# Beneficial use of 3D high performance plastic parts in automotive

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infinite possibilities

# Agenda

01 About INTAMSYS

02 Automotive Applications

03 Jigs & Fixtures

04 Various applications in automotive

05 Q&A

# Agenda

01 About INTAMSYS

# About INTAMSYS

*“create infinite possibilities to customize our future”*

- World leading high-tech company providing high performance 3D printing polymers, additive manufacturing solutions and software
- Established in 2013
- Headquartered in Shanghai, China
- Worldwide sales and support operations with EMEA office based in Stuttgart Germany
- INTAMSYS solutions are targeted to aerospace, automotive, electronics, medical, R&D, other high-tech industries


polymaker
KIMYA 3D materials by ARMOR
ARKEMA INNOVATIVE CHEMISTRY
3DXTECH Additive Manufacturing
victrex
سابك sabic
SOLVAY
eSUN

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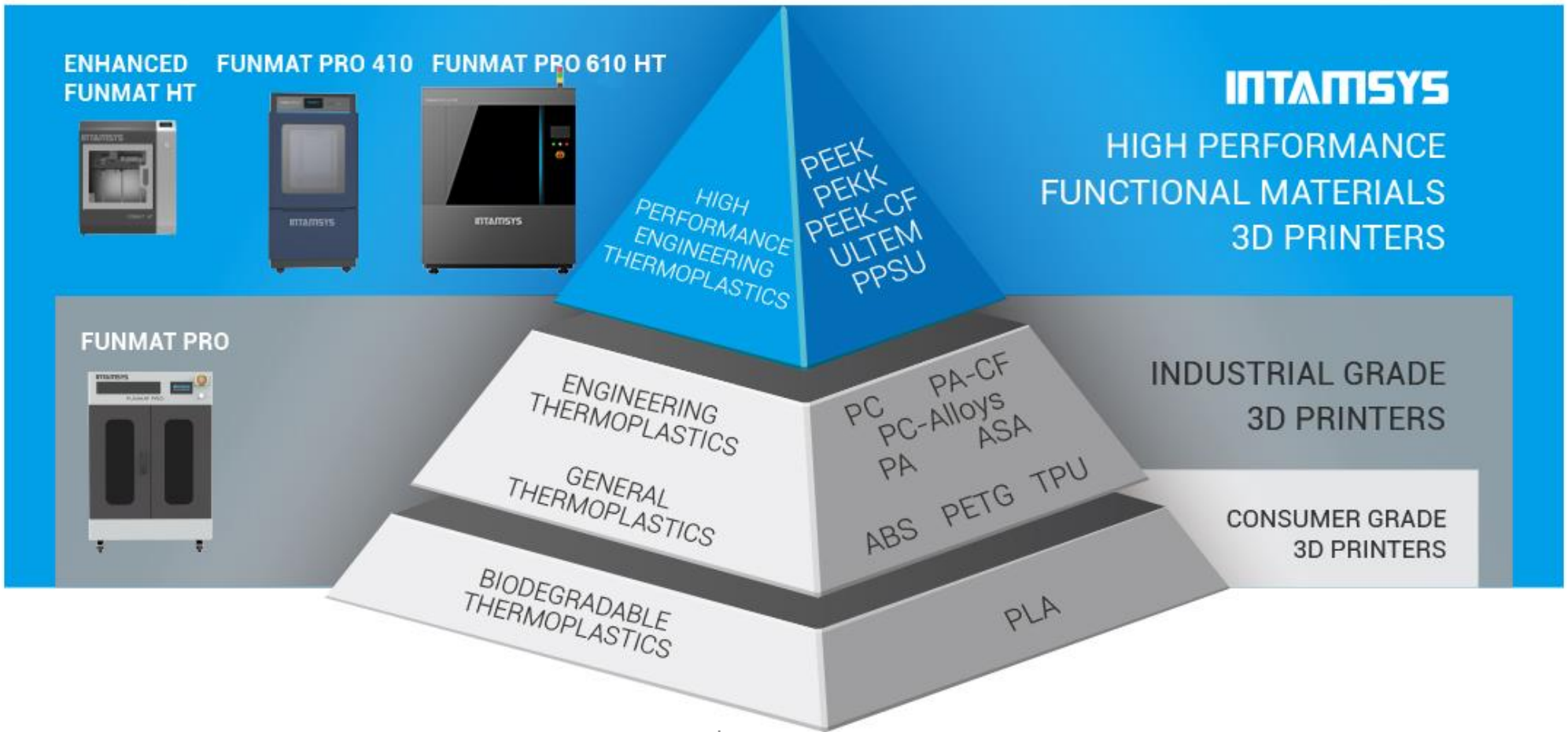
# A Multiple Functional Material All-in-one Solution
# Ideal for Industrial Additive Manufacturing

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# Global Sales & Support Networks

# Agenda

02

Automotive applications

# Automotive – growing opportunity for 3D printed parts

**26.2% CAGR** of Global 3D printing in the Automotive market from 2017-2023 (Reuters)

# Automotive– key application areas

| | Application area | Motorsport | Passenger Vehicles | Specialty Vehicles* |
|---|---|---|---|---|
| 1. | Manufacturing optimization<br>➢ Jigs & fixtures<br>➢ tooling | ✔ | ✔ | ✔ |
| 2. | Functional prototyping/ conceptualization | ✔ | ✔ | ✔ |
| 3. | Vehicle performance optimization<br>➢ Light weighting<br>➢ 3D design | ✔ | | ✔ |
| 4. | Spare parts<br>➢ Maintenance and repair<br>➢ Spare parts digital manufacturing | ✔ | | ✔ |
| 5. | Initial or small part series production | ✔ | | ✔ |

*Including, military, special purpose and luxury and limited-edition vehicles

# Agenda

03

jigs and fixtures

# A closer look at key application area: Jigs & Fixtures

- What are Jigs & Fixtures?
  - Production tools used to accurately produce series manufactured parts with consistent quality
- Why use them?
  - Ensures uniform part quality
  - Simplifies the production process
  - Provides faster transition in production from one stage to the next (improved production throughput)
  - Reduces rework (less errors) which reduces cost and speeds up production time
  - Increases worker safety and ergonomics

# Understanding Jigs & Fixtures

## Why 3D Print Jigs & Fixtures?

- Fewer geometrical restrictions
  - No design constraints – designing for manufacturability a thing of the past
- Strong & lightweight
  - **Replacing metal parts with high strength plastic** will lead to much lighter weight parts
- Faster lead time
  - Traditional manufacturing aids often take weeks/months to acquire, utilizing AM brings lead times down to hours/days
- Lower cost
  - Traditional manufacturing of fixtures has high costs due to set up time, material costs and machine/labor time involved.  AM can provide cost savings up to 90%
- Health and safety
  - AM allows you to build jigs & fixtures with the end use in mind, allowing for lightweight parts that are ergonomically friendly for the end user

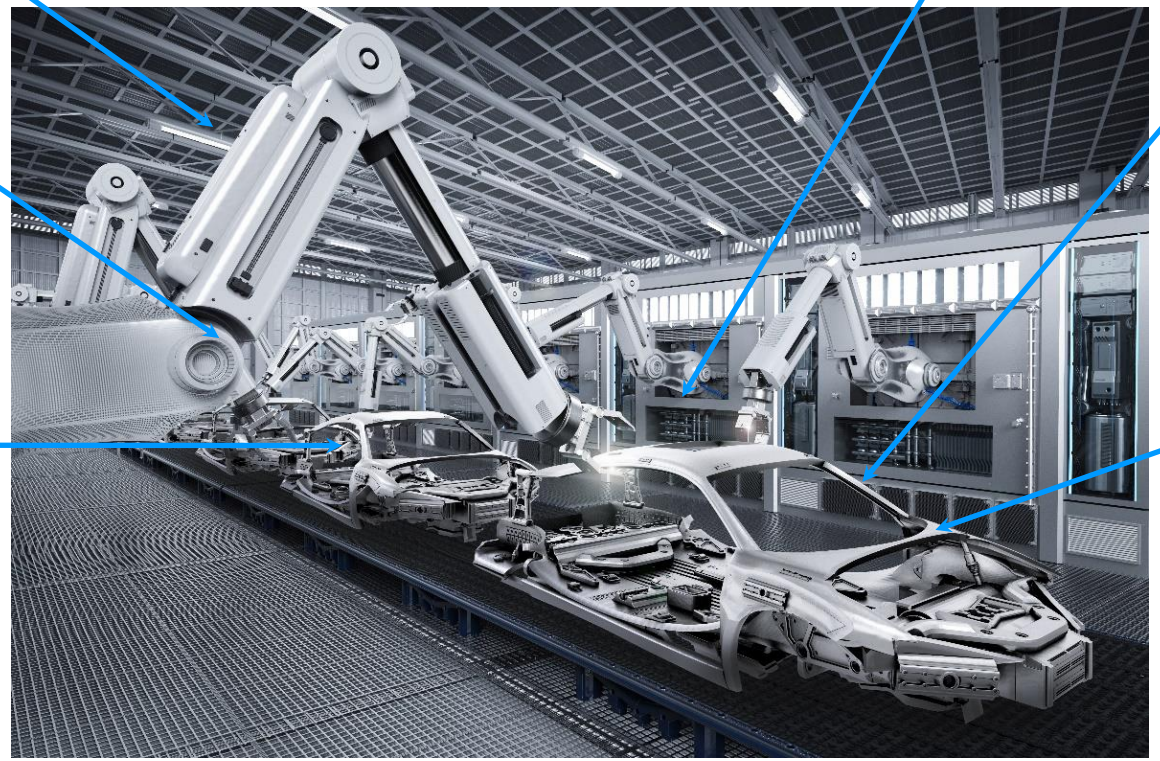
# Jigs & Fixtures: Where do you find them on the manufacturing floor?

**Quality Control** - Tooling to aid in the inspection and QC process, specialty holding devices or measurement aids

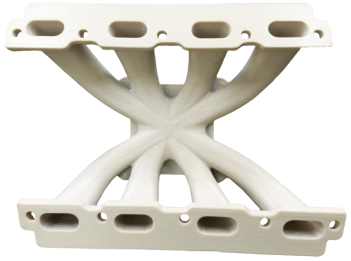
**Organization and Transportation** - Tooling designed for movement of parts within a facility or during shipment

**Health & Safety** - Specialty tooling designed to aid worker safety and address ergonomic issues in the production environment

General Manufacturing Floor

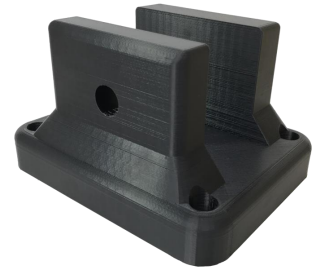


**R&D** - Tooling used in the early phases of product development and manufacturing



**Assembly** - Tooling for the assembly process, aiding workers to align and hold parts during assembly

**Production** - Parts and tools for the equipment used in the fabrication process



# Examples of AM Fixtures/Tooling

- Assembly fixtures
- Work-holding fixtures
- Welding fixture
- CMM fixture
- Inspection fixture
- Alignment fixture
- Routing fixture
- Drill guide
- Marking templates
- Masking tools
- Soft jaws
- End effectors
- End of arm tooling
- Laser marking fixtures
- Trim guide
- Glue fixture
- Stamp fixture
- Thermoform molds
- Clamping fixture
- Part nesting tray
- Hydroforming tool
- Rubber pad press tool
- Injection mold
- Silicone mold
- Investment casting pattern
- Sand casting pattern
- Placement fixture
- Locating fixture
- Transportation tray
- 5S Organizational aids
- Surrogate parts
- Sacrificial tooling
- Blow mold
- Cast urethane mold
- Check fixture
- Vacuum forming mold
- Composite layup tool
- Go/no go gauges
- Weldment fixture
- RTV mold

# Testing Fixture - sample

**Quality Control Gauge**
**Material: PC**

Benefits:

1. 76% reduction in cost per part in comparison with traditional CNC production
2. Faster and high-level customization
3. Faster Production Turnaround Time

# Jigs & Fixtures - When to consider high Performance 3D Printed parts

**Consider 3D printer parts when**

- Tool is small to moderately sized – 13mm –-500mm
- Small production quantities are 1 – 100+ pieces
- Materials are compatible: confirm material is suitable for:
  - Mechanical and electrical properties (replace metal?)
  - Chemical and thermal resistance
- Easy to implement and deploy
- Replacement or revision rate is frequent (due to wear out or frequent changes)
- New operations or processes are being implemented

# Agenda

04

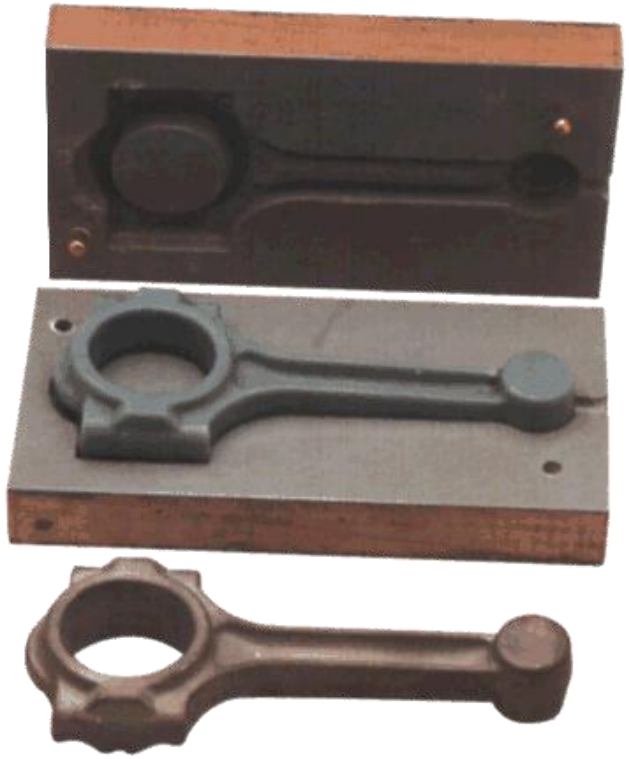
Various applications in automotive

# More tools….

End of Arm Tooling

Thermoforming

Hydroforming



Sand Casting

# Real part production - small series part production - sample

**Drive Gear**
**Material: PEEK**

Benefits

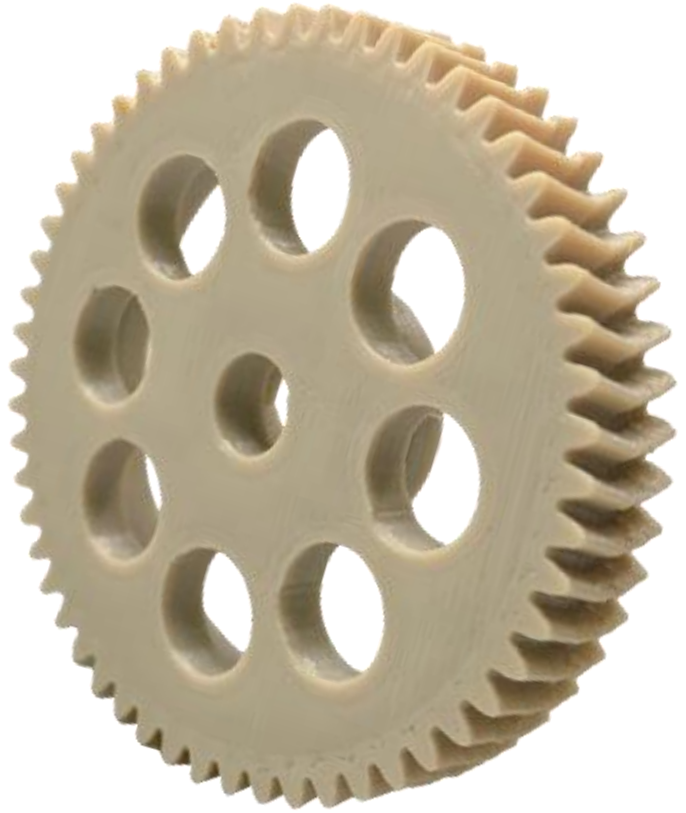
1. **Reduce 68% weight** comparing to metal
2. Generally lower part production cost
3. Fatigue resistant and self-lubricating
4. Noise reduction
5. Fast prototyping
6. Easier process

# Real part production – small series part production - sample

**Oil Pump Gear**
**Material: PEEK**

Benefits

1. Chemical inertness, resistance to corrosive gas and liquid
2. Excellent flame retardancy
3. Fatigue resistance and self-lubricating
4. Rust-proof, plastics will never get rusted
5. Abrasive resistance

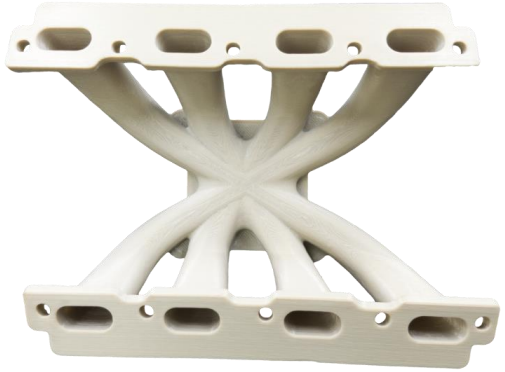


….and many other automotive parts samples….

**ULTEM 9085** Spare Part

**ULTEM 1010** Spare Part

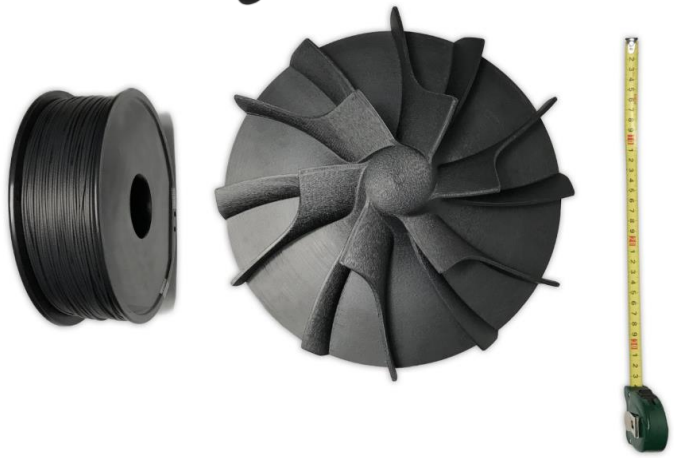
**PEEK** Manifold for Functional Test



**ULTEM 1010** Spare Part for Functional Prototype

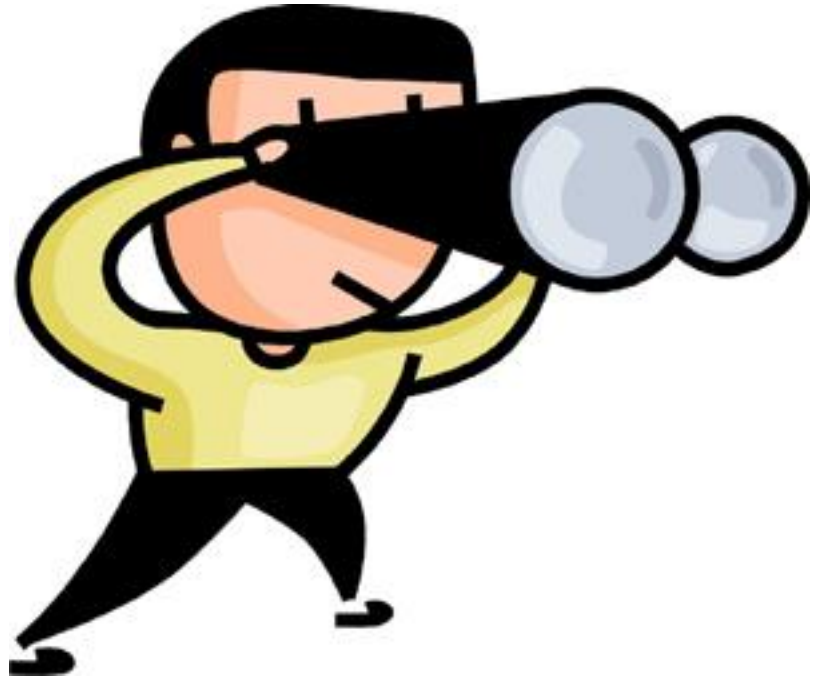
**PA-CF** Spare Part for Functional Prototype

**PA-CF** for Spare Part for Functional Prototype



# Finding the Right Applications at your manufacturing site

- Look for tooling on the factory floor, check how it's made and if it could be improved
- Watch out for low volume, high value, and possibly complex parts
- Check out how your factory automation (robots) their EOAT/end effectors are produced – also see if they've run into issues with their current method – time/cost/performance
- Look for opportunities to replace metal with PEEK, ULTEM, PEKK, PA-CF, PA- GF, to gain benefits of weight and cost reduction and faster lead time
- Find painful applications that you have struggled with in the past



# Agenda

05

Q&A

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