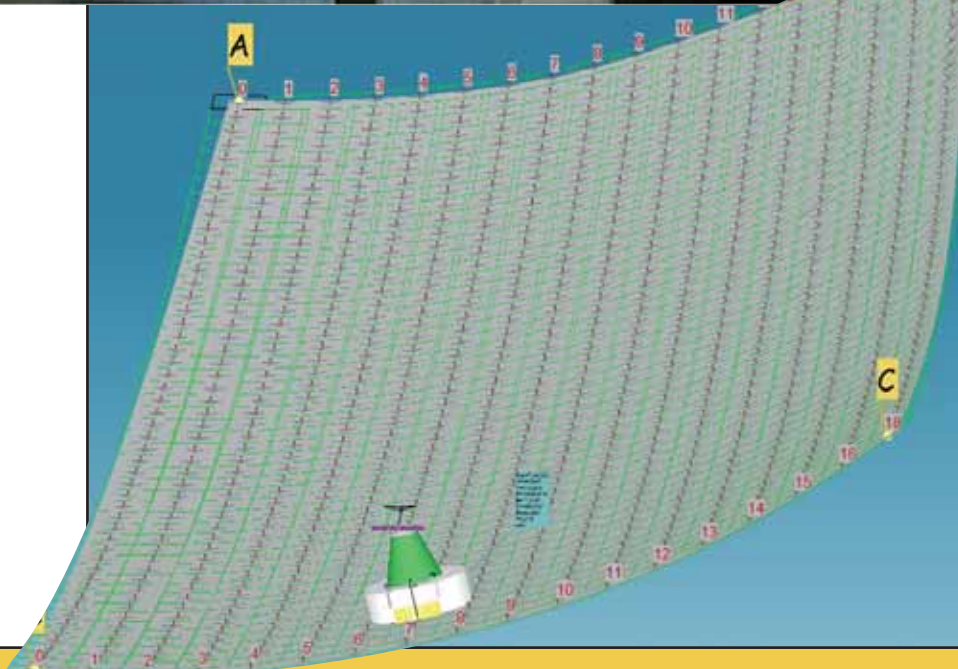




# ES-Mill

## 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.

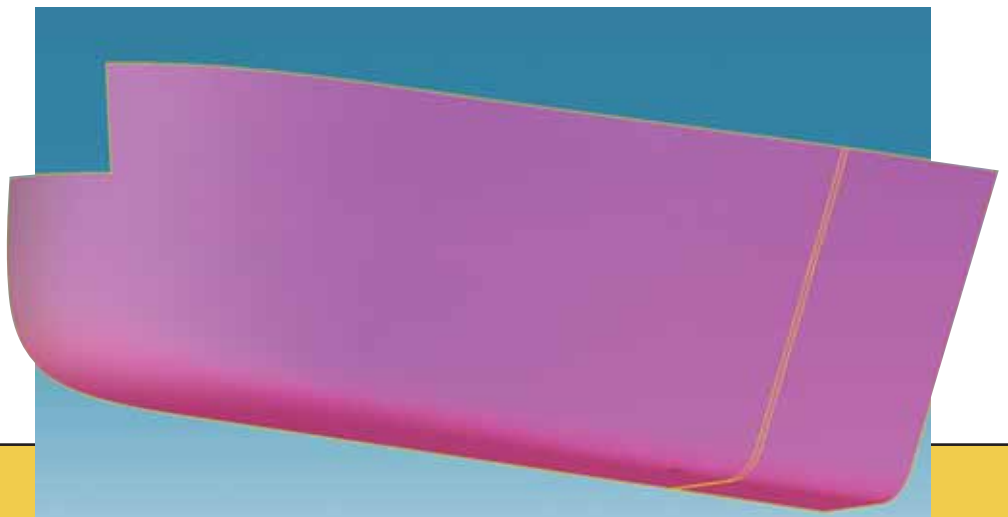
This is due to more comprehensive analysis and calculation processes.

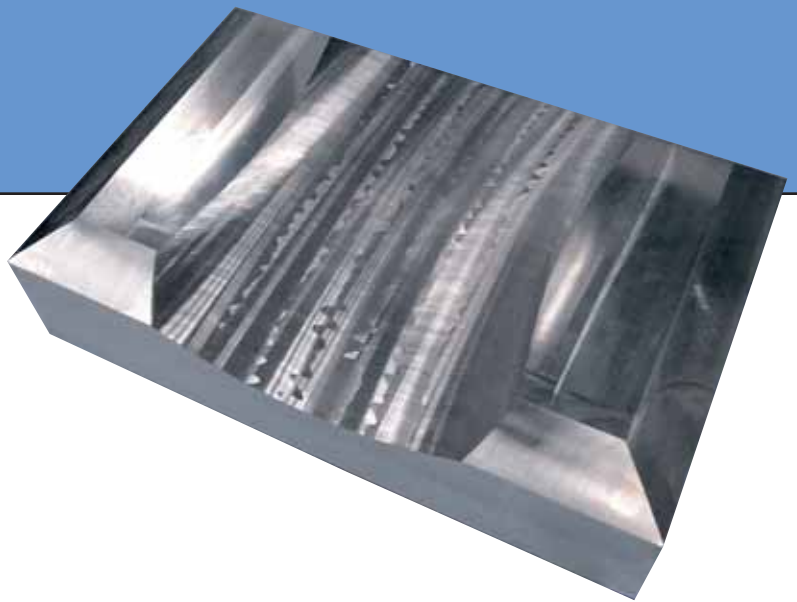
The following given times refer to the main time for one process/part without any further processes like milling slots, drilling etc.

### Example 1: Laminate base

Material : Epoxy  
Dimensions : 7000x4000x3000  
(70m<sup>2</sup>)  
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)

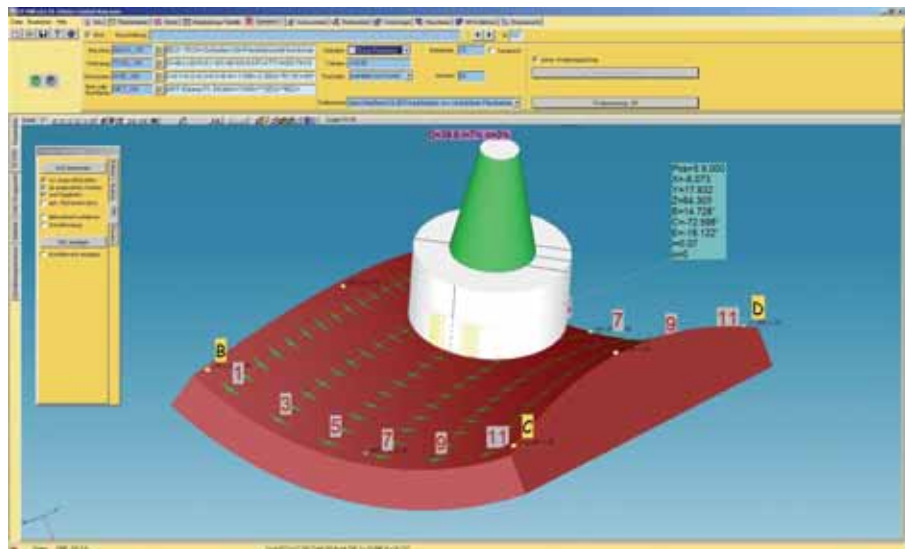
(Limitations on the machine did not allow use of a larger tool; with D200 it would have been possible to halve the time.)





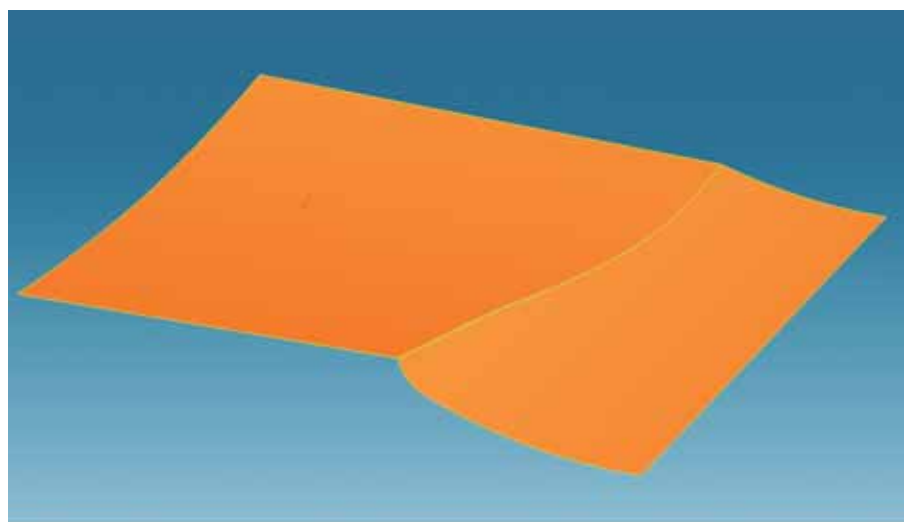
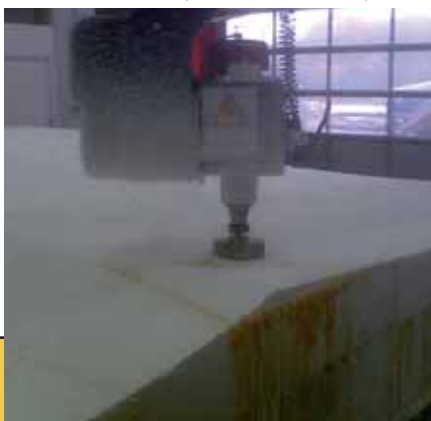
**Example 2:  
Master part**

Material : High-tensile aluminium  
 Dimensions : 300x200x100 (600 cm<sup>2</sup>)  
 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 (42m<sup>2</sup>)  
 Surface type : concave  
 Tool : HSS cutter D150  
 Machine : Milling machine  
 with swivel head  
 Cutting data : S6000 F40000  
 Machining time: 45 min  
 (line width 80mm)



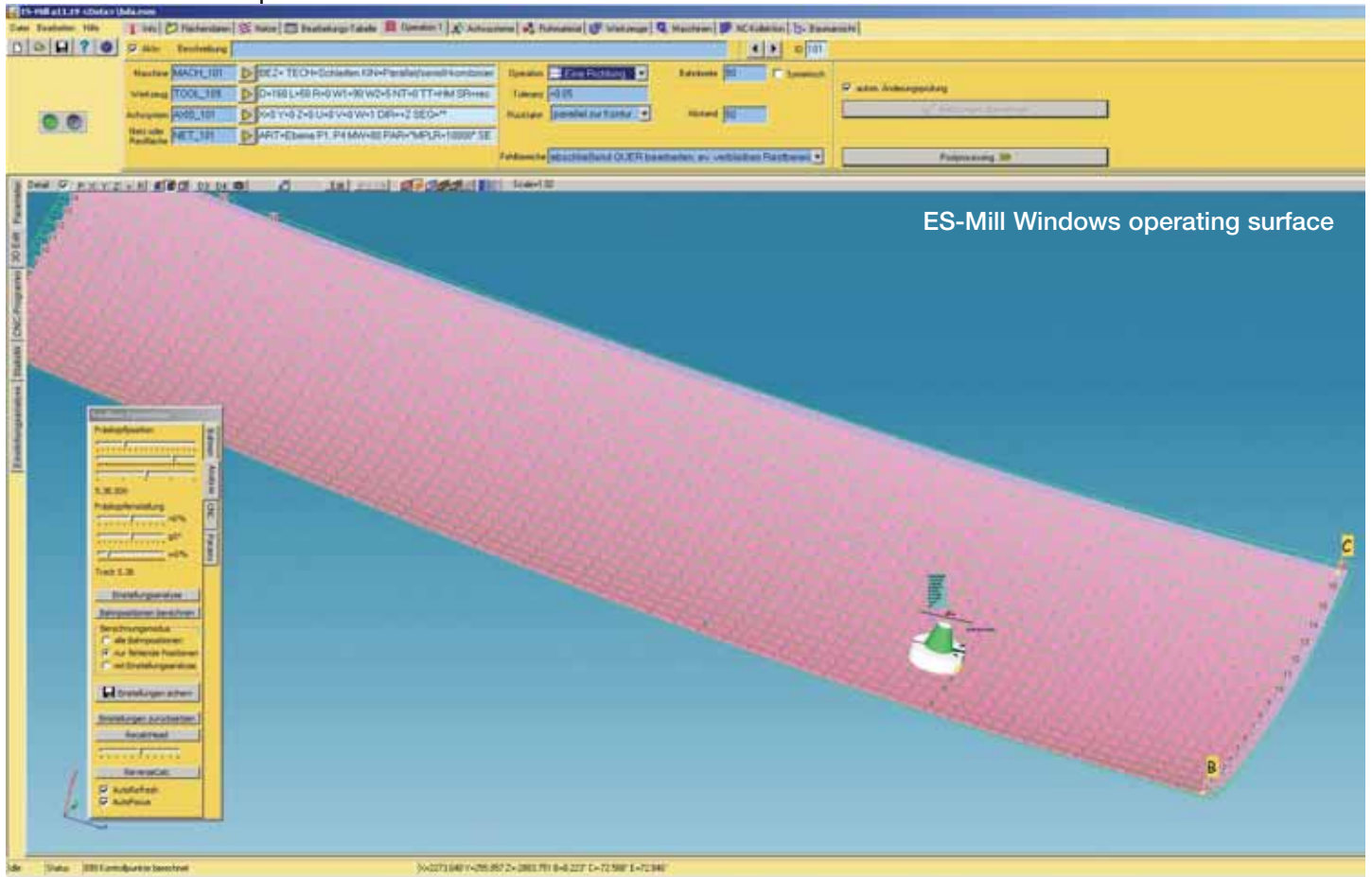
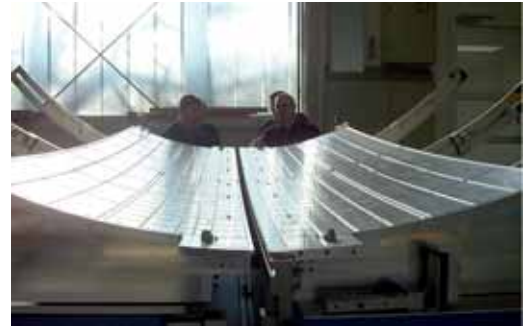


# ES-Mill

## 5-axis programming system

### Example 4: Vacuum hull

Material : Tensile aluminium EN-AW5083  
 Dimensions : 3200x800x400 (2,5m<sup>2</sup>)  
 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  
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