Design Exercise

Co-funded by the Erasmus+ Programme of the European Union

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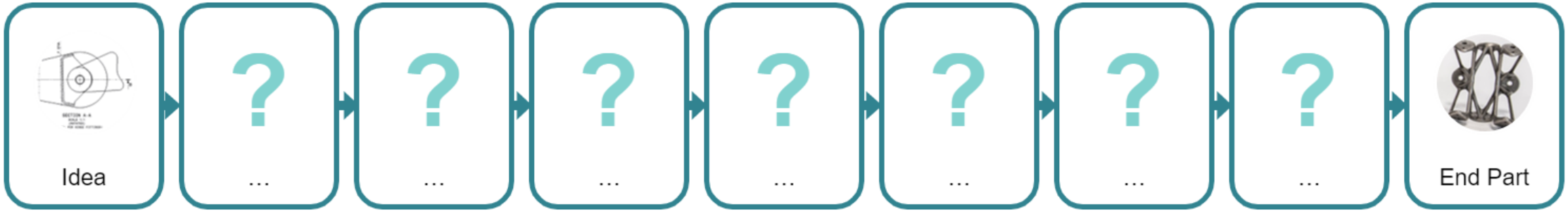
Brief

Topology optimisation of a polymer robotic end effector

- Material & Process Selection
- Formulate a design & manufacture workflow for your chosen material and process?



- What information is required to setup the topology optimisation?
- What do you need to consider when redesigning the component for AM?

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Available Machines & Materials

Technology	Available Machine Characteristics		Available Materials
Material Extrusion	• Low cost (in low production volume) • High temperature resistance available • Large build volumes available	• Highly anisotropic • Low resolution • Poor surface roughness	PLA / ABS / Nylon
Powder Bed Fusion	• Low cost (in high production volume) • Greater design freedom • Large build volumes	• Excess material removal required • Limited powder re-use • Grainy surface finish • Subject to thermal distortion	Nylon / PEEK / PEA
Vat Photopolymerisation	• Good surface finish • High resolution • Short lead time for low volume production	• Relatively higher cost • Unsuitable for high volume production • Tendency to degrade with UV exposure	Acrylate based / Epoxy based / Cyanate Ester

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Results

Topology optimisation of a polymer robotic end effector

- Workflow image
- FE Image
- Image of the load case
- Topology Optimisation result image (if possible example image of the ‘before AM’ part)

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