# HP 3D High Reusability (HR) PA 11 Gen2

Data courtesy of CURE LAB

## A ductile, bio-based material[1] for repeatable and cost-effective part production[2]

## Produce strong, ductile parts with high repeatability

- Engineered to produce parts with consistently high mechanical properties
- Maximize part quality and yield for production applications[5]
- Ideal for final use parts across a variety of industries

## Minimize material waste and cost of production

- Thermoplastic material delivering optimal mechanical properties
- Enables up to 80% material reusability[3]
- Manufactures parts at up to 40% lower cost than previous PA 11 generation[4]

## Reduce your environmental impact

- Bio-based material, derived from castor oil, reduces your environmental impact[1,7]
- Access the best PA 11 reusability in the market for optimal material efficiency[6]
- Achieve the lowest possible carbon footprint for MJF parts[7]

# General properties

| | Value | Method |
|---|---|---|
| Powder melting point (DSC) (°C / °F) | 202 / 396 | ASTM D3418 |
| Particle size (µm) | 54 | ASTM D3451 |
| Bulk density of powder (g/cm³ / lb/in³) | 0.48 / 0.017 | ASTM 1895 |

# Mechanical properties[8]

| | Axis | Average value | Method |
|---|---|---|---|
| Tensile Strength (MPa)[i] | XY | 52 | ASTM D638 |
| | Z | 52 | |
| Tensile Modulus (MPa)[ii] | XY | 1740 | ASTM D638 |
| | Z | 1800 | |
| Elongation at Yield (%)[iii] | XY | 25 | ASTM D638 |
| | Z | 20 | |
| Elongation at Break (%)[iv] | XY | 35 | ASTM D638 |
| | Z | 20 | |
| Impact strength (kJ/m²)[v] | XY | 6.0 | ASTMD256 |
| | Z | 4.0 | |
| Density (g/cm³) | XY | 1.04 | ASTMD792 |
| | Z | 1.04 | |

i. 95% measured tensiles show Tensile Strength above 49 MPa.
ii. 95% measured tensiles show Modulus values above 1690 MPa.
iii. 95% measured tensiles show Elongation at Yield in XY-direction above 24% and in Z-directon above 13%.
iv. 95% measured tensiles show Elongation at Break in XY-direction above 27% and in Z-directon above 13%.
v. Using the Izod test method A with notched @3.2 mm specimen according to the ASTM D256 standard.

# PA11 Generational Improvement in Repeatability

The below table highlights the improvement in mechanical variation in PA 11 Gen2 printed on the HP Jet Fusion 5600 Series compared to the first generation PA 11 printed on the HP Jet Fusion 5200 Series.

| | Axis | PA 11 Gen2 | PA 11 (Gen1) | Test Method |
|---|---|---|---|---|
| Standard Deviation of Elongation at Break (%)[i] | Z | 6.0 | 14.2 | ASTM D638 |

i. Based on internal testing and measured using the "HP Tensile Forest Job" following material quality control guidelines.

# Dimensional capabilities

Testing was performed for HP 3D HR PA 11 Gen2 with 20% refresh ratio using the PA 11 Gen2 Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.
The table below shows the dimensional tolerances obtained during the characterization for a target process capability of Cpk= 1.33 (4 sigma).

| Tolerances for $C_{pk}$= 1.33[i,ii] (in mm) | Nominal dimension | | | | | |
|---|---|---|---|---|---|---|
| | 0 - 30 mm | | 30 - 50 mm | | 50 - 80 mm | |
| | XY | Z | XY | Z | XY | Z |
| With the default setting for HP Jet Fusion 5600 Series 3D Printing Solutions | ±0.27 | ±0.45 | ±0.33 | ±0.60 | ±0.4 | ±0.99 |

i. Based on internal testing and measured using the HP dimensional capability characterization job. Results may vary with other jobs and geometries.
ii. Using HP 3D HR PA 11 Gen2 material, 20% refresh ratio, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.

The table below shows the dimensional tolerances if the process capability target is set to Cpk = 1.00 (3 sigma).

| Tolerances for $C_{pk}$= 1.00[i,ii] (in mm) | Nominal dimension | | | | | |
|---|---|---|---|---|---|---|
| | 0 - 30 mm | | 30 - 50 mm | | 50 - 80 mm | |
| | XY | Z | XY | Z | XY | Z |
| With the default setting for HP Jet Fusion 5600 Series 3D Printing Solutions | ±0.23 | ±0.34 | ±0.25 | ±0.45 | ±0.3 | ±0.75 |

i. Based on internal testing and measured using the HP dimensional capability characterization job. Results may vary with other jobs and geometries.
ii. Using HP 3D HR PA 11 Gen2 material, 20% refresh ratio. Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.

"As a global leader in 3D-printed O&P, we know that mechanical durability is the key to delivering high-quality, reliable medical devices. The new HP 3D HR PA 11 Gen2 material shows strong potential to further enhance performance, repeatability, and robustness in next-generation custom O&P devices produced with HP MJF technology."

**Michael Rosicky**
Vice President, Manufacturing
Invent Medical

Discover more today

# Ordering information*

| Product number | Material |
|---|---|
| B87XLA | HP 3D HR PA 11 Gen2 300L/ 146 kg Material |

*Available for HP Jet Fusion 5600 Series 3D Printing Solution.

# Safety datasheet*

| Product number | Link to Safety Datasheet |
|---|---|
| B87XLA | HP 3D HR PA 11 Gen2 300L/ 146 kg Material |

*The link provided refer to US English version of the Safety Datasheet.

Other country specific Safety Datasheets are available here.
If you need more information please contact your HP AM representative.

1. The bio-based carbon content of HP 3D High Reusability PA 11 Gen2 powder is 100% according to ASTM D6866. The bio-based carbon atoms in the product originate from castor plants that do not compete with food crops and are grown without GMOs in semi-arid areas.
2. Compatible with HP Jet Fusion 5600 Series 3D Printing Solutions.
3. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 11 Gen2 provide up to 80% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.
4. As of October 2025, the HP Total Cost of Ownership (TCO) tool calculates 40% lower variable cost comparing HP 3D HR PA 11 Gen2 parts from the HP Jet Fusion 5600 Series to HP 3D HR PA 11 (Gen1) parts from the HP Jet Fusion 4200 Series, assuming maximum reusability of 80% for HP 3D HR PA 11 Gen2 and 70% for HP 3D HR PA 11 (Gen1).
5. Optional access to HP 3D Process Development is available on the HP Jet Fusion 5600 Series 3D Printing Solution to fine tune part quality outcomes.
6. As of October 2025, no other PA 11 material in the Additive Manufacturing industry offers 80% material reusability. Source: internal audit.
7. As of October 2025, PA 11 Gen2 yields lower carbon footprint parts compared to all other materials enabled for MJF.
8. Based on internal testing and measured using the “HP Half_Commercial_Datasheet_Job” and 2 material lots following material quality control guidelines. Results may vary with other geometries, jobs, material lots, and material conditions. Using HP 3D HR PA 11 Gen2, 20% refresh ratio, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure.


4AA8-5018ENW, November 2025