

Diamond specialist Elgan provides lapping pins for precision sealing seats

Modern diesel engines often inject fuel into the combustion chamber several times during an ignition process. This quick succession requires components with maximum reliability and this is particularly true of injection pumps. The valves here have a 120° sealing seat for one ball. The seat diameter is just 1.8 mm. The function requires one-hundred percent sealing, i.e. the ball must have exact continuous line contact to the seat. The form and surface quality of the seal bevel cannot be high enough. Normal counter-sinking or boring tools are far from suitable for such finishing. Only lapping pins with diamond coating achieve the desired qualities. The process is not intrinsically complicated. The lapping pins are held on the valve seat at a specific speed and defined pressure for just a few moments. Cooling lubricants prevent the temperature rising and support the removal of material. Depending on requirements, one, two or more finishing levels with different diamond grits may be required.

High number of pieces between resharpenings

Easy-to-use, but difficult to manufacture, it is not evident at first sight, but the lapping pins contain a great deal of expertise. An important factor, in view of the short cycle times, is the high number of pieces between resharpenings; these can only be realised with the assistance of special techniques. Qualified experts determine the best functioning grits and grit qualities in the laboratory. The diamond cutting part then has to be reliably connected to the steel tool body. Simple pins, for which no regrind is intended, have a single-coat diamond layer. Things become more complex where demands are greater and the diamond part has a several-layer connection with the metal base. Under certain circumstances, small diameters require mechanical pre-machining of the metal pins to make the adhesion surface as large as possible. Such details and the coating itself are what demand real skill.

Michael Nagel, sales director at Elgan Diamantwerkzeuge GmbH & Co. KG in Nürtingen, says: "We provide regrindable lapping pins with a diamond cutting part



with diameters from 1.4 mm, which makes us a market leader."

Recalling how the development of lapping pins for injection pumps began about ten years ago, Michael Nagel says: "The number of pieces between resharpenings has been increasing continuously over time. At the outset of the project, the customer requested 100 pieces before the first resharpening. We managed 250 at first go. The customer raised their request to 800 parts in the next step. We

then achieved 1,000 parts. Today, it's much more."

Key processing in valve technology

Another example is pneumatic and hydraulic components that are used for all kinds of tasks in vehicle construction, aerospace or medical technology. Conventional chip removal and grinding tools are only possible for the pre-machining of the ball and conical sealing seats. Users emphasised that the required circularities and surface qualities could not be achieved in this way. In a further step, a stamping die admittedly improves the quality of the seats noticeably, but still not enough. The rest is up to the lapping pins of the Nürtingen diamond specialists. Apart from lapping pins, there is no other known procedure suitable for the finishing.

Diamond tools for many tasks

Diamond-coated tools are frequently used during refined abrading. Diamond allows high material removal and excellent long-term stability or high numbers of pieces between resharpenings. Specialises in producing such tools. Elgan is a company in the Nagel Group, which also produces honing and superfinishing machines. Consequently, honing and superfinishing tools make up the greater part of the tools developed by Elgan. But the product line extends even further, including deburring, grinding, lapping, polishing and dressing



tools, as well as diamond coatings for dogs or grabs.

Development manager Josef Schmid says: "Our options for working diamonds are practically unlimited. We have all the technologies needed in-house as well as high-tech testing methods, such as electron microscopy or grit size analysis using laser diffraction and the latest methods for form and surface analysis. This means we can produce diamond coatings for every conceivable application."

In general, the focus is on individual special solutions for the highest demands.

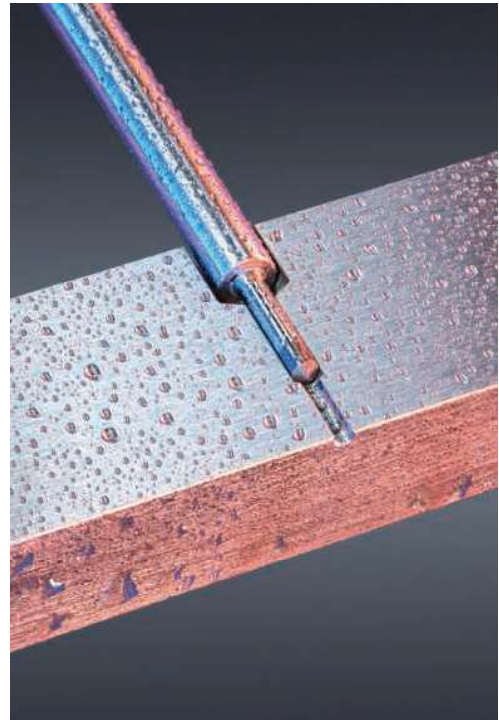
Josef Schmid concludes: "Customer requirements are becoming increasingly specialised, above all due to the development of new materials and coatings, but also due to different philosophies with regard to surfaces and load scenarios. Therefore, there are hardly any more standard solutions to further boost efficiency and performance in the drive technology even more. By keeping pace with this development with constant new solutions, we not only reinforce our own competitiveness, but above all that of our customers."

Elgan is a leading worldwide

manufacturer of diamond tools. For over 30 years, the Nürtingen company's solutions have been a byword for maximum piece numbers between resharpenings with simultaneously reduced cycle times.

In recent years, completely new qualities have been developed in cutting equipment; these are used in high-precision manufacturing such as engine construction and mechanical workshops. In addition to the automotive industry, the customer group also includes compressor and mechanical engineering, the hydraulic and pneumatic industry and medical technology.

Elgan's expertise includes the technology of precisor honing. As a result, form and dimension precisions <0.0001 mm are possible using adjustable honing mandrels. Moreover, its portfolio includes standardised lapping, polishing and grinding pins, as well as ones developed together with customers. Elgan is a company in the internationally active NAGEL Group.



Elgan Diamantwerkzeuge GmbH & Co. KG

Tel: 0049 7022605265

Email: m.nagel@elgan.de

www.elgan.de

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Engis UK Ltd - The European division of Engis Corporation
Tel +44 (0)1491 411117 Email: sales@engis.uk.com www.engis.uk.com

