



# Wind Energy



# CMS SOLUTIONS FOR BLADE ROOT MACHINING

Why CMS .01

Why to process  
the blade root by CNC .02

Why CMS EOS .03

The range of solutions .04







Competence and passion  
at the service of the customer

In almost 50 years now, CMS has supported the development of many industrial sectors with technological solutions capable of increasing productivity and reducing processing costs: multi-axis CNC machining, thermoforming systems and waterjet cutting solutions. Such a wide range of products, combining quality and precision, make it possible to offer flexible, innovative and efficient solutions, able to solve the problems which arise in different stages of the production process or the targeted needs in many industrial sectors and of different materials: light alloys, aluminium, plastics, composite materials, metal, wood, stone and glass. And it is the authority of the customer which testifies to and confirms the high quality and performance of CMS machines, which actively participate in the production of the highest expressions of international technology, such as Boeing aircraft and NASA space shuttles.



\* Courtesy of: Freeform Technology

CMS Ares machining centre producing the model and trimming the composite nose component of a competition car



CMS Poseidon for the plug production



Courtesy of **DAHER-SOCATA**

CMS Cronus machining an aircraft part



## Why to process the blade root by CNC



The accurate processing of the blade root is a key factor reducing rework and increasing wind turbine life.

The drilling and milling of the blade root is a fundamental requirement in the mechanical assembly of the blade and hub and the level of precision has a major influence on the operation of the entire wind turbine.

By using the CMS machining solution the precision level of this process ensures the highest degree of accuracy on the market and thus the most effective wind turbine operation.

### CNC vs PLC

The CNC-based architecture gives a great advantage in flexibility and in an easy reuse of the same system for several models of rotor blade.

Different models can be produced simply by changing the CNC program.

A new CNC program can be automatically generated by post-processing the relevant CAD/CAM project.

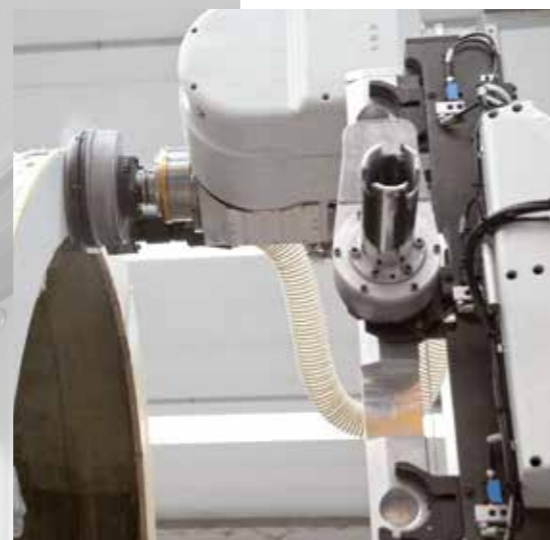
With the PLC-based solution a change of model needs a new set-up/testing of the whole system, along with relevant additional costs.

Basically a PLC-based solution is dedicated to only one or few models of rotor blades.

### CNC vs robots

While a solution based on robots may seem to be the most flexible and easy to use, it has serious limitations and drawbacks when put into practical use.

These include – lower processing accuracy due to its geometry, inefficient dust suction/removal, creating a dirty environment, each robot has to be treated as a single machine meaning a low integration level and longer testing time, due to the complicated post-processing, an higher risk of errors.



trimming (by blade) and finishing



drilling in axial and radial direction





EOS offers a complete coverage of the drilling and milling process of the rotor blades and all the benefits of an automatic solution, with the architecture base of CNC machining centres

- productivity, accuracy and repeatability
- flexibility - allows processing of new and different models of rotor blade
- less manual operation needed
- safer and cleaner working environment



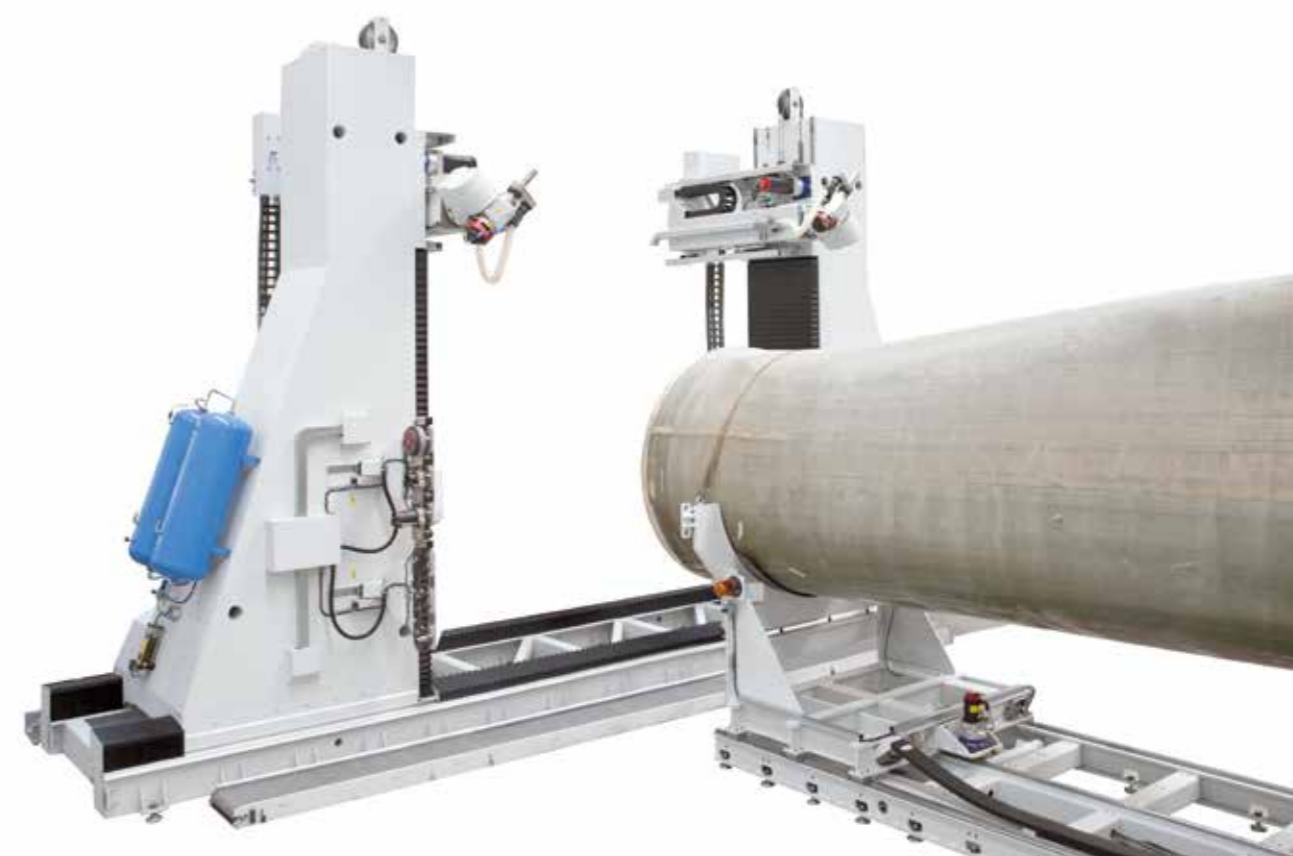
simultaneous machining with two operating units



automatic blade alignment



due to the unique technology of CMS tool cooling systems are not required



### Processing time: 2 hours 30 minutes

(Example: blade diameter 2200 mm and 50 T-bolts. Simultaneous machining with two operating units. T-bolts needing 2 holes: 1 radial + 1 axial. Automatic blade alignment included. No tandem cycle. No T-bolts insertion)





tandem cycle

**Main features**

- Single or double 5 axes operating unit with tool changer magazine. Electrospindle power: 28 kW.
- Full enclosure and suction hoods on each operating unit. Very efficient dust extraction.
- Rotor blade holder: carriages managed by CNC, fully integrated with the system.
- Automatic blade alignment. The CNC program of each blade is automatically adjusted to the actual position of the blade.
- Options: tandem cycle; T-bolt insertion.



single or double operating unit  
drilling / milling



single or double operating unit  
drilling / milling  
tandem cycle



single or double operating unit  
drilling / milling / T-bolts insertion



single or double operating unit drilling / milling /  
T-bolts insertion tandem cycle



Founded in 1969, CMS SpA includes five foreign branches and a worldwide sales and assistance network. CMS machining centres are used in the processing of a wide range of materials: plastics and composite materials, light alloys, aluminium, metal, stone, glass and wood. CMS is the specialized brand of SCM Group dedicated to the machining of such materials. Thanks to the extensive variety of solutions and its customized approach CMS SpA is in a position to meet the requirements of a wide range of industrial sectors satisfactorily, including: aerospace, military and civil aviation, automotive industry and Formula 1 racing, America's Cup sail racing, yachting, energy production (wind turbines), building, mechanics, eyewear manufacturing and many others. Such sectors have made CMS known all over the world, thanks to the accuracy, efficiency and overall quality of its products.



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