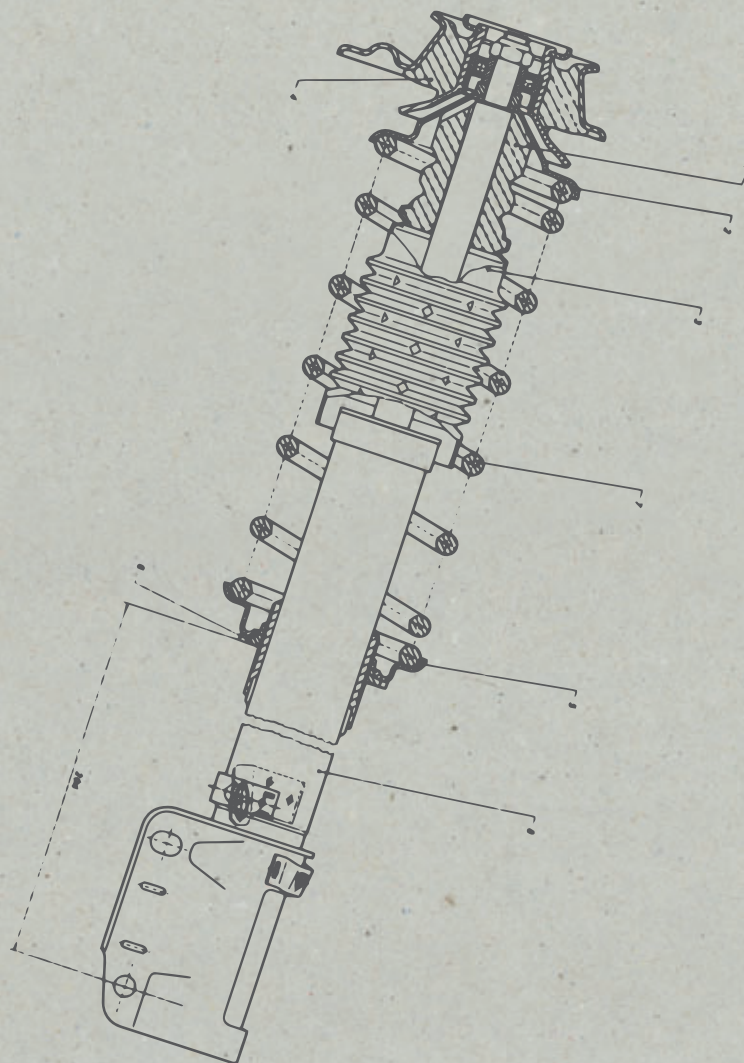


# ORIGINALE

Teile  
Typen  
Technik

04 | News and products from Porsche Classic



PORSCHE

---

950 116  
086 07

---

**As an additive production method, the 3D printing  
method known as selective laser melting  
enables entirely new possibilities for the production  
of Porsche Classic Genuine Parts.**





# 950 116 086 07

## Laser show for reissued components for 959, 968 and 944 models

Porsche Sports Car fascination. For more than 70 years, Porsche enthusiasts have been drawn to the brand thanks to a high degree of quality, impressive top speeds, fantastic lateral dynamics and brilliant acceleration, which of course requires a clutch that can be easily controlled. Particularly, in the case of the technologically advanced 959, where 450 hp and the high torque of the turbocharged engine need to be transferred.

In this context, in addition to the proper function of the clutch itself, the disengaging mechanism is also crucial. If this is worn out and has too much play, then this has an adverse effect on the controllability and both the starting and shifting operations are not performed with the smoothness and precision that is typical of Porsche.

That's why Porsche Classic has reissued a component that is especially important in this complex technology – the release

lever. This part was originally made of nodular cast iron. However, because only 292 units of the 959 super sports car were ever built, this original production method was discontinued due to the expected low demand for the part against the backdrop of high tool costs.

### **Clutch release lever for the Porsche 959 produced using 3D printing**

So Porsche Classic tested an alternative production method – selective laser melting, more commonly known as “3D printing”. In this process, the material to be processed is applied as a thin layer of powder to a base plate. The powdered material – which, in the case of the release lever for the 959, is a steel powder – is melted in an inert gas atmosphere, usually argon, and then cooled down. When it is

cooled down, the material forms a solid layer.

### **A Porsche Classic Genuine Part created from metal powder**

Next, the base plate, on which the release lever is built up layer by layer, is lowered by an amount equal to the thickness of one layer of powder, and then powder is applied and melted again. This process is repeated as many times as required until the relevant component is complete.

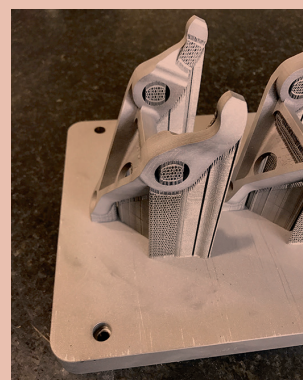
Because the layer-by-layer construction of the part takes place from bottom to top in this process, the components produced in the way often require supporting structures. This is generally the case if the part has overhangs or undercuts. The designer must take these into account when creating the CAD data. They are made up of an intricate, three-dimensional

grid composed of the same material and are built up alongside the main structure during the 3D printing process. The intricate design of the supporting structures means that they can easily be manually removed from the manufactured component at a later stage. In general, only tiny application points are left behind. These can be machined or removed manually at a later stage.

### **Manufacturing very small batch sizes**

The data for the precise control of the laser beam comes from a three-dimensional CAD design drawing – in this case the design drawing of the release lever. The software converts this data into control commands for the laser, and enables laser melting exactly at the positions at which material is needed for the

3D printing enables economically viable production in very small batch sizes, as in the case of the release lever for the Porsche 959, for example.





component. Porsche Classic already uses this method to manufacture around 10 genuine parts, which could not be produced before due to the exorbitant costs associated with the production of the conventional tools used to make them and the small number of parts required. Porsche Classic presents these parts at a wide range of trade fair events.

There are different ways of creating the CAD construction data needed for the 3D printing process. They are either created by the designer directly in the CAD system, or they are calculated based on the three-dimensional scan of an existing genuine part. In the event of a 3D scan, CAD data can either be generated from the image data through reverse engineering, or the scan file (STL file) itself can serve as the source input and can then be converted into control commands for the 3D printing process.

#### Perfect material quality, surface quality and original quality

Even for this production method that is suitable for very small batch sizes, Porsche Classic always takes into account three crucial points:

component properties, quality of the material and surface defects. At the low end, these are always the most important factors at Porsche, whose aim is always to achieve the highest possible quality. The 3D printing also knows how to impress in this respect.

#### High-quality material

In the case of the release lever for the Porsche 959, for instance, the tool steel used not only offers the benefit of a higher-quality

material with higher mechanical strength properties than the previously used nodular cast iron.

The surface quality of the release lever made in this way also features a significantly improved texture and appearance, creating a final result that absolutely matches up to the original part.

Another advantage of the component with part number 95011608607 produced via 3D printing is that it undergoes stress relief heat treatment to release any residual stress.

Another advantage of the component with part number 95011608607 produced via 3D printing is a significant improvement with regards to structural defects due to the high material density. When installing the new clutch lever, where appropriate, it is recommended that you also

replace the needle roller (part no. 99920121303) the lever shaft (part no. 95911608609) and the release bearing (part no. 95911608006).

Porsche Classic places great value on the quality of its 3D printed parts, so it is not surprising that the genuine parts manufactured through 3D printing are also subjected to an extensive range of component tests.

SLM components that are subjected to forces and loads must undergo X-ray and CT examinations. The necessary pressure tests and burst tests are carried out. Once these tests are complete, the final acceptance tests and final acceptance are carried out.

3D printing is an impressive, simple, but also time-consuming production method. This is due to the thin layer thickness of 0.16 to 0.05 thousandths of a millimetre.

CT scan of the transmission console for the Porsche 966 produced through 3D printing. The scan makes it possible to see any flaws and material inclusions. The findings of this scan can then be used to adjust the printing parameters accordingly, so that later on, it is possible to produce an impressive component with perfect material quality, surface quality and original authenticity.

