3D PRINTING FOR END USE PARTS: A TÜV APPROVED AND IMDS REGISTERED SUSPENSION CLAMP FOR MOTORBIKES

LOCTITE®

3D PRINTING ENABLES NEW APPLICATIONS FOR KTM TECHNOLOGIES IN THE AUTOMOTIVE INDUSTRY

Background

KTM Technologies is an engineering service provider with a variety of in-house capabilities including additive engineering and part redesign. With this expertise, the given volume and project requirements from KTM suspension company WP Suspensions, additive manufacturing proved to be the most cost-effective solution. Using GENERA printing technology and LOCTITE material, the part designed was among the first IMDS listed and end-use approved automotive parts manufactured with photopolymer technology.

APPLICATION:
3D Printed Clamp for the Duke and RC 390 Suspension

MATERIAL:
LOCTITE 3D 3843 HDT60 High Toughness Matte Black

TECHNOLOGY:
GENERA G2 / F2 System

The Challenge

KTM is an Austrian manufacturer of motorcycles and sports cars. They were seeking for a solution to improve a specific clamping component used on the rear suspension system on the Duke and RC 390 Bike. This component is used to mount a part of the performance suspension from WP Suspensions. The KTM Technologies team knew that a more traditional manufacturing method such as injection molding would simply be too expensive given the small series production. However, the legacy solution, colored SLS PA12, was not suitable as it had low resistance to environmental influences and an inadequate surface finish for an end-use part. KTM Technologies had to search for the best solution for this part, prioritizing durability, surface finish, and additional part requirements including:

- Cost effective component design
- Agile manufacturing process
- Quick and easy assembly for vehicle production
- Withstand temperature ranges from -15°C to +60°C
- IMDS registered part for end use serial application
- Pass all specific tests and approved by TÜV

Henkel

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The Solution

- Technology: GENERA G2 / F2 System
- Material selection: LOCTITE 3D 3843 HDT60 High Toughness Matte Black
- Cleaner used: GENERA Clear3d
- Print resolution: 100 µm, layer height: 100 µm

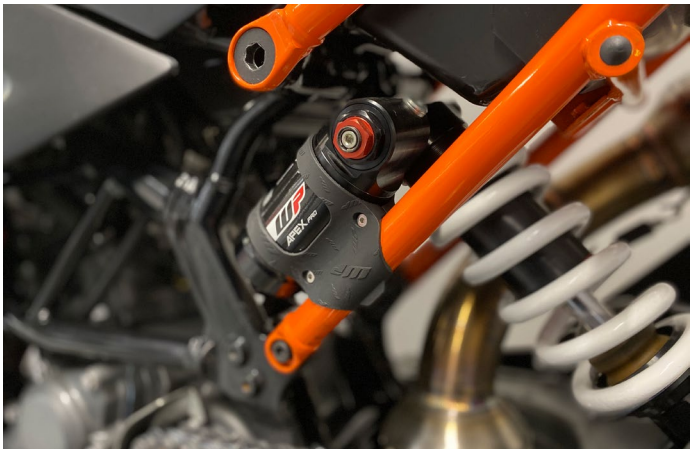
Loctite 3D 3843 HDT60 High Toughness Matte Black				
43 %	**1806 MPa**	**51 MPa**	**53 J/m**	**63 °C**
Elongation at Break	*Young's Modulus*	*Ultimate Tensile Strength*	*Impact Strength (Notched)*	*Heat Deflection Temperature*

Given the constraints of small series production with additional part requirements, KTM found that leveraging additive manufacturing with the GENERA G2/F2 system was the best fit for their production goals. After evaluating the Loctite 3D printing materials portfolio, KTM determined that Loctite 3D 3843 HDT60 High Toughness Matte Black was the best solution to meet part requirements. This material offers the characteristic of a high strength engineering plastic, similar to ABS, with good impact resistance and excellent surface finish. With the requirements to meet end use production quality of the automotive industry, the final part had to be tested to the following standards:

- In accordance to ISO 4892, surface testing conducted with artificial irradiation and weathering to withstand temperature changes and environmental factors
- ASTM D638 (ISO 52701), chemical resistance testing to water, engine oil, bike cleaner, salt and other common exposure chemicals
- Surface adherence to interlock properly

> *"The WP suspension clamp was our in-house case study to enable 3D printing for series production,"* notes Florian Fischer, Additive Manufacturing Lead at KTM Technologies. *"Over our daily business of producing prototype parts with different needs – from full motorcycle fairings, over rapid tooling to electric drive train components – we met new challenges regarding series validation and production scale. By using GENERA 3D printing systems and Henkel Loctite materials, we finally were able to make this step forward."*

The team at KTM Technologies continues to drive and identify innovative solutions for rapidly designing, qualifying, and deploying solutions for the after-market components and work towards a full scale production.



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"With this serial application, the KTM Technologies team perfectly harnessed the advantages of the GENERA 3D printing system with Henkel Loctite material," comments Dr. Klaus Stadlmann, Managing Director at GENERA. "The high level of automation in the G2/F2 system from GENERA and the fully optimized part design, from application requirements, material properties, and process capabilities, enable a cost-competitive serial production of 3D printed parts in the automotive sector. The GENERA workflow and the validated process parameters ensure the desired mechanical properties, surface finish, and part quality. The repeatability of high-quality results is crucial for proper serial production, which was the key advantage of using GENERA's printing solution for KTM Technologies."

BENEFITS

By leveraging 3D Printing and the additive process, KTM Technologies were able to create a cost-effective solution using LOCTITE 3D 3843 HDT60 High Toughness Matte Black that was registered on the International Material Data System (IMDS), the automobile industry's material data system used by majority of OEMs across the globe. With this system, all materials are collected and archived, to ensure automotive manufacturers and suppliers are meeting all standards, laws, and regulations.

By securing a registration from IMDS, the visibility for 3D printing in automotive production sharply increases, highlighting it's potential as a cost-effective, compliant, and agile solution to small series production. In addition to securing IMDS registration and TÜV approval of test conformity, it was possible to stack 8 parts in a single print job using the GENERA G2, significantly reducing lead time.

By using a combination of the print quality from GENERA and engineering-grade resin from LOCTITE, it was possible to achieve superior surface finish compared to previous solutions, while validated workflows made it possible to print parts in repeatable serial production quality. There is also a customizable option to include the company branding of WP. Thanks to the GENERA system, KTM Technologies profits from on-demand rapid production at their facility.

Want to learn more about Henkel's unique material solutions for the additive manufacturing industry?
Visit Henkel's LOCTITE 3D Printing at **LoctiteAM.com** or reach out to us via **loctite3dp@henkel.com**

About LOCTITE

LOCTITE Additive Manufacturing delivers unique photopolymers with production capability, customized resins and engineering services to identify the best application to address your needs. With a constantly growing portfolio of high-performance materials, specialized equipment and post-processing solutions, LOCTITE overcomes the limitations of conventional 3D printing to enable additive manufacturing for the production of durable, functional parts. Through its strategic partnership with technology leaders for specialized equipment, LOCTITE is driving the adoption of 3D printing beyond prototyping and toward the production of final parts. **(www.LoctiteAM.com)**

About GENERA

GENERA is a young Austrian SME with the vision of revolutionizing industrial 3D Printing.

3D Printing has been promising fast, reliable and clean production for many years but failed to deliver on these claims. GENERA was founded with the mission of creating a fully automated DLP 3D Printing System for Serial Production. In the past, users were left with the delicate coordination between process steps and selection of process parameters. To overcome these issues, we strongly believe that additive manufacturing needs to be a comprehensive process from setup to the final result. Only if all steps are harmonized, the end product can be exceptional. The GENERA Workflow and the GENERA Printing Systems guarantee repeatable results according to the required specifications. With our open material library and strong industry partners our customers can choose the material best suitable for each application. The freedom and reliability of the GENERA Printing Systems will take your production to a new level.

Learn more about GENERA and our 3D Printing Systems on our homepage and register for an online live demo:
https://genera3d.com/online-live-demo/

About KTM TECHNOLOGIES

Products, services, achievements
As a specialist in concept development, KTM Technologies has specialized in lightweight construction and high-performance composites. The team of experts who designed the KTM X-Bow was surrounded by a center for complete vehicle competence for two-, three- and four-wheel projects. Lightweight, reliable and transferrable to series production - this know-how makes KTM Technologies a sought-after partner for numerous well-known manufacturers and brands - even outside the mobility sector. **(https://ktm-technologies.com/en/home/)**