

## Full production output for wind power expansion

ICARUS Consulting uses Tecnomatix digital factory tools to improve customer operations; advantages include substantially higher quality, up to 80 percent time and cost reductions, and 200-300 percent higher output

### Business challenges

Faster commissioning of manufacturing installations

Shorter lead times

Lower error quota

Higher quality

Cost-efficient manufacturing processes

Higher output

### Keys to success

Comprehensive analysis of manufacturing processes

Generation of realistic digital simulation models

Computer-aided optimization of manufacturing scenarios

Robot programming and simulation in real-time

Accompaniment for new production scenario realization

### Results

Significantly improved quality

Up to 80 percent time and cost reductions

200-300 percent higher output

Shorter programming times for robots, without idle times

### ICARUS CONSULTING GMBH

#### More efficiency in global competition

Founded in 1995, ICARUS Consulting GmbH was one of the first engineering consultants supporting the development, planning and simulation of manufacturing processes in Germany. The aim was to accompany customers through every stage of manufacturing planning via qualified consultancy and process management.

Additionally, ICARUS Consulting takes over all tasks regarding planning, design, 3D simulation, process optimization, as well

as system and software development. The company's more than two dozen specialists have gained extensive experience across various industries. Among its customers are car manufacturers and car manufacturer suppliers, aerospace businesses and engineering consultants, as well as rail and bus manufacturers.

Almost always, the tasks reflect global business challenges. "We are hired to achieve lower production costs, shorter project times or the trouble-free commissioning of new manufacturing plants," says Volker Wildeboer, one of the two chief executive officers at ICARUS Consulting. "Also, ergonomic workplaces, higher product quality, shorter lead times and higher output are in high demand."

In fact, these are among the key factors that decide whether a company pushes global competition – or gets pushed by it.

#### Digital factory pioneers

As a progress trailblazer for its international customers, ICARUS Consulting relies on digital factory tools from the very beginning. Tecnomatix® solutions from Siemens PLM Software are used to generate simulation models, set up production scenarios, design and optimize manufacturing lines, and program robots. Some 20 workplaces are equipped with the Tecnomatix solutions for plant design, robotics, and automation planning. These comprehensive tools support answering particular customers' questions with



# TECNOMATIX

[www.siemens.com/tecnomatix](http://www.siemens.com/tecnomatix)

# SIEMENS

*“In this dynamic market environment, we were able to increase the throughput of two to three rotor blades per day by 200 to 300 percent.”*

Volker Wildeboer  
Chief Executive Officer  
ICARUS Consulting

*“Industrial processes are continually increasing in complexity. Only by using simulation models are plant operators able to face this trend effectively. For this, the Tecnomatix solutions are the key to success.”*

Bernd Lienhöft  
Chief Executive Officer  
ICARUS Consulting

an accuracy of nearly 100 percent. On the other hand, already existing simulation models can regularly be used to optimize, modify or enhance manufacturing plants.

“Industrial processes are continually increasing in complexity,” notes Bernd Lienhöft, also chief executive office at ICARUS Consulting. “Only by using simulation models are plant operators able to face this trend effectively. For this, the Tecnomatix solutions are the key to success.”

### Wind power stations – a booming market

With expertise in manufacturing site automation and Tecnomatix solutions, ICARUS Consulting also supports the manufacture of wind power stations. In order to achieve the political goals regarding renewable energies just in the North Sea and Baltic Sea, more than 1,000 wind power stations shall be constructed every year during the next decades. These wind power stations have a hub height of over 100 meters and rotor blades up to 80 meters long.

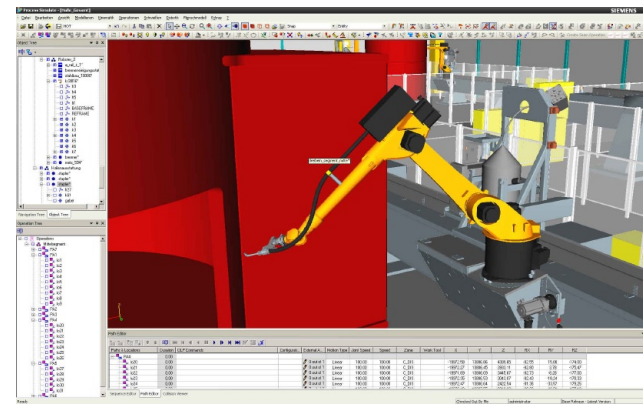
The manufacturers of the gigantic stations must achieve higher quality and quantities in the production process to help secure a strong market position. Therefore, ICARUS Consulting creates simulation models of the production facilities for foundation, tower and rotor blades in an early stage using existing customer CAD models, library components and 2D plans. Boundary conditions like hall layouts are considered, as well as are customer specifications regarding cycle times and output. Different production scenarios provide information about the right utilization of manpower, machines, devices, and robots.

Additionally, the scenarios support product variant testing and the selection of automation components. “With the simulation model, we ensure that the right devices are ordered on time, that the workplaces and buffers are arranged and that all means of transport are in place,” says Wildeboer. This prevents commissioning issues regarding the feasibility of individual operations or the availability of the entire installation. Also, existing manufacturing facilities are further optimized with the digital factory tools.

### Robot programming the right way

The rotor blades, being up to 80 meters long, are horizontally flanged to the future mounting point, in order to grind them and to apply gel coat and paint. In this process, the blades strongly deflect. This, as well as material characteristics, e.g., gel coat dries in a few seconds, complicate the programming of operating robots. Idle times during processing must not occur.

In the past, it often took months to optimally program the robots by using a teach pendant, also known as an online, manual-teach procedure. “With Tecnomatix, we develop the programs offline and go live in a few days,” says Wildeboer. “We are able to reduce production start-up times significantly. Additionally, we improve the robot programs in a way that the quality of the rotor blade surface reaches its optimum.” This essentially determines the efficiency of the future wind power station – the higher the surface quality is, the less turbulence affects the blade run.



*Welding robots were programmed offline in order to reduce manufacturing times of underwater frameworks for wind power stations.*



## Solutions/Services

Tecnomatix  
www.siemens.com/tecnomatix

### Client's primary business

ICARUS Consulting GmbH provides development, planning and simulation of manufacturing processes for the digital factory.  
www.icarus-consult.de

### Client location

Winsen an der Luh  
Germany

*"For a rotor blade of 70 meters in length, sufficient buffer space is rarely available. When you are able to save a single component carrier, then the analysis costs are already amortized several times."*

Michael Lüdemann  
Project Director  
ICARUS Consulting

### Optimized material flow

High quantities and short cycle times are typical reasons for performing a material flow simulation with Tecnomatix; however, for wind power stations, the enormous dimension is the deciding factor. "For a rotor blade of 70 meters in length, sufficient buffer space is rarely available," says Michael Lüdemann, project director at ICARUS Consulting. "When you are able to save a single component carrier, then the analysis costs are already amortized several times."

Another field of application for material flow simulation is the elaborate logistics needed for constructing an offshore installation. The coordination of special transporters, which bring the huge parts from the manufacturer to the designated port, is very complex. Additionally, the right assembly order and the storage capacity of the port have to be considered to ensure quick and cost-efficient at-sea construction. "The costs for the special transporters alone justify the effort of an extensive optimization," notes Lüdemann.

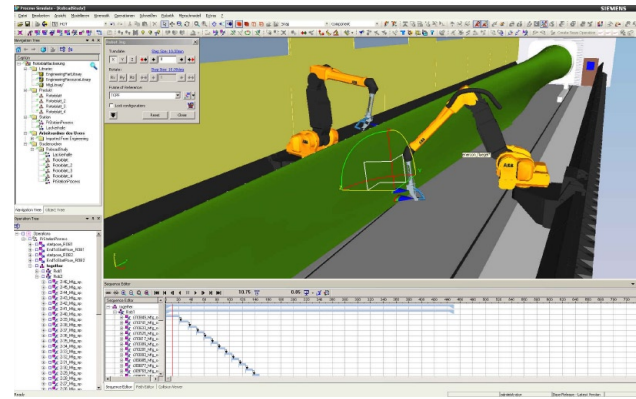
### Demanding applications, outstanding results

In the rail sector, robots for sandblasting wagons are programmed offline within two days. The on-site programming process used to cause an idle time of 14 days.

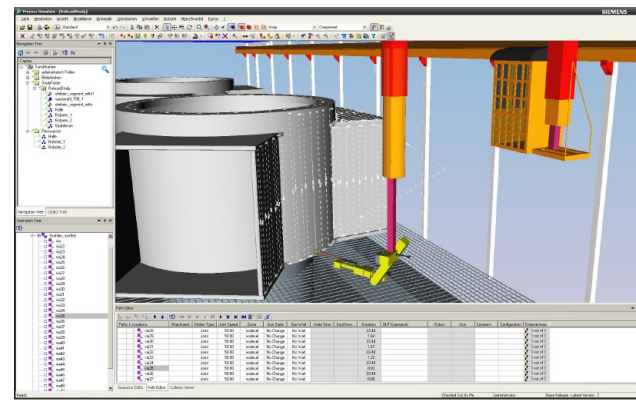
The automotive sector also has a strong need for material flow simulations. For example, in the case of just-in-time (JIT)/just-in-sequence (JIS) manufacturing, no two seats are alike due to customized variants. This creates a challenge in guaranteeing that the seats are always provided in the right sequence.

"Industrial processes are becoming increasingly complex," notes Lienhöft. "Only by using simulation models are plant operators able to face such trends effectively. Tecnomatix software offers the right solutions to address these demands."

Wildeboer points out, "In this dynamic market environment, we were able to increase the throughput of two to three rotor blades per day by 200 to 300 percent. Of course, the corresponding automation and the in-advance validation within the digital factory were absolutely necessary."



Surface quality is decisive for rotor blades up to 80 meters long. Optimized, automated processes ensure the highest quality and best lead times.



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