



MMS

Leading innovation
with proven technology



MATERIAL REMOVAL

Mirror Milling Star



MMS



Mirror Milling Star is the digital machining solution for high-speed milling, drilling and trimming of 3D aluminum or composite fuselage panels.

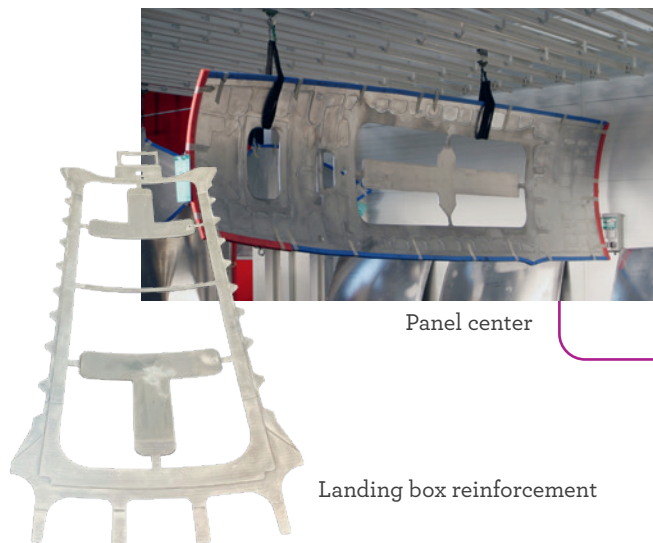
Thanks to its surface scanning system, the machining adapts to the real shape of the panel and the dual 6-axis heads arranged in a mirror guarantee an unequaled level of precision by controlling the symmetry and the thickness of the pocket depth bottoms, whatever be their complexity and diversity.

Flexible machining

Proven solution

Sustainable results

Mass production of skin panels aircrafts and space launchers waffle parts



Panel center

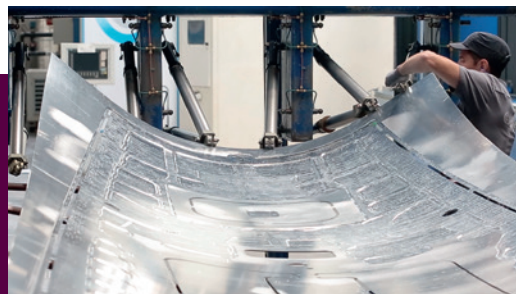
Landing box reinforcement



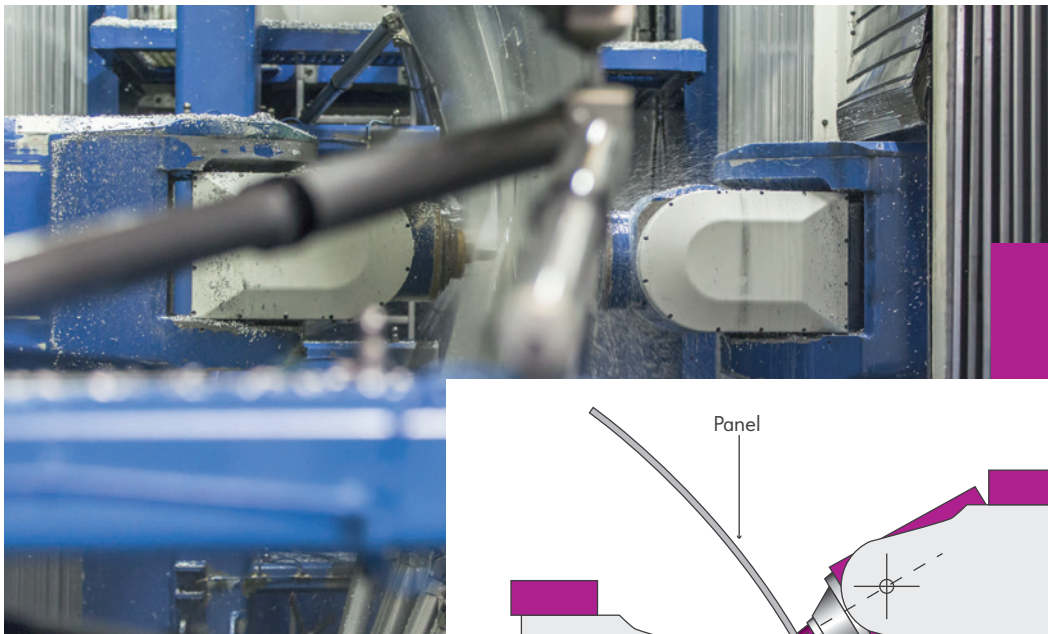
Canopy



Right front side panel



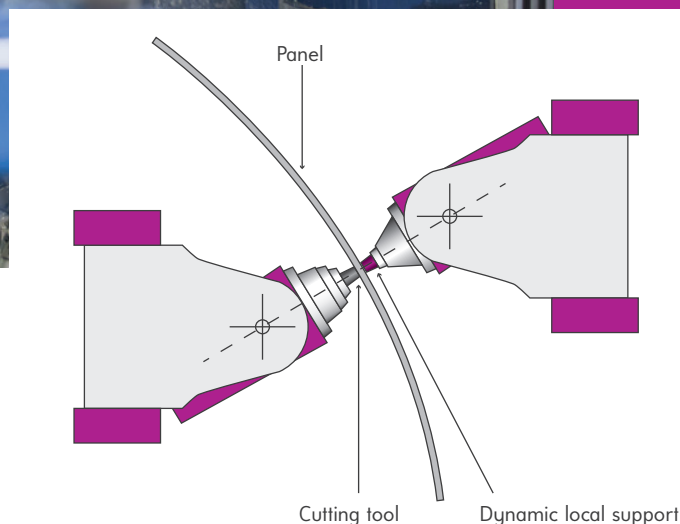
Along with complete life-cycle support, assistance, and solid technological collaboration, MMS Mirror Milling Star has been customized on request to meet the highest industry standards and quality.



Mechanical milling process advanced solution to replace chemical milling

12 axis synchronized action

- Scan & MAP Milling Adaptive Process to morph the ISO milling program to the real shape of skin panel
- Local support head maintaining contact and avoiding vibrations
- Ultrasonic sensor for thickness measurement
- Cutting head & support head full synchronisation for dynamic adjustment



No chemical product consumption
No chemical product evacuation and treatment
50% electrical supply less consumption
Chips and extra raw material recycling

Digital Machining Solutions

Leading your machining process with digital tools, from balancing to final control

MPT - MMS

Full MMS Programming Tools
Shrink your global programming phase
from 3 weeks to 3 days !

Phasing and automatization of: panel balancing
on the frame, clamping arm and jack table
positioning, laser projection, trimming, drilling
& pocketing NC code generation within the
appropriate milling strategy.

MAP-B - MMS

Reduce your calculation process time
from 20mn to 2 mn and improve your
capacity to address high complex parts

New release of the famous software: morphing
the theoretical Cad part to the digitalized
surface of the real part and automatically
generating the NC code of the machine.

Visu 3D - All Fives solutions

Manage your quality thanks to machined
part 3D visualization

Real time data monitoring while machining:
capturing the position of the cutting point and
quality/ process metrics at the same time, then
create a 3D view of the product.

3D Vit - MMS

Achieve high-quality metrology of
panels, at low cost

Virtual Inspection Tooling: Jigless dimensioning
metrology of skin panel after MMS process.
High accuracy Laser Tracker solution with
Fives algorithms
No tooling and reduced CAPEX

INDUSTRIALIZATION

MMS MACHINING

IN PROCESS CONTROL

POST PROCESS CONTROL

Proven process with digitalisation readiness
improves production capacity and adaptability

Flexible machine

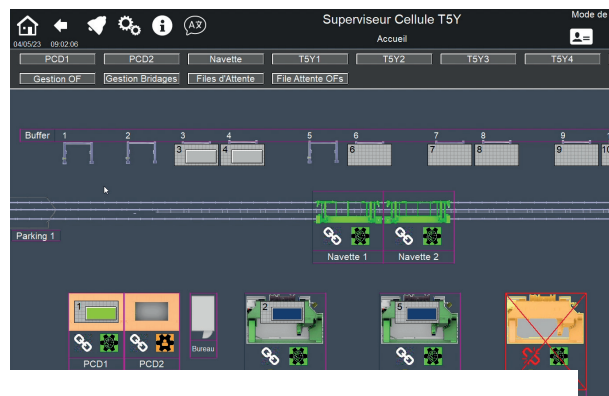


LARGE RANGE OF PANELS

FLEXIBLE PARTS TOOLING

- Universal clamping frame for all types of panels
- Surfacing, drilling and routing operations in one set-up and in one MMS
- Save money: 65% save time, 50% floor saving compared to chemical, less CAPEX
- Both panel sides machining without unclamping

MMS Mirror Milling Star offers the shortest ever skin manufacturing cycles with outstanding quality skin surface and dimensional accuracy.



FLEXIBLE MANUFACTURING SYSTEM

FM FLEXIBLE MANUFACTURING SUPERVISOR

- Automated solution, simple, robust and reliable
- Optimize the production flow on large diversity of parts type
- Supervision system ergonomics, simple operations designed for operators
- Excellent expertise with more than 30 years' experience in Fives supervision

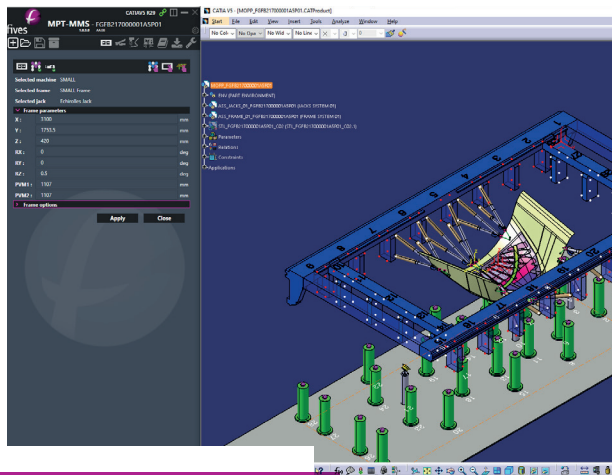


UNMATCHED PRODUCTIVITY

HIGH SPEED MACHINING

- 30,000 RPM spindle
- Feed rate 15m/min
- High dynamic stiffness
- Fast automation process
- High machine availability

Proven solution



EASY TO MANAGE

END TO END DIGITAL SOLUTION

- Easy programming, Fives CAM and post-processor solution
- Only 3 days to program a new part thanks to MPT Management Programming Tool
- Production optimization thanks to process visualization
- Secured connected solution and data collection: Fives CortX / Diziscope



HIGH QUALITY FINISHED PARTS

PROVEN PROCESS

- Accurate thickness control for better panel weight control
- High repeatability and consistent quality
- Outstanding surface quality
- High accurate, clean and dry parts



FIVES PROCESS EXPERTISE

STRONG EXPERIENCE AND EXPERTISE IN PRODUCTION

- R&D demo center and workshop available for tests
- Aerospace EN9100 Certified
- Panels production manufacturer for the world's largest industrial groups
- Turnkey solution: from trials to industrialization
- Secured and optimized production

16 Machines installed base on production with more than 10 years of background

Sustainable results



ENERGY SAVING

GREENER THAN CHEMICAL MILLING

- 100% chips recycling, no chemical sludge
- Optimized panels for lighter aircrafts
- Conform to REACH regulation



COST SAVING

EFFECTIVE SOLUTION

- Drastic reduction of power consumption during production thanks to data expertise, up to 30% compared to chemical milling
- Reduction of cycle time and Work in Progress
- From formed raw panels to finished skin panels in a single MMS cycle
- Easy vertical integration
- Universal tooling frame avoiding capex

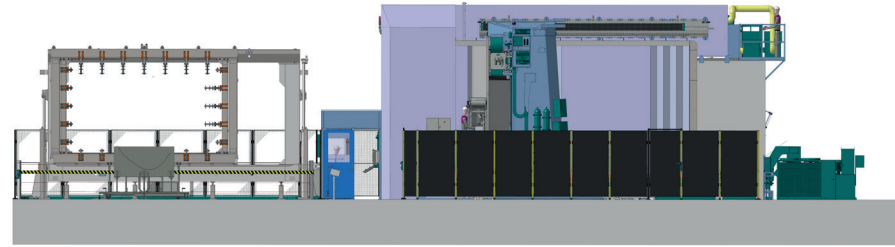
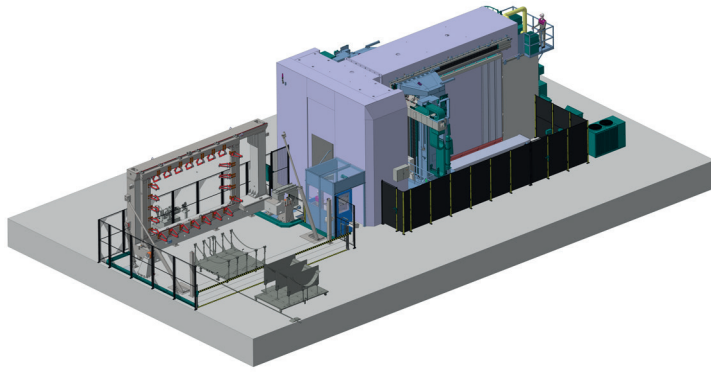


MADE TO LAST, FIVES DESIGN EXPERTISE

150 YEARS EXPERIENCE IN MACHINE-TOOLS

- Heavy duty engineering, high-quality manufacturing
- Innovative design and process
- 5-Axis head made by Fives
- Designed and produced in France

MMS Mirror Milling Star, your advanced, digital and eco-friendly solution



MMS | SPECIFICATIONS

Pallet

Reconfigurable clamping frames

Size (raw panel)

Max part: adaptable configuration

Standard part: 4 m x 2,5 m
and 6m x 2,5m

X Axis (Table)

Travel / Stroke 4800 - 6800 mm

Speed / Feed rate 30 m/min

Y Axis (Saddle)

Travel / Stroke 3000 mm

Speed / Feed rate 30 m/min

Z Axis (Ram)

Travel / Stroke 1600 mm

Speed / Feed rate 20 m/min

B Axis (Rotary)

Travel / Stroke +/- 90°

Speed / Feed rate 10 rpm

A Axis (Rotary)

Travel / Stroke +/- 90°

Speed / Feed rate 10 rpm

HF-Spindle

Max Power (SI) 20 kW to 63 kW

Max Speed 30 000 rpm

Taper HSK 50 to HSK 63

GLOBAL SERVICES



OPERATION

- OEM spare parts and other brands
- Customer support 7 days a week
- Preventive maintenance
- Sub-assembly repair
- Workshop machinery relocation



OPTIMIZATION

- Certified training
- Consulting (setting-up, operation...)
- Expertise and certifications
- Process optimization



EVOLUTION

- Refurbishment - Machine rebuilding
- Mechanical transformation
- Retrofit (NC and automation)
- Retooling
- Obsolescence management



50 field technicians and experts

3 000 parts items in stock in Europe

3 shops floor dedicated to refurbishment

MMS Mirror Milling Star

Data is not binding. Non-contractual pictures. The manufacturer reserves the right to make modifications without notice. © FIVES MACHINING S.A. 2023





fives

Industry can do it

CONTACT US

Fives Machining
44, boulevard François Mitterrand
12700 Capdenac, France
Tel.: +33 (0)5 65 63 80 27
fmg.contact@fivesgroup.com

www.fivesgroup.com