

Chavant News

Published by Ford Design

Advanced Five-Axis Milling machines Take Ford into A New Era of Three-Dimensional Reality

Global Design Connections

Volume III, No. 2

June 1997

Ford has invested Lire 5 million for two of the world's most advanced five-axis milling machines at its Small & Medium Vehicle Centre design studios in Dunton, Essex and Merkenich, Germany.

The milling machines use the latest computer software and highly precise numerical controls to create physical models of design proposals. The five-axis machines can mill any- thing from a full-size vehicle exterior or interior model, to smaller components measuring just a few centimeters in size. Models can be milled from foam, synthetic wood or traditional clay.

"The key advantages of the new milling machines are their ability to faithfully and quickly reproduce physical models from computer-generated data", said Claude Lobo, Ford's Director of Design at the Small & Medium Vehicle Centre. 'Combined with our world-leading Computer-Aided Industrial Design (CAID) technology, the five-axis mills will help to further reduce the time it takes to develop new vehicle designs and improve the quality of our design process. The result will be vehicles brought to market in a faster time and that better meet and exceed the needs of our customers, commented Lobo.

Jointly developed by Ford and the manufacturer, MECOF of Italy, the milling machines are called "five-axis" because the cutting tool continually changes its orientation in five directions in space to optimise cutting on the surface of a model.

Each milling machine features two independent vertical columns with a rotating cutting tool. The columns face each other and operate in tandem, enabling both sides of a model (or different models) to be milled at the same time. The machines can move at speeds of as high as 20 metres per minute, with a positioning accuracy of 0.15 mm any- where within the working zone of nine metres long by three metres wide and three metres high. Three-dimensional mathematical models of new vehicle designs are modeled on Ford's advanced CAID systems. The information used to drive the five-axis mills at Dunton and Merkenich can be sent from any one of Ford's seven design centres around the world. From the math surface data, the machines can mill a solid, physical model of what, until then, has only existed as information in a computer.

Computer simulations also can be run "off-line" to show just how a model would look once milled and to check out the programmes before they are actually machined.

"In some respects, these milling machines can be thought of as three-dimensional 'printers' for our designers," stated Jon Barber, Supervisor, Design Numerical Control Milling at the Dunton and Merkenich design studios.

"However, they complement rather than replace traditional design craftsmanship skills, such as clay modelling by hand. There are still some things that you just cannot replace by even the most advanced technology, such as experience, human creativity and emotion - all of which are vital elements in automotive design," said Barber. Each milling machine is operated by a team of five people at both Dunton and Merkenich. The multi-skilled teams are composed of existing Ford Design staff who have undergone extensive training to enable them to programme and operate the advanced five-axis mills.

Article by John S. Gardiner, FAD. Public Affairs Photograph Courtesy of FAD. Public Affairs

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