# TruPrint 3000
# Aluminum


TRUMPF

# Contents



version 2025/03/03
TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

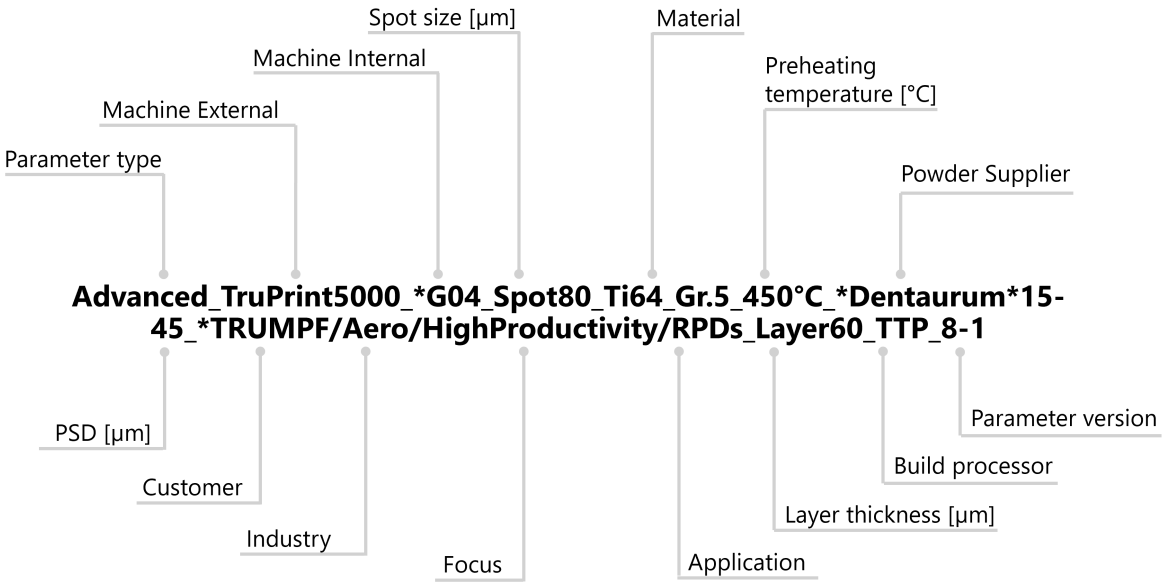
# 1. Introduction to parameters at TRUMPF AM

This document details the parameter set for processing Aluminum using the TruPrint 3000. The set encompasses all materials within this material group, various layer thicknesses, and types of data preparation software. TRUMPF recommends using TruTops Print for data preparation. Each set may include basic and advanced parameters. Basic parameters are intended as a starting point for development. They are suitable for test geometries, but are generally not recommended for direct part production. Advanced parameters are refined settings suitable for actual component production.

Additionally, the document provides detailed information about the powders used to develop these parameters. Other powders, similar to those mentioned, are also suitable for production on our systems.

We are happy to assist you further in parameter development and optimization to meet your part requirements. Please reach out to us for support.

## How do parameter names work at TRUMPF Additive Manufacturing?




***optional possibilities to differ the parameter portfolio**

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 2. Available Parameters

| Material | Machine | Parameter type[1] | Spot [µm] | Preheating temperature[2] [°C] | Layer thickness [mm] | Build processor[3] | Build rate[4] [cm³/h] |
|---|---|---|---|---|---|---|---|
| 6061-RAM2 | G08 | Advanced | 80 | 200 | 0.06 | TTP | 145.4 |
| 6061-RAM2 | G08 | Advanced | 80 | 200 | 0.06 | TTP | 101.6 |
| 6061-RAM2 | G08 | Basic | 80 | 200 | 0.03 | TTP | 60.5 |
| A20x | G08 | Basic | 80 | 200 | 0.04 | TTP | 37.4 |
| AlSi10Mg | G08 | Advanced | 80 | 100 | 0.06 | TTP | 138.2 |
| AlSi10Mg | G08 | Advanced | 80 | 100 | 0.08 | TTP | 176.3 |
| AlSi10Mg | G02 | Advanced | 100 | 200 | 0.03 | TTP \| Mat | 11.9 |
| AlSi10Mg | G02 | Advanced | 100 | 200 | 0.06 | TTP \| Mat | 27.0 |
| AlSi10Mg | G08 | Basic | 80 | 100 | 0.06 | TTP \| Mat | 139.5 |
| AlSi10Mg | G08 | Basic | 80 | 100 | 0.06 | TTP \| Mat | 164.2 |
| AlSi10Mg | G08 | Basic | 80 | 100 | 0.06 | TTP \| Mat | 123.1 |
| AlSi10Mg | G08 | Basic | 80 | 200 | 0.06 | TTP | 123.1 |
| AlSi10Mg | G02 | Basic | 100 | 200 | 0.03 | Mat | 34.8 |
| AlSi10Mg | G02 | Basic | 100 | 200 | 0.045 | Mat | 44.6 |
| AlSi12Cu4Ni2Mg | G02 | Basic | 100 | 200 | 0.03 | Mat | 13.0 |
| AlSi9Cu3 | G02 | Advanced | 100 | 200 | 0.03 | TTP \| Mat | 28.5 |
| AlSi9Cu3 | G02 | Advanced | 100 | 200 | 0.06 | TTP \| Mat | 56.2 |
| CP1 | G08 | Advanced | 80 | 200 | 0.06 | TTP | 82.1 |
| Custalloy | G08 | Advanced | 80 | 23 | 0.06 | Mat | 72.6 |
| Custalloy | G08 | Advanced | 80 | 23 | 0.06 | Mat | 124.8 |
| F357 (AlSi7Mg0,6) | G08 | Advanced | 80 | 200 | 0.08 | TTP | 218.9 |
| F357 (AlSi7Mg0,6) | G08 | Advanced | 80 | 200 | 0.08 | TTP | 112.8 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

# 3. Powder Information

Please contact additive.manufacturing@de.trumpf.com for direct contact to powder manufacturers.

| Material | Supplier | Powder name | PSD [µm] | Supplier ID |
|---|---|---|---|---|
| 6061-RAM2 | Elementum3D | A6061-RAM2C | 20-83 | A6061-RAM2C |
| A20x | ECKART | A205 Additive Manufacturing Powder 20-80 µm | 20-80 | 705731UP0 (2,5 kg, PE-Flasche) 705731UL1 (5 kg, CuTec) 705731V30 (20 kg, CurTec) |
| AlSi10Mg | BH Materials | AlSi10Mg | 15-53 | E(15-53) |
| AlSi10Mg | ECKA | AlSi10Mg04 AN 0,02 - 0,056 mm | 20-56 | 13538.0 |
| AlSi10Mg | Equispheres | AlSi10Mg | 40-68 | AlSi10Mg [40-68µm] granules |
| AlSi10Mg | IMR | AlSi10Mg 20-63µm | 20-63 | 3809.0 |
| AlSi10Mg | Tekna | TEKMAT™AlSi10Mg-63/20-A | 20-63 | 60134.0 |
| AlSi12Cu4Ni2Mg | Nanoval | Nanoval AlSi12Cu4Ni2Mg | 20-53 | — |
| AlSi9Cu3 | ECKA | AlSi9Cu3Fe1Zn1Mg0,3Mn0,2 AN 0,02 - 0,056 mm | 20-56 | 13773.0 |
| CP1 | Constellium | Aheadd CP1 | 20-63 | Aheadd CP1 |
| Custalloy | ECKA | ECKA AlSi3,5Mg2,5Mn0,2Zr0,2 AN 0,02-0,063 mm | 20-63 | 14189.0 |
| F357 (AlSi7Mg0,6) | IMR | AlSi7Mg0,6 F357 25-63 µm | 25-63 | 3876.0 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

# 4. Parameter details

## 4.1. Advanced_TruPrint3000_G08_Spot80_6061-RAM2_600W_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | 6061-RAM2 | **Build rate[4] [cm³/h]** | 145.4 |
| **Supplier** | Elementum3D | **Relative density[5] [%]** | 99.7 |
| **Powder name** | A6061-RAM2C | **Average roughness[6] $R_a$ [µm]** | 8.1 |
| **Supplier ID** | A6061-RAM2C | **Average roughness[6] $R_z$ [µm]** | 44.2 |

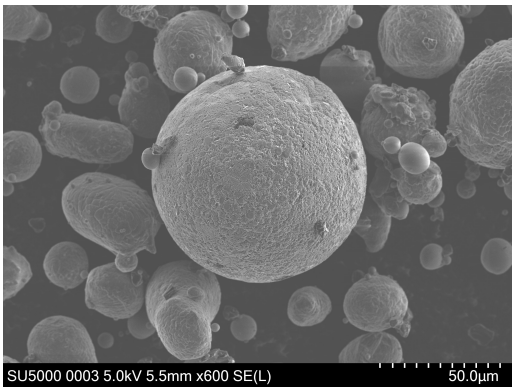



Figure 1: 6061-RAM2 powder by Elementum3D. PSD: 20-83 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 177.8 – 214.4 | 182.2 – 201.4 | 177.5 – 211.7 | **Samples** | 8 |
| **Tensile strength [MPa]** | 215.0 – 223.4 | 215.6 – 225.2 | 214.6 – 224.2 | **Build jobs** | 1 |
| **Elong. at break [%]** | 16.4 – 21.2 | 7.3 – 22.9 | 14.2 – 22.0 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 63.7 – 69.7 |
| **Brinell [HB]** | 62.2 – 71.2 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 27.1 – 27.7 |
| **Thermal conductivity[14] [W/mK]** | 113.7 |

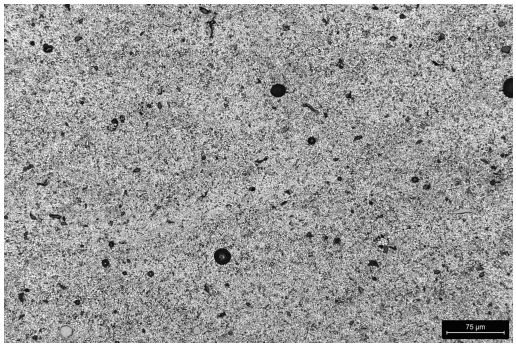


Figure 2: Microstructure of 6061-RAM2: no heat treatment

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

### 6061-RAM2: AM_T6_Elementum3D

Process description[7]: 500°C/1,5h,Water; 165°C/18h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 304.6 – 324.4 | 282.5 – 331.7 | 289.3 – 332.5 | **Samples** | 10 |
| **Tensile strength [MPa]** | 324.2 – 337.4 | 310.6 – 334.6 | 311.2 – 342.4 | **Build jobs** | 1 |
| **Elong. at break [%]** | 8.4 – 15.0 | 9.8 – 15.2 | 9.1 – 15.1 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 102.7 – 109.3 |
| **Brinell [HB]** | 98.0 – 104.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.8 – 35.4 |
| **Thermal conductivity[14] [W/mK]** | 146.8 |

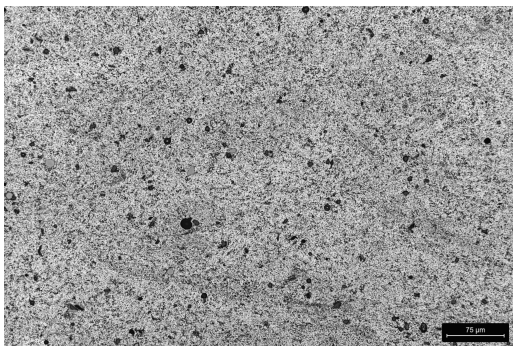



Figure 3: Microstructure of 6061-RAM2: AM_T6_Elementum3D

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.2. Advanced_TruPrint3000_G08_Spot80_6061-RAM2_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | 6061-RAM2 | **Build rate[4] [cm³/h]** | 101.6 |
| **Supplier** | Elementum3D | **Relative density[5] [%]** | 99.9 |
| **Powder name** | A6061-RAM2C | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | A6061-RAM2C | **Average roughness[6] $R_z$ [µm]** | — |

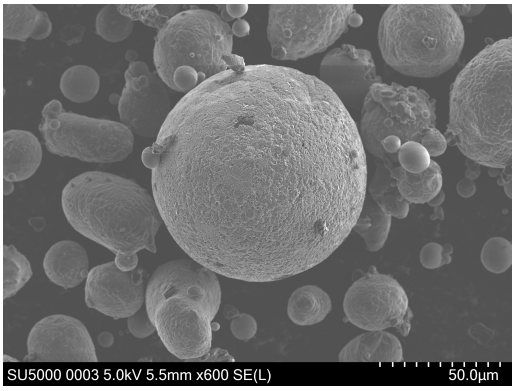



Figure 4: 6061-RAM2 powder by Elementum3D. PSD: 20-83 µm. SEM magnification: 600x.

### No Heat Treatment

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 138.3 – 168.3 | 140.6 – 163.4 | 139.7 – 166.1 | **Samples** | 8 |
| **Tensile strength [MPa]** | 215.4 – 219.0 | 215.2 – 221.8 | 214.9 – 220.9 | **Build jobs** | 1 |
| **Elong. at break [%]** | 11.7 – 30.3 | 18.2 – 27.8 | 13.6 – 29.8 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 65.0 – 71.0 |
| **Brinell [HB]** | 63.2 – 68.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 27.1 – 27.7 |
| **Thermal conductivity[14] [W/mK]** | 113.7 |

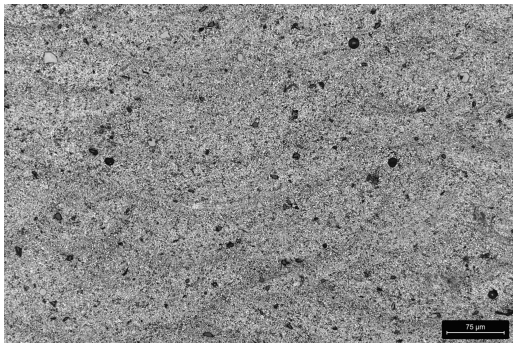


Figure 5: Microstructure of 6061-RAM2: no heat treatment

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

### 6061-RAM2: AM_T6_Elementum3D

Process description[7]: 500°C/1,5h,Water; 165°C/18h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 300.6 – 309.6 | 282.0 – 306.0 | 275.2 – 340.0 | **Samples** | 20 |
| **Tensile strength [MPa]** | 321.9 – 338.1 | 309.9 – 330.3 | 307.5 – 348.3 | **Build jobs** | 2 |
| **Elong. at break [%]** | 11.4 – 14.4 | 6.9 – 15.3 | 6.8 – 17.0 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 103.5 – 106.5 |
| **Brinell [HB]** | 95.2 – 104.8 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.8 – 35.4 |
| **Thermal conductivity[14] [W/mK]** | 146.8 |

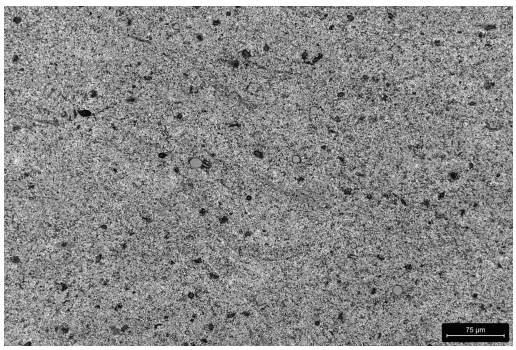



Figure 6: Microstructure of 6061-RAM2: AM_T6_Elementum3D

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.3. Basic_TruPrint3000_G08_Spot80_6061_RAM2_Layer30

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | 6061-RAM2 | **Build rate[4] [cm³/h]** | 60.5 |
| **Supplier** | Elementum3D | **Relative density[5] [%]** | 99.9 |
| **Powder name** | A6061-RAM2C | **Average roughness[6] $R_a$ [µm]** | 3.7 |
| **Supplier ID** | A6061-RAM2C | **Average roughness[6] $R_z$ [µm]** | 27.1 |

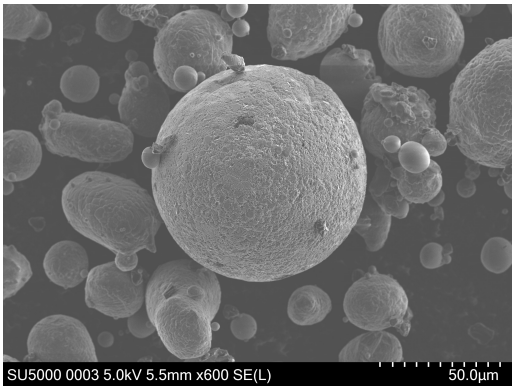



Figure 7: 6061-RAM2 powder by Elementum3D. PSD: 20-83 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 205.0 – 289.0 | 196.0 – 250.0 | 181.2 – 280.2 | **Samples** | 15 |
| **Tensile strength [MPa]** | 229.9 – 294.1 | 227.2 – 251.2 | 215.2 – 284.2 | **Build jobs** | 2 |
| **Elong. at break [%]** | 2.2 – 7.4 | 17.5 – 20.3 | -6.7 – 34.1 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 70.9 – 81.1 |
| **Brinell [HB]** | 68.7 – 75.3 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 27.1 – 27.7 |
| **Thermal conductivity[14] [W/mK]** | 113.7 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**6061-RAM2: AM_T6_Elementum3D**

Process description[7]: 500°C/1,5h,Water; 165°C/18h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 310.0 – 358.0 | 308.0 – 362.0 | 311.2 – 358.0 | **Samples** | 10 |
| **Tensile strength [MPa]** | 342.0 – 366.0 | 343.0 – 379.0 | 339.4 – 376.0 | **Build jobs** | 1 |
| **Elong. at break [%]** | 6.3 – 14.7 | 6.5 – 14.9 | 6.7 – 14.5 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 108.9 – 113.1 |
| **Brinell [HB]** | 105.9 – 108.9 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.8 – 35.4 |
| **Thermal conductivity[14] [W/mK]** | 146.8 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.4. Basic_TruPrint3000_G08_Spot80_A20x_Layer40

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | A20x | **Build rate[4] [cm³/h]** | 37.4 |
| **Supplier** | ECKART | **Relative density[5] [%]** | 99.9 |
| **Powder name** | A205 Additive Manufacturing Powder 20-80 µm | **Average roughness[6] $R_a$ [µm]** | 13.3 |
| **Supplier ID** | 705731UP0 (2,5 kg, PE-Flasche) 705731UL1 (5 kg, CuTec) 705731V30 (20 kg, CurTec) | **Average roughness[6] $R_z$ [µm]** | 66.9 |


Figure 8: A20x powder by ECKART. PSD: 20-80 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | 228.2 – 248.6 | 216.0 – 246.0 | — | **Samples** | — |
| **Tensile strength [MPa]** | 255.9 – 287.7 | 274.7 – 280.1 | — | **Build jobs** | — |
| **Elong. at break [%]** | 8.4 – 18.6 | 14.4 – 16.8 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 83.0 – 89.0 |
| **Brinell [HB]** | 81.0 – 87.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 23.8 – 39.4 |
| **Thermal conductivity[14] [W/mK]** | 132.4 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

### A20x: AM_T7_ECKART

Process description[7]: 505°C/3h,530°C/5h,Water; 190°C/5h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | 337.0 – 447.4 | 376.2 – 413.4 | — | **Samples** | — |
| **Tensile strength [MPa]** | 434.5 – 505.9 | 455.3 – 485.9 | — | **Build jobs** | — |
| **Elong. at break [%]** | 4.4 – 9.6 | 8.1 – 9.9 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 146.0 – 164.0 |
| **Brinell [HB]** | 136.0 – 148.0 |

### Additional Information

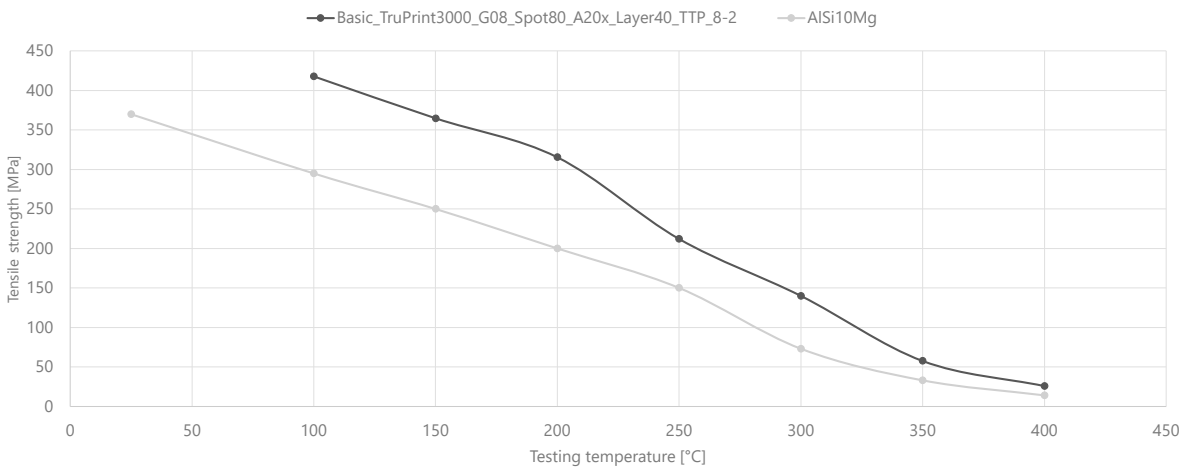



Figure 9: High-temperature strength of A20x printed on a TruPrint 3000 according to DIN EN ISO 6892-2:2018-09

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**Exemplary Application parts**

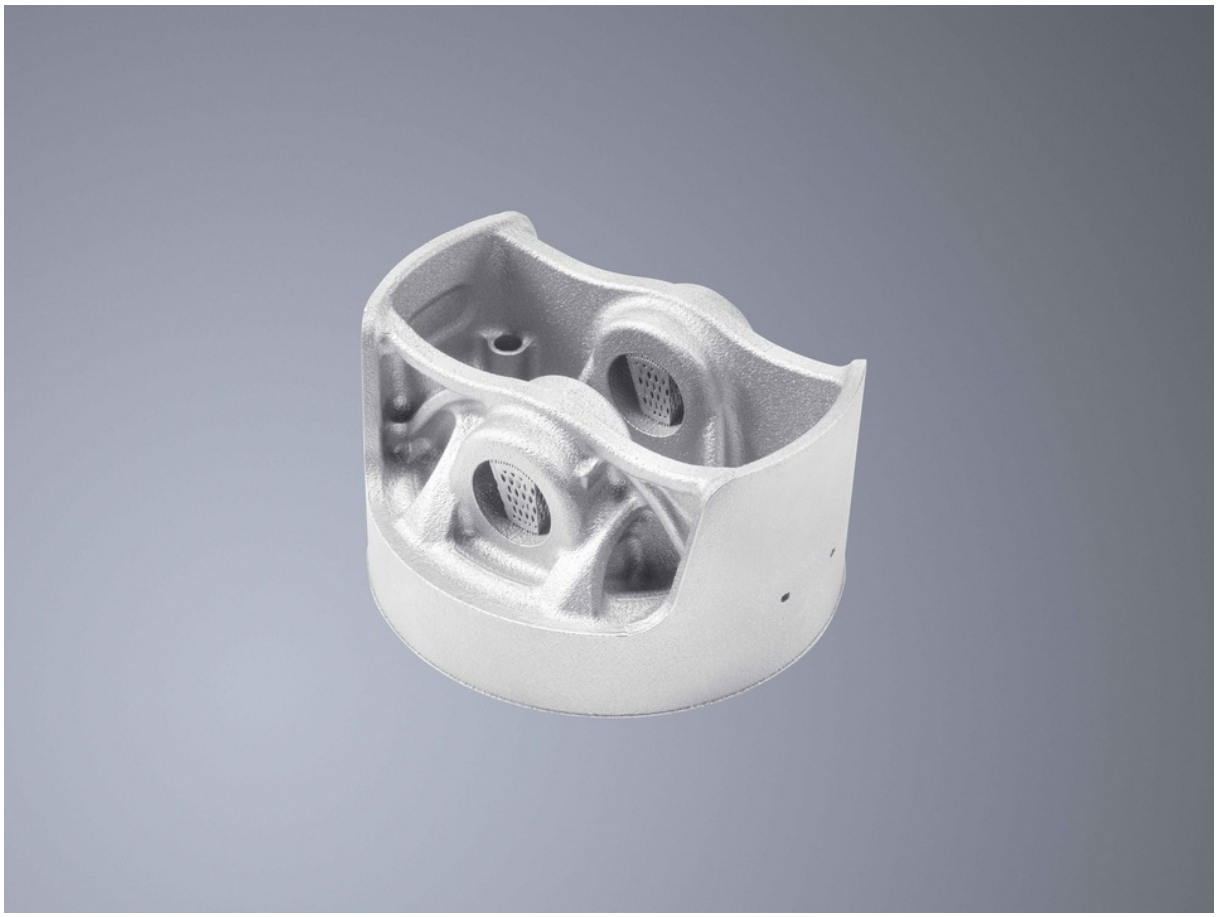


Figure 10: Car piston

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

Figure 11: Car pioston machined

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.5. Advanced_TruPrint3000_G08_Spot80_AlSi10Mg_Equispheres_700W_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 138.2 |
| **Supplier** | Equispheres | **Relative density[5] [%]** | 99.9 |
| **Powder name** | AlSi10Mg Performance | **Average roughness[6] $R_a$ [µm]** | 12.4 |
| **Supplier ID** | AlSi10Mg [40-68µm] granules | **Average roughness[6] $R_z$ [µm]** | 63.4 |

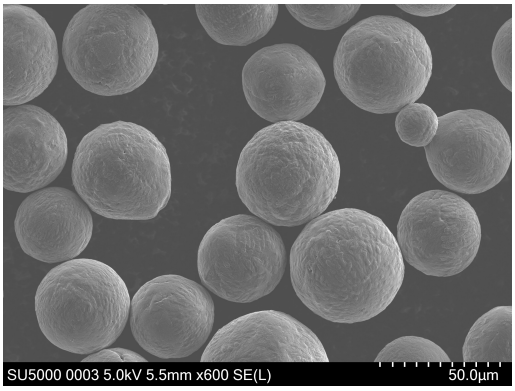



Figure 12: AlSi10Mg powder by Equispheres. PSD: 40-68 µm. SEM magnification: 600x.

### No Heat Treatment

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 221.0 – 239.0 | 218.0 – 260.0 | 213.0 – 266.4 | **Samples** | 36 |
| **Tensile strength [MPa]** | 406.0 – 436.0 | 423.9 – 452.1 | 388.5 – 476.7 | **Build jobs** | 2 |
| **Elong. at break [%]** | 4.9 – 12.1 | 4.1 – 8.9 | 0.7 – 12.1 | **Machines** | 2 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 112.0 – 136.0 |
| **Brinell [HB]** | 108.0 – 132.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.6. Advanced_TruPrint3000_G08_Spot80_AlSi10Mg_Equispheres_700W_Layer80

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 176.3 |
| **Supplier** | Equispheres | **Relative density[5] [%]** | 99.5 |
| **Powder name** | AlSi10Mg Performance | **Average roughness[6] $R_a$ [µm]** | 16.2 |
| **Supplier ID** | AlSi10Mg [40-68µm] granules | **Average roughness[6] $R_z$ [µm]** | 79.4 |

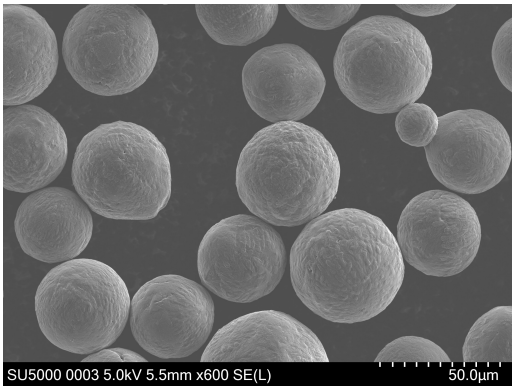



Figure 13: AlSi10Mg powder by Equispheres. PSD: 40-68 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 219.0 – 231.0 | 165.0 – 285.0 | 182.7 – 266.7 | **Samples** | 20 |
| **Tensile strength [MPa]** | 400.0 – 424.0 | 393.0 – 429.0 | 396.3 – 426.9 | **Build jobs** | 1 |
| **Elong. at break [%]** | 5.5 – 14.5 | 5.0 – 11.0 | 1.7 – 11.3 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 104.0 – 128.0 |
| **Brinell [HB]** | 100.0 – 124.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.7. Advanced_TruPrint3000_AlSi10Mg_Layer30

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 11.9 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi10Mg04 AN 0,02 - 0,056 mm | **Average roughness[6] $R_a$ [µm]** | 8.0 |
| **Supplier ID** | 13538.0 | **Average roughness[6] $R_z$ [µm]** | — |


Figure 14: AlSi10Mg powder by ECKA. PSD: 20-56 µm. SEM magnification: 600x.

**Other suitable AlSi10Mg powders**
For details see powder information page.

| Supplier | Powder Name |
|---|---|
| IMR | AlSi10Mg 20-63µm |

**SEM images of other suitable AlSi10Mg powders**

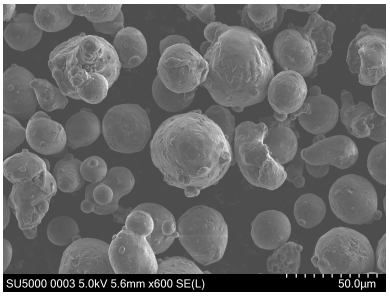



Figure 15: AlSi10Mg powder by IMR. PSD: 20-63 µm. SEM magnification: 600x.

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

### No Heat Treatment

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | 190.0 – 280.0 | 195.0 – 285.0 | — | **Samples** | — |
| **Tensile strength [MPa]** | 335.0 – 425.0 | 370.0 – 460.0 | — | **Build jobs** | — |
| **Elong. at break [%]** | 5.0 – 9.0 | 2.0 – 6.0 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Brinell [HB]** | 100.0 – 130.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.8. Advanced_TruPrint3000_AlSi10Mg_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 27.0 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi10Mg04 AN 0,02 - 0,056 mm | **Average roughness[6] $R_a$ [µm]** | 9.0 |
| **Supplier ID** | 13538.0 | **Average roughness[6] $R_z$ [µm]** | — |


Figure 16: AlSi10Mg powder by ECKA. PSD: 20-56 µm. SEM magnification: 600x.

**Other suitable AlSi10Mg powders**
For details see powder information page.

| Supplier | Powder Name |
|---|---|
| IMR | AlSi10Mg 20-63µm |

**SEM images of other suitable AlSi10Mg powders**

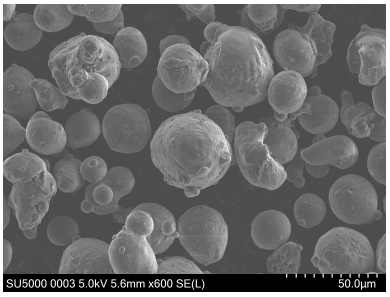



Figure 17: AlSi10Mg powder by IMR. PSD: 20-63 µm. SEM magnification: 600x.

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

### No Heat Treatment

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 130.0 – 250.0 | 135.0 – 255.0 | — | **Samples** | — |
| **Tensile strength [MPa]** | 225.0 – 435.0 | 255.0 – 465.0 | — | **Build jobs** | — |
| **Elong. at break [%]** | 4.0 – 8.0 | 2.0 – 6.0 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Brinell [HB]** | 90.0 – 120.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.9. Basic_TruPrint3000_G08_Spot80_AlSi10Mg_Equispheres_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 139.5 |
| **Supplier** | Equispheres | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi10Mg Performance | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | AlSi10Mg [40-68µm] granules | **Average roughness[6] $R_z$ [µm]** | — |

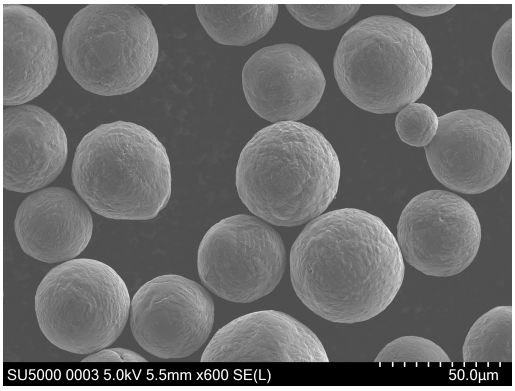



Figure 18: AlSi10Mg powder by Equispheres. PSD: 40-68 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.10. Basic_TruPrint3000_G08_Spot80_AlSi10Mg_Equispheres_high_melting_rate_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 164.2 |
| **Supplier** | Equispheres | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi10Mg Performance | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | AlSi10Mg [40-68µm] granules | **Average roughness[6] $R_z$ [µm]** | — |

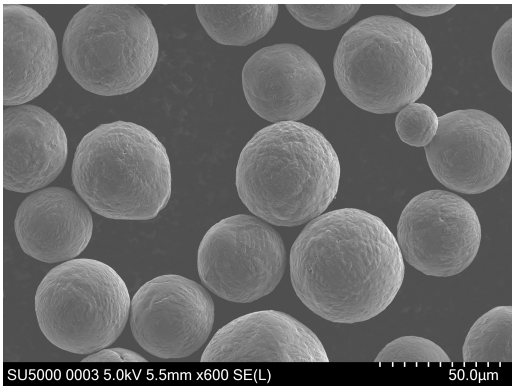



Figure 19: AlSi10Mg powder by Equispheres. PSD: 40-68 µm. SEM magnification: 600x.

### No Heat Treatment

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.11. Basic_TruPrint3000_G08_Spot80_AlSi10Mg_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 123.1 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi10Mg04 AN 0,02 - 0,056 mm | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | 13538.0 | **Average roughness[6] $R_z$ [µm]** | — |


Figure 20: AlSi10Mg powder by ECKA. PSD: 20-56 µm. SEM magnification: 600x.

**Other suitable AlSi10Mg powders**
For details see powder information page.

| Supplier | Powder Name |
|---|---|
| IMR | AlSi10Mg 20-63µm |

**SEM images of other suitable AlSi10Mg powders**

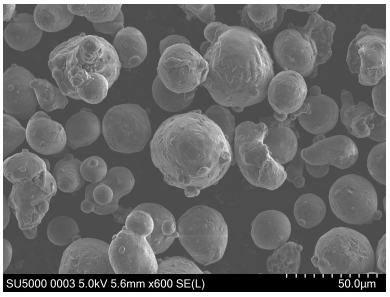



Figure 21: AlSi10Mg powder by IMR. PSD: 20-63 µm. SEM magnification: 600x.

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.12. Basic_TruPrint3000_G08_Spot80_AlSi10Mg_Tekna_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 123.1 |
| **Supplier** | Tekna | **Relative density[5] [%]** | 99.6 |
| **Powder name** | TEKMAT™AlSi10Mg-63/20-A | **Average roughness[6] $R_a$ [µm]** | 4.0 |
| **Supplier ID** | 60134.0 | **Average roughness[6] $R_z$ [µm]** | 21.5 |

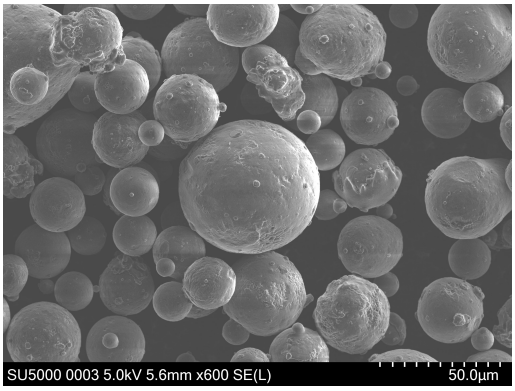



Figure 22: AlSi10Mg powder by Tekna. PSD: 20-63 µm. SEM magnification: 600x.

### No Heat Treatment

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 96.4 – 103.6 |
| **Brinell [HB]** | 86.4 – 93.6 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

| Roughness after blasting | | | |
|---|---|---|---|
| **Type** | **Corrund** | **Glas** | **Steel** |
| **$R_a$ [6] [µm]** | 4.49 | 4.34 | — |
| **$R_z$ [6] [µm]** | 24.16 | 21.51 | — |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**AlSi10Mg: T6 (F3318)**

Process description[7]: 530°C/6h,Water; 160°C/6h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 69.0 – 73.8 |
| **Brinell [HB]** | 70.7 – 73.1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 38.7 – 39.9 |
| **Thermal conductivity[14] [W/mK]** | 164.8 |

**AlSi10Mg: SR1**

Process description[7]: 285°C/2h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 41.6 – 42.8 |
| **Thermal conductivity[14] [W/mK]** | 174.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.13. Basic_TruPrint3000_AlSi10Mg_BHMaterials_Layer30

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 34.8 |
| **Supplier** | BH Materials | **Relative density[5] [%]** | 99.7 |
| **Powder name** | BHMaterials AlSi10Mg | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | E(15-53) | **Average roughness[6] $R_z$ [µm]** | — |

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.14. Basic_TruPrint3000_AlSi10Mg_BHMaterials_Layer45

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi10Mg | **Build rate[4] [cm³/h]** | 44.6 |
| **Supplier** | BH Materials | **Relative density[5] [%]** | 99.7 |
| **Powder name** | BHMaterials AlSi10Mg | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | E(15-53) | **Average roughness[6] $R_z$ [µm]** | — |

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 34.7 – 37.7 |
| **Thermal conductivity[14] [W/mK]** | 151.2 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.15. Basic_TruPrint3000_AlSi12Cu4Ni2Mg_Layer30

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi12Cu4Ni2Mg | **Build rate[4] [cm³/h]** | 13.0 |
| **Supplier** | Nanoval | **Relative density[5] [%]** | 99.7 |
| **Powder name** | M174+ (AlSi12Cu4Ni2Mg) | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | - | **Average roughness[6] $R_z$ [µm]** | — |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.16. Advanced_TruPrint3000_AlSi9Cu3_Layer30

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi9Cu3 | **Build rate[4] [cm³/h]** | 28.5 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | Ecka Aluminiumlegierungspulver AlSi9Cu3Fe1Zn1Mg0,3Mn0,2 AN 0,02-0,056mm | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | 13773.0 | **Average roughness[6] $R_z$ [µm]** | — |

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 223.0 | 243.0 | — | **Samples** | — |
| **Tensile strength [MPa]** | 381.0 | 390.0 | — | **Build jobs** | — |
| **Elong. at break [%]** | 3.0 | 1.5 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Brinell [HB]** | 116.0 – 134.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 20.1 – 21.3 |
| **Thermal conductivity[14] [W/mK]** | 88.5 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.17. Advanced_TruPrint3000_AlSi9Cu3_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | AlSi9Cu3 | **Build rate[4] [cm³/h]** | 56.2 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.8 |
| **Powder name** | Ecka Aluminiumlegierungspulver AlSi9Cu3Fe1Zn1Mg0,3Mn0,2 AN 0,02-0,056mm | **Average roughness[6] $R_a$ [µm]** | 7.9 |
| **Supplier ID** | 13773.0 | **Average roughness[6] $R_z$ [µm]** | 41.0 |

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 173.0 | 173.0 | — | **Samples** | — |
| **Tensile strength [MPa]** | 349.0 | 336.0 | — | **Build jobs** | — |
| **Elong. at break [%]** | 2.1 | 3.1 | — | **Machines** | — |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 117.0 |
| **Brinell [HB]** | 95.0 – 125.0 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 20.1 – 21.3 |
| **Thermal conductivity[14] [W/mK]** | 88.5 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.18. Advanced_TruPrint3000_G08_Spot80_CP1_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | CP1 | **Build rate[4] [cm³/h]** | 82.1 |
| **Supplier** | Constellium | **Relative density[5] [%]** | 99.8 |
| **Powder name** | Aheadd CP1 | **Average roughness[6] $R_a$ [µm]** | 8.5 |
| **Supplier ID** | Aheadd CP1 | **Average roughness[6] $R_z$ [µm]** | 45.6 |

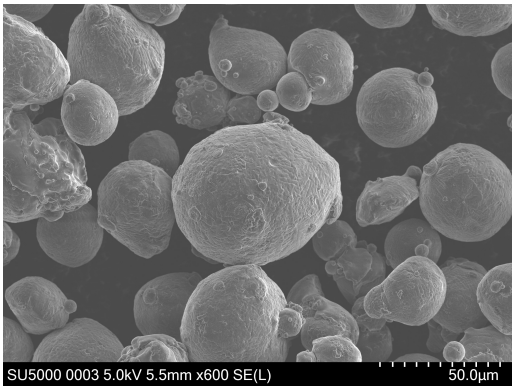



Figure 23: CP1 powder by Constellium. PSD: 20-63 µm. SEM magnification: 600x.

### No Heat Treatment

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 153.0 – 175.8 | 122.7 – 150.9 | 95.2 – 188.2 | **Samples** | 34 |
| **Tensile strength [MPa]** | 193.4 – 197.6 | 195.1 – 198.7 | 192.9 – 198.3 | **Build jobs** | 2 |
| **Elong. at break [%]** | 23.7 – 26.7 | 22.7 – 31.1 | 22.2 – 31.8 | **Machines** | 2 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 60.6 – 65.4 |
| **Brinell [HB]** | 56.3 – 59.9 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 29.8 – 30.4 |
| **Thermal conductivity[14] [W/mK]** | 125.3 |

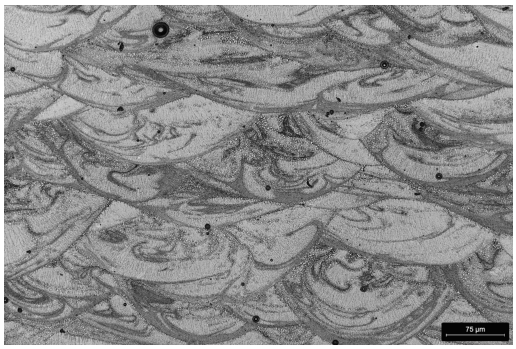



Figure 24: Microstructure of CP1: no heat treatment

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**CP1: AM**

Process description[7]: 400°C/4h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 263.1 – 285.9 | 266.6 – 286.4 | 264.8 – 293.0 | **Samples** | 35 |
| **Tensile strength [MPa]** | 298.8 – 303.6 | 298.7 – 307.7 | 292.8 – 318.6 | **Build jobs** | 2 |
| **Elong. at break [%]** | 16.2 – 25.8 | 12.8 – 32.0 | 15.3 – 29.1 | **Machines** | 2 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 84.2 – 97.4 |
| **Brinell [HB]** | 87.7 – 94.9 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 46.4 – 47.0 |
| **Thermal conductivity[14] [W/mK]** | 196.1 |

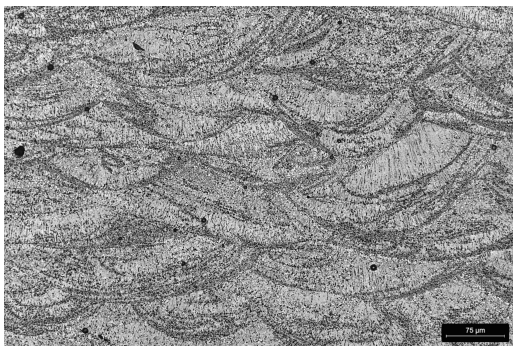



Figure 25: Microstructure of CP1: AM

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**Exemplary Application parts**

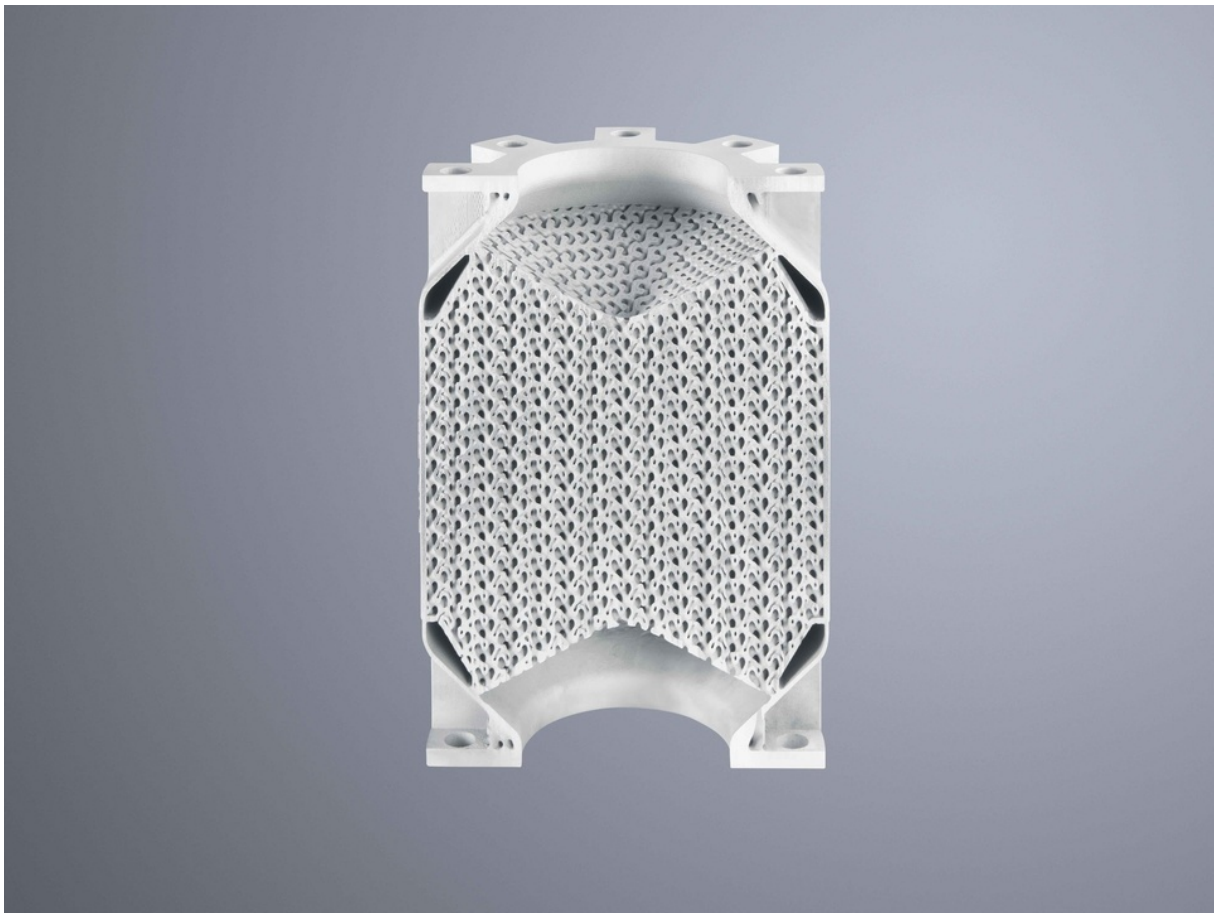


Figure 26: Heat Exchanger

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.19. Advanced_TruPrint3000_G08_Spot80_AlSi3,5Mg2,5_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | Custalloy | **Build rate[4] [cm³/h]** | 72.6 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | Custalloy ® | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | 14189.0 | **Average roughness[6] $R_z$ [µm]** | — |

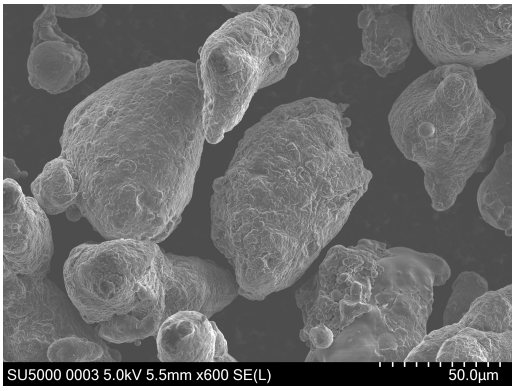



Figure 27: Custalloy powder by ECKA. PSD: 20-63 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 250.0 – 340.0 | 220.0 – 310.0 | 234.5 – 328.7 | **Samples** | 10 |
| **Tensile strength [MPa]** | 385.0 – 475.0 | 365.0 – 455.0 | 389.4 – 454.8 | **Build jobs** | 1 |
| **Elong. at break [%]** | 8.0 – 14.0 | 9.0 – 15.0 | 9.0 – 15.0 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 25.9 – 32.5 |
| **Thermal conductivity[14] [W/mK]** | 120.9 |

**Custalloy: 170°C/1h**

Process description[7]: 170°C/1h,Air

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | 330.0 – 390.0 | — | 345.0 – 367.8 | **Samples** | 5 |
| **Tensile strength [MPa]** | 430.0 – 490.0 | — | 460.3 – 466.9 | **Build jobs** | 1 |
| **Elong. at break [%]** | 7.5 – 10.5 | — | 7.3 – 10.3 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 27.8 – 30.2 |
| **Thermal conductivity[14] [W/mK]** | 122.4 |

**Custalloy: 380°C/1h**

Process description[7]: 380°C/1h,Air

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | — | — | 98.3 – 106.1 | **Samples** | 5 |
| **Tensile strength [MPa]** | — | — | 180.6 – 183.0 | **Build jobs** | 1 |
| **Elong. at break [%]** | — | — | 24.0 – 25.2 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 36.3 – 39.9 |
| **Thermal conductivity[14] [W/mK]** | 159.8 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**Exemplary Application parts**

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.20. Advanced_TruPrint3000_G08_Spot80_AlSi3,5Mg2,5_high_melting_rate_Layer60

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | Custalloy | **Build rate[4] [cm³/h]** | 124.8 |
| **Supplier** | ECKA | **Relative density[5] [%]** | 99.7 |
| **Powder name** | Custalloy ® | **Average roughness[6] $R_a$ [µm]** | — |
| **Supplier ID** | 14189.0 | **Average roughness[6] $R_z$ [µm]** | — |

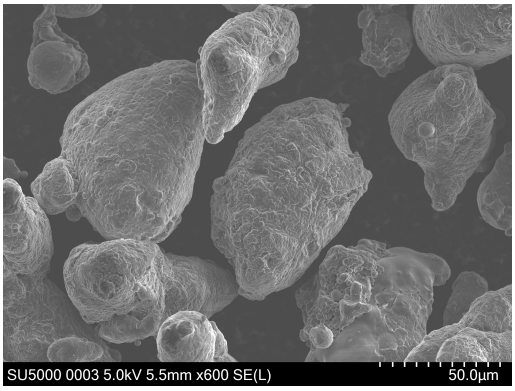



Figure 28: Custalloy powder by ECKA. PSD: 20-63 µm. SEM magnification: 600x.

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 255.0 – 345.0 | 220.0 – 310.0 | 225.7 – 336.1 | **Samples** | 10 |
| **Tensile strength [MPa]** | 345.0 – 435.0 | 345.0 – 435.0 | 376.2 – 409.8 | **Build jobs** | 1 |
| **Elong. at break [%]** | 1.0 – 7.0 | 2.0 – 8.0 | 2.7 – 6.9 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 25.9 – 32.5 |
| **Thermal conductivity[14] [W/mK]** | 120.9 |

**Custalloy: 170°C/1h**

Process description[7]: 170°C/1h,Air

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | 320.0 – 380.0 | — | 330.5 – 368.3 | **Samples** | 5 |
| **Tensile strength [MPa]** | 410.0 – 470.0 | — | 403.0 – 467.8 | **Build jobs** | 1 |
| **Elong. at break [%]** | 1.5 – 4.5 | — | 1.1 – 4.1 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 27.8 – 30.2 |
| **Thermal conductivity[14] [W/mK]** | 122.4 |

**Custalloy: 380°C/1h**

Process description[7]: 380°C/1h,Air

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | 0° | 90° | Average[12] | | |
| **Yield strength [MPa]** | — | — | 107.3 – 115.1 | **Samples** | 5 |
| **Tensile strength [MPa]** | — | — | 180.6 – 183.0 | **Build jobs** | 1 |
| **Elong. at break [%]** | — | — | 13.4 – 24.8 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 36.3 – 39.9 |
| **Thermal conductivity[14] [W/mK]** | 159.8 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.21. Advanced_TruPrint3000_G08_F357_700W_Layer80

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | F357 (AlSi7Mg0,6) | **Build rate[4] [cm³/h]** | 218.9 |
| **Supplier** | IMR | **Relative density[5] [%]** | 99.3 |
| **Powder name** | AlSi7Mg0,6 F357 25-63 µm | **Average roughness[6] $R_a$ [µm]** | 9.3 |
| **Supplier ID** | 3876.0 | **Average roughness[6] $R_z$ [µm]** | 51.2 |

**No Heat Treatment**

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 157.2 – 169.8 | 82.6 – 231.4 | — | **Samples** | — |
| **Tensile strength [MPa]** | 267.1 – 278.5 | 210.2 – 360.2 | — | **Build jobs** | — |
| **Elong. at break [%]** | 6.4 – 8.8 | 4.3 – 11.5 | — | **Machines** | — |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 39.0 – 39.6 |
| **Thermal conductivity[14] [W/mK]** | 162.0 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

## 4.22. Advanced_TruPrint3000_G08_F357_Layer80

| Powder information | | Material properties | |
|---|---|---|---|
| **Material** | F357 (AlSi7Mg0,6) | **Build rate[4] [cm³/h]** | 112.8 |
| **Supplier** | IMR | **Relative density[5] [%]** | 99.7 |
| **Powder name** | AlSi7Mg0,6 F357 25-63 µm | **Average roughness[6] $R_a$ [µm]** | 7.7 |
| **Supplier ID** | 3876.0 | **Average roughness[6] $R_z$ [µm]** | 43.9 |

**No Heat Treatment**

All properties are reported using 3$\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 118.1 – 159.5 | 115.9 – 154.9 | 117.3 – 156.3 | **Samples** | 9 |
| **Tensile strength [MPa]** | 252.0 – 260.4 | 247.1 – 286.7 | 239.7 – 284.7 | **Build jobs** | 1 |
| **Elong. at break [%]** | 7.1 – 16.7 | 5.5 – 10.9 | 2.3 – 17.3 | **Machines** | 1 |

| Physical properties | |
|---|---|
| **Electrical conductivity [%IACS]** | 39.0 – 39.6 |
| **Thermal conductivity[14] [W/mK]** | 162.0 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**F357 (AlSi7Mg0,6): T6_Short**

Process description[7]: 545°C/0,5h,Water; 167°C/6h,Air

All properties are reported using $3\sigma$-intervals[8]. The values for 0° and 90° are derived from qualification reports, while the average values are calculated from additional measurements.

| Mechanical properties[9] machined | | | | | |
|---|---|---|---|---|---|
| | **0°** | **90°** | **Average[12]** | | |
| **Yield strength [MPa]** | 268.8 – 277.8 | 267.8 – 272.6 | 265.4 – 278.0 | **Samples** | 10 |
| **Tensile strength [MPa]** | 344.1 – 355.5 | 338.5 – 349.3 | 335.8 – 358.0 | **Build jobs** | 1 |
| **Elong. at break [%]** | 9.7 – 14.5 | 8.9 – 13.7 | 9.0 – 14.4 | **Machines** | 1 |

| Hardness[13] | |
|---|---|
| **Vickers [HV]** | 103.6 – 114.4 |

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

**Exemplary Application parts**

Figure 29: Coolant nozzle

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620

[1] Basic parameters: starting point for development, generally not recommended for direct part production. Advanced parameters: refined settings, suitable for actual component production.
[2] Describes the preheating temperature of the build plate. A generic value of 23°C is stated, if no active preheating was used. The actual value depends on the climatic conditions of the surrounding.
[3] TTP: TruTops Print, Mat: Materialise, Cam: Cambridge, Oqt: Oqton
[4] Calculated melting rate with maximum amount of lasers; effective melting rate may differ depending on the application.
[5] ASTM E 1245:2003. Measurement of the relative density was performed for specimens with cubic geometries. Values can differ for other geometries and sizes.
[6] Arcording to DIN EN ISO 21920-2-01:2022 with used measurement length of 4,8 mm
[7] The process description is read as follows: Example: 650°C/10min,850°C/10min,1010°C/30min,Air; 590°C/2h,Air; 590°C/2h,Air: 1. Heat treatment cycle: (1. temperature/1. holding time at temperature, 2. temperature/2. holding time, quenching medium); 2. heat treatment cycle (temperature/holding time, quenching medium); 3. heat treatment cycle (temperature/holding time, quenching medium). We recommend that titanium is heat treated under vacuum.
[8] Values are stated as intervals from 3$\sigma$ to the left of the mean to 3$\sigma$ to the right of the mean. This ensures that, statistically, 99.73% of the process output meets customer requirements. For sufficiently many data points, a full process capability analysis was performed and intervals are stated such that a CPK of 1.33 was achieved.
[9] DIN EN ISO 6892-1:2017, DIN 50125:2016
[10] DIN EN ISO 22674
[11] ASTM E8
[12] The average values could include a combination of different build jobs on the same machine type, different powder manufacturers and different inspection orientations.
[13] DIN EN ISO 6506-1:2015
[14] Calculated from electrical conductivity using Wiedemann Franz Law: $\kappa/\sigma = LT$, with thermal conductivity $\kappa$ [W/mK], electrical conductivity $\sigma$ [S/m], Lorenz number $L = 2.44 \cdot 10^{-8}$ W$\Omega$/K$^2$, temperature $T$ [K].

Further test procedure details are available on request.

The component properties obtained were exclusively derived from the combination of suitable powder, the TRUMPF TruPrint and the parameter sets, while observing the current operator's manual.

The data in this technical data sheet and other information are up to date. They alone do not provide a sufficient basis for designing components. The suitability of a component for a particular application cannot be guaranteed by this information. The details in this data sheet are intended exclusively for information purposes and do not constitute an agreement on certain qualities. The TRUMPF warranty only covers agreements specified in the delivery contracts.

The manufacturer of a component is responsible for determining the properties and suitability for any use of the component. They are also responsible for respecting any potential property rights and current legislation and regulations.

As a result of continuous improvement processes in place at TRUMPF, the information in this data sheet is subject to change without prior notice. Errors are excepted.

TRUMPF Laser- und Systemtechnik SE
Johann-Maus-Straße 2, 71254 Ditzingen
additive.manufacturing@de.trumpf.com
+49 (0) 7156 303-31620