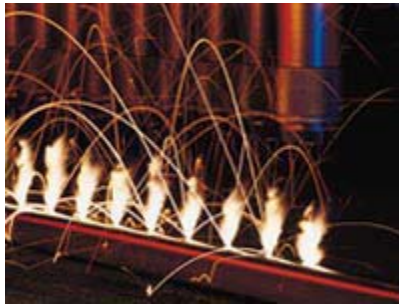


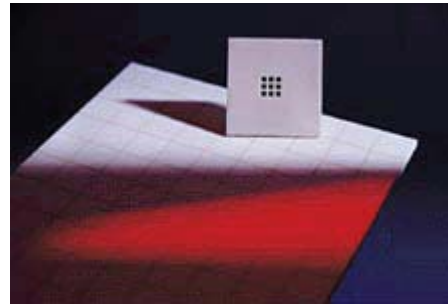


Innovative control systems for high-grade laser systems

Innovative laser machining - precisely controlled



Heads of the laser cutting system



Cutting mould of the laser cutting system

As a specialist in innovative laser systems, the Munich-based InnoLas GmbH company develops and produces customized production systems for industrial machining. To be able to offer their customers high-grade and application-optimized technology in the area of control and operation as well, for more than three years now InnoLas has been cooperating with ECKELMANN as its medium-sized control systems partner. The success achieved by InnoLas and the great level of end customer acceptance are proof of how strategically important a direct and application-specific exchange between machine and control systems manufacturers is in machine construction.

In conformity with customer specifications, InnoLas produce individual and highly technical laser systems for precise cutting, drilling, perforating, grooving, welding and marking. These systems are used not only in the machine tools area. Conventional and particularly sophisticated materials such as ceramics and sintered materials, composites and plastics or glass or silicon- based components can be machined well with these high-grade and powerful laser systems.

Medium-sized development partners

For their compact ILS600 machining system, which was conceived for typical applications such as machining of silicon wafers or highly precise grooving, cutting and drilling of ceramic substrates, InnoLas was looking for a control system supplier who could cover all common technical standards with their products and who, at the same time, could cooperate openly and flexibly in the implementation of solutions that are tailored to the specific needs of applications and customers. Despite the offers of market-leading corporations, InnoLas therefore decided in favor of cooperating with ECKELMANN Steuerungstechnik which, as a medium-sized company, was able to assure personal support in line with requirements during the course of development and later user support. The ILS600 is equipped as standard with three CNC-controlled axes. The stable E-CNC20, which has particularly proven itself in the industrial environment, serves as the control system platform. ECKELMANN ergonomically configured programming, operating and visualization under WINDOWS for reliable operation. The moving components are driven in the X and Y directions as a compound table with linear motors. As it has less elastic elements in comparison with a single drive, this type of drive realizes higher acceleration and final speed values combined with high precision. Digital control of the linear motors by fiber-optic conductor through the control system's SERCOS interface runs without problems and is also unsusceptible to interference even in a tough electromagnetic environment.



ILS600 compact machining system

Special features of ceramic machining

Among other things, the ILS600 is used to machine ceramics as a substrate material for pc boards. In this application, on the one hand very small contours have to be cut and, on the other hand, later break edges have to be grooved as quickly as possible by laser cutting of points at intervals of about $180\mu\text{m}$. Typical values are hole diameters of 0.1 mm which, with a laser diameter of $80\mu\text{m}$, are produced with a circular radius of about $15\mu\text{m}$. In combination with the drive systems described, the system realizes an accuracy of $<10\mu\text{m}$ and achieves a final speed of 20m/min during the grooving process.

Ceramic machining calls for a whole series of technical control processes that are specific to the material. Thus, for quality control reasons it is necessary to particularly pay attention to the constancy of the section energy given off by the laser. Therefore, with a variable machining speed, as is necessarily encountered when cutting complicated and fine geometries, the laser output has to be continuously controlled as a function of the relevant contouring speed.

The E-CNC20 controller features an analog output that carries a voltage value of between 0 and 10 V in proportion to the contouring speed. This output's timing resolution corresponds to the control system's interpolation cycle. For the E-CNC20, the value is at 2 ms . Solutions with a higher interpolation frequency are, however, available for more time-critical applications. The reference speeds at which a minimum and maximum analog value has to be output can be programmed freely. Now, the laser's pulse frequency is controlled with the aid of this analog signal during machining. With a constant pulse intensity and length, this results in laser output control that is proportional to the speed.

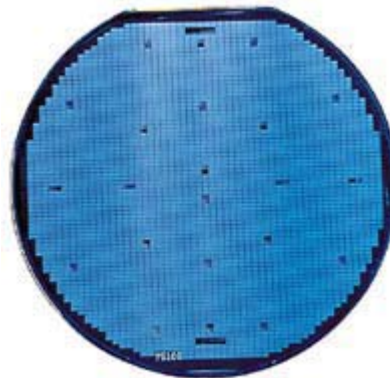


Control solutions from one source

As a control system partner, ECKELMANN offers individual complete solutions on the basis of proven standard technology. Accordingly, the scope of services offered by ECKELMANN Steuerungstechnik is extensive and ranges from consulting and planning to the design of electrical installations and complete production of control cabinets. Thus, machine makers profit from the many years of experience gathered by a control system specialist and can place part of their system responsibility in experienced hands. It goes without saying that an ECKELMANN employee was present during initial commissioning of the ILS600 at InnoLas in Munich. It is particularly individual cooperation with the control system supplier in an atmosphere of partnership that produces a considerable competitive lead in modern machine production.



Heads of the
laser cutting
system



Mould of the laser cutting system