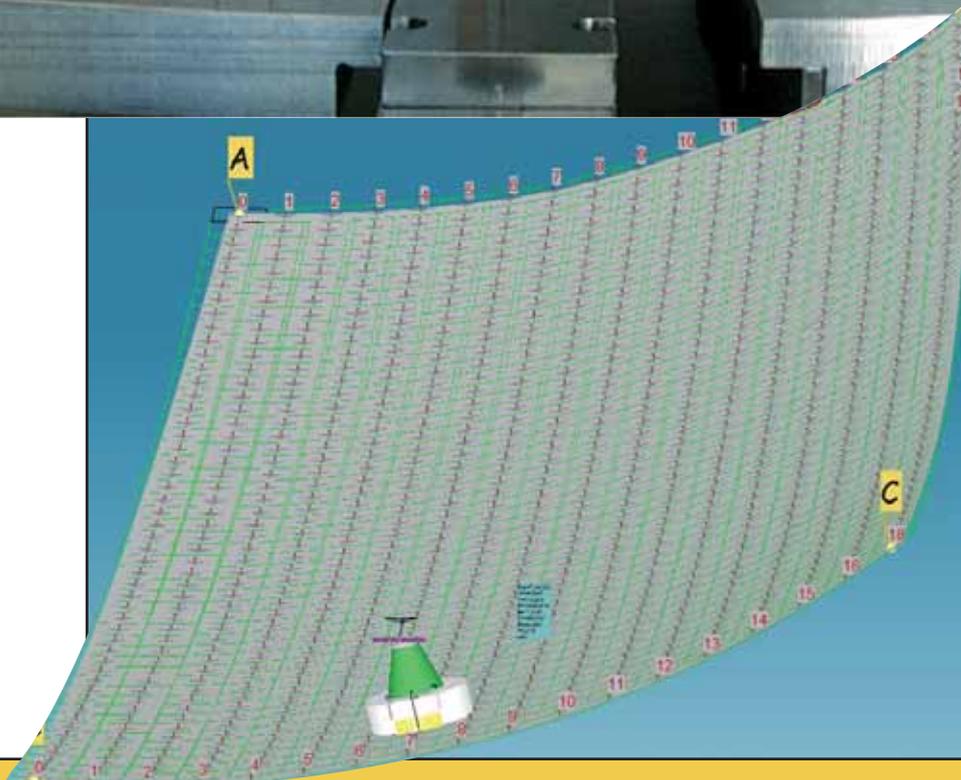




ES-Mill

5-axis programming system

for extremely fast machining
of large workpieces





ES-Mill

5-axis programming system

Enhanced Surface-Milling is a new 5-axis milling process, which mills curved surfaces considerably faster and more effectively than conventional line milling done with a ball milling tool.

The tool works using an angle adjustment, angled towards the part surface and the line of contact corresponds to an ellipse section. The cutter angle and thereby the radius of the line of contact are calculated in such a way that the widest line possible is created. The ratio line width:diameter lies at maximum 1:2, that means in an optimal case a tool with for instance 100 diameter can achieve a milling line width of 50mm. In comparison with a fixed tool milling with

-a toric milling tool with a line of 2,5mm factor 20
-a ball milling tool line of 0,5mm factor 100.

The machine movements are reduced to approx 20% compared to 3-axis high speed milling so using ES-Mill time savings of approx 80-90% can be achieved for suitable surface areas.

The necessary **RPMs and feed are considerably lower** than when using

ball milling tools (no high speed spindles required). Machining times are reduced so much that manless shifts and unattended machine operation are only necessary in exceptional cases.

The time required for preparing an ES-Mill programme compared to conventional line milling programmes is normally higher.

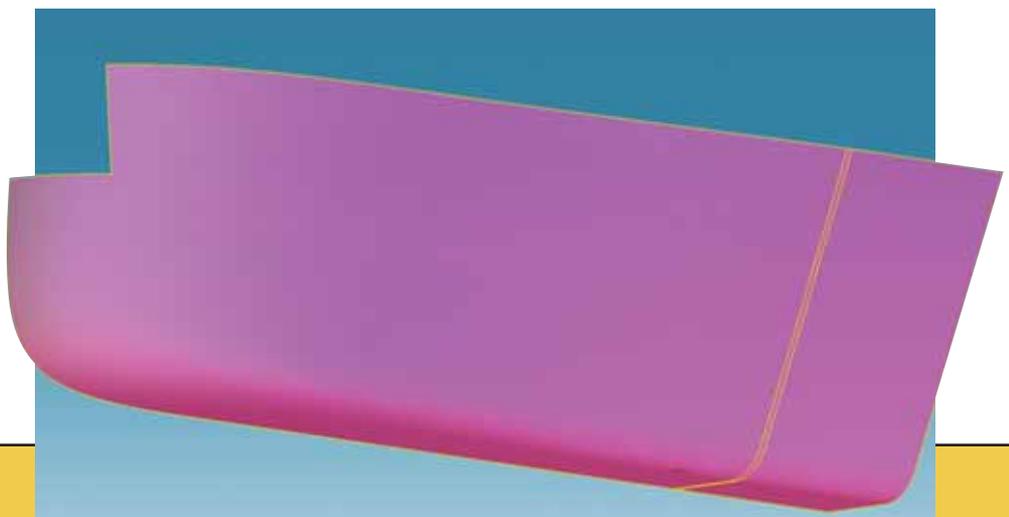
This is due to more comprehensive analysis and calculation processes.

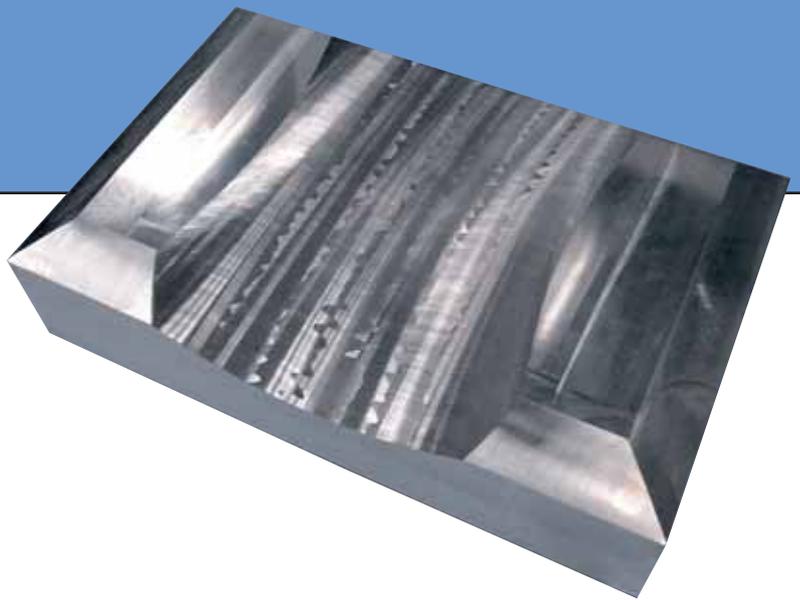
The following given times refer to the main time for one process/part without any further processes like milling slots, drilling etc.

Example 1: Laminate base

Material : Epoxy
Dimensions : 7000x4000x3000
(70m²)
Surface type : mixed concave,
convex, plane
Tool : HM cutter head D100
Machine : Milling machine
with swivel head
Cutting data : S8000 F2500
Machining time : 12 hours
(line width 50mm)

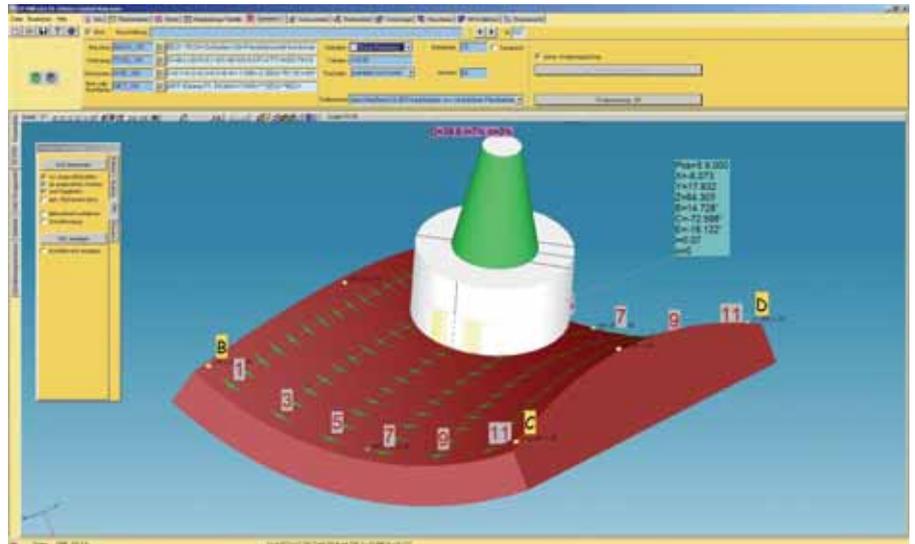
(Limitations on the machine did not allow use of a larger tool; with D200 it would have been possible to halve the time.)





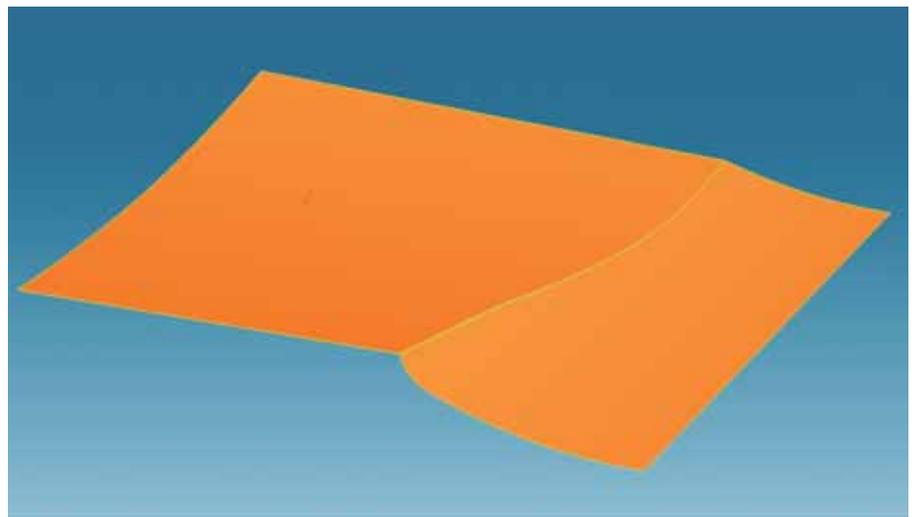
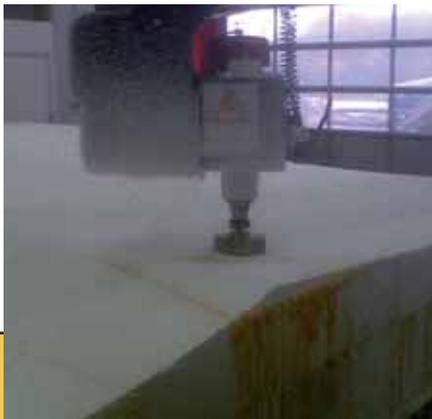
Example 2:
Master part

Material : High-tensile aluminium
 Dimensions : 300x200x100 (600 cm²)
 Surface type : mixed concave, convex
 Tool : HM cutter head D80
 Machine : Milling machine with swiveling rotary table
 Cutting data : S5000 F500
 Machining time : 5 min (line width 30mm)



Example 3:
Substructure for laminate base

Material : Styrofoam
 Dimensions : 7000x6000x1000 (42m²)
 Surface type : concave
 Tool : HSS cutter D150
 Machine : Milling machine with swivel head
 Cutting data : S6000 F40000
 Machining time: 45 min (line width 80mm)



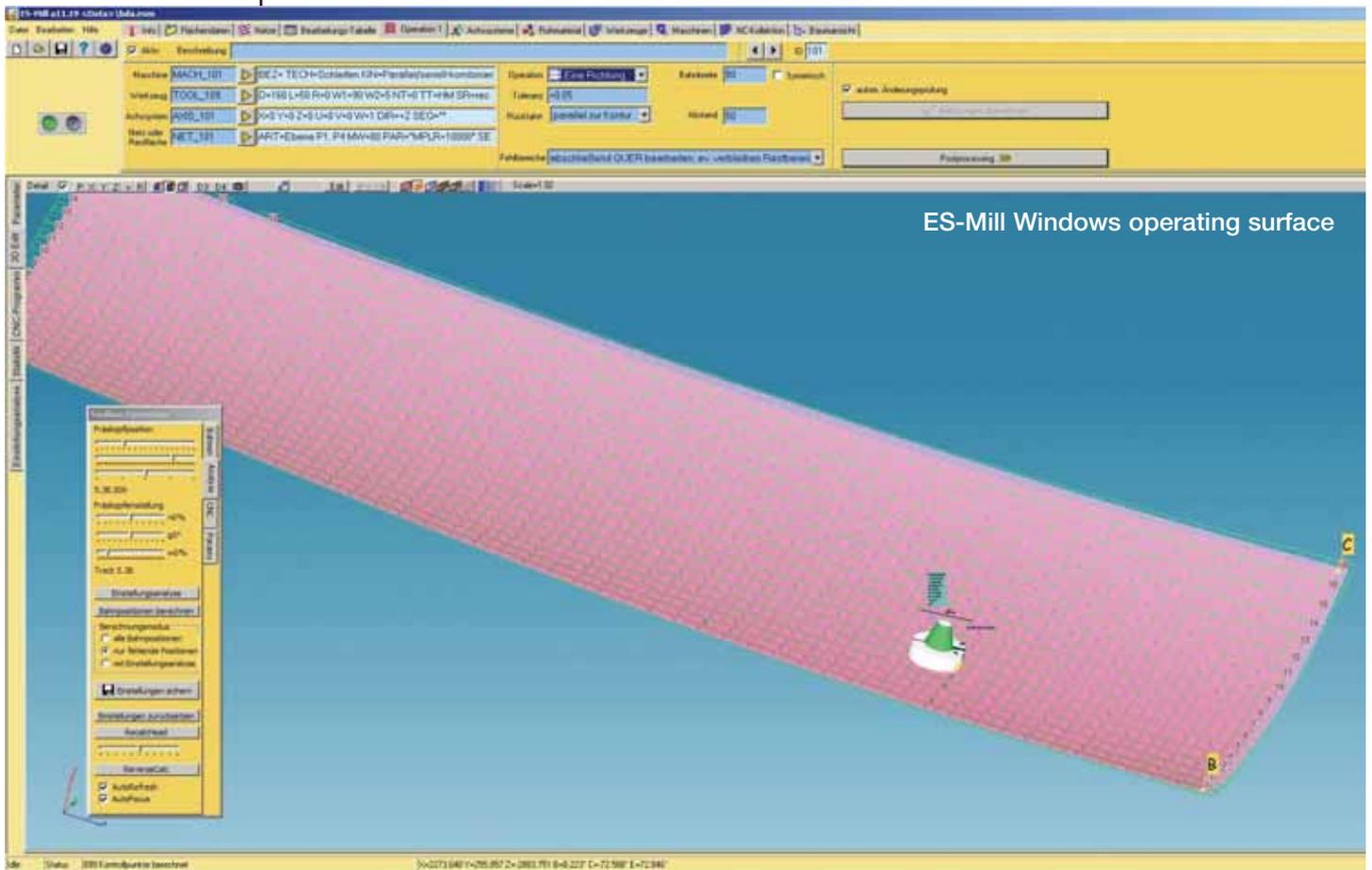
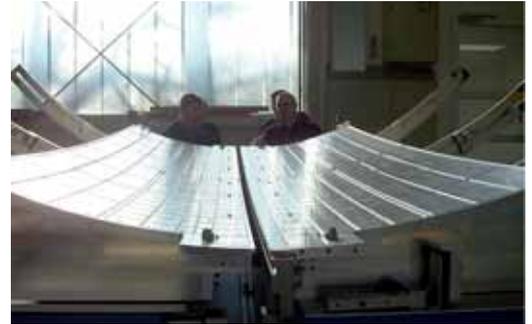


ES-Mill

5-axis programming system

Example 4: Vacuum hull

Material : Tensile aluminium EN-AW5083
 Dimensions : 3200x800x400 (2,5m²)
 Surface type : concave
 Tool : HM cutter head D160
 Machine : Milling machine with swivel head
 Cutting data : S2500 F2000
 Machining time : 20 min (line width 80mm)



awtne
CAM-Systems

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System requirements:

Current PC with min. 3GHz frequency, 1GB RAM (2GB recommended)
 200MB free hard disk memory, Open GL- able graphics board
 Operating system WindowsXP, screen with minimum resolution of 1024 x 768 pixel
 Connection of Space mouse is possible (3D-connection)

ES-Mill is trademark protected
 ES-Mill is copyright protected, patent pending

