ADDITECH | THE DIGITAL ON-DEMAND MANUFACTURING SPECIALIST

Company introduction







Additech – The digital on-demand manufacturing specialist

Additive manufacturing domain expertise



 Our team of experts have deep domain expertise within product design and engineering, materials, additive manufacturing, qualification, testing and validation combined with deep industry knowledge Competent engineering & design team



• We offer a leading engineering and design team that develops the best products and solutions for our customers >30 years of experience with product development



 We are building on more than 30 years of experience from designing, engineering and production of complex parts and structures

Offering end-toend solutions



 Offering end-to-end solutions for our customers from design, production, finishing, testing and validation to delivery

Introduction to additive manufacturing

What is additive manufacturing:

"Creating a physical object from a digital design, which is built layer by layer, as opposed to machined objects, which are subtracted from a block of material"



Additive manufacturing requires less material input <u>and</u> produces less material waste compared to conventional manufacturing

Additive manufacturing highlights



Industrial 3D printing enables customization and optimization of products



Engineers can add precise features and complex geometries without increasing costs



Enables production of lighter, stronger and more durable objects

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Short production time and time of delivery



Locally produced objects eliminates shipping costs and reduces CO2 emissions



Less raw material required and reduced waste



Additech is a provider of end-to-end additive manufacturing solutions

Additech is a provider of end-to-end solutions										
Customer dialogue			Engineering & design			Manufacturing				Service
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Custor dialog	ner Digital ue file	Cost estimation	Product Testing & configuration qualification planning	Supply chain readiness	Materials supply	Pre production M	Additive Manufacturing pr	Post ocessing	Testing & validation	Delivery & follow-up
Services & solutions			Scope of services & so	Scope of services & solutions						
1	End-to-end additive manufac	End-to-end additive manufacturing solutions in-house quality printers for metal and polymers								
2	Design services		 On-demand design set Design for object optim Advisory 	 On-demand design services Design for object optimization and performance enhancement Advisory 						
3	Market development and consultancy servicesTraining courses aimed at increasing demand• Market development and education for industry to fully embrace the advantages of additive manufacturing									
4	On-demand 3D printing		 Printing services for customers with ready to print design or with new optimized design (by Additech) Our 5 in-house 3D printers enable quick on-demand printing 							
5	Rapid prototypir	ng	 Prototyping services in polymers and metals for low cycle time part development In-house printing facilities close cooperation with the client for product prototyping & testing, enabling high quality product development 							

DfAM (Design for Additive Manufacturing)

- DED (Directed energy deposition)
 - Simple features
 - Can combine materials
 - Post processing should be considered
- SLM (Selective laser melting)
 - Overhangs typically need supports
 - Large cross sections should be avoided if possible
 - Escape holes for powder
- Binder jetting
 - No sharp corners
 - Escape holes for powder
 - Maximum thickness







Selective Laser Melting (SLM)

An SLM machine has a chamber filled with metal powder. This metal powder is spread across the substrate or build plate in very thin layers by a coater blade.

A high-power laser then fuses a 2D slice of the part by selectively melting the powdered material.

The build plate then drops down by the height of one layer, and the coater spreads another layer of fresh powder finely across the surface.

The process is repeated until you have the finished part.



CAPABILITES: Metal Additive Manufacturing

Technology: Selective Laser Melting

Build volume: 300x300x300mm

Layer thickness: 0.05mm

Material: Inconel 625 (Plans to expand selection)



CAPABILITES: Continuous Fiber Additive Manufacturing

Technology: Continuous fiber printing

Build volume: 320x132x154mm

Layer thickness: 0.1-0.2mm

Material: Nylon, Carbon fiber, kevlar, fiberglass



CAPABILITES: High temp polymer Additive Manufacturing

Technology: Fused deposition modeling Build volume: 406x355x406mm

Layer thickness: 0.1-0.3mm

Material: ULTEM, Antero, Nylon 12CF



CAPABILITES: 3D Scanning

Technology: 3D scanning

Accuracy: 0.025 mm

Application: Reverse engineering, quality control



Design iterations: BMW Roof bracket



Additive manufacturing superior to traditional manufacturing

Additive manufacturing, key technology advantages



Shorter production time and delivery

Lighter products





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Additech customer case studies



Case from Equinor: Designed, Printed and Qualified



Cost reduction associated with weight reduction

Weight reduction: 75% Lower powder costs Shorter print times Lower CO2 emissions

Other potential benefits: Less residual stress in parts Part consolidation Improved performance







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| 15

Competing technologies

Additive manufacturing **Additive Manufacturing CNC Machining** Casting Forcing molten metal under Remove material from rod Build part layer by layer Production high pressure into a mould or plate to create final part process • Low cost for large quantity of Short lead time High precision High degree of design freedom parts • Low cost for simple geometries • **Advantages &** • Large degree of porosity in parts Flexible Accuracy is dependent on operator Long lead times disadvantages High cost for simple geometries • Expensive for small series of parts Rough surface • Minimum wall thickness 0.5 mm Can't produce deep narrow holes Thickness needs to be uniform • . Parts with overhangs need to be Can't have sharp internal corners • Can't have sharp corners • • Needs draft angles Design • Features need to be accessible printed with support structures Build volume of printer indicated to cutting tool • considerations size of parts that can be printed Weight of part ٠ Size of part • Size of part • Type of material Complexity of part • Complexity of part Cost drivers Post processing steps required • • Type of material Type of material • Number of parts Number of parts 16 ADDITECH

Other available competing technologies



Huge market potential for additive manufacturing

ADDITECH Source: TEKNA market study by Energy Growth Partners

| 17

Quick Check

Introduction to 3D print How to choose the right components for AM How to design for AM

Evaluation of AM suitability of customer products Potential test prints

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