Disruptive Innovation – ~~Digital~~ PP

ACTUAL

David Tucker

UL Prospector 5/25/2020

DAVID TUCKER

Education:

- B.S. Plastics Engineering
- B.S. Product Design Engineering
- Masters Business Administration
- M.S. Technology Management

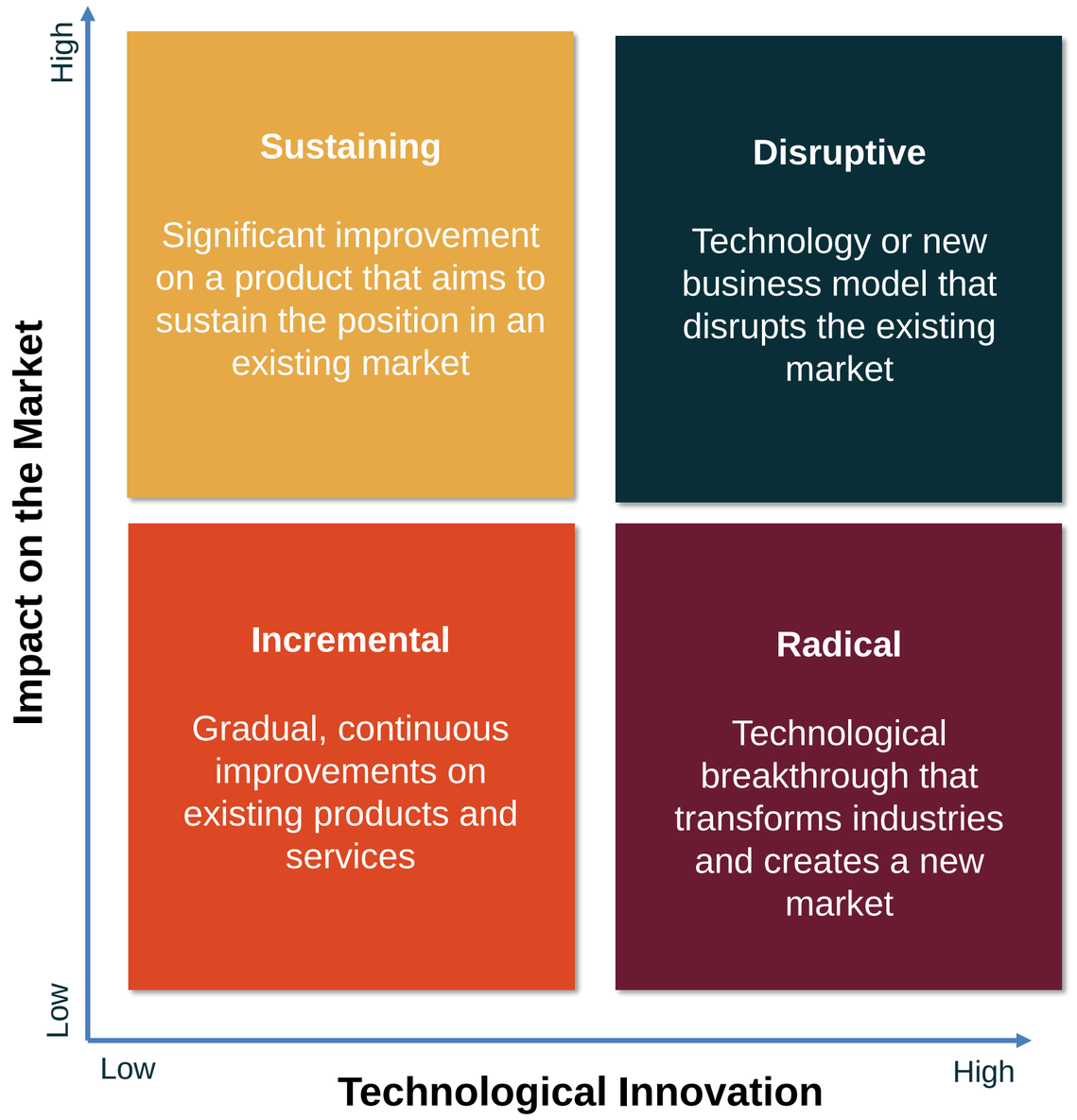
Experience:

- **Product Development**
  - Passenger Vehicle Product Development
  - Commercial Vehicle Product Development
  - Electronics
- **HP**
  - Strategic Sourcing
  - 3D Print Market Development
  - Automotive Production Development Manager
- **Forecast 3D**
  - Director of Digital Solutions and Strategy

SPECIALIZING IN PRODUCTIZING DIGITAL INNOVATION

WHAT IS DISRUPTION?

Disruptive Innovation describes the process by which a product or service initially takes root in simple applications, moving upmarket, displacing established competitors.



“DISRUPTIVE TECHNOLOGIES TYPICALLY ENABLE NEW MARKETS TO EMERGE.” – CLAYTON M. CHRISTENSEN, THE INNOVATOR'S DILEMMA

DISRUPTION IN ACTION

How did we go from physical to digital?

1892

Film reels were invented

Nitrate, Acetate, and Polyester
Also, film developing technology

1977

VHS videocassette was introduced in North America

Mechanics of metal structure, displaced by Plastics innovation and combining of parts

1996

DVD or digital optical disc data storage was formally released

Polycarbonate innovation, and low-cost laser technology

2005

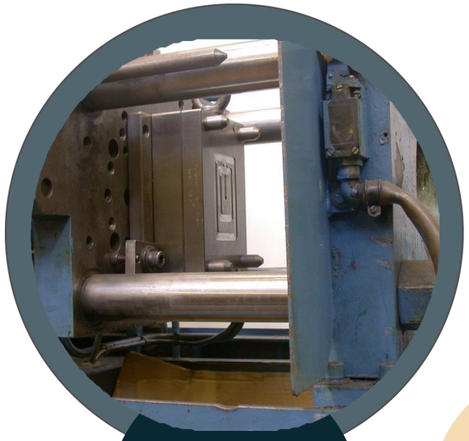
Streaming technologies have revolutionized into platforms we know such as Youtube, Netlix, Hulu, and Disney+

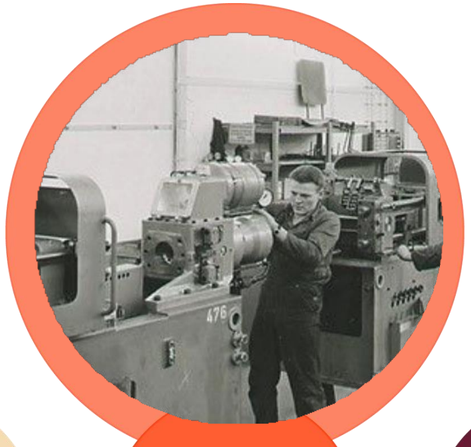
Connectivity, Cloud Servers, Low-cost processors, energy efficient processors,

PLASTICS MANUFACTURING

Injection Molding

- **1872** - Patented the first injection molding machine
- **1939** - Patented the injection molding of soluble cellulose acetate
- **1946** - First screw injection machine, which created more precise control over the speed and quality of production
- **1979** - Plastic production overtook steel production



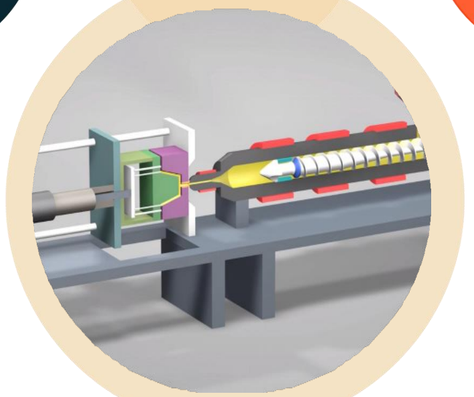


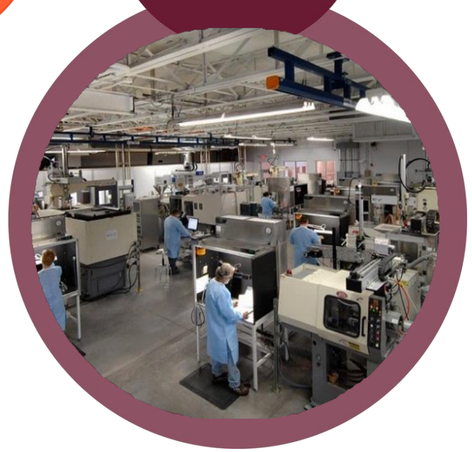
1872

1939

1946

1979





ADDITIVE MANUFACTURING

1980

1988

1988

2016

- **1980** – First Patents by Dr. Kodama Rapid Prototyping
- **1988** – 3D Systems first commercialization
- **1988** – First Powder Machines with SLS
- **2015** – Area Based Powder Processing

WHERE ARE WE GOING?

- Mass-personalization and Customization
- Distributed Manufacturing
- Sustainability

FORECAST 3D
Powered by GKN

25+
Years

15+
Metal 3D Printers

45+
Polymer 3D Printers

OFFERINGS

Parts

Technology

SLA
DMLS
MJF
FDM
DLS
Cast Urethane
Binder Jet
MIM/PM

Services

Engineering

Application & Process
Manufacturing Technology
Product Design & Strategy
Project & Program Management
Subject Matter Expertise

Strategic Business

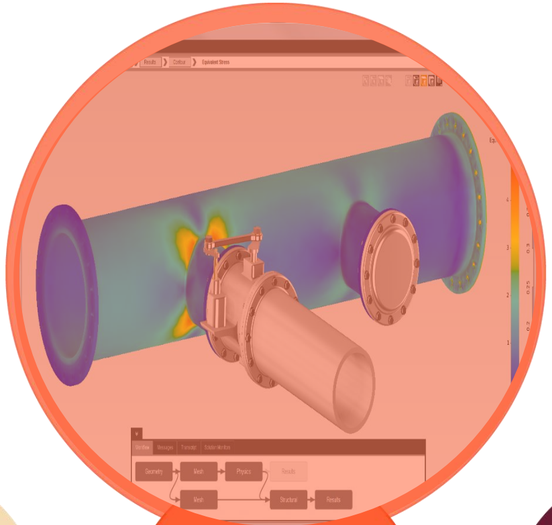
Collaborative Development
Radical Business Model Analysis
Priority Partnerships

INNOVATIVE PRODUCTS OFFERED BY FORECAST 3D

NEXT DAY SERVICES

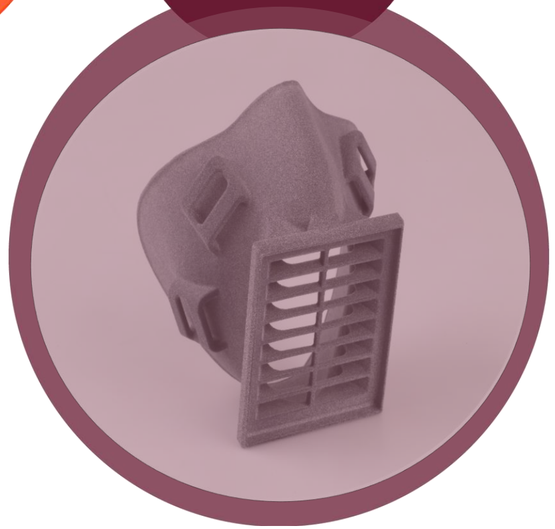
SPEED

QUALIFIED FINISHES



DIGITAL WORKFLOW & SIMULATION

POLYPROPYLENE



THE VALUE OF ONE-DAY TURNAROUND

Printing Prototype and Production Parts for Shipment Next Day

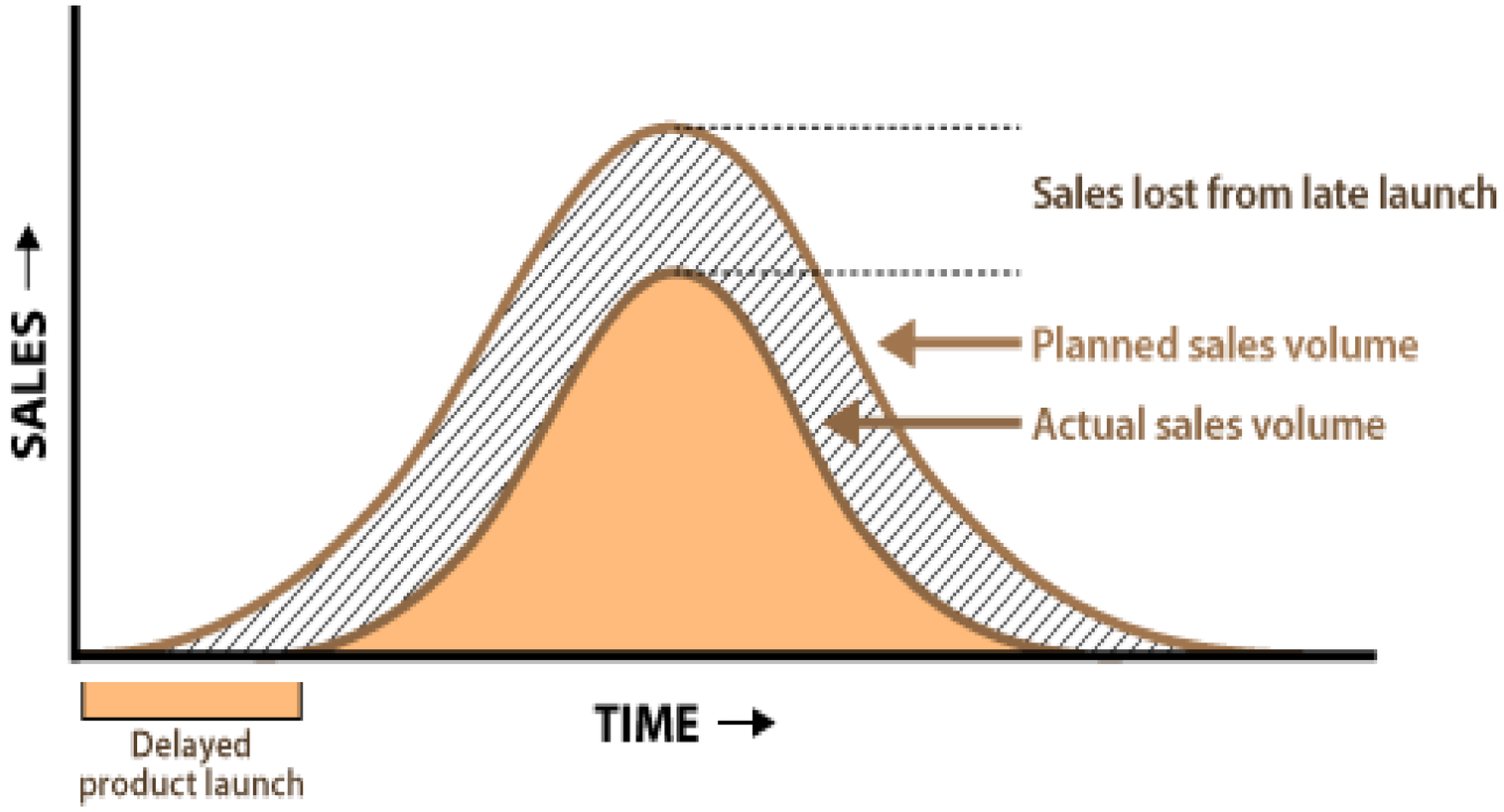
Fast-tracking human creativity and making any idea into a reality in one day

- Next day will allow clients to see, review, and optimize their parts and prototypes quicker than ever before
- Speed of knowledge
- Shorten time to market

TIME TO MARKET

In a classic study, McKinsey & Co found that a product that is six months late to market, earns 33% less profit over five years

- Competitive Advantage
- Reduce R&D costs (and waste)
- Improve customer satisfaction
- Grow Revenue
- Grow Share

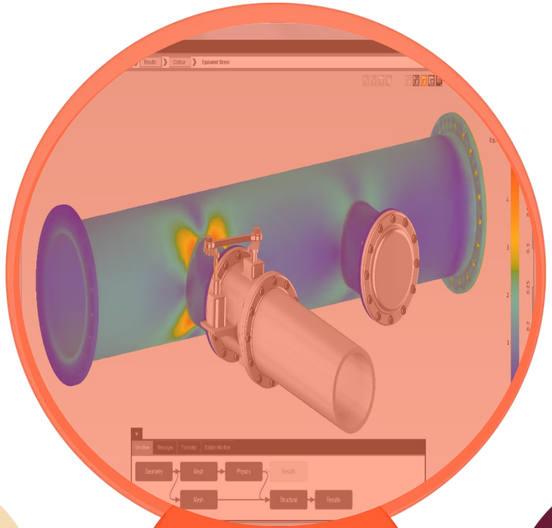


INNOVATIVE PRODUCTS OFFERED BY FORECAST 3D

QUALIFIED FINISHES

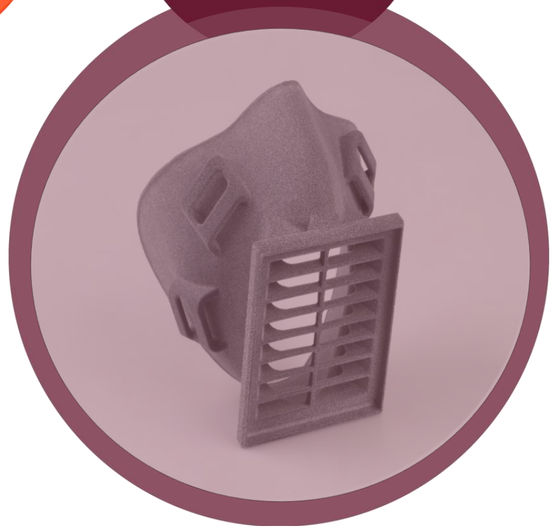
SPEED

QUALIFIED FINISHES



DIGITAL WORKFLOW & SIMULATION

POLYPROPYLENE



QUALIFIED FINISHES

Ensuring Product Performance for Demanding Applications

Developing finishes to bring innovative ideas to life

- Going beyond basic finishes and developing premium final parts and products
- Vapor Polishing
- Performance Paint
- Flex Paint
- Custom Dye

PERFORMANCE PAINT

- Injection-mold-like, glossy-smooth finish
- Best-in-class sealing, smoothing, and surface quality post-processing
- Capable of consistent, high-volume processing
- This manual process combines low volumes and high-quality spray coating equipment (automated, robotic coating options available for qualified serial production applications)

FLEX PAINT

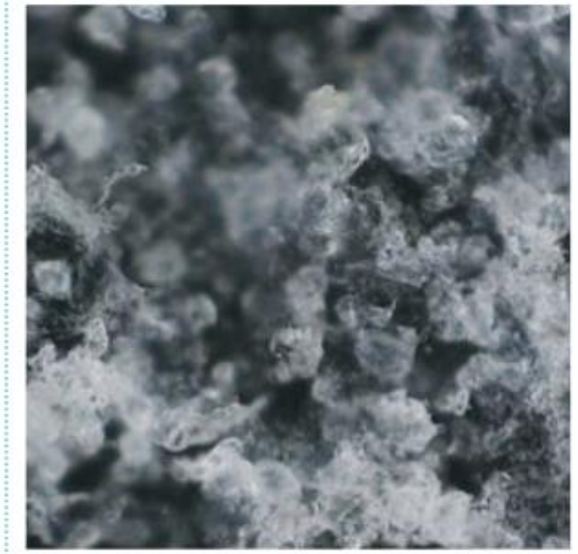
- Developed by BASF as Ultracur3D Coat F, enhances the visual appeal of flexible components while enhancing the durability and quality of printed parts

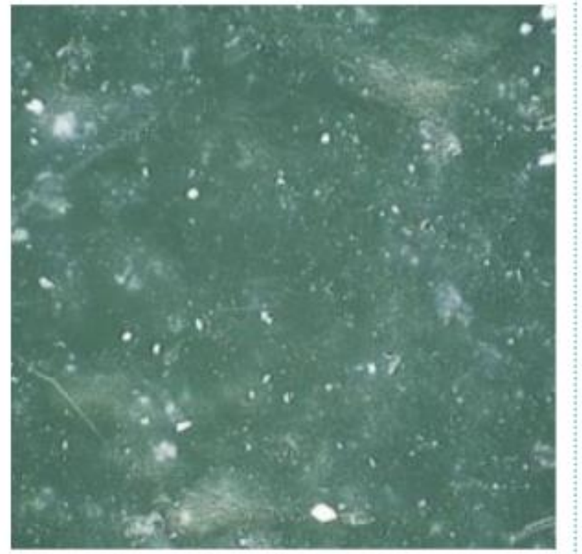
- This manual process combines low volumes and high-quality spray coating equipment (automated, robotic coating options available for qualified serial production applications)

- Finish works with a variety of part preparation methods to achieve a smooth or more textured look and feel

VAPOR POLISHING

- Developed using AMT Post Pro 3D technology, modifies the part surface, resulting in an injection-mold-like smooth, glossy part appearance
- Using a fully automated, recipe driven, alcohol based chemical smoothing process
- This process is best utilized in high volume applications with prototype recipes available for discovery explorations



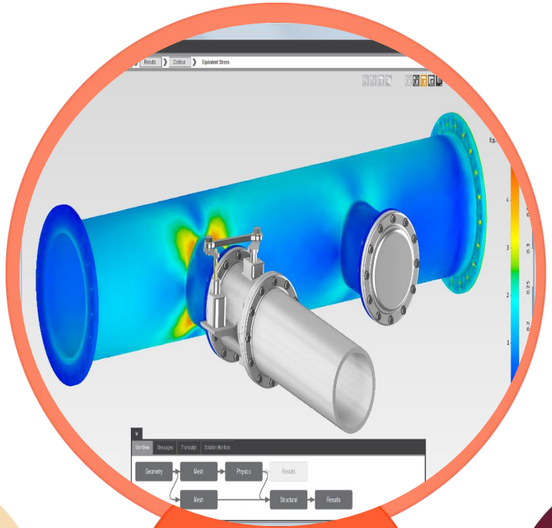


INNOVATIVE PRODUCTS OFFERED BY FORECAST 3D

DIGITAL WORKFLOW AND SIMULATION

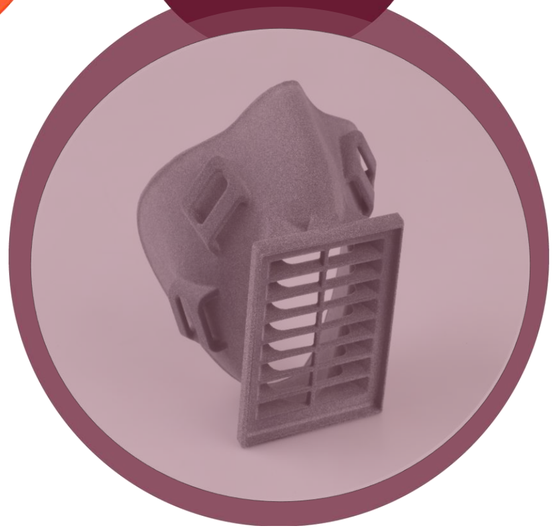
SPEED

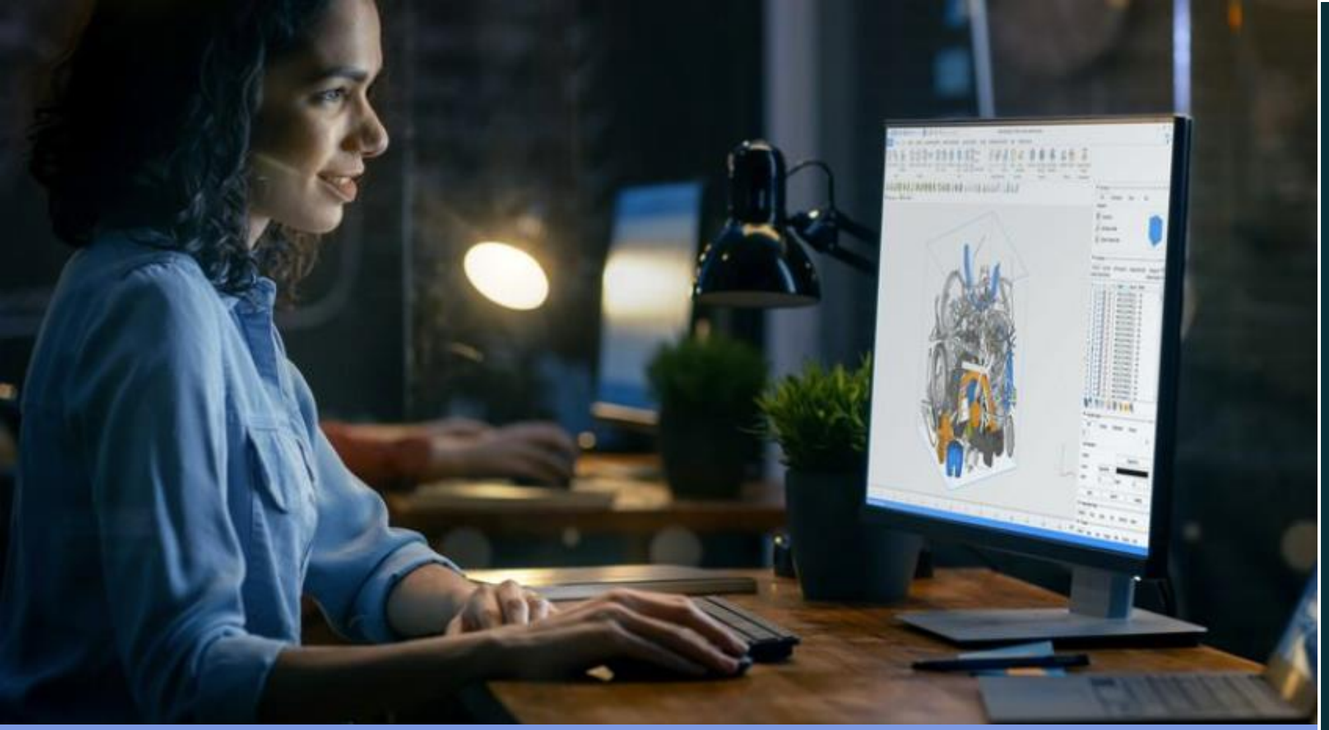
QUALIFIED FINISHES

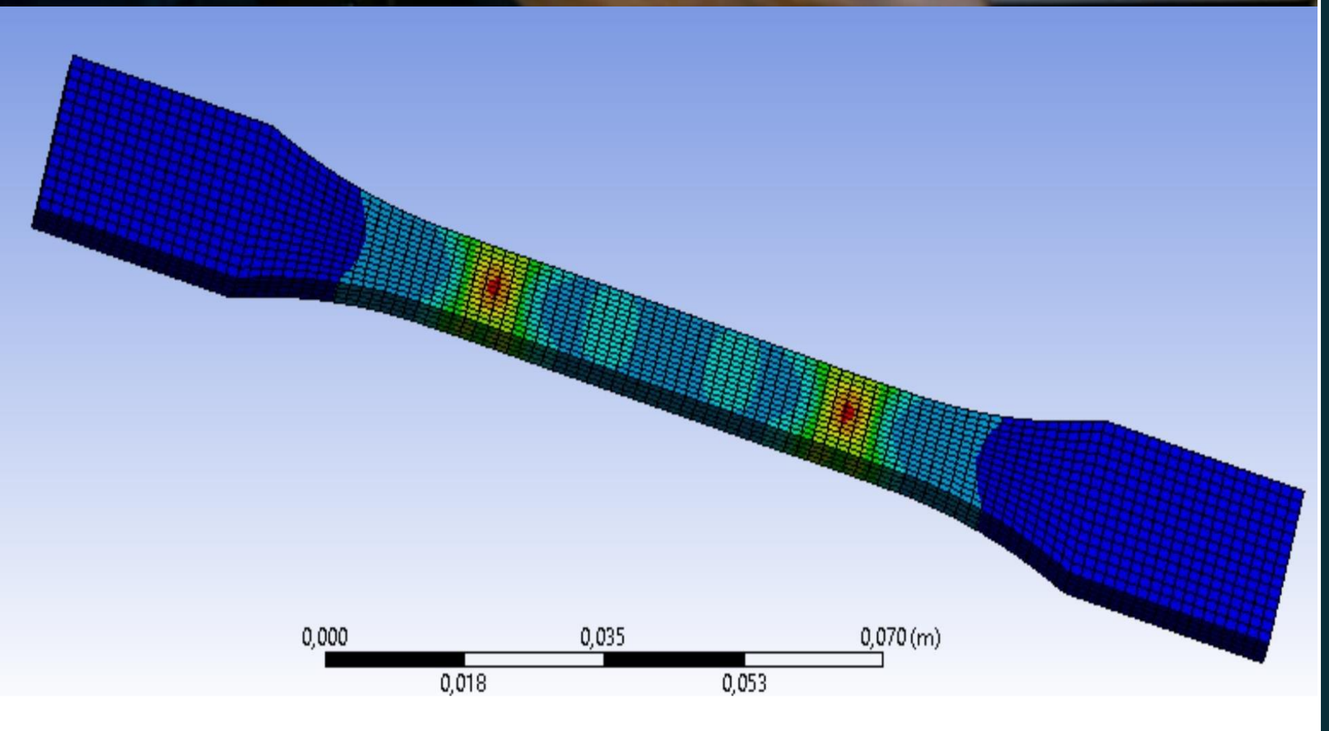


DIGITAL WORKFLOW & SIMULATION

POLYPROPYLENE







DIGITAL WORKFLOW & SIMULATION

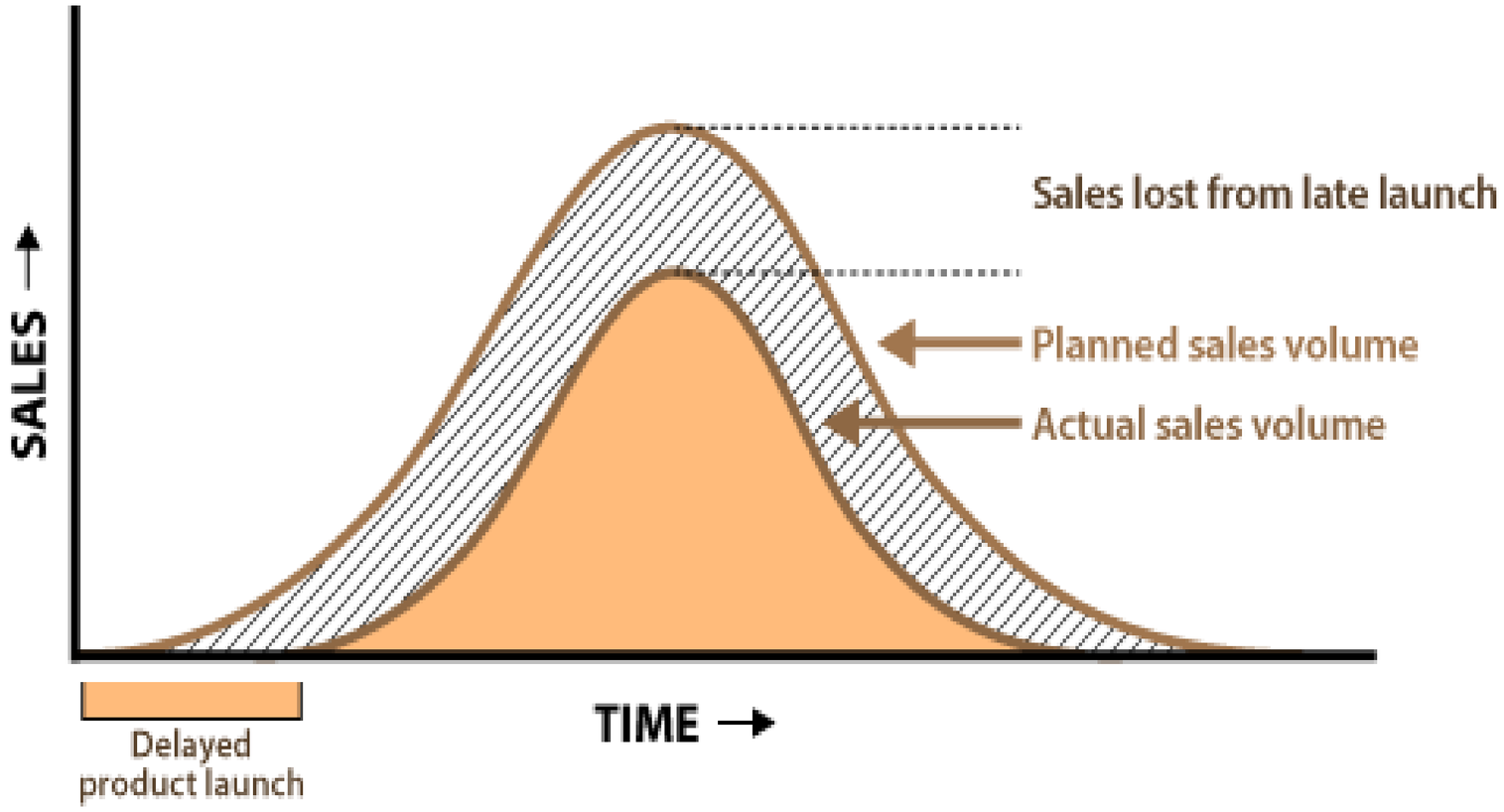
Optimizing parts of the production journey through digital Simulation

- Fully characterized materials with LS Dyna
- Able to assess the performance of any prototype and material
- Can test out different iterations prior to printing
- Able to evaluate all the weak spots in your design prior to printing
- Able to test out prototypes digitally, reducing time and cost

TIME TO MARKET

In a classic study, McKinsey & Co found that a product that is six months late to market, earns 33% less profit over five years

- Competitive Advantage
- Reduce R&D costs (and waste)
- Improve customer satisfaction
- Grow Revenue
- Grow Share



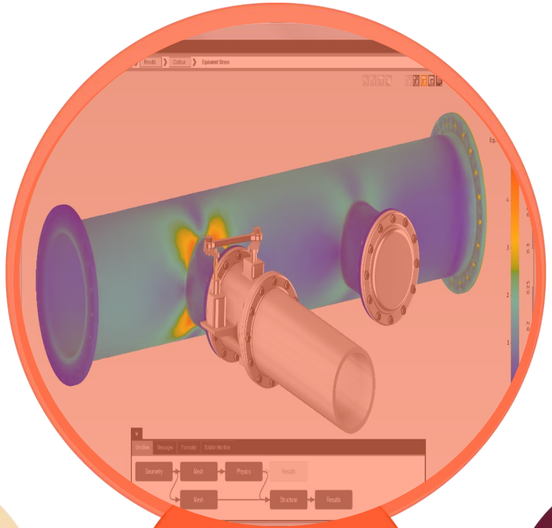
INNOVATIVE PRODUCTS OFFERED BY FORECAST 3D

~~DIGITAL~~ PP

ACTUAL

NEXT DAY MJF

QUALIFIED FINISHES



DIGITAL WORKFLOW & SIMULATION

POLYPROPYLENE

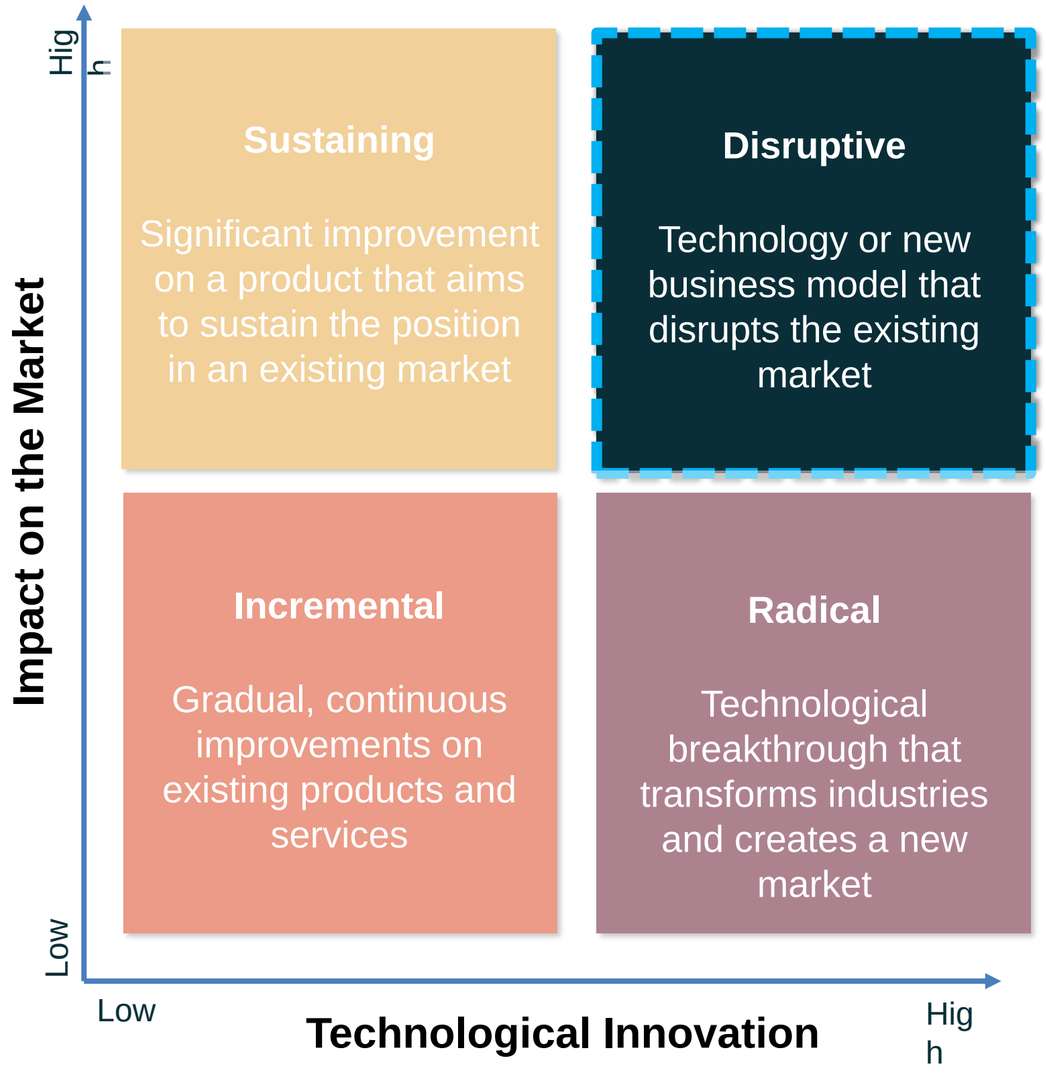
~~DIGITAL~~ ACTUAL
POLYPROPYLENE

Unlocking opportunity and improving sustainability

Automakers will be able to use the same polypropylene for prototyping and production of final parts

- Ideal for a range of applications
- Optimal balance of performance and cost
- Biocompatibility
- High Powder Reusability
- Easy-to-Process material
- Lowest cost material for MJF
- Low moisture absorption
- Outstanding welding capabilities

CORRECTING CAR PARTS WITH ACTUAL PP



APPLICATIONS

Enabled by Polypropylene

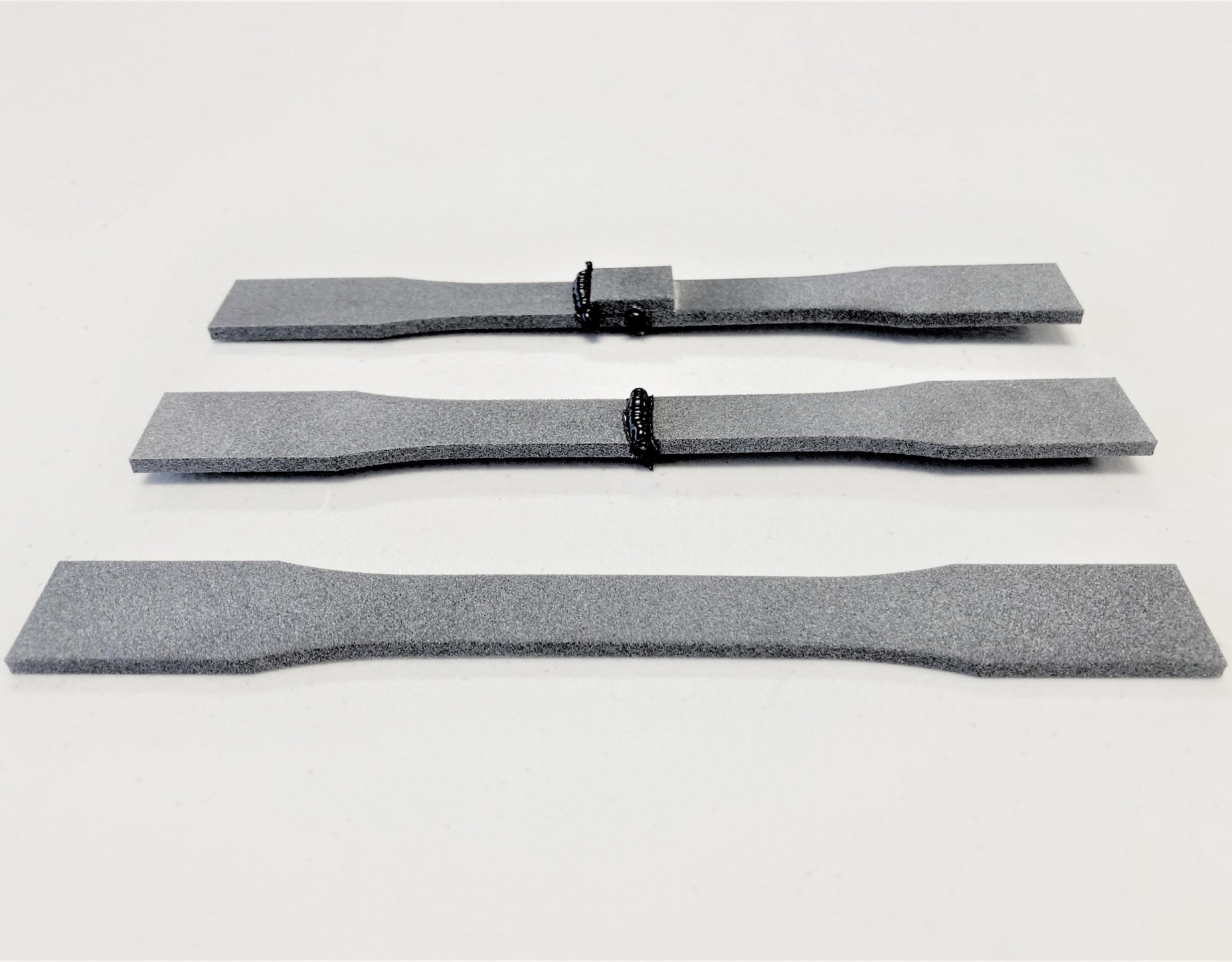
Hybrid Manufacturing
Fusing injection molded parts with AM attachments using a digital attachment library

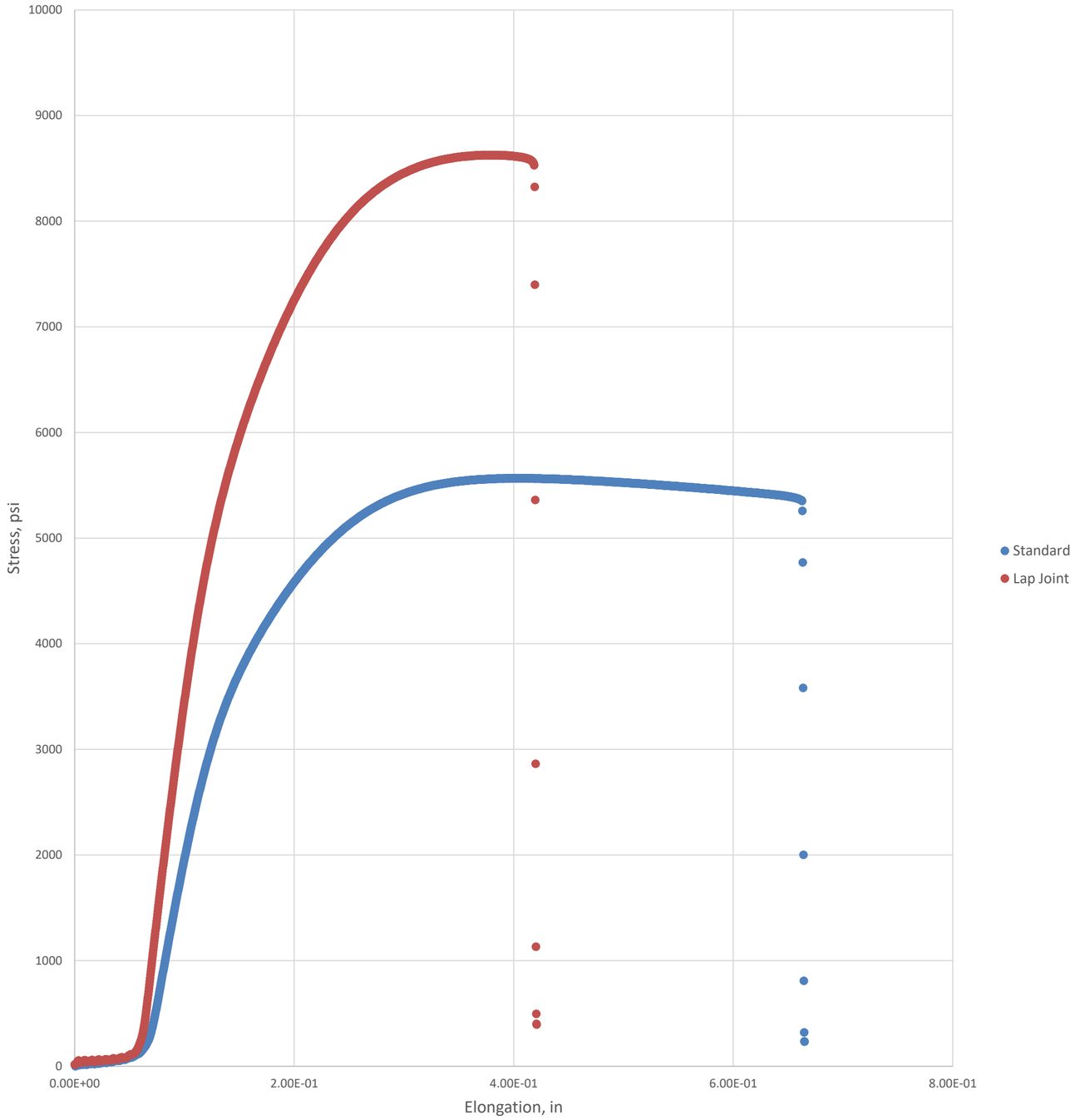
Polypropylene Prototyping
Versatile material that is ideal for a range of applications from consumer goods to automotive

Cut & Connect
Using digital modifications to build large parts, add new features, and weld AM sections to make final large component

Quick Correct
Scan and/or reverse engineer, create fixturing and manufacturing aids, cut and repair with AM components

MECHANICAL TESTING





MECHANICAL TESTING

Utilizing physical testing to give confidence on design methods

- Meeting regulatory requirements; maintaining safety requirements
- Selecting the appropriate materials and treatments for parts and products
- Evaluating product design and adjusting for improvement
- Verifying a production process

HOW ARE WE MOVING TOWARDS THE FUTURE OF ADDITIVE MANUFACTURING?

As the digital environment continues to evolve, as industry leaders we evaluate and implement the components that fit our vision of the future.

This means...

+ Investing in strategic technologies
+ Developing certified solutions
+ Expanding value-add simulation
+ Focusing on end-to-end value stream solutions
+ Cultivating collaborative Channels

STEPPING CLOSER TO THE FUTURE WITH DISRUPTIVE INNOVATION

THANK YOU

DAVID TUCKER
DAVIDT@FORECAST3D.COM

FORECAST 3D