
RENAULT & MITSUBISHI MATERIALS

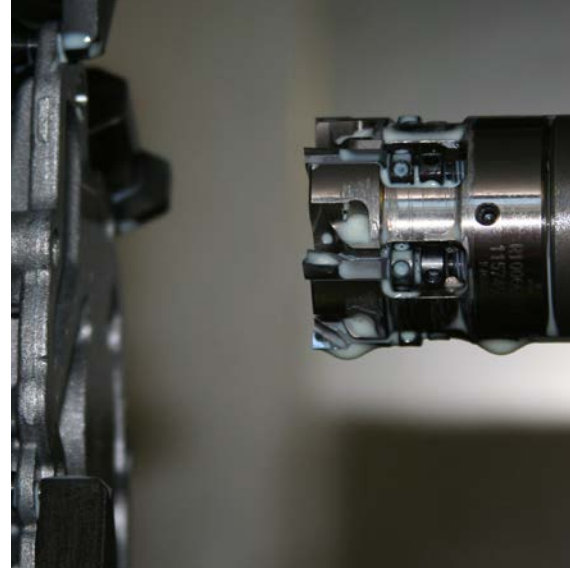
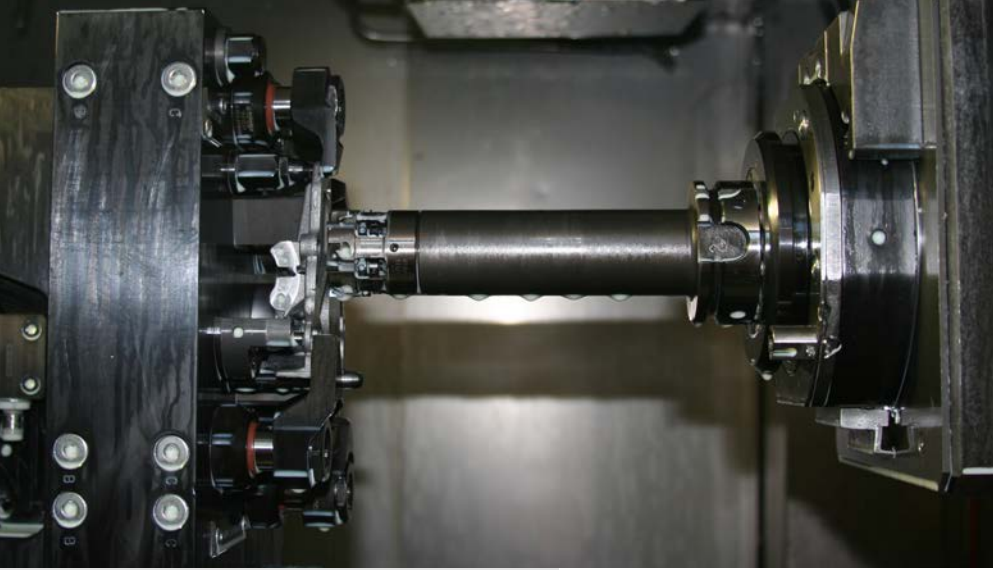
FMAX HIGH FEED MILLING CUTTER



RENAULT CACIA

A SUCCESS STORY THROUGH TECHNOLOGY





Machining process: High accuracy and precision with Mitsubishi Materials' FMAX high feed milling cutter.

"Our target is to constantly increase production capacity and maximise profits reducing cycle times. To help achieve this, we trust the Japanese technological know-how of Mitsubishi Materials."

JOÃO SANTOS
TECHNICAL MANAGER RENAULT

ABOUT FMAX

Diameter	Ø80mm / 14 teeth
	Ø100mm / 18 teeth
	Ø125mm / 24 teeth
Insert Grade	GOER1408PXFR2
	MD2030 diamond insert

Pre-balanced for high revolution. For high quality surface finishes in cast aluminium.



Six seconds provide 15% more productivity

Optimising cost-performance across the whole value chain is nowadays a critical factor for the automotive industry. Renault is using Mitsubishi Materials' FMAX high feed milling cutter to influence machining parameters and maximise the efficiency of the engine oil pump production.

The machining of cast aluminium components such as oil pumps, which require an exacting surface finish due to metal to metal sealing face when the oil pump body and cover are assembled, demands careful planning and precision tools. Renault has recently launched their "variable flow oil pump", a new generation pump that regulates oil flow based on engine speed. This improves engine efficiency by decreasing parasitic loads and thereby reduces CO₂ emissions. "Our business objective is to increase productivity on each and every component while maintaining a high quality," says Paulo Vale, tooling technician at the Renault plant in Cacia, Portugal. In the case of the oil pump this was made possible by using Mitsubishi's new FMAX 6-tooth fine pitched milling cutter, developed specially for this particular application.

Renault Cacia was established in 1981 for the production of gearboxes and gradually expanded operations into other engine components. With the Renault-Nissan Alliance in 1999,

Renault Group capitalised on anticipated synergies by investing in new production lines. Today in Cacia, Renault operates two large production facilities for oil pumps and gearboxes. With a yearly production of 300.000 oil pumps, Cacia is one of the major

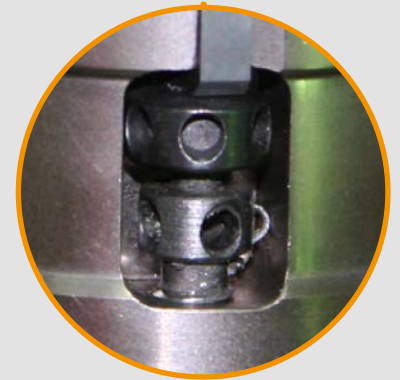


production sites amongst the other Renault sites in the Iberian Peninsula (Valladolid and Seville).

"Through the strategic partnership with Nissan we optimised processes in manufacturing by implementing Japanese process management methods such as Kanban, Just-in-Time delivery and Kaizen," says João Santos, Technical Manager of Renault Cacia. "Our target is to constantly increase production capacity and maximise profits by reducing cycle times. To help achieve this, we trust the Japanese technological know-how of Mitsubishi Materials," João continues.



Optimising machining parameters: Paulo Vale (Renault) and Javier Mahía Cures (MMC) adjust the machining parameters to achieve the optimum surface finish quality of the oil pump.



High performance through reliable technology

Renault first launched the new oil pump production line in early 2015 utilising 3-axis horizontal GROB BZ40C machining centres with a 40mm diameter 4-tooth milling cutter from a different supplier.

“We were running the production for some months during our standard 5-shift, 7 days a week, round the clock pattern. Although the quality of the machined parts matched the required specifications, there was always the thought that the cycle time and tool life could be improved. Tool life with the 4 tooth type was around 8000 pieces before the acceptable limit of insert wear was reached, but with the 6-tooth FMAX, we can easily achieve 12000 pieces before a tool change is necessary. Importantly, this new solution also saved us 6 seconds per cycle, offering a 15% total time reduction. Six seconds per cycle (one cycle machines two oil pumps) may not seem a long time, but when multiplied by 300,000 components, it represents a significant yearly saving. This saving was primarily due to an increase in overall feed rate from 9000 Vf (mm/min) to 13000 Vf (mm/min), at a depth of cut (ap) of 1mm while simultaneously maintaining an excellent surface finish up to a max of tolerance of 1.6Ra” says Paulo.

An additional benefit is the ease of use with regards to the pre-setting of the tool. Due to increasing demand,

Renault Cacia has doubled capacity in the oil pump production line, which in turn intensified the need for an extremely accurate but efficient method for pre-setting the height of the tool to an exacting tolerance. “The setting became easier and much more accurate due to the integrated coarse and fine adjustment screws on the FMAX. The axial height tolerance requires each tooth to be set within 4 µm but we can easily achieve a runout accuracy of only 1 or 2 µm. As well as the obvious benefits of better results in production that this accuracy provides, the ease of adjustment saves us considerable time, given that today we operate seven machines and we may add three more in the future,” Paulo confirms.

As a next step Renault Cacia is testing the FMAX on other components while Mitsubishi Materials is developing a CBN as well as a carbide insert solution to widen the tool’s field of application.

“The FMAX solution saved us 6 seconds per cycle, offering a 15% total time reduction, while maintaining an excellent surface finish.”

PAULO VALE
TOOLING TECHNICIAN RENAULT



About GROUPE RENAULT

Groupe Renault has been making cars since 1898. Today it is an international multi-brand group, and sold more than 2.8 million vehicles in 125 countries in 2015. It has 36 manufacturing sites, 12,000 points of sales and employs more than 120,000 people. To meet the major technological challenges of the future, the Group is harnessing its international growth and the complementary fit of its three brands, Renault, Dacia and Renault Samsung Motors, together with electric vehicles and the unique alliance with Nissan. With a new team in Formula 1 and a strong commitment to Formula E, Renault sees motorsport as a vector of innovation and brand awareness.

RENAULT CACIA, one of Renault's 36 industrial sites, has been producing mechanical parts and sub-sets for the motor industry since September 1981. The plant is located in Aveiro, Portugal. Within a total ground area of 300 000m², the covered area occupies 70,000m² and is mainly composed of two buildings, one dedicated to gear boxes manufacturing and the other to mechanical parts for engines. There are more than 1,000 people employed at the plant. 100% of production is transported to different vehicle assembly and mechanical plants within the Renault-Nissan Alliance.

RENAULT CACIA

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About Mitsubishi Materials

Mitsubishi Materials Corporation is a leading Japanese company, specialising amongst others, in the production of cutting materials, coatings and precision tools for the metal working industry. Mitsubishi Materials Corporation operates Head Offices in Europe, India, Brazil, China, USA, Japan and Thailand, a modern R&D Centre in Japan and several production facilities throughout the world. The Corporation employs over 23,000 people in more than 77 countries.

Mitsubishi Materials España operates a production plant and a sales office for high precision tools. The Spanish office, provides tooling solutions in Spain and Portugal.

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Finding solutions: (From left to right) Vicent Alcover Gimeno (MMC), João Santos (Renault), Javier Mahía Cures (MMC) and Paulo Vale (Renault) evaluating the performance of the FMAX tool.

Mitsubishi's technical and personal ability creates a true partnership

Vicent Alcover Gimeno [Key Account Manager] and Javier Mahía Cures [Application Engineer] from Mitsubishi Materials Spain, consulted with Renault and supervised the project from the very beginning. "We visited the Cacia plant regularly to ensure the performance of FMAX, by observing the quality of the surface finish and by adjusting the machining parameters to the optimum," says Javier. "The tests ran smoothly considering the long tool overhang and soon we concluded that the FMAX was the optimal solution for this application," Javier describes.

For Mitsubishi Materials, developing special tools together with customers is a key part of the business and requires committed personnel and maximum capability from the tools to meet specific needs. In this case at Cacia it was soon identified that the design of the FMAX, with radially mounted diamond sintered MD2030 grade inserts, allowed more teeth; 6 compared to the 4 tangentially mounted inserts of the competitor, even on such a small diameter. This ensured that the customer would be fully satisfied with the result. "Mitsubishi's R&D department was already working on the future development of the FMAX and this project will hasten the placing of this Ø40mm type into the standard product portfolio. Through development of these customised solutions, Mitsubishi's standard product range

can expand to help provide further improvements for Renault and other customers around the world. The FMAX body and inserts are produced in Japan but we have carefully planned our supply chain and stock levels to allow for every eventuality," Vicent explains.

The seamless implementation and functionality of the cutter combined with a high level of personal service changed Renault's perception about Mitsubishi Materials.



"In the past we considered Mitsubishi as a good supplier of inserts. After the positive experience with the FMAX milling cutter we realised that Mitsubishi has great potential for innovation because they also offer a very wide range of tools for different materials and applications which we look forward to using on other components," João concludes.