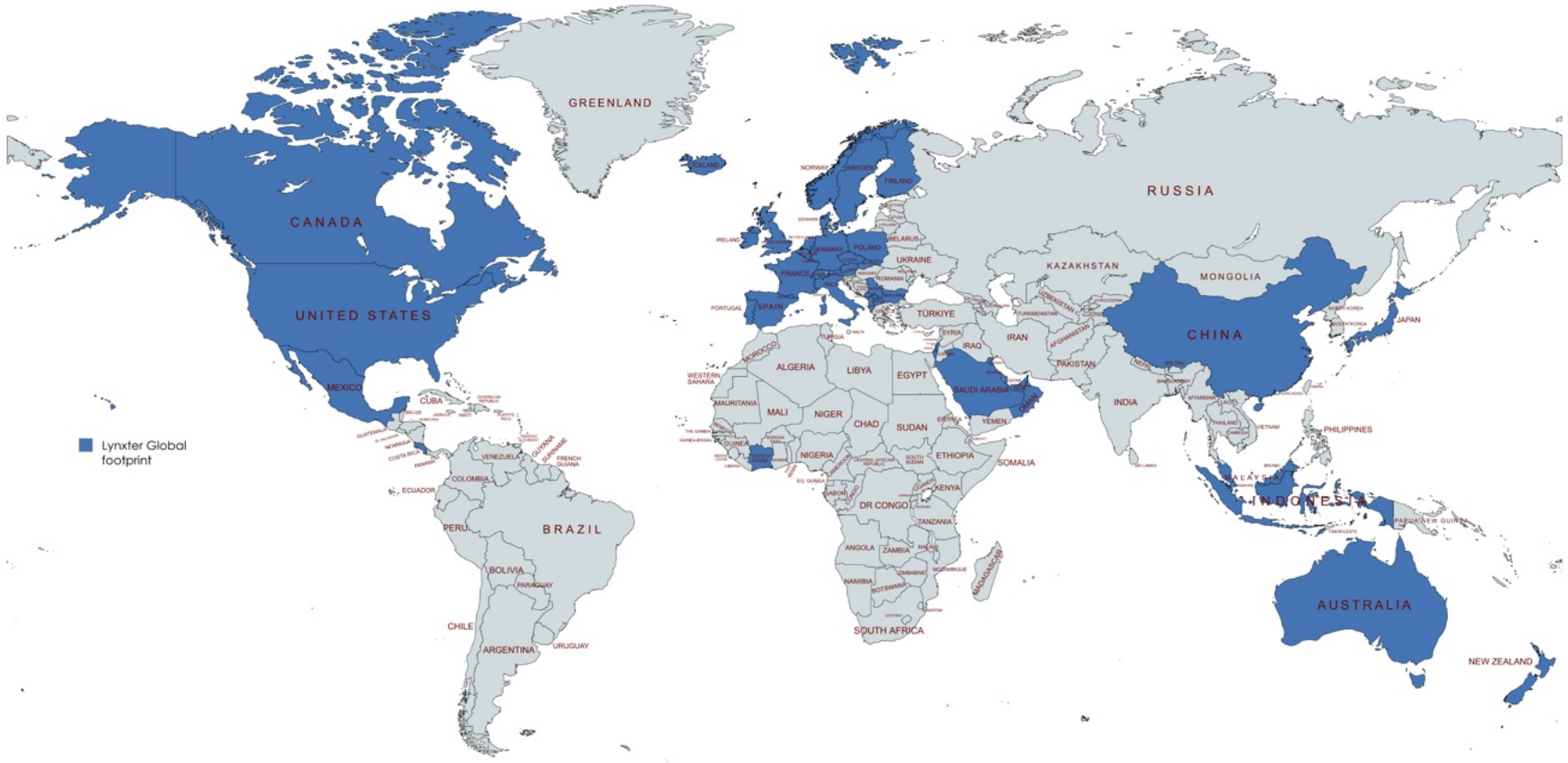
x33 team
FTE

2016
Incorporation

100%
Made in France

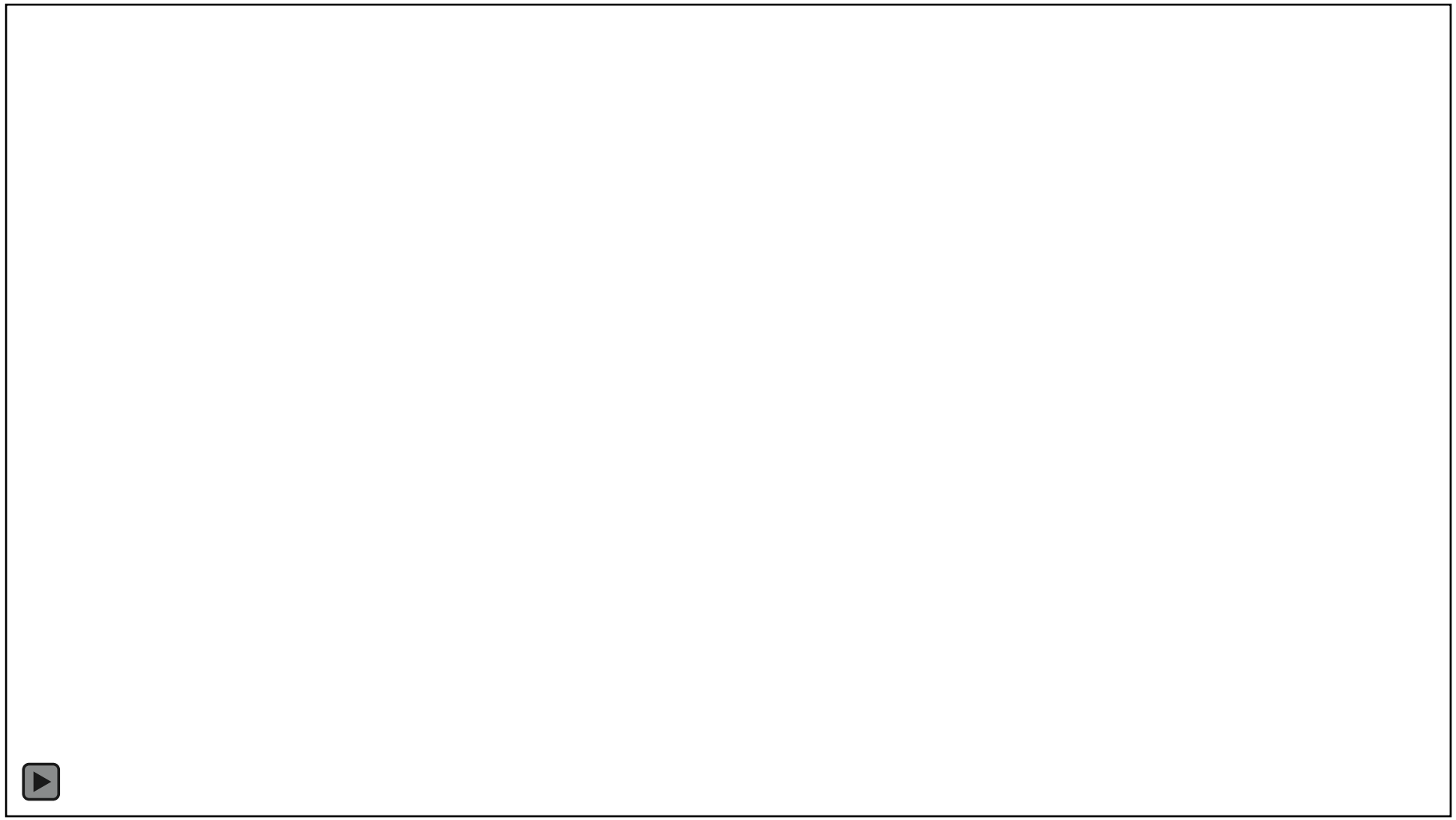
Global Footprint

22 Partners covering 43 countries



Markets

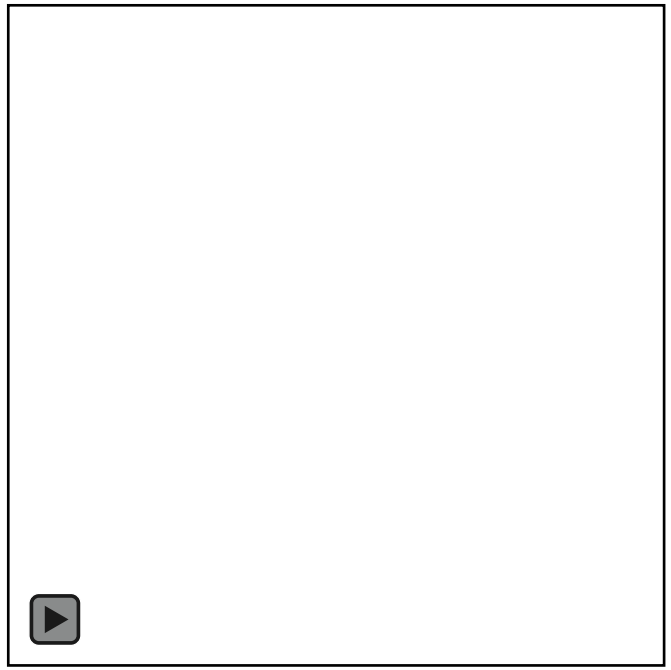
INDUSTRY	EDUCATION R&D	HEALTHCARE	LUXURY FASHION	DEFENSE
Masking **Prototyping** **Maintenance** **Production tooling**	**Research** **Education, training**	**Medical devices** **Anatomical models**	**Innovative textiles** **Sports**	**MRO** **Prototyping** **Tailor-made**
				
Complex shapes Direct processes Reusable	Innovative projects Soft robotics Trainings	Soft materials Skin contact Tailor-made	High customization Limited Series Disruptive creations	Maintenance efficiency Equipment upgrades Certified



Watch on YouTube

Tailored to any geometry and properties

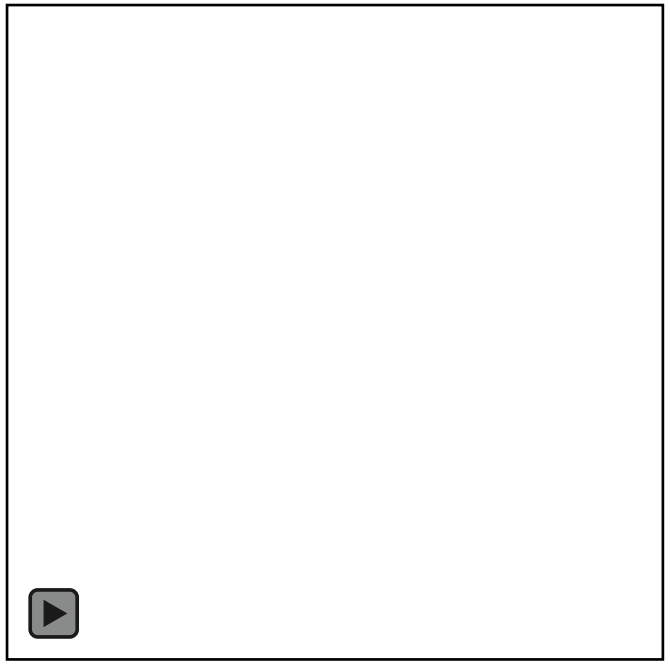
MEX – LIQ process variants



Locally extruded support material

(water soluble)

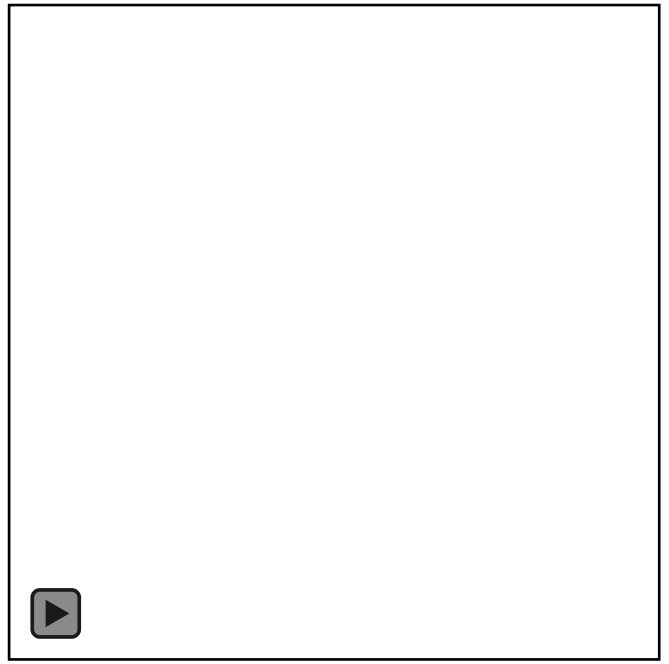
Watch on YouTube



Self supporting in gel

(water soluble – reusable)

Watch on YouTube



Self supporting in powder - Dynamic Molding

(composite material and/or soluble support)

Watch on YouTube

Combine MEX with other techniques

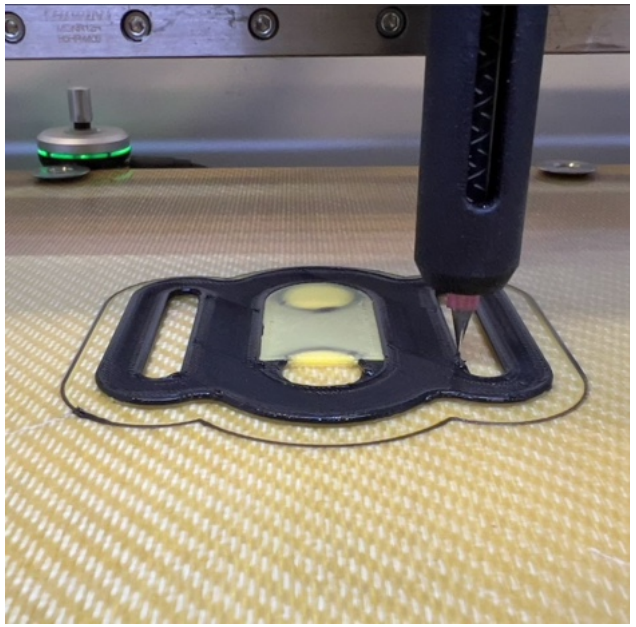
Get creative !

Colour and tune material formulations

(article & video here)

Print on textile, leather, metal to add grip, absorb shocks and avoid glueing

(article & video here)



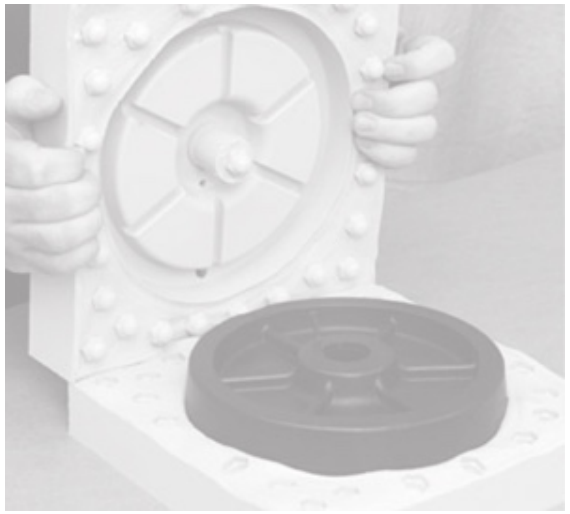
Incorporate sensors and inserts into parts while printing

Landscape

Silicone processing techniques

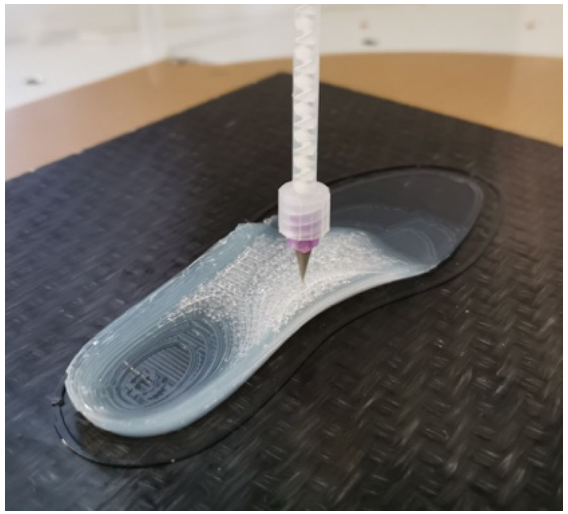
Injection moulding

- Large series
- Specific tooling
- Productivity



Casting

- Small series / custom
- Specific tooling



Additive manufacturing

- Medium - Small series / custom
- No specific tooling
- Reactivity

Silicone & PU 3D printing techniques

Pick the one that suits you

	VAT photopolymerization SLA, DLP, LED	Material jetting MJ	Material extrusion MEX
Resolution	High	High	Medium
Multi-colour	No	Yes	Medium
Multi-material	No	Medium	Yes
Mechanical properties	Low	Low	High
UV resistance	Low	Low	High
Thermal resistance	Low	Low	High
Aerospace/food/medical qualification	Medium	Medium	Yes
Material range	Small	Small	Large
Pre/post processing	Yes (UV and or heat)	Yes (UV and or heat)	No (heat optional)
Operating costs	$$	$$$	$$
Building volume	Medium	Small	Medium to big
Print on existing surfaces	No	Yes	Yes

Silicone MEX Additive manufacturing

Performance

End parts properties

Equivalent to injection moulded parts:

- Fully isotropic thanks to the homogeneous crosslinking.
- Keeps chemical integrity, silicone remains inert.

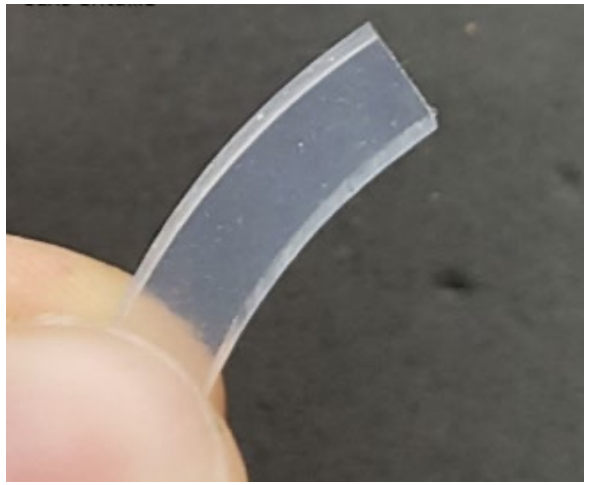
Material selection

- RTV1, RTV2, LSR
- Rheology (non-flowing) and pot life (long) must be considered for optimal results.
- Viscosity will impact the kind of device to be used to feed the pumps.

Fracture surface profile

No disruption of the fracture profile on MEX processed parts vs. injection.

(with and without incipient crack)



Injection moulded

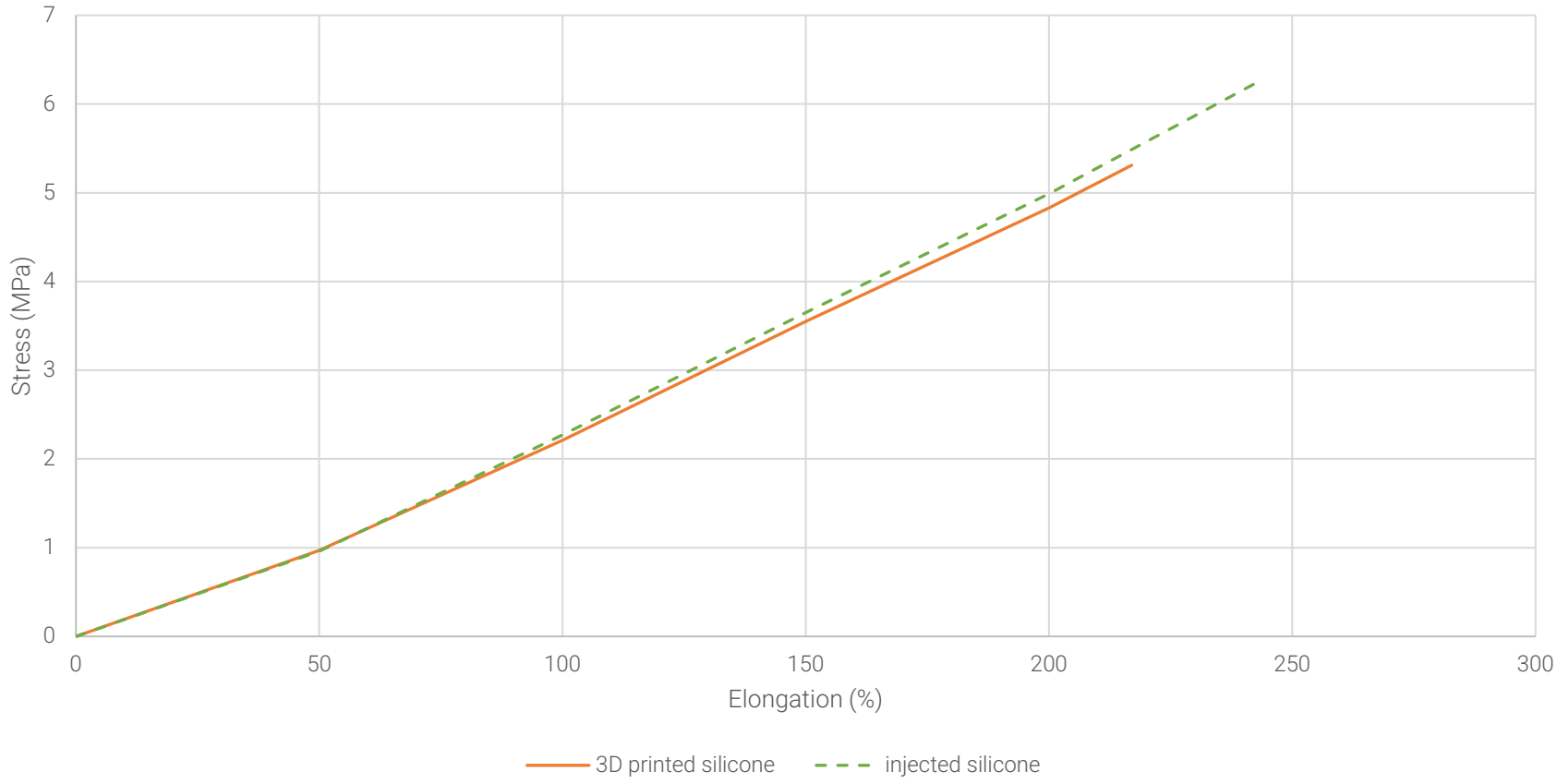
MEX 3D printed

Silicone MEX Additive manufacturing

Performance – RTV2 example

Silicone parts, as expected

No orientation or process dependent properties



✅ RTV1

✅ RTV2

❓ LSR

LIQUID

Silicones, PU, epoxy

SIL-002

Industrial | High performance | Elastic

- High elastic recovery
- Good mechanical resistance
- Good thermal and chemical resistance

Hardness	70 shore A
Tensile strength	11.8 MPa (N/mm²)
Elongation at break	275 %
Compression set (25°C)	0,4 %
Resilience	62 %
Colour	White
Working temperature	-50 °C to 250 °C

Applications

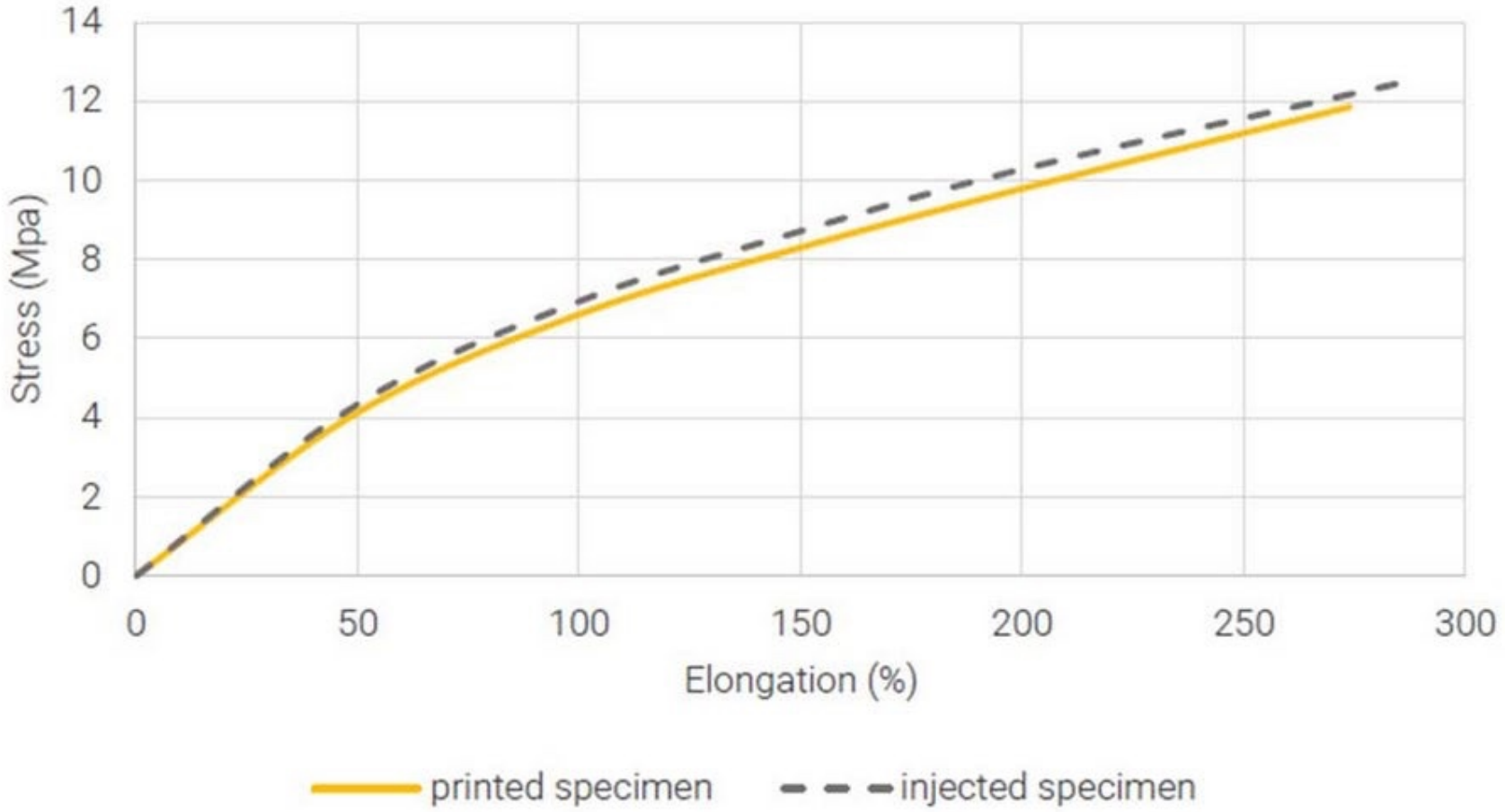
- Protective parts
- Functional prototypes
- Non-slip surfaces
- Sealing component
- Masking parts for surface treatment

Terms of use

- Mixing ratio: 1:1
- Toolhead: LIQ21
- Curing time: 7h30 at 40 °C
- Compatible support: SUP-001
- Packaging available: 2 x 55 g syringes, 2 x 850 g cartridges

SIL-002

MEX LSR - Performance



SIL-002

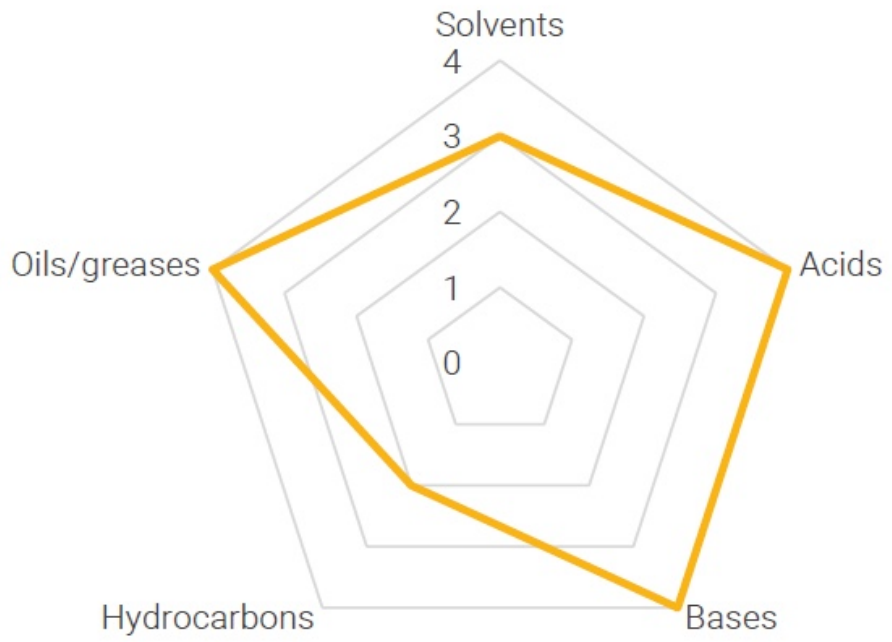
MEX LSR - Performance

Mechanical properties[4]	Method	Values
Young modulus	ISO 37	9.17 (±0.1) MPa
Hardness	ISO 48-4	68 (±3) shA
Elongation at break	ISO 37	274 (±20) %
Tensile strength	ISO 37	11.86 (±0.5) MPa
Tear strength	ISO 34.1	10.1 (±0.5) N/mm
Resilience	ISO 4662	62 (±0.5) %
Compression set	ISO 815-1 , 22 h at 175 °C	41.9 (±0.5) %
Compression set	ISO 815-1 , 22 h at 25 °C	0.4 (±0.5) %

SIL-002

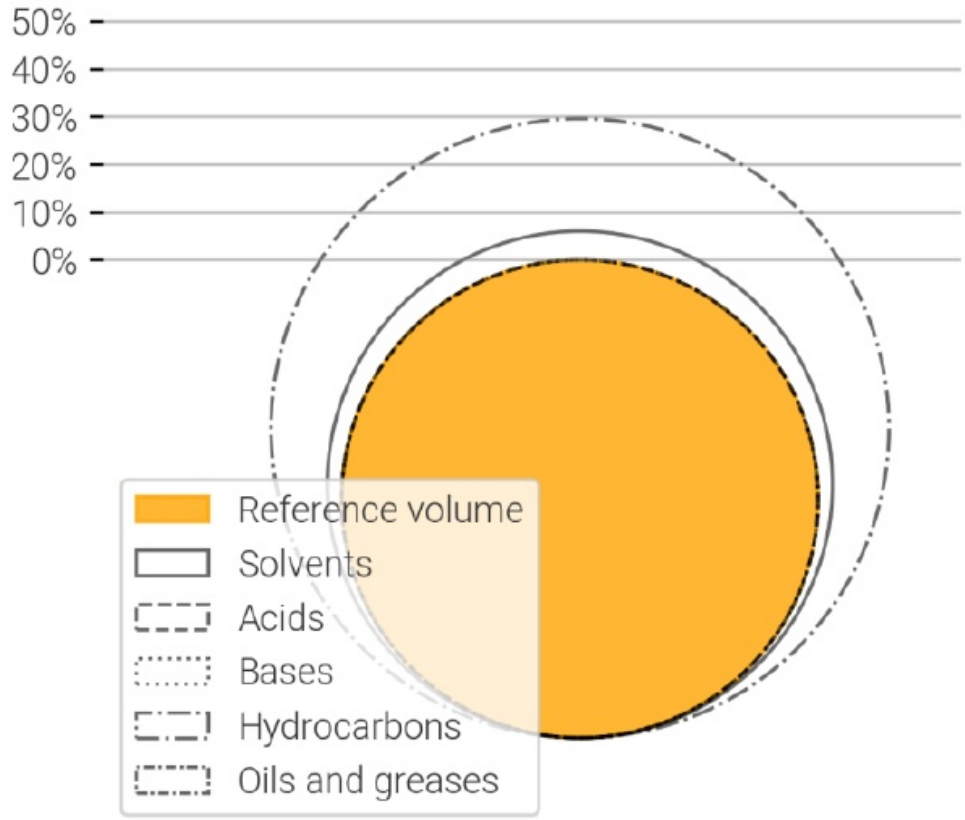
MEX LSR - Performance

Chemical resistance



1: bad, 2: poor, 3: good, 4: excellent

Swelling after being immersed 24h



Future MEX silicone applications

Certified, critical use-cases

WIP, qualifications to prioritize

- Food
- Railway
- Aeronautics
- Space
- Medical *(skin compatibility already available COPSIL3D by COP Chimie)*

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Lynxter

APPENDIX

some extra content if you are curious

OUTILLAGE

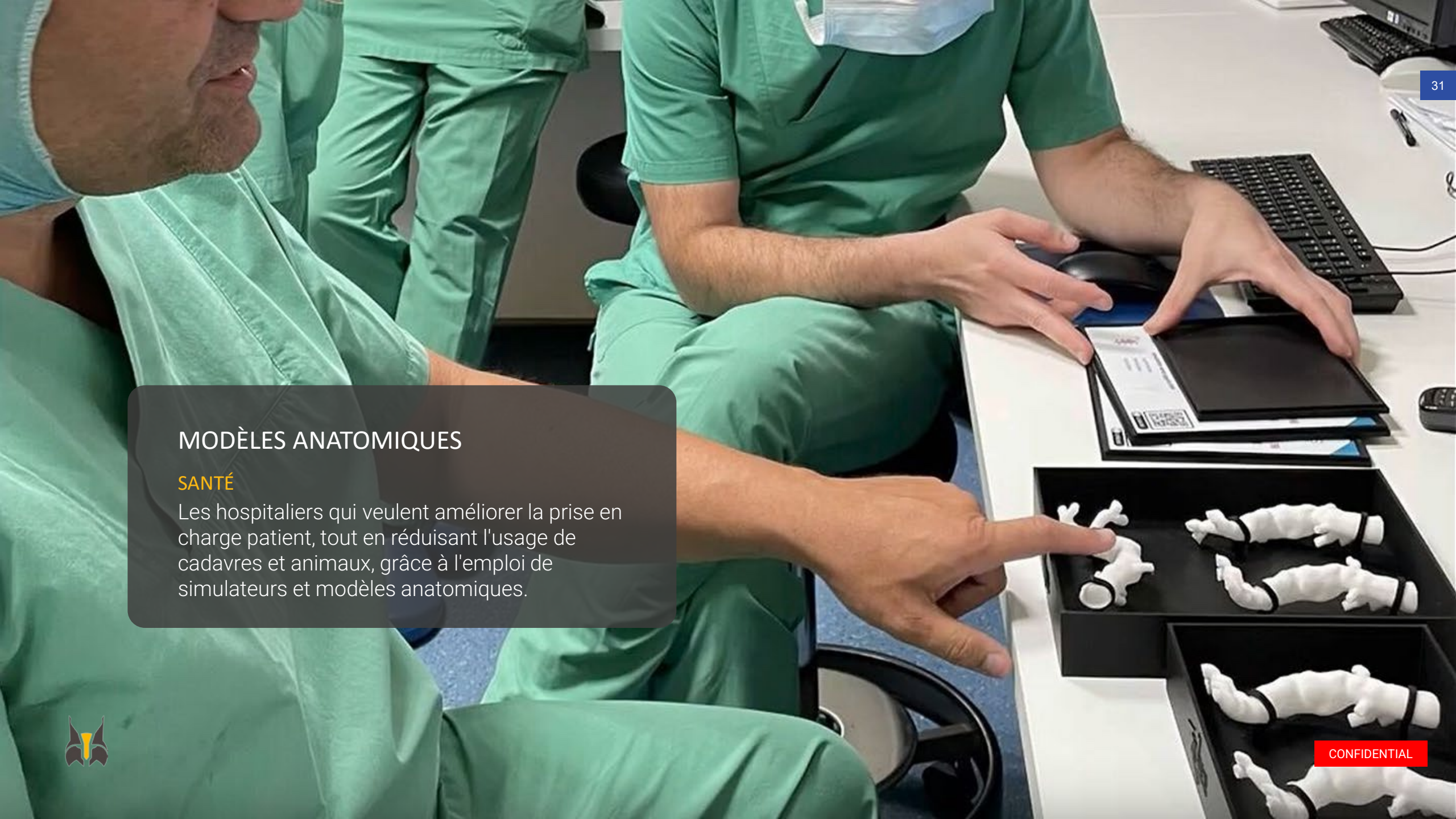
INDUSTRIE

Les ingénieurs qui cherchent à améliorer le rendement de leurs usines, minimiser la pénibilité et les déchets, grâce à des outils de masquages, des gabarits et des supports.

MAINTENANCE

INDUSTRIE

Les techniciens qui souhaitent adapter et prolonger la vie de leurs équipements aux pièces détachées introuvables ou hors de prix, grâce à la fabrication rapide.



MODÈLES ANATOMIQUES

SANTÉ

Les hospitaliers qui veulent améliorer la prise en charge patient, tout en réduisant l'usage de cadavres et animaux, grâce à l'emploi de simulateurs et modèles anatomiques.

ORTHÈSES & PROTHÈSES

SANTÉ

Les orthoprothésistes et chirurgiens qui souhaitent améliorer la vie d'un plus grand nombre de patients avec des dispositifs médicaux personnalisés et plus accessibles, parfois directement à l'hôpital

MÉDICAMENTS

SANTÉ

Les pharmaciens qui veulent traiter les enfants et personnes âgées en s'adaptant à leurs contraintes, en palliant les ruptures de stock et la disponibilité de qualité.

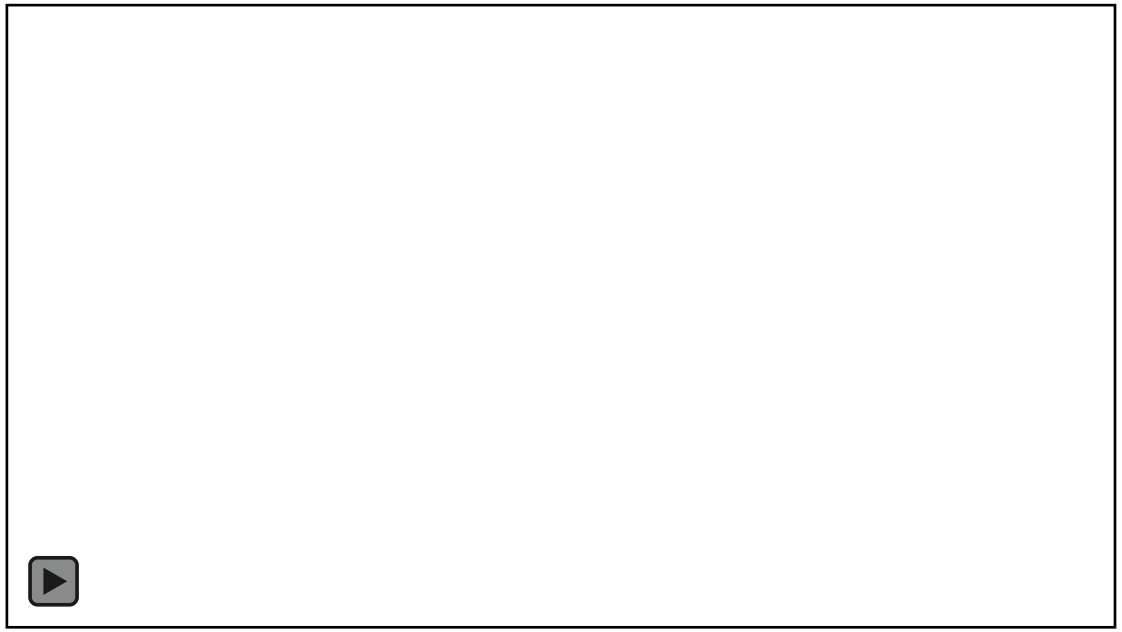
INNOVATION

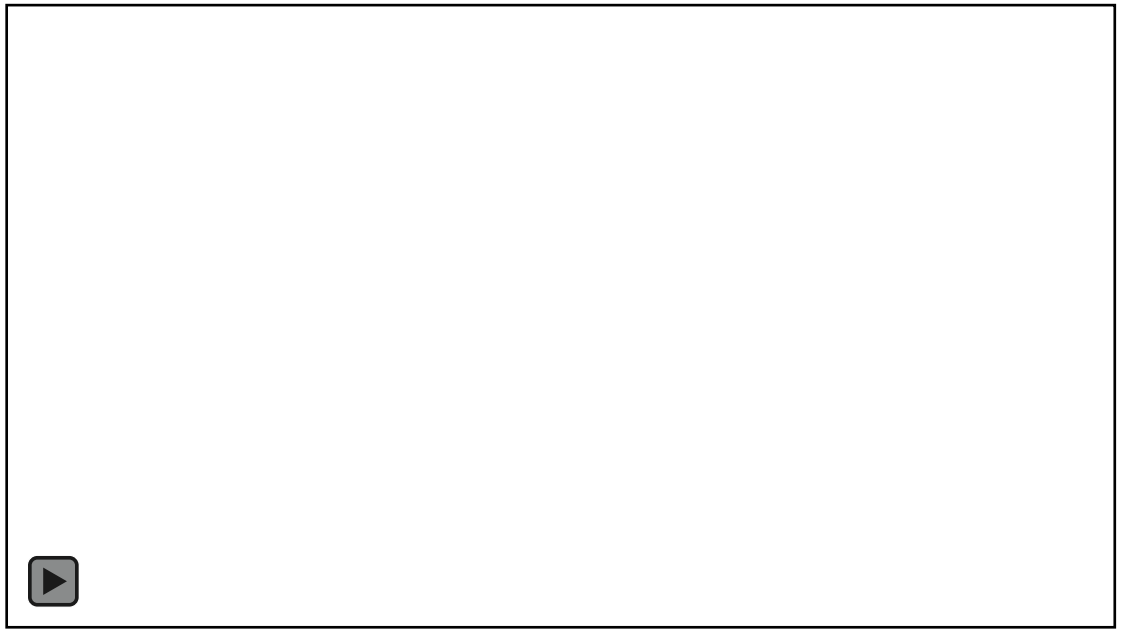
R&D

Les inventeurs qui développent les avions, les trains, les innovations de demain, avec un engagement fort de circularité, de fabrication locale et de minimisation des déchets.

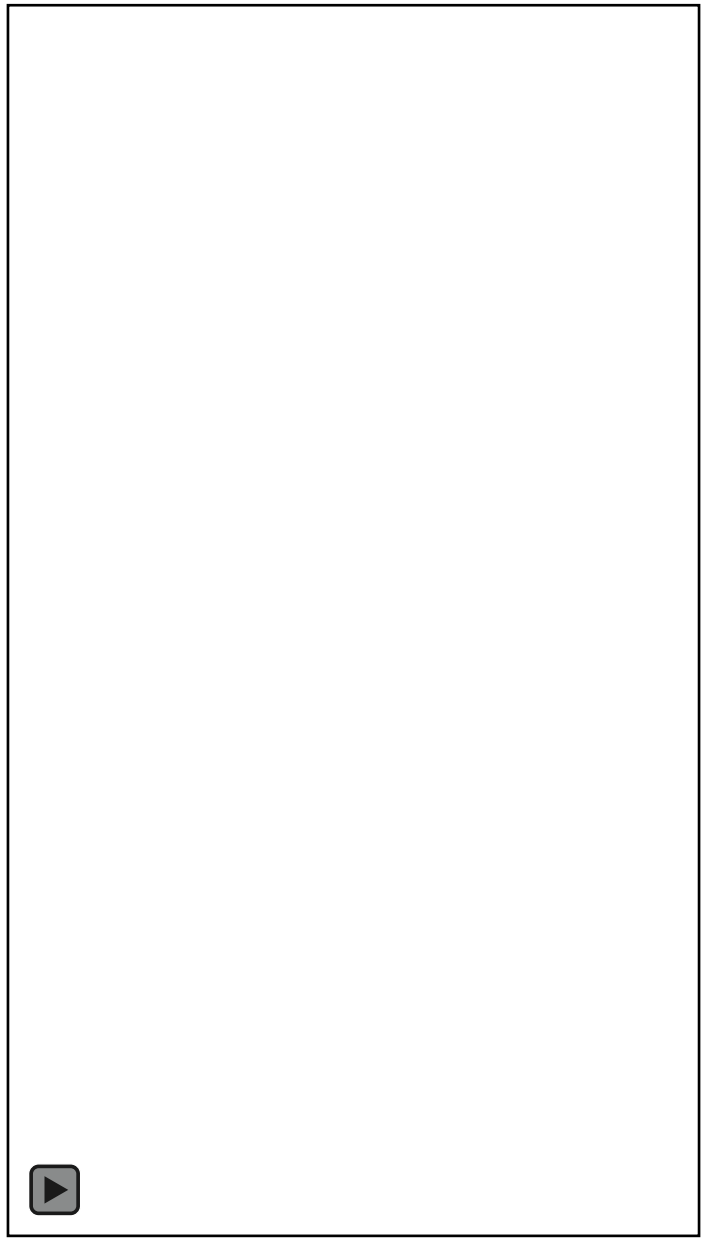
Silicone MEX Additive manufacturing

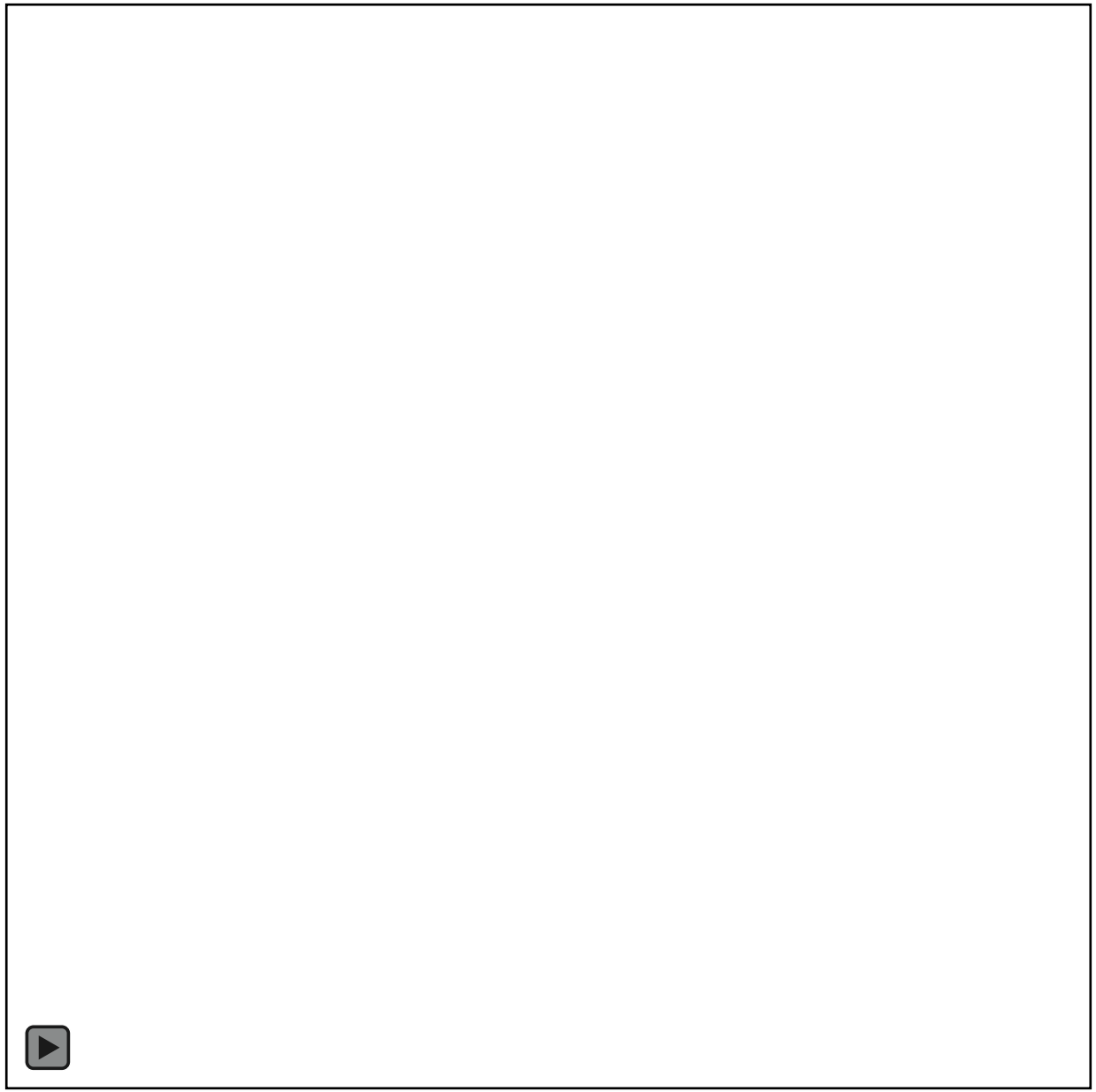
Basic principle with dosing pumps





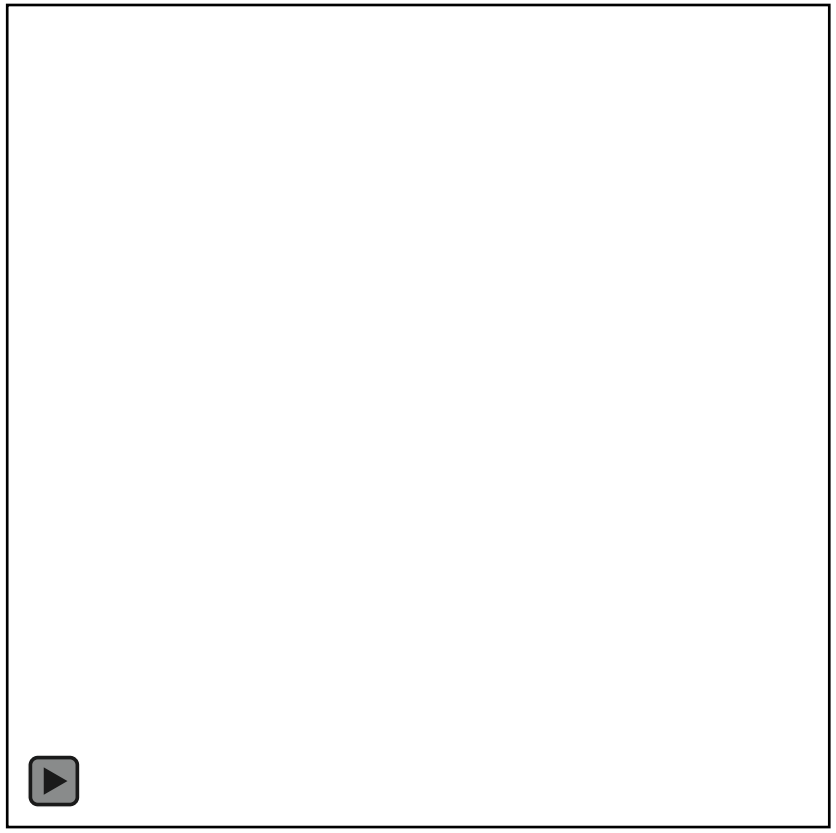
Credit : Viscotec GmbH





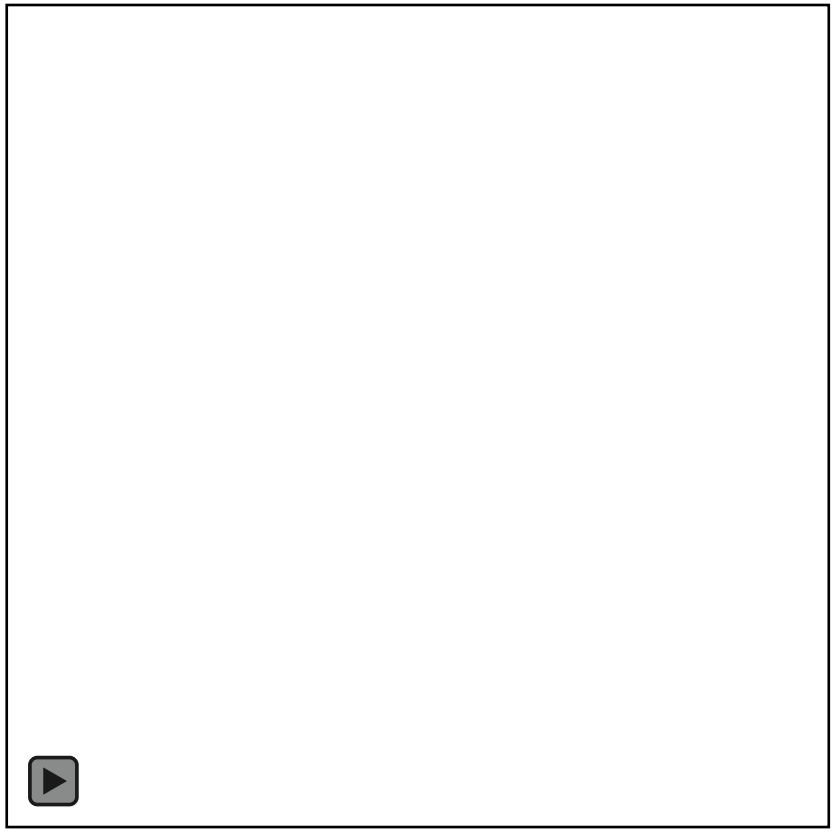
Silicone MEX Additive manufacturing

Applications – Industry



Saprena – Screwing gripper

(article & video here)



Suction cup

(article & video here)

Silicone MEX Additive manufacturing

Applications – Tooling

Silicone bladder for composite moulding

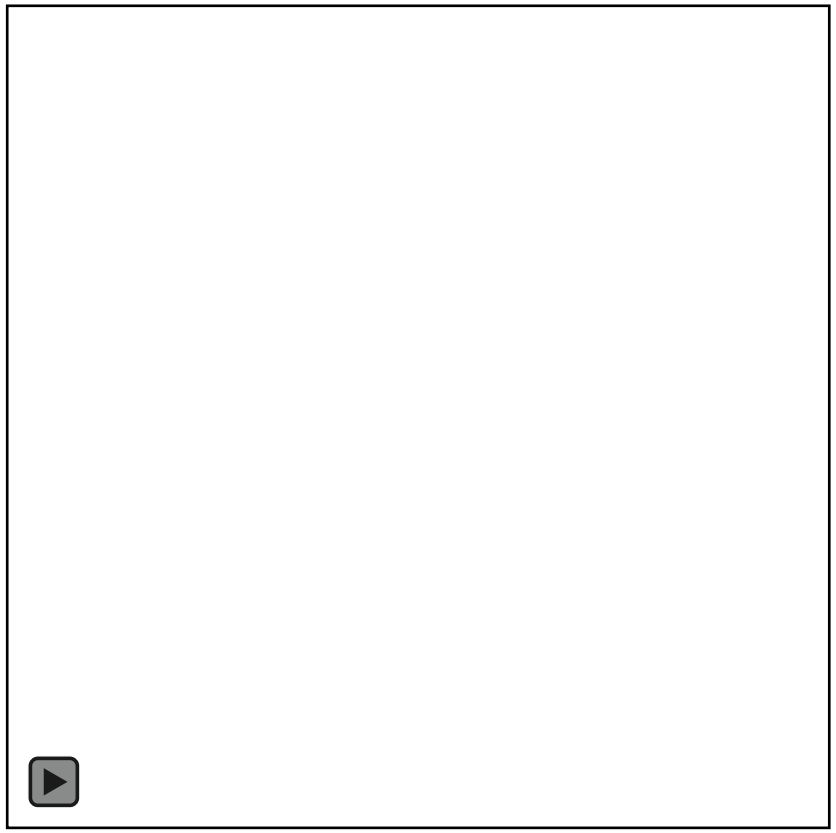
(article & video here)

SPI Aero – Surface treatment mask

(article & video here)

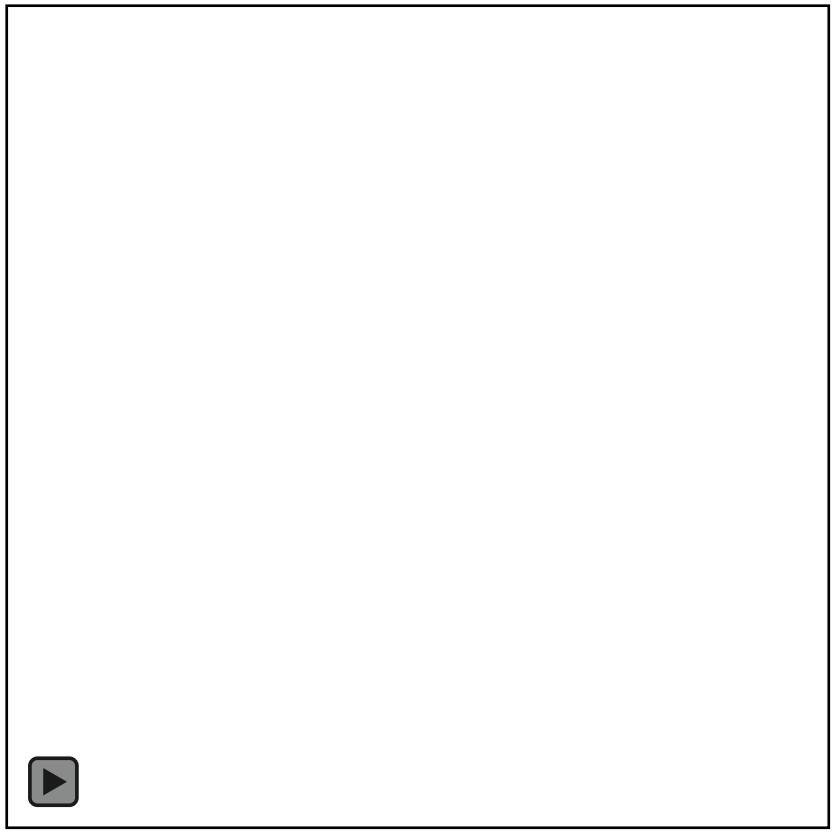
Silicone MEX Additive manufacturing

Applications – R&D



Institut Carnot – Larynx simulator

(article & video here)

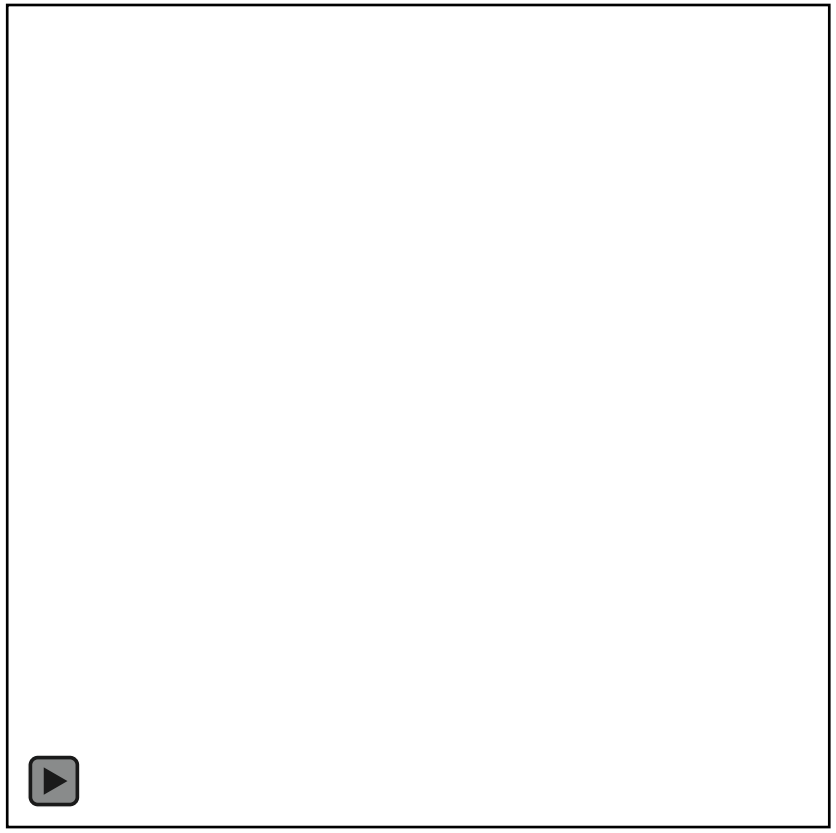


Universities – Soft robots

(article & video here)

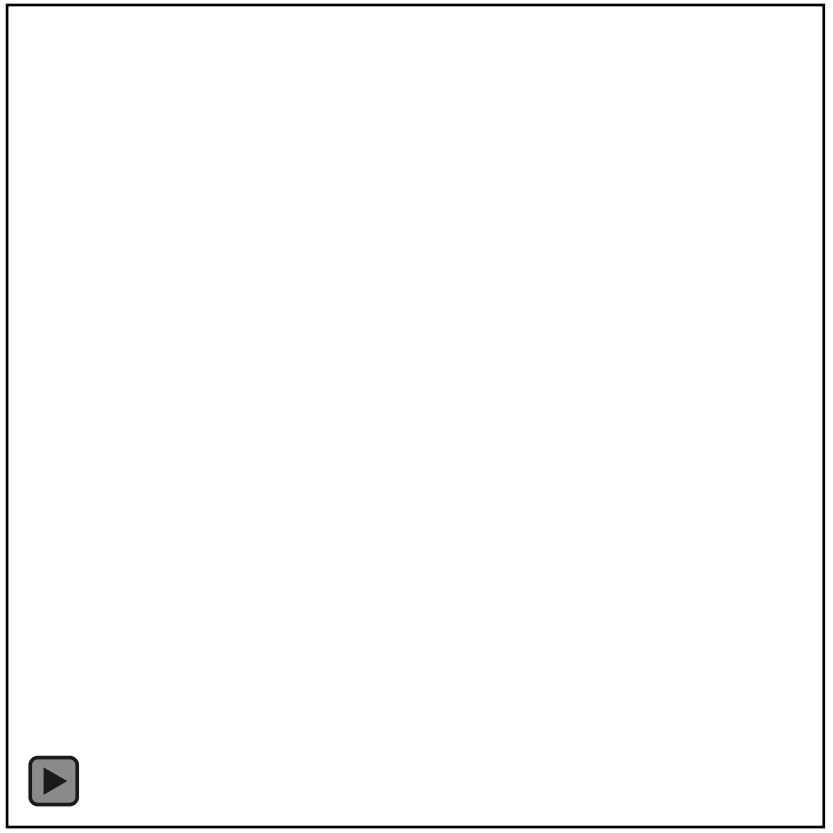
Silicone MEX Additive manufacturing

Applications – Medical devices



Odapt - Ostomy bags personalised adapter

(article & video here)

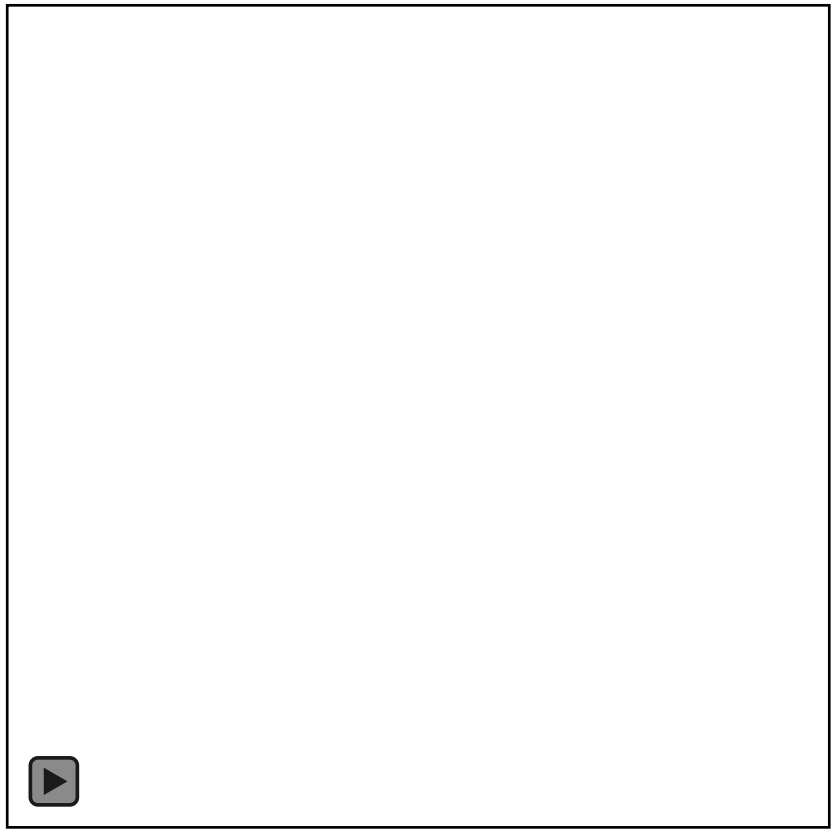


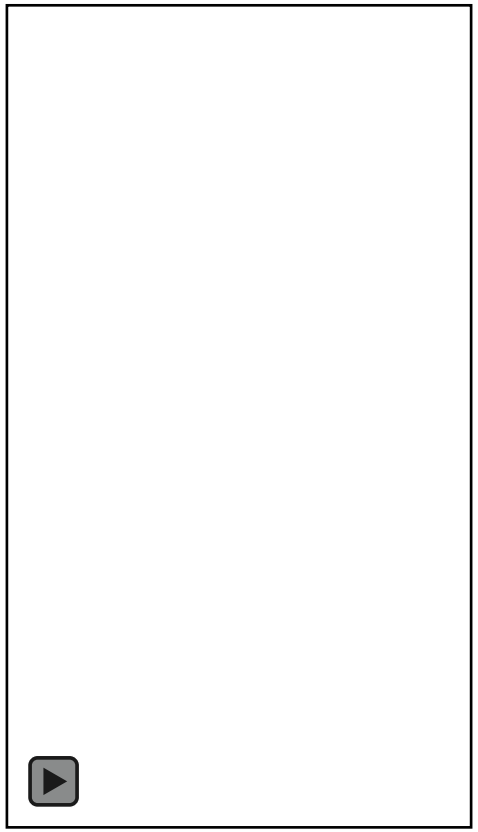
Anatomical models

(article & video here)

Silicone MEX Additive manufacturing

Applications – Luxury





Incxnnue – Emilie in Paris bag

(article & video here)

Silicone MEX Additive manufacturing

Applications - Defence

AM Village

(article & video here)

Market

Size and trends

METAL AND POLYMER AM MARKET SIZE 2022 AND 2027

Additive Manufacturing market valued close to EUR 10 billion in 2022

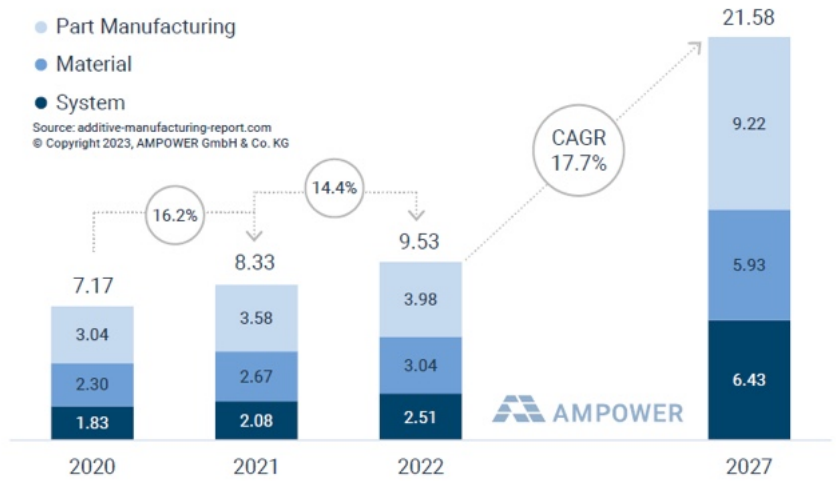


FIGURE 3 GLOBAL METAL AND POLYMER ADDITIVE MANUFACTURING MARKET 2020 TO 2022 AND SUPPLIER FORECAST 2027 [EUR BILLION]

POLYMER MARKET SIZE AND GROWTH 2022 AND 2027

Polymer AM has reached revenue of EUR 6.5 billion in 2022

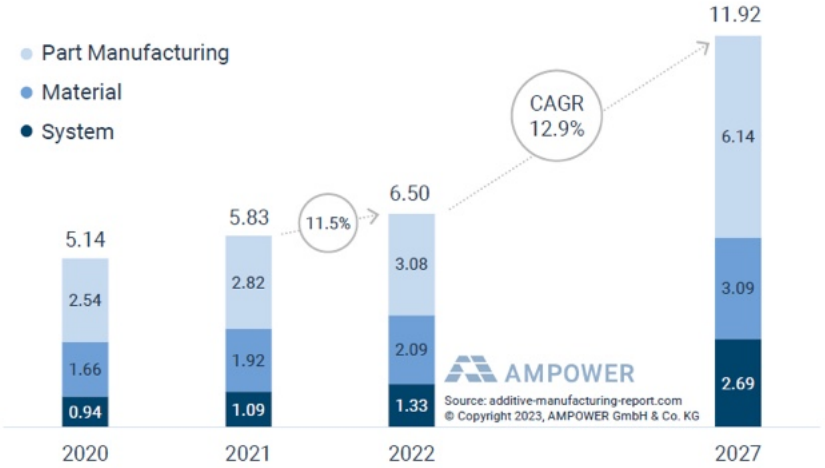


FIGURE 5 POLYMER ADDITIVE MANUFACTURING MARKET 2020 TO 2022 AND SUPPLIER FORECAST 2027 [EUR BILLION]

Source : AMPower report 2023 https://ampower.eu/reports/

Market

Applications and usage

PURPOSE OF POLYMER AM PARTS

Continuous increase of end parts

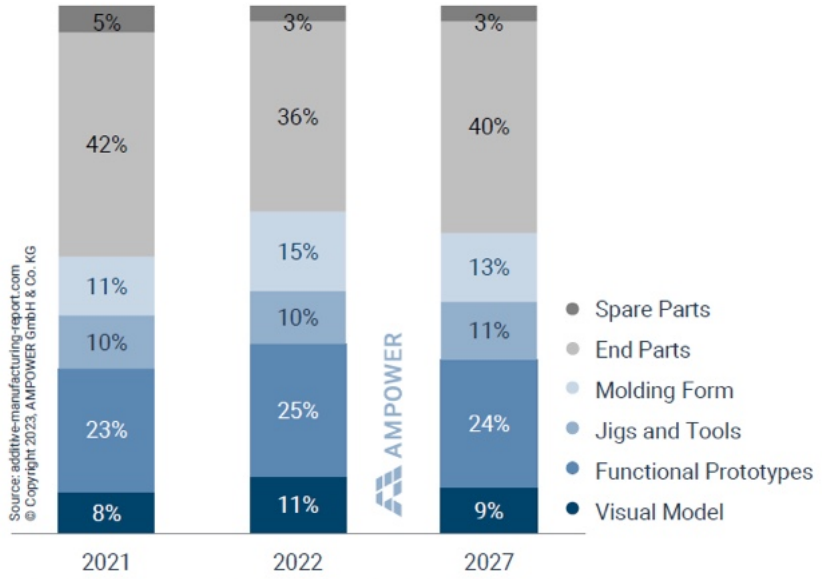


FIGURE 11 APPLICATION CATEGORY OF PRINTED PARTS 2021 TO 2022 AND FORECAST 2027

POLYMER SYSTEM UTILIZATION

Automation is driving higher utilization

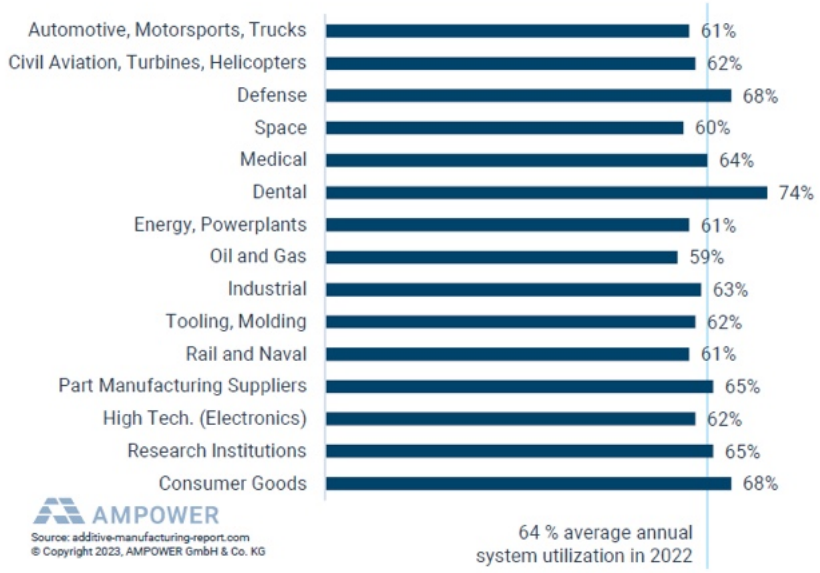


FIGURE 12 AVERAGE INDUSTRIAL POLYMER SYSTEM UTILIZATION BY INDUSTRY 2022

Source : AMPower report 2023 https://ampower.eu/reports/

The AM hardware landscape 2023

POLYMER

Material Extrusion

Filament

Pellet

Liquid

VAT Photopolymerization

Led Light

UV Light Through A Mask

Laser Beam

Powder Bed Fusion

Laser Beam

Infrared Light

Material Jetting

Sheet Lamination

METAL

Powder Bed Fusion

Laser Beam

Electron Beam

Directed Energy Deposition

Laser Beam x Powder

Laser Beam x Wire

Electric Arc x Wire

Electron Beam x Wire

Material Extrusion

Multi-step

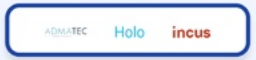
Single-step

Binder Jetting

Solid State

Material Jetting

VAT Photopolymerization



CERAMIC

VAT Photopolymerization

Material Extrusion

Binder Jetting

Material Jetting

OTHERS

Concrete

Electronics

Edible

Glass

Wood

BIOPRINTERS

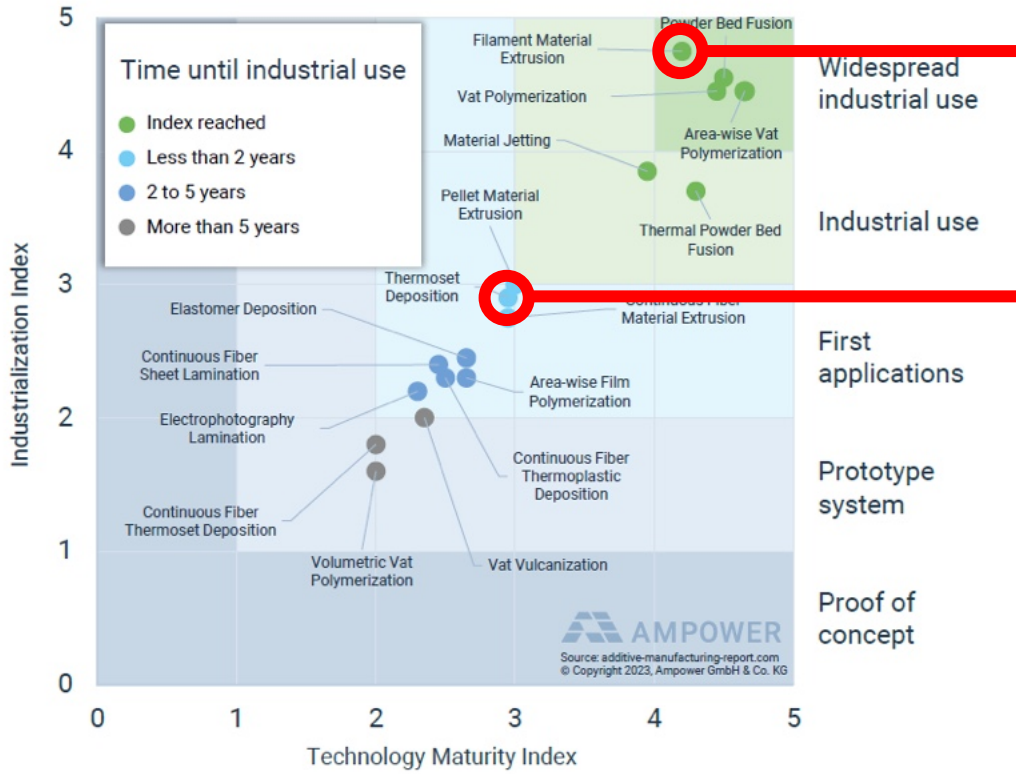
COMPOSITE*

*Continuous/long fiber-reinforced polymers

aniwaa

Market

Maturity index



MEX – FIL technology
Thermoplastic filament extrusion 3D printing

MEX – LIQ technology
Silicone and polyurethane liquid extrusion 3D printing

FIGURE 16 AMPOWER MATURITY INDEX: POLYMER AM 2023

Source : AMPower report 2023 https://ampower.eu/reports/

- What is « MEX », and specifically MEX – LIQ additive manufacturing process?
- Where does silicone 3D printing fits in the manufacturer’s toolbox?
- Part design & silicone 3D printing : constraints and opportunities?
- Open vs. Closed material ecosystem in silicone 3D printing, pros & cons?
- How to silicone 3D printing?
- Why and when it is smart to use silicone 3D printing?
- Can I use injection moulding grade silicones in a 3D printer?
- What are the final 3D printed part properties vs. injection or casting?
- Where are we in terms of aerospace/healthcare/automotive qualifications?
- How to tune a silicone for 3D printing? (rheology, colours, fillers, additives, …)
- How productive silicone 3D printing is today? What to expect tomorrow?
- For which application such technology is a game changer?
- What are the pitfalls and hidden difficulties when implementing this technology?