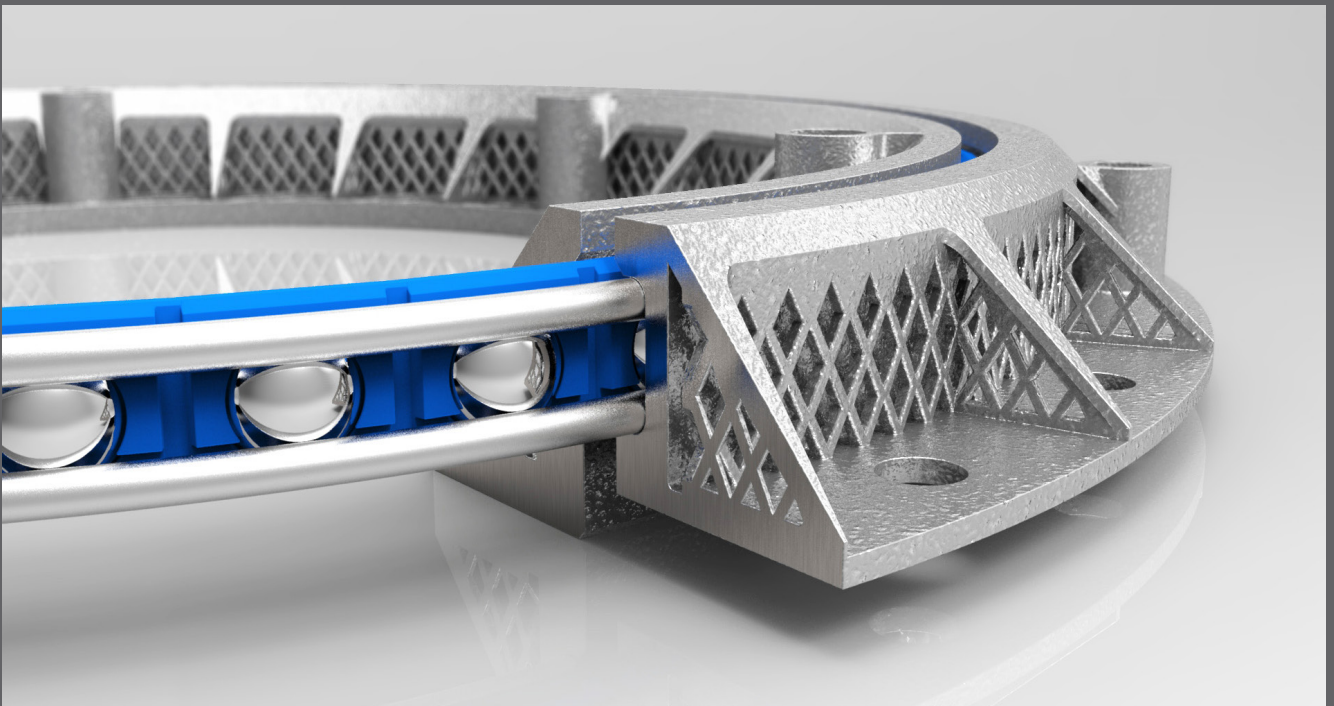


## Wire Race Bearings for Lightweight Design

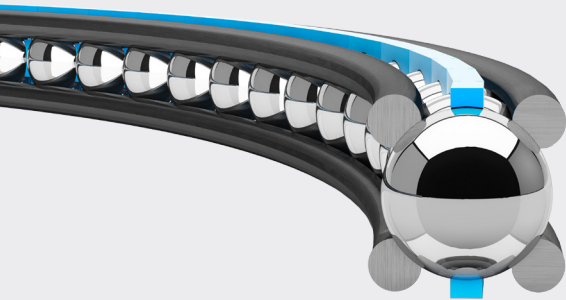
Aluminum, 3D-Printing and Carbon CFRP



# The core of lightweight: compact, precise and long- lasting wire race bearings

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Due to their characteristics and properties, Franke wire race bearings are predestined for lightweight design. Reduced to the essentials, they enable completely new designs of the bearings and the use of light materials for the housing parts. On the basis of state-of-the-art production technologies, light-weight bearings are created with substantial weight, energy and space savings with comparable stiffness and highest precision over the entire service life.



## Lightweight wire race bearings

- Hardened steel
- High precision
- High load capacity from all directions
- Individualisation of wire profile, grinding, ball diameter and material
- Also non-magnetic and stainless steel versions
- Lot size 1 to serial production
- Diameter 80 - 300 mm (larger on request)
- Fast availability

## Application examples for ultralight bearings

- Mechanical engineering
- Aviation
- Robotics
- Automotive
- Medical technology

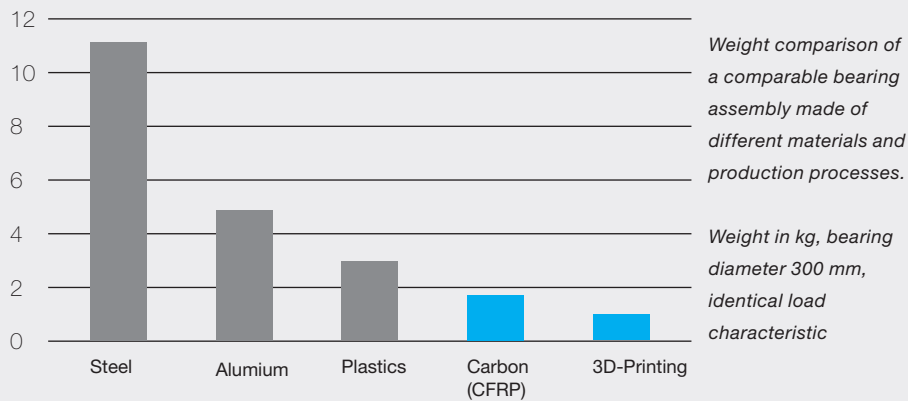
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## Great combination

Depending on the requirements, either carbon fiber reinforced plastic constructions or 3D printers in aluminum are used. The most important component of these enclosing constructions are the extremely light and compact wire race bearings from Franke. These have the effect that the housing parts are not directly exposed to the loads on the rolling elements and therefore can be designed particularly thin. Due to the possibility of the free design of the enclosing construction, the weight can be reduced, which means that additional components are often eliminated and entire assemblies are replaced.

# Aluminum, 3D-printing and Carbon CFRP for up to 90% weight reduction

The weight savings of 3D-printed bearing assemblies compared to a conventional steel bearing can be as much as 90%. If the use of different materials for the enclosing design with comparable bearing diameters already results in significant savings, the result is further improved by the use of 3D printed housing rings.



## Countless possibilities of construction

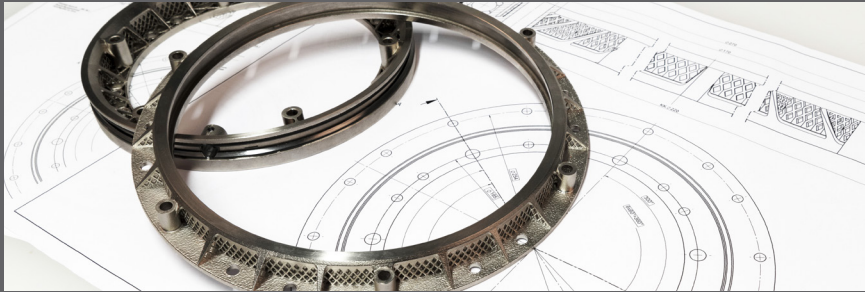
The enclosing structure is freely designable, as are the materials used, such as aluminum, carbon fiber and plastic.



# Optimization of design by FEM analysis and the test laboratory

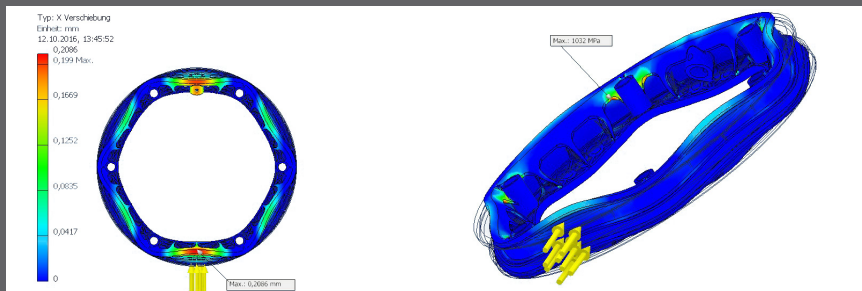
## Configuration

As specialists for special bearings, we are also able to meet extraordinary wishes in the field of wire race bearings. Together with you we develop the optimal solution for your application. We use a wide range of possibilities. Parameters such as load rating, stiffness, preload and rotational resistance can also be variably defined as height, width and drilling pattern or the different materials of the bearing rings.



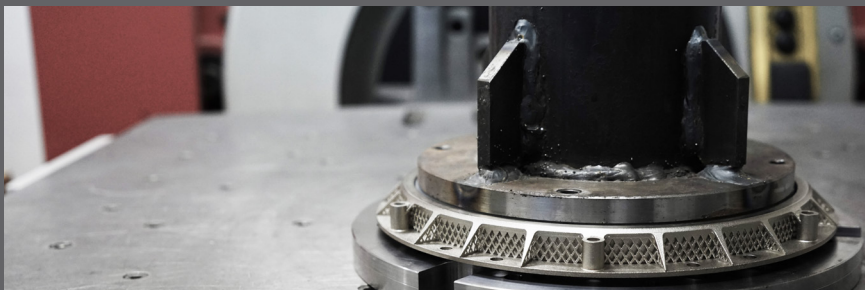
## FEM analysis

Using a topology optimization software, the weight is repeatedly reduced and the stiffness of the components is considered. Under real load conditions, the stresses and shifts occurring are compared and the support structures are optimized. As a result, the weight of the bearing can be reduced once again and the stiffness can be increased.

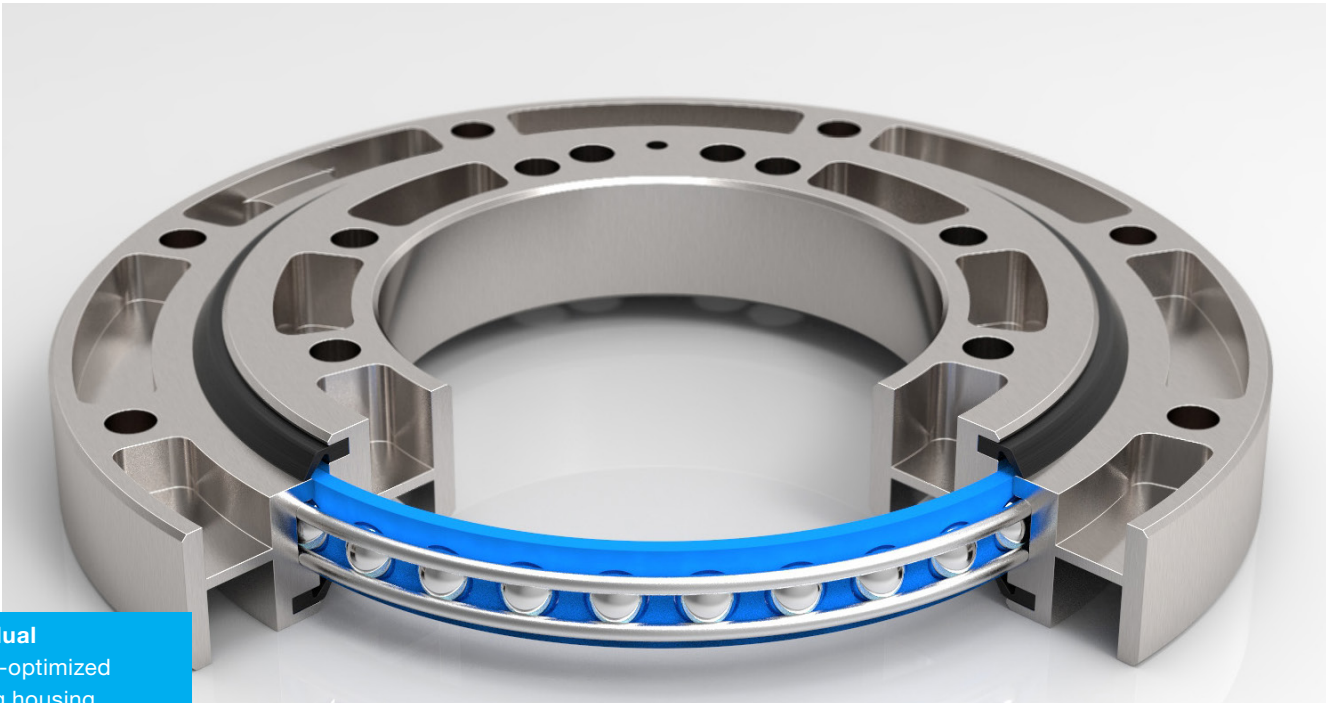


## Test laboratory

Initial samples and prototypes pass through the facilities of the test laboratory, such as shakers, climatic chambers and run-in machines, to simulate the application in the real situation.



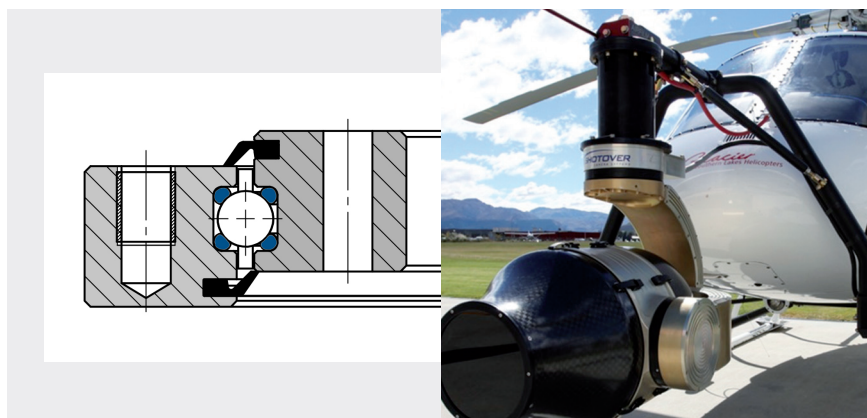
# Aluminium for the movies: Example of a highly dynamic camera gyroscope



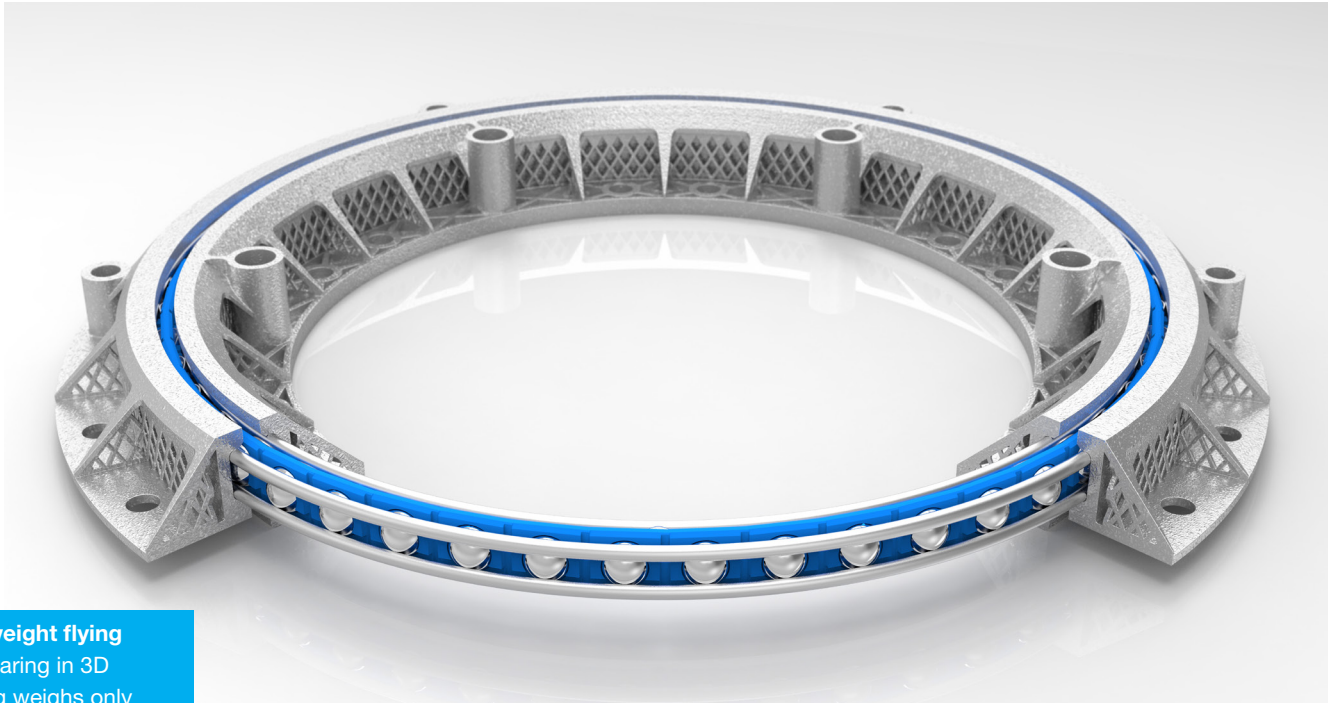
**Individual**  
Weight-optimized  
bearing housing  
made of aluminum.

For the articulated joints of the gimbals, lightweight, customized bearings with high stiffness are used. They are lightweight and characterized by a low breakaway torque and a low rotational resistance. Forces and moments arise from all directions. This will not interfere with the recording quality of the camera.

The bearing housing is optimized by the release of surplus material. FEM analyzes provided the evidence for the reduction of the masses in noncritical points. The four-point bearing can absorb forces from all directions and is insensitive to temperature fluctuations and vibrations. The result is a smooth running bearing with a high stiffness at a low price.



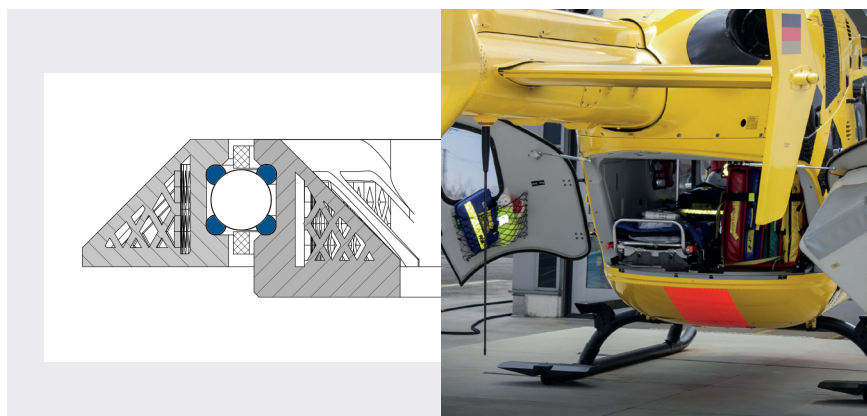
# 3D printed aluminum for aviation: Example rescue helicopter



**Lightweight flying**  
The bearing in 3D printing weighs only 800 g!

Designers of components for aviation use every opportunity for weight reduction. Nowhere else does each gram weight have such a direct impact on the performance of the aircraft as well as on the fuel costs.

One application for a wire race bearing with surrounding parts from the 3D printer is the mount of a patient's bed in a rescue helicopter. The hand-swiveled bed can be rotated easily and evenly to facilitate the loading and unloading of the patient. The special bearing from aluminum is characterized by extremely low weight and insensitivity to temperature fluctuations and vibrations. And by a weight of only 800 grams!



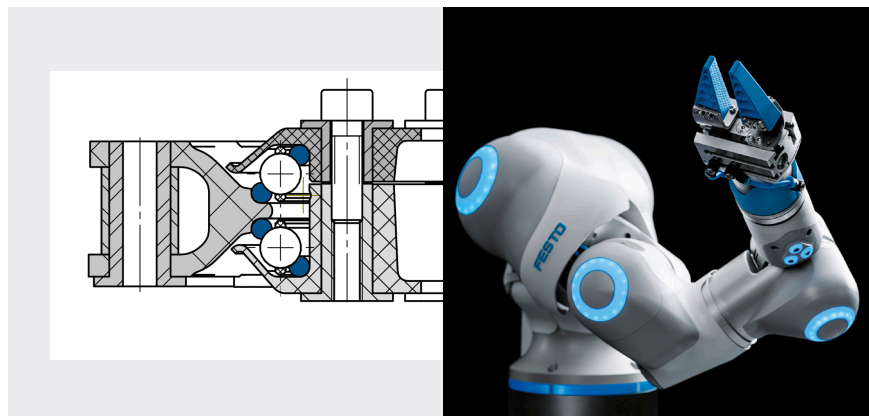
# Carbon CFRP for robotics: Example of a service robot



**Perfect for robotics**  
Bearing assembly for  
the „BionicCobot“ with  
human interaction.

Lightweight robots are increasingly used as service and mobile robots. The mass of such robots rarely exceeds 10 kg with a typical nominal load of 3 kg. They consist of light CFRP materials with good stiffness and low mass. Space-saving bearings are used for the motion axes, which have a high stiffness, low weight and a small installation space.

Wire race bearings are very compact and are integrated directly into the design of the robot. The material of the surrounding construction therefore does not depend on the bearing and can be chosen freely. The high load capacity of the bearing from all directions is ensured by the 4-point arrangement of the wires.



# 1.000 times in use: wire race bearings and linear systems



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