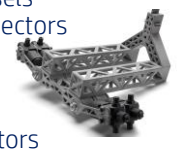
HP Multi Jet Fusion applications

3D printing design courtesy of Invent Medical

HP Multi Jet Fusion - Current Applications (HP 3D HR PA 12)

	Military & Defense	Aerospace	Mobility & Transportation	Healthcare	Consumer Goods & Electronics	Industrial & Services	Agricultural, Mining & Energy
FUNCTIONAL PROTO	**All Sub-segments** Functional Prototyping • Drones • Exoskeleton 		**All Sub-Segments** Functional Prototyping • Fluid & Air ducts • Impellers • Snap fit • Housing • Grills 		**HH Appliances** Functional Prototyping • Fluid & Air ducts • Snap fit • Housing • Living hinges	**Electronics** Functional Prototyping • Fluid & Air ducts • Snap fit • Housing • Living hinges 	
TOOLING		**Tooling** Jigs & Fixtures	**Tooling** Jigs & Fixtures • Temporary/dummy parts • J&F for production line • Ergonomic tools • Tools organizer **Tooling** Molds • Thermoforming • Metal Stamping	**Tooling: Dental** Molds • Thermoforming for dental aligners 	**Tooling** Jigs & Fixtures • Dummy parts • J&F for production line • Ergonomic tools • Tools organizer	**Tooling** Jigs & Fixtures • Dummy parts • J&F for production line • Ergonomic tools • Tools organizer **Tooling** Molds • Thermoforming • Embossing • Sand Casting • Metal Stamping	**Tooling** Jigs & Fixtures
FINAL PART				**Medical Equipment** Final Part • Housing • Internal components	**HH Appliances** Final Part • Housing • Internal components • Fluid vessels (air) 	**Machinery & Equipment** Final Part • Temporary/dummy parts • Machinery parts • Fluid vessels • Pipe connectors  **Robots** Final Part • End effectors • Vacuum grippers	**Cattle Industry** **Feed Industry** Final Part • Fluid vessel • Air ducts for ventilation 

Data courtesy of NACAR, Ficep S3, 3Shape

HP Multi Jet Fusion – Current to Future Applications

	Military & Defense	Aerospace	Mobility & Transportation	Healthcare	Consumer Goods & Electronics	Industrial & Services	Agricultural, Mining & Energy
CURRENT	**All Sub-segments** Functional Prototyping 	**Tooling** Jigs & Fixtures	**All Sub-Segments** Functional Prototyping Jigs & Fixtures Molds	**Dental** Molds Thermoforming for dental aligners  **Medical Equipment** Housing & parts **Personalized Prosthetics** Insoles, orthoses, prostheses 	**HH Appliances** Functional Prototyping **Tooling** Jigs & Fixtures **HH Appliances** Housing & parts & air ducts  **Footwear** Insoles, heels 	**Electronics** Functional Prototyping **Tooling** Molds **Machinery & Equipment** Temporary Dummy parts Fluid & Air Ducts Pipe connectors **Robots** EOAs 	**Tooling** Jigs & Fixtures **Air Conditioning** Housing & parts & air ducts
MID-TERM	Drones frames Exoskeleton **Equipment** Covers and parts 		Customized parts For short runs	**Surgical Planning** Guides (dental, knees) **Anatomic Models** Patient models  **Dental** Apnea Braces	**Toys** Housing & parts **Wearables FMCG** Phone case  **Sports equipment** Grippers	**Watering systems** Construction drainage pipes **HVAC**	**Agricultural** Accessories Machine parts
BEYOND 2018	**Military & Defense** Helicopter parts (FR coating) Aircraft opportunistic parts (ducts) Non structural parts for drones Military equipment for trucks Spare parts for ships	**Aero** Small parts for the cabin, brackets for cups etc.	**Automotive, Rail & Trucks** Interior & exterior parts Electrical parts for cars 	**Medical Equipment** Enclosures with FR material parts	**Sport equipment** Skates Ski equipment Bicycle components	**Packaging** Enclosures with FR material Parts 	**Tractors** Interior customized parts

Data courtesy of NACAR, Superfeet, RS Print powered by RS Scan and Materialise, Phoenix Children's Hospital, Ignasi Sagré, Guala Closures, UPC MotoSpirit Team, Ficep S3, Invent Medical, 3Shape, Ficosa

HP 3D HR PA 12 Prototyping and Final Part Applications

PA 12 Certification
PA12 Certification planned

Sept 2017

USP Class I

Military & Defense
Functional Prototyping
- Drones
- Exoskeleton

Mobility & Transportation
Functional Prototyping
- Fluid & Air ducts
- Impellers
- Snap fit
- Housing
- Grills

HH Appliances
Functional Prototyping
- Fluid & Air ducts
- Housing
- Snap fit
- Living hinges

Tooling
Jigs & Fixtures
- Temporary/dummy parts
- J&F for production line
- Ergonomic tools
- Tools organizer

Tooling
Molds
- Dental (Thermoforming)
- IM (HT coating)
- Embossing
- Sand Casting
- Metal Stamping

Oct 2017

ROHS | REACH | PAH's

USP Class I-VI

Dec 2017

Machinery & Equipment
HH Appliances
Medical Equipment
Final Part
- Dummy parts
- Parts of machinery
- Fluid vessels
- Housings

Robots
Final Part
- End effectors
- Vacuum grippers

Jan 2018

UL 94: HB
UL 746: dielectric and GWFI

Machinery & Equipment
HH Appliances
Medical Equipment
Final Part
- Dummy parts
- Parts of machinery
- Fluid vessels
- Housings

Materials coming soon:

PA 11

PA 12 GB

Future Materials:

PP

Elastomers

Data courtesy of NACAR, Ficep S3, 3Shape

HP MJF New Materials - Final Part Applications

Q1- Q2 2018

PA12GB | February | PA11

Machinery & Equipment
HH Appliances
Medical Equipment
Final Part
- Dummy parts
- Parts of machinery
- Fluid vessels
- Housings

Personalized Prosthetics
Final Part
- Insoles
- Personalized Orthoses
    - Knee prostheses
    - Baby helmet
    - Arm orthoses
    - Exoskeleton

Footwear
Final Part
- Insoles
- Heels

Automotive
Final Part
- Snap fits
- Customized interior parts
- Fluid Vessel (air)

Data courtesy of NACAR, Superfeet, RS Print powered by RS Scan and Materialise, and Invent Medical

Where is the opportunity today?

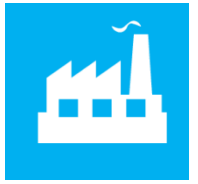
MILITARY & DEFENSE

AEROSPACE

MOBILITY & TRANSPORTATION

HEALTHCARE

CONSUMER GOODS & ELECTRONICS



INDUSTRIAL & SERVICES

AGRICULTURE, MINING & ENERGY

Functional prototyping

Functional prototyping

Functional prototyping allows testing of a concept early in the product design cycle before moving into production.

Why HP MJF?

- Low cost, high productivity and high accuracy
- Near isotropic behavior of parts
- Low warpage
- Fast time to part

ITERATION OF SPEAKER DESIGN

Data courtesy of NACAR

Based on internal testing and simulation, HP Jet Fusion 3D average printing time is up to 10 times faster than average printing time of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from $100,000 USD to $300,000 USD on market as of April, 2016. Testing variables: Part quantity: 1.4 full build chamber of parts from HP Jet Fusion 3D at 20% of packing density on fast print mode vs same number of parts on above-mentioned competitive devices; Part size: 30 grams; Layer thickness: 0.08 mm/0.0031 inches. HP Jet Fusion 3D Printing Solution average printing cost-per-part is half the average cost of comparable FDM & SLS printer solutions from $100,000 USD to $300,000 USD on market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 1build chambers per day/ 5 days per week over 1 year of 30-gram parts at 10% packing density using HP 3D High Reusability PA 12 material, and the powder reusability ratio recommended by manufacturer. Based on dimensional accuracy of ±0.2 mm/0.008 inches, measured after sand blasting with HP 3D High Reusability PA 12 material. Based on the following mechanical properties: Tensile strength at 48 MPa (XYZ), Modulus at 1700-1800 MPa (XYZ). ASTM standard tests with HP 3D High Reusability PA 12 material. See hp.com/go/3Dmaterials for more information on materials specifications.

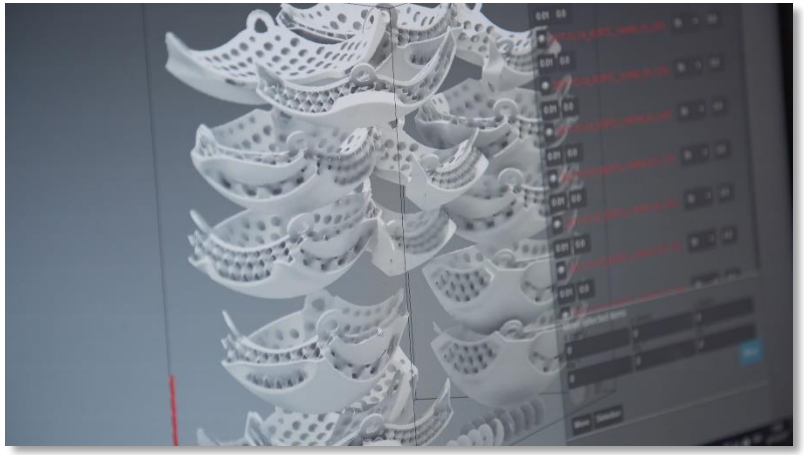
Functional prototyping – Bicycle helmets

Company background:

Sculpteo is a leader in digital manufacturing and provides professional online 3D printing and laser cutting services for on-demand production of prototypes and short-run manufacturing of end-use products.

Syncro Innovation is an industrial design firm located in Quebec, Canada. Using additive manufacturing, they work with clients to help bring innovative new products to life.

They worked together to reinvent sports headgear – specifically bicycle helmets.



Challenge:

- Overcome the limitations of mass manufacturing – significant upfront costs, limited options for customization
- Create a lighter and more functional helmet
- Eliminate the need for EPS foam, usually used in the helmet's interior, that traps heat on the rider's head.

With HP MJF, they can:

- Create functional prototypes faster than with other 3D printing methods
- Produce a lighter design and with the anisotropic strength needed for helmets
- Develop a commercially appealing design, thanks to HP MJF surface finish and lower porosity
- Consider manufacturing the helmets at scale thanks to HP Jet Fusion 4200 3D printers high productivity and low cost per part.

Functional prototyping - HP 3D HR PA 11 Applications

Zip tie from GoProto

Why PA 11?

- Flexible yet strong material

Why 3D printing?

- Most cost-effective alternative for prototyping this type of part

Application description

- Functional prototyping
- Fine detailing required


San Diego, California
Proto

Functional prototyping - HP 3D HR PA 11 Applications

Motorcycle rearview mirror and Motorcycle blinkers prototypes

Why PA 11?

- High impact strength makes it a functional part
- Good elongation at break which makes this part easy to assemble

Why 3D printing?

- Most cost-effective alternative for prototyping this type of part

Application description

- Automotive exterior part

Where is the opportunity today?

MILITARY & DEFENSE

AEROSPACE

MOBILITY & TRANSPORTATION

HEALTHCARE

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INDUSTRIAL & SERVICES

AGRICULTURE, MINING & ENERGY

Tooling

Tooling - Jigs & Fixtures in the production line

Jigs and fixtures are manufacturing and assembly aids that provide repeatability, accuracy, and interchangeability in the manufacturing of products.

Why HP MJF?

- Low cost
- Specific features can be machined to achieve a required high tolerance (e.g. 50 µm).
- More freedom of design to adapt better the jigs and fixtures to the required geometries.
- CNC assemblies can be unified with HP MJF, which results in a lower cost and lower risk of bad assembly.

Benefits

- Ergonomic and lighter for the employee on the production floor
- The plastic avoids scratching the part during assembly

Tooling - Molds for Dental applications

The aligners are customized for each patient
(up to 10 aligners per patient).

Data courtesy of 3Shape

Why HP MJF?

- High productivity.
- High level of resolution and definition in the small details.
- Low cost.
- No post-processing necessary.

Based on internal testing and simulation, HP Jet Fusion 3D average printing time is up to 10 times faster than average printing time of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from $100,000 USD to $300,000 USD on market as of April, 2016. Testing variables: Part quantity: 1.4 full build chamber of parts from HP Jet Fusion 3D at 20% of packing density on fast print mode vs same number of parts on above-mentioned competitive devices; Part size: 30 grams; Layer thickness: 0.08 mm/0.0031 inches. HP Jet Fusion 3D Printing Solution average printing cost-per-part is half the average cost of comparable FDM & SLS printer solutions from $100,000 USD to $300,000 USD on market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 1build chambers per day/ 5 days per week over 1 year of 30-gram parts at 10% packing density using HP 3D High Reusability PA 12 material, and the powder reusability ratio recommended by manufacturer.

Tooling - Tube Bending Tools

Company background:
Sag Tubi is an innovative company focused on pipe solutions since 1969.

Challenge:
They use a tube bending process to create fluid systems and pipes.

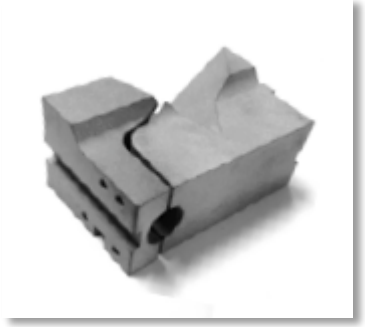
This process requires significant work, as well as:

- Tools to to bend the tubes and make fixtures
- Moulds to check the tubes curvature and shape

These tools are usually made of metal, produced with CNC machines.

With HP MJF, they can:

- Create lighter tools and moulds
- Reduce their production costs and time



HP MJF bending mould

HP MJF checking fixture mould

Based on internal testing and simulation, HP Jet Fusion 3D average printing time is up to 10 times faster than average printing time of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from $100,000 USD to $300,000 USD on market as of April, 2016. Testing variables: Part quantity: 1.4 full build chamber of parts from HP Jet Fusion 3D at 20% of packing density on fast print mode vs same number of parts on above-mentioned competitive devices; Part size: 30 grams; Layer thickness: 0.08 mm/0.0031 inches. HP Jet Fusion 3D Printing Solution average printing cost-per-part is half the average cost of comparable FDM & SLS printer solutions from $100,000 USD to $300,000 USD on market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 1build chambers per day/ 5 days per week over 1 year of 30-gram parts at 10% packing density using HP 3D High Reusability PA 12 material, and the powder reusability ratio recommended by manufacturer.

Where is the opportunity today?

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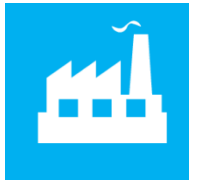


INDUSTRIAL & SERVICES

AGRICULTURE, MINING & ENERGY

Final part production

Final parts - Communications equipment components

Company background:

FORECAST 3D provides a unique depth of custom manufacturing and 3D printing services to a wide variety of industries including Healthcare, Automotive, Aerospace, Consumer Goods, and Design.

Forecast 3D customer, Knuckledragger Design Inc., designs and manufactures custom components for communications equipment used by government agencies.

Challenge:

During their design and production process, Knuckledragger would usually:

- Develop a prototype using traditional manufacturing methods
- Modify the design for a production run on an injection molding press
- Spend another 25 hours to redesign for the mold, which caused a bottleneck

With HP MJF, they can:

- Cut out having to redesign for the mold, instead designing parts specifically for the HP MJF process
- Apply features that are unique to additive manufacturing
- Produce usable parts at cost-effective prices compared to CNC or injection molding
- Cut up to two weeks off their production schedule

"...we can actually design the parts and get them quickly. And they're printed, so we can design them however we want, where previously we were restricted by the manufacturing methods."

Knuckledragger Design Inc. owner, Mike McCrory

Final parts – Consumer Goods – LookReal customized dolls

Company background:

LookReal is a doll manufacturer located in Alicante, Spain. They have decades of experience in the art of doll making.

Through research and experience, they found that the number one reason children play with action figures and dolls is because they see themselves reflected in them. They imagine they are the doll.

Challenge:

- Start a new business, creating dolls unique to each customer
- Find an alternative to traditional injection molding production, that was too costly for mass customization, as well as time-consuming
- Identify a 3D printing technology that was fast, produced a robust product at optimal costs.

With HP MJF, they can:

- Create an affordable doll that is highly personalized - and get their new business idea off the ground.
- Make some of the molds used for mass production and also produce prototypes. This has helped them to eliminate the need for a sculptor and saves the company a considerable amount of time and money.

"HP's Multi Jet Fusion was the only 3D printing technology that allowed us to create personalized doll faces at a reasonably decent price. It's also helped us streamline cost and time in other aspects of our business, allowing us to be far more nimble."

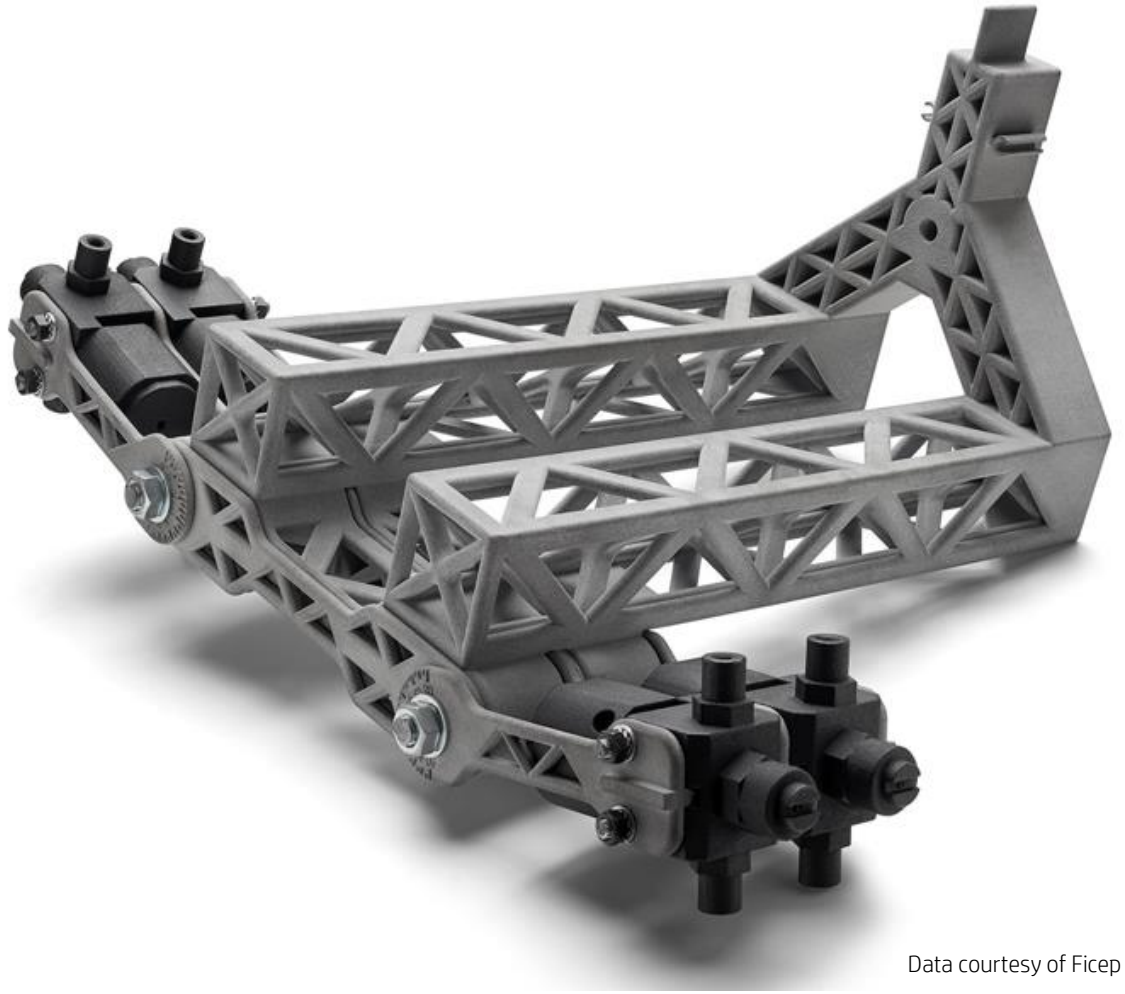
Philippe Jouvert, LookReal CEO

Final parts - Machinery & Equipment / Robots
Grippers / End effectors

The **end effector** or gripper is the device at the end of a robotic arm, designed to interact with the environment.

Why HP MJF?

- Low cost
- Grippers can be totally customized without taking into account minimum volume production.
- More freedom of design.
- Assemblies optimization.



Data courtesy of Ficep S3

Based on internal testing and simulation, HP Jet Fusion 3D Printing Solution average printing cost-per-part is half the average cost of comparable FDM & SLS printer solutions from $100,000 USD to $300,000 USD on market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 1build chambers per day/ 5 days per week over 1 year of 30-gram parts at 10% packing density using HP 3D High Reusability PA 12 material, and the powder reusability ratio recommended by manufacturer.

Final parts - Automatic Paint Machine

Company background:
FICEP Steel Surface Systems (S3) is a high tech engineering and research & development company which operates worldwide within the FICEP group.

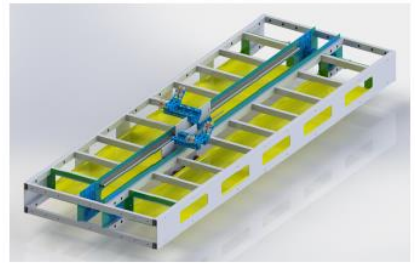
HP Multi Jet Fusion technology was used to overcome challenges typically faced with traditional production methods.

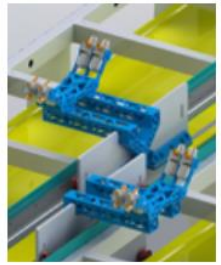
With HP MJF, they can:

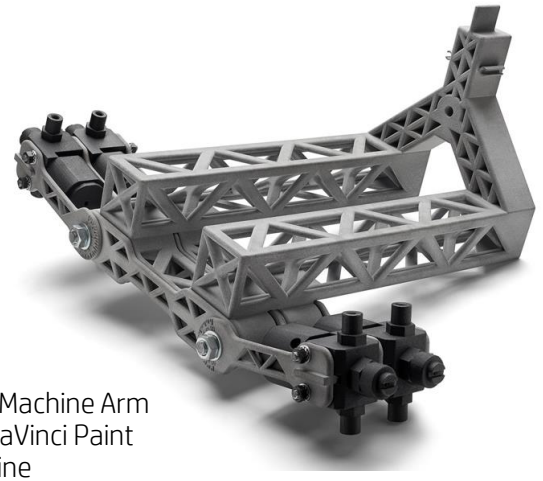
- Improve the design of an automatic paint machine arm - it is now extremely lightweight
- Optimize geometry with DFAM (design could not be machined or moulded)
- Improve the machine arm performance and help enable savings for the end customer
- Reduce the height of the entire machine, as well as the volume of air that needs to be filtered, and in turn the size of the filtration unit.

FICEP S3 aims to replace as much as 40% of the machine's traditionally manufactured parts with HP MJF technology.


FICEP S3's DaVinci Automatic Paint Machine


FICEP S3's DaVinci Automatic Paint Machine


Machine Arm


HP MJF printed Machine Arm for FICEP S3 DaVinci Paint Machine

Final parts - Pneumatic Robotics

IAM 3D Hub, a Digital Innovation Hub and Competence Centre in Additive Manufacturing and 3D Printing, aims to provide SMEs a “One-stop shop” to assess, guide and address all their needs in AM.

IAM 3D Hub has been developing robotic systems for supply chain operations with better safety controls.

Parts of these robots have been produced using HP Multi Jet Fusion technology to create customized parts and innovative pneumatic systems that could not be produced with other 3D printing technologies, due to material or structural porosity.

HP MJF Robotic arm grip

- Customized frame shape perfectly fits the final part
- More design versatility and optimization for the part

HP MJF Pneumatic grip

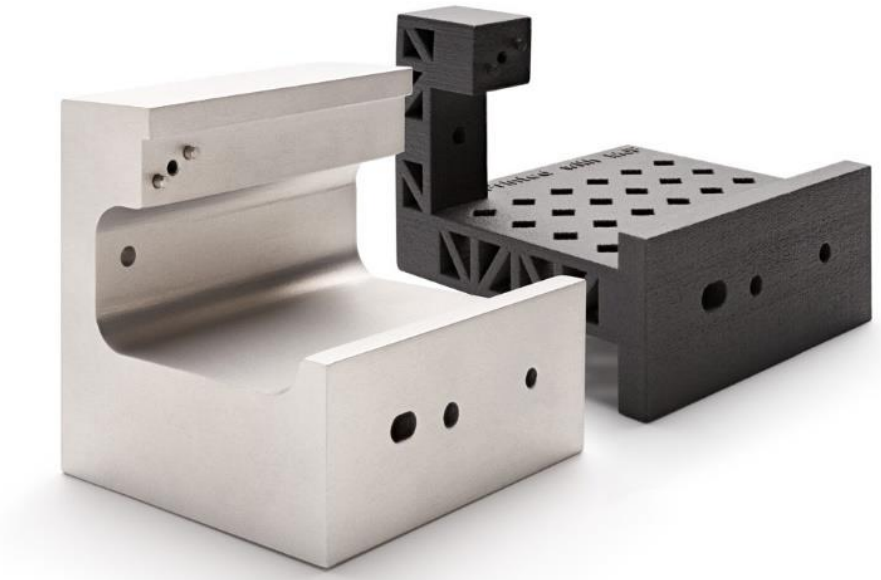
- Grip needs to last a minimum of one million cycles
- Design improved to enable this by strengthening typical failure areas and adding smaller, precise mechanisms for better movement and stability.

HP MJF Pneumatic Lateral Actuator

- Flexibility and elongation of HP 3D HR PA 12 material allows for very thin but strong folding areas.

Final parts - Machinery / Household Appliances / Medical Equipment
Interior visible & non visible parts

For low volume machinery, some parts are produced by machining or sheet metal instead of injection molding because it is not worth manufacturing a mold.



Why HP MJF?

- Low cost
- Fast time to part
- Good tolerances
- More freedom of design to adapt design, weight and geometry
- Assemblies optimization

Final parts – Machinery

Company background:

SIGMADESIGN is a product development services company, offering solutions that help clients take their products from concept to production and beyond. Among other services, SIGMADESIGN provides industrial design, quality assurance and testing, and engineering support, in addition to end product manufacturing.

Challenge:

SIGMADESIGN usually used injection molding and machining to produce parts for fruit labeling machines. They were looking to reduce costs and improve the speed and flexibility of their design process.

SIGMADESIGN's engineers looked to redesign the **vacuum applicator fitting**. It was originally machined, but its simple design created a right angle, which created a design constraint for production.

They created a more efficient design that removed the right angle, which would eliminate the potential of friction with other parts. They first attempted to 3D print it using a fused deposition modeling (FDM) printer. Unfortunately the part did not meet the company's quality requirements. It was too porous and lacked strength.

With HP MJF:

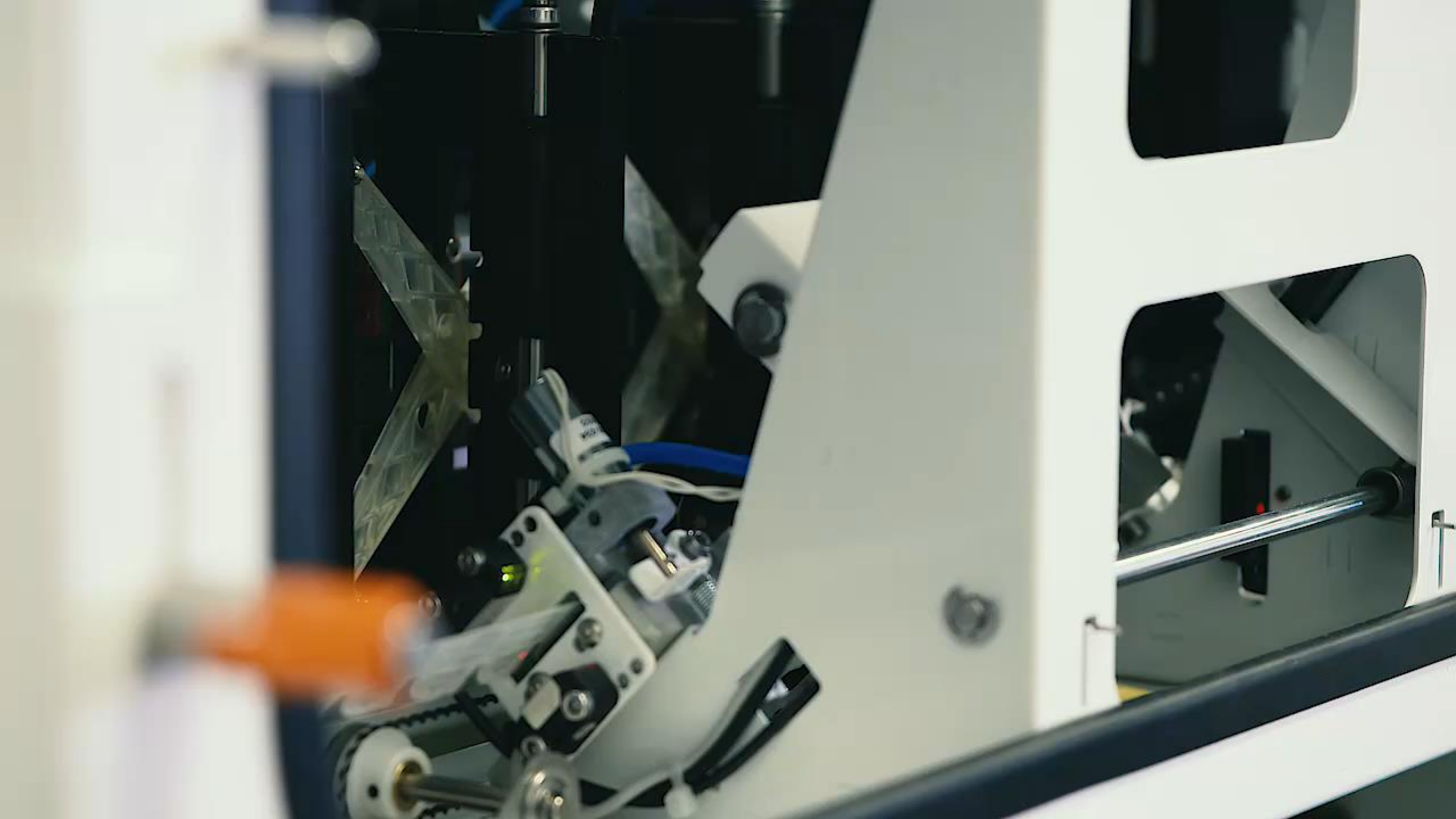
SIGMADESIGN printed the part using their new HP Jet Fusion 3D 4200 printer. From a quality standpoint it was vastly superior. The part didn't leak and was strong enough for a production environment.

Armed with this new technology, the engineers at SIGMADESIGN identified a total of 877 other parts which could be 3D printed.

Vacuum applicator fitting

Tapered pulley

Rotary sensor flapper arm



Final parts - Machinery / Household Appliances / Medical Equipment
Fluid vessels

Fluid vessels are deposits or ducts that contain fluids.

Ducts are produced by extrusion. Deposits are produced normally by blow molding.

Why HP MJF?

- Fluid tightness without any post-processing.
- Unification of different ducts or parts together.
- Optimization of product space.
- Flow efficiency improvement.
- HP 3D HR PA 12 is inert with water, break fluid, alcohols.

Requirements

- HP 3D HR PA 12 parts have been tested to prove chemical compatibility with water, break fluid and air (passed).
- HP 3D HR PA 12 parts can work with a constant pressure up to 20 bar and 4mm wall thickness during 7h.

HP MJF cooling duct

HP Jet Fusion 3D print solution with HP 3D High Reusability PA 12 has the highest post-production surplus powder reusability with 80% reusability vs any other powder based 3D printing technology using PA 12 material. Consistent performance with only 20% powder refresh rate.

Final parts - Machinery / Household Appliances / Medical Equipment
Housings / covers

External covers are normally manufactured by injection molding or rotomolding. In different industries we can find short run machinery where the use of 3D printed covers makes a lot of sense from an ROI point of view.

Why HP MJF?

- Digital manufacturing, which allows production of a totally customized product
- Cost for low volume production can be optimized.
- Design freedom to produce shapes that cannot be produced with other technologies.

Data courtesy of NACAR

Final parts - HP 3D HR PA 12 GB Applications

Shaver housing concept FINAL PART and prototyping

Data courtesy of NACAR

Why PA 12 GB?

- High dimensional stability is needed for assembling the two parts
- High stiffness, which is important for functionality in this application

Why 3D printing?

- Most cost-effective alternative for prototyping this type of part

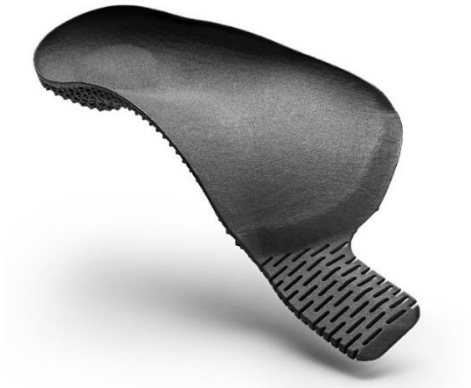
Application description

- Prototyping

Final parts - Insoles (personalized orthotics & footwear)

An insole is the interior bottom of the shoe, which provides support for the foot.

Orthotic insoles redistribute ground reaction forces as well as realigning foot joints while standing, walking or running.



Data courtesy of RS Print, powered by RS Scan and Materialise

Why HP MJF?

- Digital manufacturing of the insoles, which allows production of a totally customized product
- Fast time to part
- Reduced cost
- Repeatable process

Based on internal testing and simulation, HP Jet Fusion 3D average printing time is up to 10 times faster than average printing time of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from $100,000 USD to $300,000 USD on market as of April, 2016. Testing variables: Part quantity: 1.4 full build chamber of parts from HP Jet Fusion 3D at 20% of packing density on fast print mode vs same number of parts on above-mentioned competitive devices; Part size: 30 grams; Layer thickness: 0.08 mm/0.0031 inches. HP Jet Fusion 3D Printing Solution average printing cost-per-part is half the average cost of comparable FDM & SLS printer solutions from $100,000 USD to $300,000 USD on market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 1build chambers per day/ 5 days per week over 1 year of 30-gram parts at 10% packing density using HP 3D High Reusability PA 12 material, and the powder reusability ratio recommended by manufacturer.

Final parts - Personalized prosthetics & orthotics

A Prosthesis is an artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions.

Orthoses are devices which are applied externally to any part of the body in order to prevent or correct deformity, promote or improve function of the affected area or assist in the reduction of pain.

Applications examples

- Protection Helmet
- Orthoses for hands, legs
- Arm/leg cast/plasters
- Boots
- Scoliosis braces
- Post surgery splints

Why HP MJF?

- Digital manufacturing of the insoles, which allows production of a totally customized product
- Fast time to part
- Reduced cost

Data courtesy of Invent Medical

Final parts - HP 3D HR PA 11 Applications

FINAL PART and prototyping cast by Optimus 3D

Why PA 11?

- Flexible part for comfort
- High tensile strength and elongation at break – resistant to breaking when the two parts fit into each other

Why 3D printing?

- Customization. Part adapted to patients' anatomy

Application description

- Healthcare – personalized prosthetics

Final parts – Hand orthotics

Company background:
Optimus 3D, founded in 2014, is a team of engineers who design for additive manufacturing technologies in order to find the best solutions to suit the needs of each customer.

Challenge:
They collaborated with Bioef and the Osakidetza-Basurto traumatology team to design and manufacture customized casts fully adapted to the patient's anatomy.

With HP MJF:
With 3D scanning, CAD 3D tools and HP Multi Jet Fusion technology, cast designs can be optimized in order to:

- Produce lighter models
- Reduce material
- Improve ergonomics

Traditional cast design

Data courtesy of Optimus 3D

HP MJF cast

HP 3D HR PA 11 Applications

Phone case concept for mobility , FINAL PART and Prototyping

Why PA 11?

- High impact strength makes it a functional part
- Good elongation at break which makes this part easy to assemble

Why 3D printing?

- Enables short run production and customization to help meet customer demands with Lower CPP vs Injection molding

Application description

- Consumer goods - FMCG
- Customizable smartphone cases that can be attached to multiple devices such as Car, Bike, Etc.

HP 3D HR PA 11 Applications

Customized clip

Why PA 11?

- High tensile strength and elongation at break:
  - make it resistant to breaking when the two parts fit into each other.

Why 3D printing?

- Suitable for short run production of clips in order to meet particular design needs

Application description

- Consumer goods - Snap fit

HP 3D HR PA 11 Applications

Hill New Rock shoes

Why PA 11?

- High impact strength is needed for this kind of application
- High tensile strength and elongation at break make it resistant to breaking when assembly

Why 3D printing?

- Ideal for short run customized production
- Complex structures can be printed in one job with no assembly needed

Application description

- Consumer goods - Footwear

HP 3D certifications

Biocompatibility - USP Class I-VI and FDA Intact Skin Surface Devices
http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-0331ENW

RoHS REACH

http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-0939ENW

PAHs

http://h20195.www2.hp.com/v2/GetDocument.aspx?docname=4AA7-1264ENW