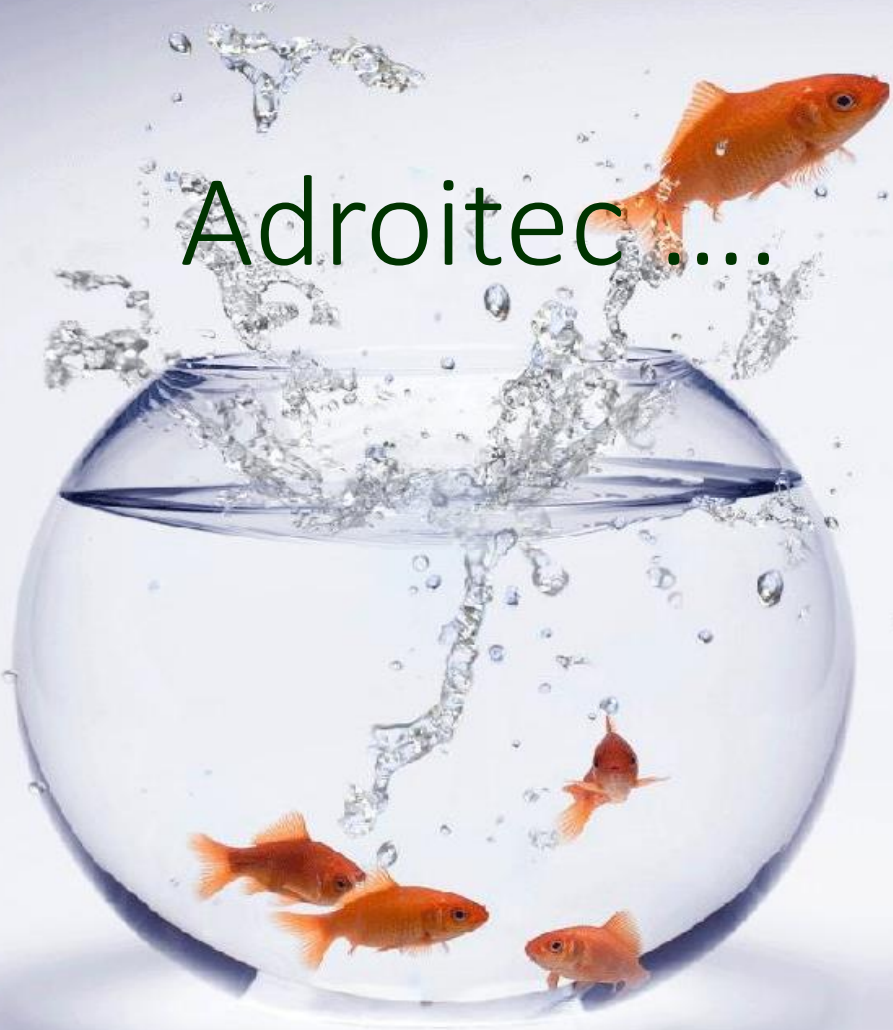




Adroitec....

.....Enabling you to leap forward



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Adroitec Group

Å Design

Å Engineering

Å Robotic & Automation

Å IOT

Å Knowledge Management

Å 3D printing

Evolution of 3D printing – Beyond Prototyping

- ÅMaterial to meet standard
- ÅSpeed for Prebatch Production
- ÅSize of parts
- ÅEase of operation
- ÅFunctional parts
- ÅReliable systems for 24X7 operations

Factory on the move



3D printing to meet the growing challenges

Personalisation



Frequent ECO

on
systems



to many models
every year
More than 100
changes in each
model which
means 300 to 400
job tkts every year
Even cricket has
transformed



Global development ,
manufacturing & usage

Smart Products

Global product development for
Global customers-Groups to work collaboratively

The Challenge:

Enable concurrent work on separate design elements, and synchronize
those collective efforts while minimizing product integration issues.



FMC applied modular product architecture definition to significantly
improve on-time delivery of its subsea systems.

Making Distributed Design and manufacturing Work and be ready to service
anywhere any time

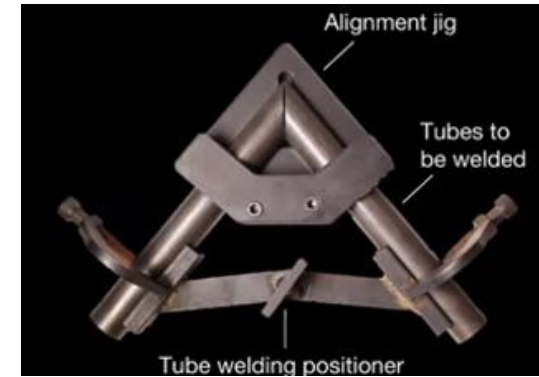
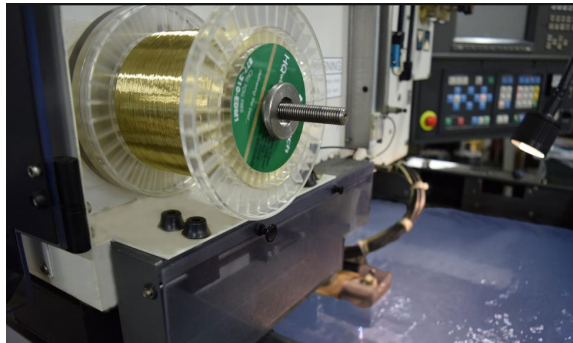


Intelligent, adaptive ,
self diagnostic

Introduction of new product – 100's of parts need to be developed or procured



Present multiple Processes



Significant cost and time



SME and Start-up: Challenges

Å Limited Capital

Å Skilled resources

Å Vendor Network

Å Economy of scale

Å Market Branding



3D printing- Great Equaliser for SME & Startups

- ÅRapid Innovation
- ÅToolless manufacturing
- ÅEconomic Pre-batch production
- ÅEarly roll out to market
- ÅMultivariant for Market Branding
- ÅLess inventory for today and for maintenance
- ÅHigher Capital Efficiency



Design Without boundaries



Developers emerging and evolving the 3D print process to reduce cost, time impossible products and assured parts meeting standards

Technologies:

Laser-SLA, SLS, SLM, DLP ,
Binding- Mark forged/desktop
metal
continuous fibre reinforcement
Voxel Jetting HP - MJF

Materials:

Plastic, high temperature, composite,
continuous reinforced, strong and
castable resins, metals and alloys,
ceramics, Clay

BASF, GKN, SABIC, HOGAN, Arkem,
Lubrizol, Evonik, Henkel

Software:

PTC, Siemens, Dassault, ANSYS,
Nastran, Altair, Moldflow

Standards:

ASTM, ISI-NASSCOM, FDA

Size, SPEED, Post processing,
cost, Standards

HP Driving the transformation to industrial-scale 3D manufacturing



Large build size
for heavy production

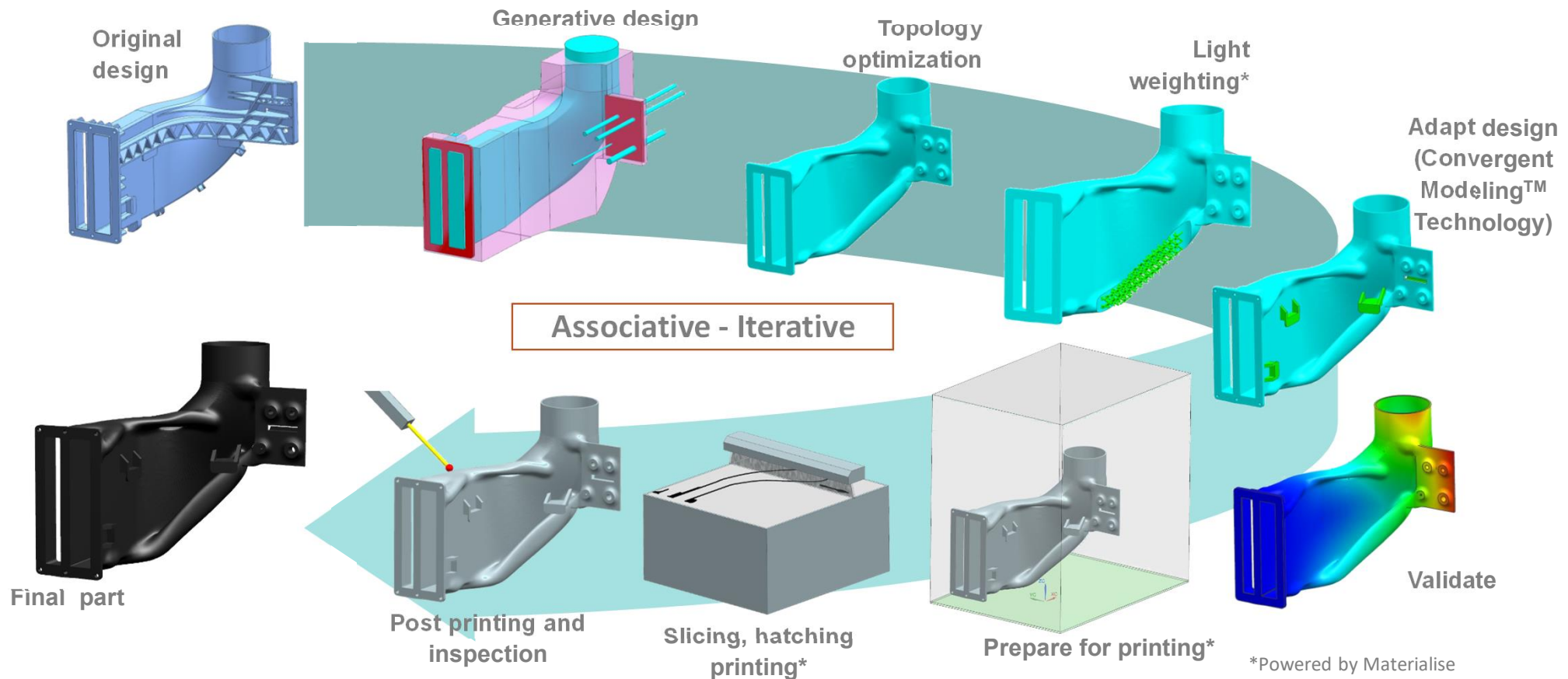
Continuous printing

Economics to disrupt
manufacturing



Siemens - Digital Enterprise Suite for Additive Manufacturing

Integrated end-to-end process in one system



MATERIALS



PLASTICS: ABS, TPU, PC, NYLON ETC



CASTABLE, WAXES



CLAY, SOIL, CONCRETE ETC



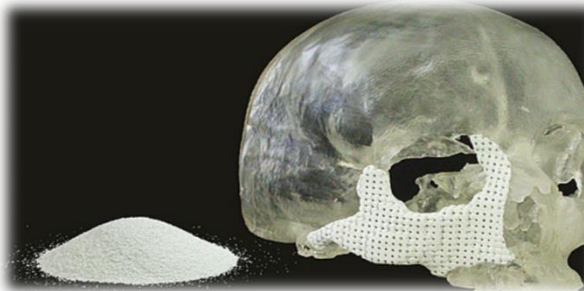
RESINS, PHOTOCURABLE



METAL: SS, TS, TI, AL, INCONEL, ALLOYS ETC



CERAMICS



BIO COMPATIBLES



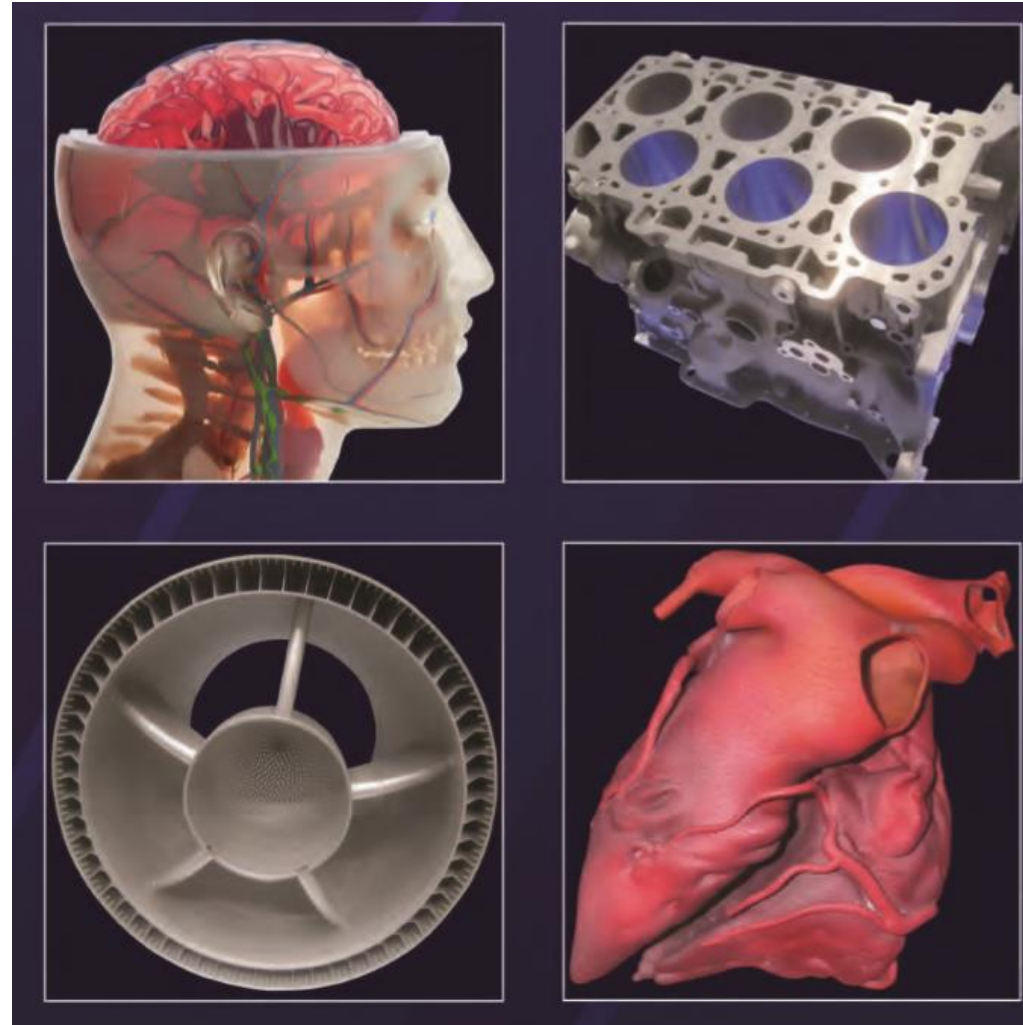
LIVE CELLS, TISSUE, ORGANS ETC



DAY TODAY WASTES

Additive Printing/3D printing
- Beyond Prototyping,

Functional parts ,
Tool Room- jigs & fixture,
Gauges, CMM Testing ,
Assembly process,
Manufacturing,
Die making – conformal
cooling,
Pattern making – sand mould



TYPICAL APPLICATION CATEGORIES

Machine Setup

Calibration jigs and machine repair and maintenance tools improve line startup efficiency when getting production up to speed

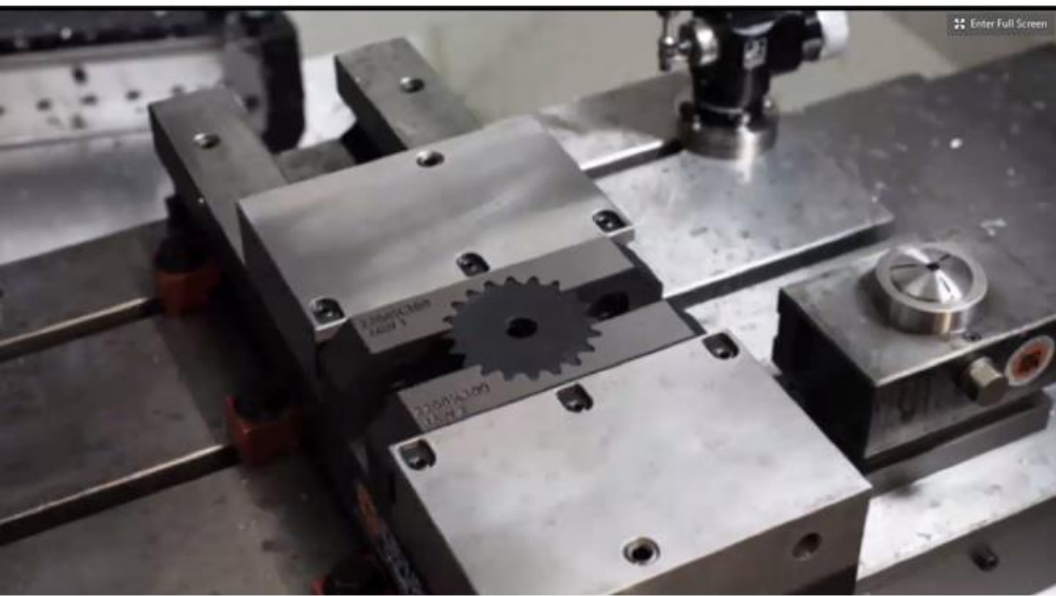
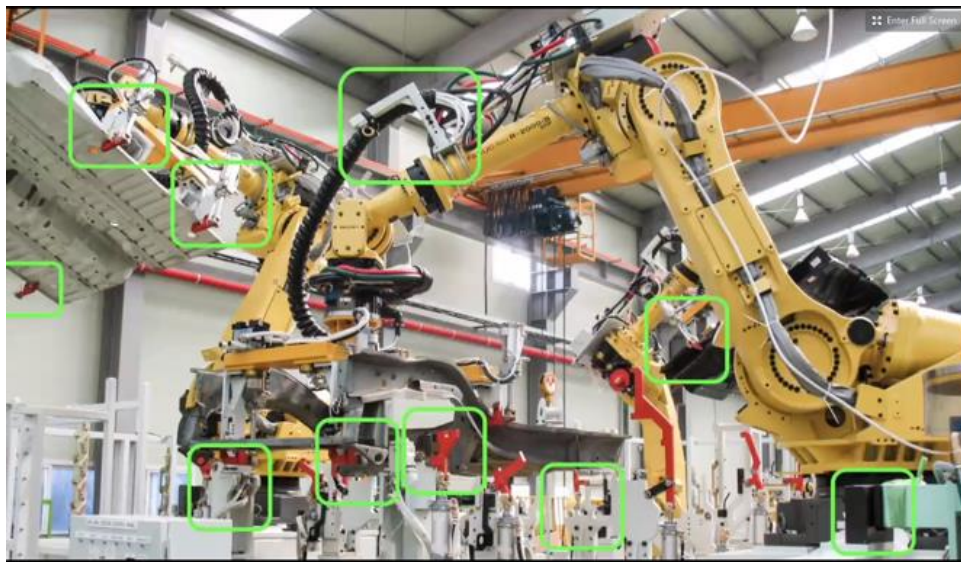
Fixturing, Positioning & Tooling

Inspection fixtures, soft jaws, assembly jigs, and other workholding devices require alignment features that can be hard to machine

Line Optimization

Custom end effectors, line add-ons and upgrades, and ergonomic equipment can improve line efficiency and safety





CMM FIXTURING



Every QC/QA room needs fixtur

3D printed fixtures are cheap
repeatable and have complex geo

No machining experience/equipm
required

LASER MARKING FIXTURING

Enables laser marking of complex or non-planar surfaces

Quick, cheap solution for positioning

Parallelized fixtures enable high throughput scaling



CNC LATHE BAR PULLER

\$13 print replaces \$700 - \$1000 standard CNC bar puller tool

Fully customizable to non-standard geometries

Easily replaceable in-house in case of breakage

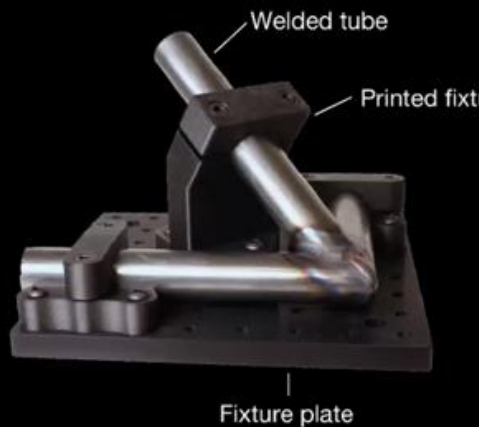


PRINTED FIXTURING

Complex structures with non-standard geometries are difficult to fixture.

Traditional fixtures make the process lengthy and custom fixturing is costly.

Printed fixtures are an affordable solution for tack welding steel and simplify setup.

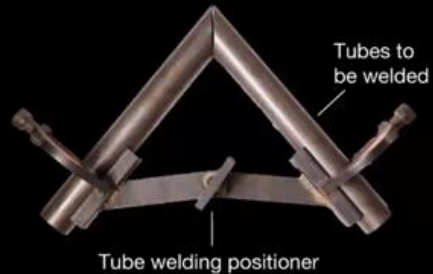


ALIGNMENT JIGS & CHECK GAGES

Modular welding fixtures are imprecise and can lead to misalignment.

It takes time to adjust these types of fixtures to achieve the desired results.

Welds may need to be redone if the parts aren't held or oriented correctly.

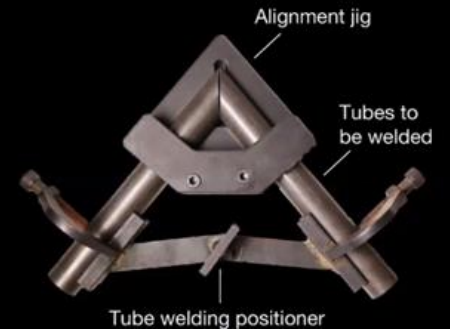


ALIGNMENT JIGS & CHECK GAGES

A printed jig ensures proper part alignment during setup.

This decreases setup time and allows welders to confirm setups easily.

The jig can further act as a quality assurance tool to confirm the model meet specifications.



CUSTOM RISERS & MOUNTS

It may be necessary to keep the frame in the fixture during the entire welding job.

Standard welding fixtures do not guarantee a repeatable process.

Custom fixturing can be costly for odd orientations because of machining capabilities.



PRODUCTION

Production Support - Assembly Aids



Large Weld Pickoff

Weld Pick off Tool

	Conventional Process	Additive Manufacturing
Fixture Material	Aluminium	Ultem-9085
Design hours	35	45
Mfg. Lead Time (days)	20	9(118 hrs.)
Mfg. Cost in \$	Thousands	Thousands
Expected Life in Yrs. (Strength, Stability, Reliability)	2	1
Weight in Kg's	24 kg	8.5 kg
Ergonomics (Weight, posture, ease of handling etc)	Good	Excellent

Conventional Process



3D Printing





**NORTHROP
GRUMMAN**

DELPHI

Automotive Systems

Kimball®Office >



VARIDESK



**United
Technologies**

**Johnson
Controls**



TREK



FedEx



UC San Diego



TINKER AIR FORCE BASE



plexus
WORLDWIDE.

PEDIGO



Northern Illinois
University



TELEDYNE

syngenta



JOHN DEERE



EATON



DBM REFLEX®



THE UNIVERSITY OF
SYDNEY

1B

firstbuild

MEGGITT



CATERPILLAR

Crayola



Middlesex
University



YASKAWA



WOODWARD



**WALT DISNEY
Imagineering**

Raytheon

MILITARY AND DEFENSE

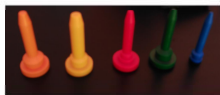
All Sub-segments Functional Prototyping

- Drones
- Exoskeleton



AEROSPACE

Tooling Jigs & Fixtures



MOBILITY & TRANSPORTATION

All Sub-Segments Functional Prototyping

- Fluid & Air ducts
- Impellers
- Snap fit
- Housing
- Grills



HEALTHCARE

Tooling: Dental Molds



CONSUMER Goods & Electronics

HH Appliances Functional Prototyping

- Fluid & Air ducts
- Snap fit
- Housing
- Living hinges



INDUSTRIAL & SERVICES

Electronics Functional Prototyping

- Fluid & Air ducts
- Snap fit
- Housing
- Living hinges



AGRICULTURE & MINING & ENERGY

Tooling Jigs & Fixtures

Medical Equipment Final Part

- Housing
- Internal components

HH Appliances Final Part

- Housing
- Internal components
- Fluid vessels (air)



Machinery & Equipment Final Part

- Temporary/dummy parts
- Parts of machinery
- Fluid vessels
- Pipe connectors

Robots Final Part

- End effectors
- Vacuum grippers



Cattle Industry Feed Industry

- Final Part
- Fluid vessel
- Air ducts for ventilation

SPM manufacturers – Digital Manufacturing of Smart Machines

- ⚠ Complete trial of the system in short time and low capital cost
- ⚠ No Minimum Order
- ⚠ No coordination of multiple vendors
- ⚠ No inventory for production
- ⚠ Integration of subassembly- Reduction of parts
- ⚠ No storage of spares for maintenance

AUTOMOTIVE



Doctors



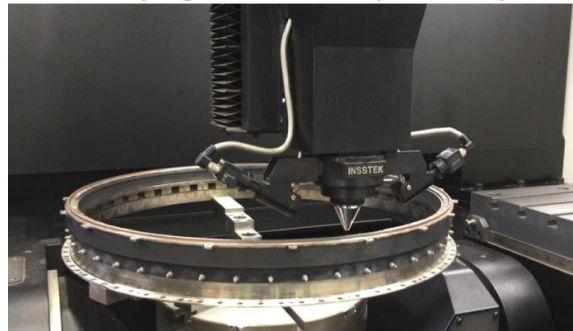
Aircraft



Worlds First Privately
Funded 3D Printed Aircraft



- ROKAF, F110 Engine HPT Shroud Support
- Certified by Engine manufacturer(GE aviation)



- Requirement: repair of worn out parts
- Base: IN718(Ni alloy)
- Printing material: Stellite25(Cobalt)



F110's F110 engine(GE)



HPT Shroud Support

- Saving Cost
30K\$/EA → 4K\$/EA
- Lead time
60days → 20days



The Additive Manufacturing People

ARCHITECTURAL



Total cost of acquisition

⌚ Material cost

⌚ Processing cost of different machines and manpower

⌚ Inventory cost

⌚ Maintenance part cost and availability

⌚ Cost of capital investment and space

ADROITEC Group

- ❖ 350 + Strong Team,
- ❖ 25 + Years Old Company
- ❖ Focused on Engineering Design solutions
- ❖ 10000 + Satisfied Customers base
- ❖ Growing 20% Y.O.Y for last 5 Years
- ❖ 9 offices spread across the country , Germany and USA