

## Laser Welding – A Key Manufacturing Process

Marquardt GmbH is a manufacturer of electronic drive authorization systems for vehicles, with the company's products used by customers around the world.

Within the company, plastic welding using diode lasers has been a mainstream manufacturing process for many years and is used in the production of a wide range of parts. One such example is the car key, which today has become far more than just an object used to start the car engine.

The once humble and simple car key has evolved into a design object which at the same time provides the security functions for the vehicle. In the course of assembling the key's plastic components, it is essential that the joining process does not affect the component surface, as aesthetics and finish must be maintained and more importantly, there must be no risk of damage to the sensitive internal electronic components.



**(The once humble car key is now both a design object and a security device)**

The company therefore follows a series of strict production guidelines to ensure that consistent joining techniques are guaranteed. The welding process, for example, must ensure high weld seam strength as well as a hermetically sealed joint to keep out moisture. High operational flexibility is also crucial in order to allow maximum freedom for component design. A further important aspect is the high dimensional accuracy required on the components after assembly. The welding process should also be controllable whilst keeping the process time as short as possible. Welding using a high-power diode laser fulfils all of these requirements.

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Additional benefits from the laser welding process include the ability to process 3-dimensional contours and, due to the small heat-affected zone, very fine welding seams can be achieved.

Laser welding of plastics using high-power diode lasers has become well-established, with more and more well-known companies within the automotive industry, medical device manufacturing industry and others using this as the preferred joining method. The clear advantages in terms of cost, process stability, high precision and weld seam quality mean that laser welding for plastics continues to grow in popularity as more manufacturers discover the technology.

The development of the car key continues at pace, with miniaturization and compact design requiring a joining technology that can deliver small and precise weld seams. In addition, the demand for even more complex and contemporary designs looks set to exceed the capabilities of conventional joining technologies.

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