

HIGH SPEED MACHINING CENTER AND USING CAM TECHNOLOGY

Noriyuki Kato (Manufacturing Research Center, OKUMA Corporation)

ABSTRACT

OKUMA Die / Mold manufacturing system provides high speed, high rigidity and heavy cutting in a compact machining center and CAD/CAM system.

1. INTRODUCTION

Okuma's technologies support Die/Molds manufacturing system with

- High -speed, high and quality machining of plastic molds.
- High efficiency cutting.
- CAD / CAM System for Die/Mold production.

2. HIGH-SPEED SPINDLE SERIES

High-speed spindles (25,000 rpm) output

Unbeatable pretension control to give the highest quality available.

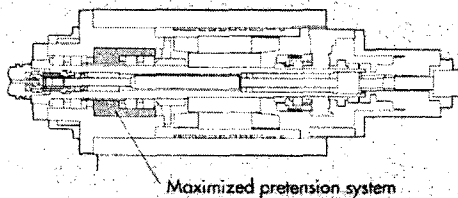


Fig. 25,000 rpm spindle

3. SPINDLE HEAT DISPLACEMENT OFFSET

The heat displacement effects generated as the spindle rotates are reduced to ensure the highest Accuracy.

- Heat displacement offset for spindle generated heat (X,Y,Z-axes)
- High-accuracy offsets for transient state.

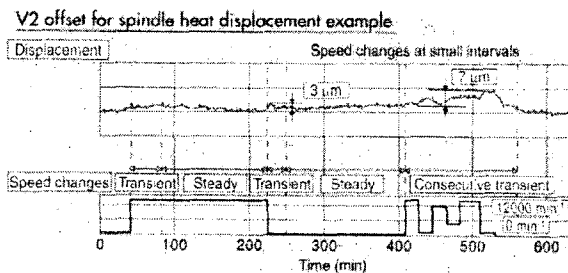


Fig. Spindle heat displacement offset

4. ABSOSCALE

Okuma's high speed linear encoders with the highest resolutions keep in the cut with absolute position feedback

- Resolution : Absoscale 0.1 μ m
- Laser Absoscale 0.01 μ m

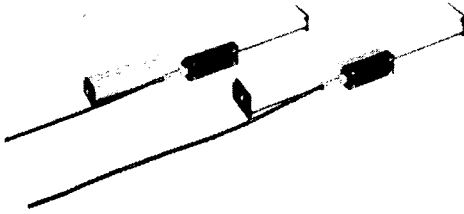


Fig. Absoscale

5. HIGH-SPEED NC (HI-NURBS)

Optimize turning, shorten cycle time, and get improved work surfaces with shape reconstruction control and shape adaptive control.

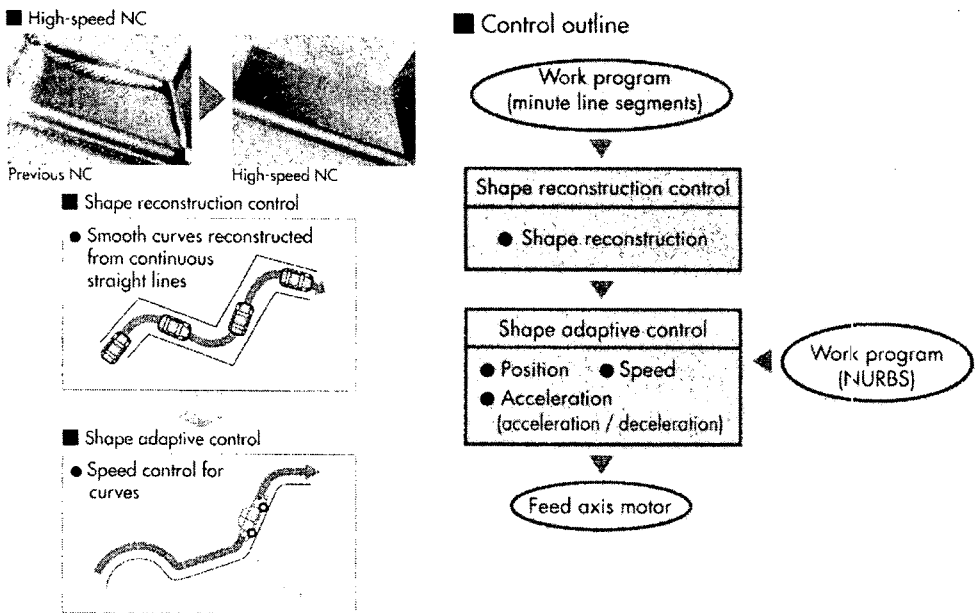


Fig. Hi-NURBS

6. HIGH EFFICIENCY ROUGHING

Work processes are optimized to match the shapes of work.

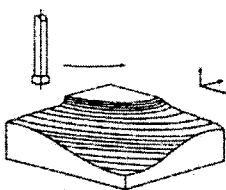


Fig. Contour cutting

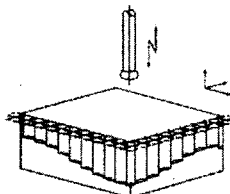


Fig. Plunging

7. LOST OF CUTTING PATTERNS

Contour cutting, corners and walls, scanning and parameters, these are just some of the patterns you can use.

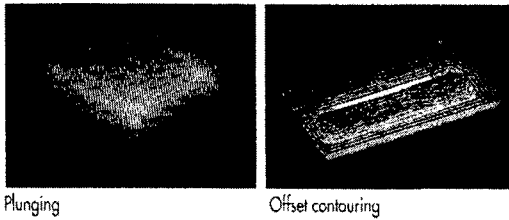


Fig. Cutting patterns

8. SIMULATION

Run a simulation of work process to confirm the turning load, any possible interference between The tools and holders, and check the final outcome before ever moving a tool.

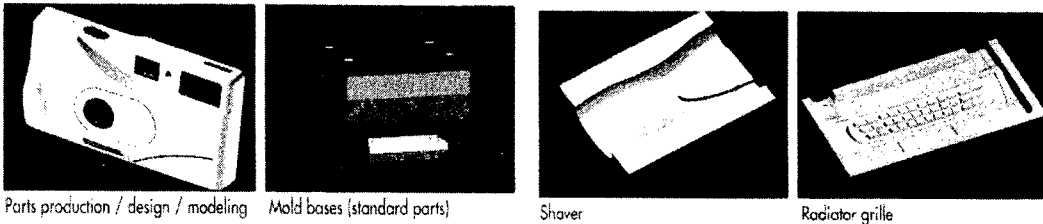


Fig. Resin designing

Fig. 3D modeling

9. MacMan INTRANET

By making your work information accessible, Okuma has provided a way to shorten lead times and save money.

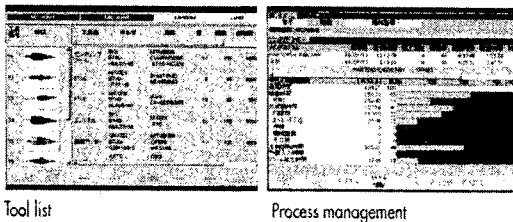


Fig. MacMan Intranet

10. MACHINING EXAMPLE

High accuracy plastic Die/Mold machining with a high speed , high accuracy and high efficiency vertical machining center

Cutting condition

	Tool	Spindle speed rpm	Feedrate mm/min	Pick mm
Roughing	Ø4 carbide ball end mill	22,000	5,000	0.75
Finishing	Ø2 carbide ball end mill	25,000	6.000	0.1

