GRX-810 (A)

GRX-810 (A) is a Nickel-based superalloy developed by NASA. It is specifically developed for additive manufacturing with the aim to deliver a material with high ductility, excellent strength and creep resistance properties at high temperatures. The target properties were carefully selected with specific target applications in mind, namely combustor components and nozzle operating above 1093˚C (2000˚F). As a reference, GRX-810 (A) outperforms both Ni718 and Ni625 in terms of strength and creep resistance at this temperature.

3D Systems offers GRX-810 (A) through the Application Innovation Group (AIG) for evaluation purposes. This service is limited to customers inside the United States. 3D Systems GRX-810 (A) evaluation services using the integrated additive manufacturing (AM) workflow software, 3DXpert®, and the DMP Flex/Factory 350 metal 3D printers. 3D Systems' uses optimized parameters for GRX-810 (A) that were developed, tested, and optimized in cooperation with Velontra and our AS9100/ISO9001 part production facilities, which have the unique distinction of printing more than 1,000,000 challenging metal production parts in various materials, year over year.

For companies inside the United States looking to evaluate GRX-810 (A), our AIG in the United States can support and accelerate this survey.

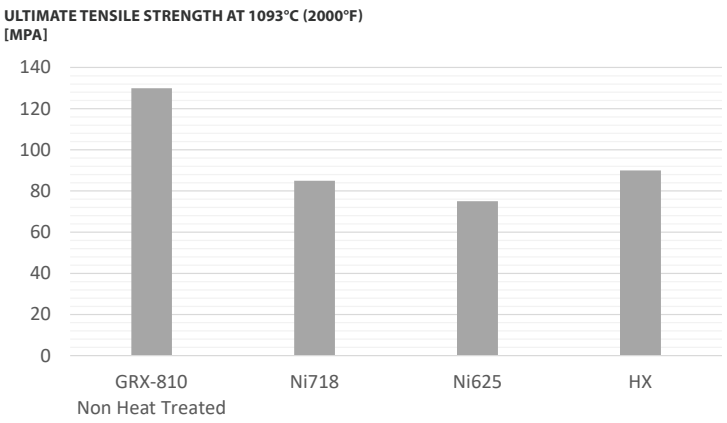
Material Description

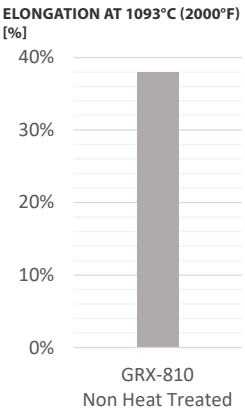
GRX-810 (A) is a Ni-Co-Cr alloy that because of its oxide dispersion strengthening mechanism has exceptional creep resistance, a failure mode that occurs in many turbine and combustion components. GRX-810 (A) was first manufactured by NASA with fuel injection nozzles that suffer from creep failure and have high mechanical requirements at high temperatures in mind. GRX-810 (A) has a high service temperature between 1000°C and 1200°C and is capable of withstanding high stresses around 50% higher than Inconel at these elevated temperatures.

3D Systems is uniquely positioned to support evaluation surveys on this material and is the first entity other than NASA to verify the elevated temperature tensile and creep properties of GRX-810 (A). In this exercise, 3D Systems successfully replicated the mechanical performance at 1093°C (2000°F).

3D Systems offers evaluation services only through AIG located in the United States on this unique alloy for additive manufacturing. Availability is also limited to customers inside the United States. The 3D Systems build volume reducer accessory for the DMP Flex or Factory 350 DMP systems reduces the required amount of powder to load in the printer and allows for cost-efficient evaluation exercises on GRX-810 (A).

Typical Properties[1, 2, 3]

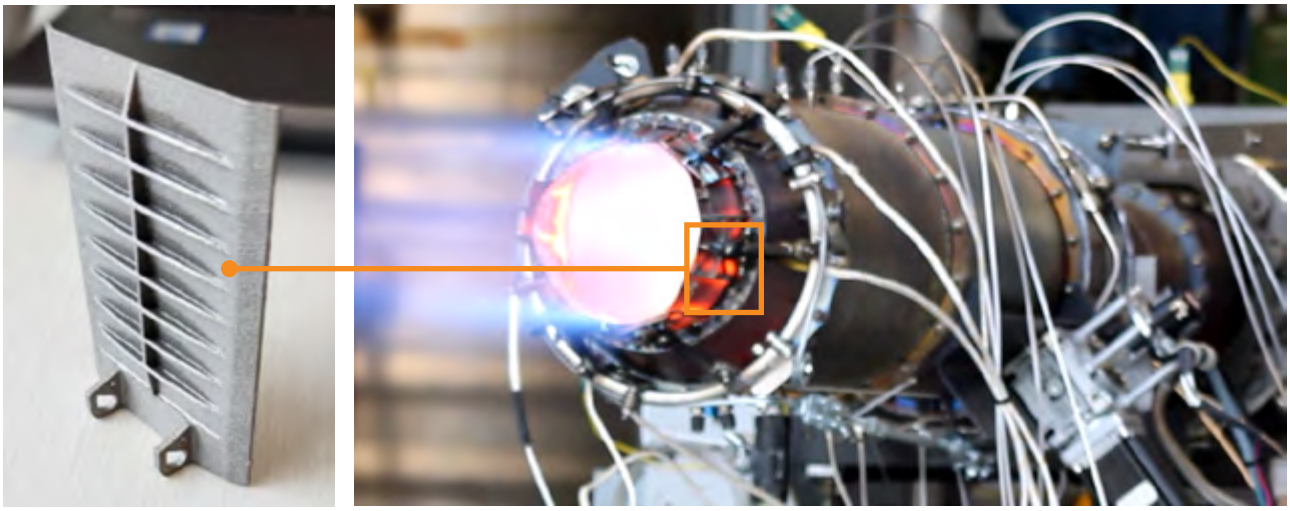




[1] Parts manufactured with a standard parameters and protocols on DMP Flex/Factory 350 using layer thickness 60 µm (LT60)
[2] Sampled machined and tested according to ASTM E8 using round tensile test specimen type 4
[3] Typical values, average of 3 vertical tensile coupons

Layer thickness: 60µm
Typical relative density[4]: 99.9%

Application Focus:
Exhaust Nozzle Flap



PART HEIGHT	57 mm
PRINT TIME	6 h
BATCH SIZE	2
LAYER THICKNESS	60 µm

The exhaust nozzle flap in GRX-810 (A) was built with the DMP Flex 350 printer using the DMP Flex 350 Ø100x160mm build volume reducer insert. It was subsequently tested by Velontra and passed hot fire testing under extreme temperature conditions

[4]Values based on a limited sample population (<15). Values shown are typical values from density test coupons, may deviate depending on specific part geometry

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To confirm the suitability of this material for your specific application, please contact the 3D Systems Application Innovation Group (AIG): https://www.3dsystems.com/consulting/application-innovation-group