

HP 3D High Reusability PA 12

Strong, lowest cost,¹ quality parts



Produce strong, functional, detailed complex parts

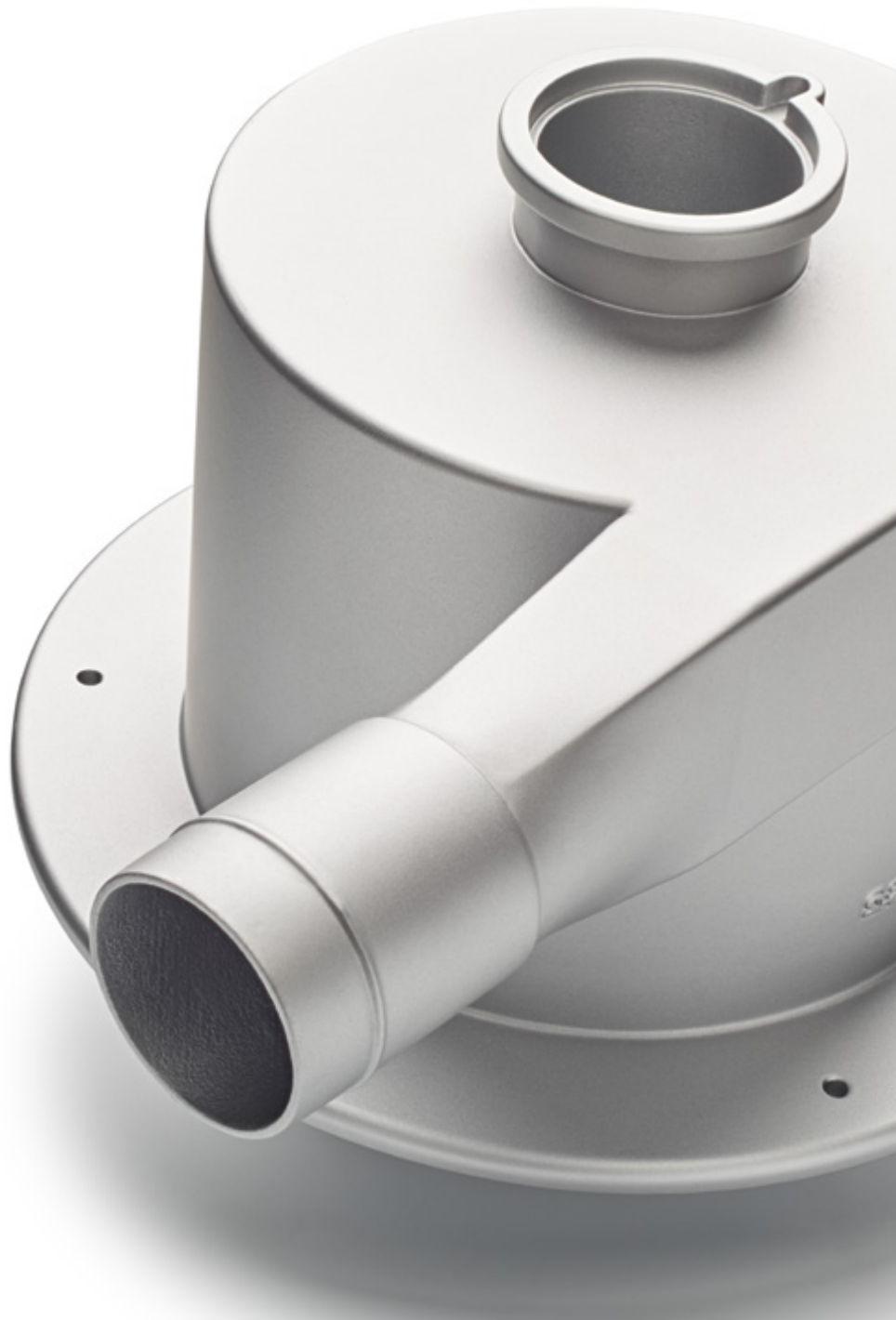
- Robust thermoplastic produces high-density parts with balanced property profiles and strong structures.
- Provides excellent chemical resistance to oils, greases, aliphatic hydrocarbons, and alkalis.²
- Ideal for complex assemblies, housings, enclosures, and watertight applications.
- Biocompatibility certifications—meets USP Class I-VI and US FDA guidance for Intact Skin Surface Devices.³

Quality at the lowest cost per part¹

- Achieve the lowest cost per part¹ and reduce your total cost of ownership.⁴
- Minimize waste—reuse surplus powder batch after batch and get functional parts, no throwing away anymore.⁵
- Get consistent performance while achieving 80% surplus powder reusability.⁵
- Optimize cost and part quality—cost-efficient material with industry-leading surplus powder reusability.⁵

Engineered for HP Multi Jet Fusion technology

- Designed for production of functional parts across a variety of industries.
- Provides the best balance between performance and reusability.⁷
- Achieves watertight properties without any additional post-processing.
- Engineered to produce final parts and functional prototypes with fine detail and dimensional accuracy.



Picture taken after graphite post-processing

For more information, please visit
hp.com/go/3DMaterials

Performance results for HP 3D HR PA 12

Testing was performed for HP 3D HR PA 12 with a 20% refresh ratio using the PA 12 Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.

Table 2 shows the dimensional tolerances obtained during the characterization for a target process capability² of $C_{pk} = 1.33$ (4 sigma).

| Tolerances for $C_{pk} = 1.33$ ^{ii iii} (in mm) | Nominal dimension | | | | | |
|--|-------------------|-------|------------|-------|------------|--------|
| | 0 – 30 mm | | 30 – 50 mm | | 50 – 80 mm | |
| | XY | Z | XY | Z | XY | Z |
| With the general dimensional profile for the HP Jet Fusion 5200 Series 3D Printing Solution | ±0.25 | ±0.42 | ±0.30 | ±0.50 | ± 0.37 | ± 0.60 |
| With a hardware-specific dimensional profile generated by HP 3D Process Control | ±0.17 | ±0.25 | ±0.20 | ±0.30 | ± 0.23 | ± 0.37 |

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 12 material, 20% refresh ratio, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.

iii. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure.

Table 2. Dimensional capabilities for HP 3D HR PA 12. Target process capability of $C_{pk} = 1.33$.

Table 3 shows the dimensional tolerances if the process capability target is set to $C_{pk} = 1.00$ (3 sigma).

| Tolerances for $C_{pk} = 1.00$ ^{ii iii} (in mm) | Nominal dimension | | | | | |
|--|-------------------|-------|------------|-------|------------|--------|
| | 0 – 30 mm | | 30 – 50 mm | | 50 – 80 mm | |
| | XY | Z | XY | Z | XY | Z |
| With the general dimensional profile for the HP Jet Fusion 5200 Series 3D Printing Solution | ±0.19 | ±0.34 | ±0.23 | ±0.40 | ± 0.28 | ± 0.47 |
| With a hardware-specific dimensional profile generated by HP 3D Process Control | ±0.13 | ±0.21 | ±0.16 | ±0.25 | ± 0.18 | ± 0.30 |

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 12 material, 20% refresh ratio, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars..

iii. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure

Table 3. Dimensional capabilities for HP 3D HR PA 12. Target process capability of $C_{pk} = 1.00$.

Technical specifications⁸

| Category | Measurement | Value | Method |
|-----------------------|---|-------------------------|-------------------------|
| General properties | Powder melting point (DSC) | 187 °C/369 °F | ASTM D3418 |
| | Particle size | 60 µm | ASTM D3451 |
| | Bulk density of powder | 0.425 g/cm ³ | ASTM D1895 |
| | Density of parts | 1.01 g/cm ³ | ASTM D792 |
| Mechanical properties | Tensile strength, max load ⁹ , XY | 48 MPa/6960 psi | ASTM D638 |
| | Tensile strength, max load ⁹ , Z | 48 MPa/6960 psi | ASTM D638 |
| | Tensile modulus ⁹ , XY | 1700 MPa/247 ksi | ASTM D638 |
| | Tensile modulus ⁹ , Z | 1800 MPa/261 ksi | ASTM D638 |
| | Elongation at break ⁹ , XY | 20% | ASTM D638 |
| | Elongation at break ⁹ , Z | 15% | ASTM D638 |
| | Flexural strength (@ 5%) ¹⁰ , XY | 65 MPa/9425 psi | ASTM D790 |
| | Flexural strength (@ 5%) ¹⁰ , Z | 70 MPa/10150 psi | ASTM D790 |
| | Flexural modulus ¹⁰ , XY | 1730 MPa/251 ksi | ASTM D790 |
| | Flexural modulus ¹⁰ , Z | 1730 MPa/251 ksi | ASTM D790 |
| | Izod impact notched (@ 3.2 mm, 23°C), XYZ | 3.5 kJ/m ² | ASTM D256 Test Method A |
| Thermal properties | Heat deflection temperature (@ 0.45 MPa, 66 psi), XY | 175 °C/347 °F | ASTM D648 Test Method A |
| | Heat deflection temperature (@ 0.45 MPa, 66 psi), Z | 175 °C/347 °F | ASTM D648 Test Method A |
| | Heat deflection temperature (@ 1.82 MPa, 264 psi), XY | 95 °C/203 °F | ASTM D648 Test Method A |
| | Heat deflection temperature (@ 1.82 MPa, 264 psi), Z | 106 °C/223 °F | ASTM D648 Test Method A |
| Recyclability | Refresh ratio for stable performance | 20% | |
| Certifications | USP Class I-VI and US FDA guidance for Intact Skin Surface Devices, RoHS ¹¹ , EU REACH, PAHS | | |

Ordering Information

| | HP 3D High Reusability PA 12 | HP 3D High Reusability PA 12 Bundle 12 units | HP 3D High Reusability PA 12 |
|------------------|---|--|--|
| Product Number | V1R10A | V1R15A | V1R16A |
| Weight | 13 kg | 156 kg | 130 kg |
| Capacity | 30L ¹² | 360L ¹² | 300L ¹² |
| Dimensions (xyz) | 600 x 333 x 302 mm | 600 x 333 x 302 mm | 800 x 600 x 1205 mm |
| Compatibility | HP Jet Fusion 3D 4210/4200/3200 Printing Solution | HP Jet Fusion 3D 4200 Printing Solution | HP Jet Fusion 3D 4210/4200 Printing Solution |

Eco Highlights

- Powders and agents are not classified as hazardous¹³
 - Cleaner, more comfortable workplace—enclosed printing system, and automatic powder management¹⁴
 - Minimizes waste due to industry-leading reusability of powder¹⁵
- Find out more about HP sustainable solutions at hp.com/ecosolutions



For more information, please visit am3d.pl
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- Based on internal testing and public data, HP Jet Fusion 3D printing solution average printing cost per part on the HP Jet Fusion 3D 4200 Printing Solution is half the cost of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from \$100,000 USD to \$300,000 USD, when averaged together and not taken individually, in market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by the manufacturer. Cost criteria: printing 1-2 buckets per day/5 days per week over 1 year of 30-gram parts at 10% packing density using the powder reusability ratio recommended by the manufacturer.
- Tested with diluted alkalis, concentrated alkalis, chlorine salts, alcohol, ester, ethers, ketones, aliphatic hydrocarbons, unleaded petrol, motor oil, aromatic hydrocarbons, toluene, and DOT 3 brake fluid.
- Based on HP internal testing, June 2017, HP 3D600 Fusing and Detailing Agents and HP 3D High Reusability PA 12 powder meet USP Class I-VI and US FDA's guidance for Intact Skin Surface Devices. Tested according to USP Class I-VI including irritation, acute systemic toxicity, and implantation; cytotoxicity per ISO 10993-5, Biological evaluation of medical devices—part 5: Tests for in vitro cytotoxicity; and sensitization per ISO 10993-10, Biological evaluation of medical devices—Part 10: Tests for irritation and skin sensitization. It is the responsibility of the customer to determine that its use of the fusing and detailing agents and powder is safe and technically suitable to the intended applications and consistent with the relevant regulatory requirements (including FDA requirements) applicable to the customer's final product. For more information, see www.hp.com/go/biocompatibilitycertificate/PA12.
- Compared to selective laser sintering (SLS) and fused deposition modeling (FDM) technologies, HP Multi Jet Fusion technology can reduce the overall energy requirements needed to attain full fusing and reduce the system requirements for large, vacuum-sealed ovens. In addition, HP Multi Jet Fusion technology uses less heating power than SLS systems for better material properties and material reuse rates, minimizing waste.
- Based on using recommended packing densities and compared to selective laser sintering (SLS) technology, offers excellent reusability without sacrificing mechanical performance. Tested according to ASTM D638 and MFI test using HDT at different loads with a 3D scanner for dimensional stability. Testing monitored using statistical process controls. Liters refers to the materials container size and not the actual materials volume. Materials are measured in kilograms.
- HP Jet Fusion 3D printing solutions using HP 3D High Reusability PA 12 provide 80% post-production surplus powder reusability, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for recyclability). Parts are then made from each generation and tested for mechanical properties and accuracy.
- Compared to selective laser sintering (SLS) technology. Tested according to ASTM D638 and MFI test.
- The following technical information should be considered representative of averages or typical values and should not be used for specification purposes. These values refer to a balanced print mode with FW B05.
- Test results realized under the ASTM D638 with a test rate of 50mm/min, specimens type V.
- Test results realized under ASTM D790 Procedure B at a test rate of 13.55 mm/min.
- RoHS certification for EU, Bosnia-Herzegovina, China, India, Japan, Jordan, Korea, Serbia, Singapore, Turkey, Ukraine, Vietnam.
- Liters refers to the materials container size and not the actual materials volume. Materials are measured in kilograms.
- The HP powder and agents do not meet the criteria for classification as hazardous according to Regulation (EC) 1272/2008 as amended.
- Compared to manual print retrieval process used by other powder-based technologies. The term "cleaner" does not refer to any indoor air quality requirements and/or consider related air quality regulations or testing that may be applicable.
- Compared to PA 12 materials available as of June, 2017, HP Jet Fusion 3D printing solutions using HP 3D High Reusability PA 12 provide 80% post-production surplus powder reusability, producing functional parts batch after batch.

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This is an HP Indigo digital print.

