

TIANJIN ALSTOM HYDRO

Power

SPRING
TECHNOLOGIES
Machining as Designed

Success Story



NCSIMUL
MACHINE





Information	
Industry :	Power
Solution :	NCSIMUL Machine



POWER
Hydro

Company Overview

Tianjin ALSTOM Hydro Co. Ltd boasts a workforce of more than a thousand qualified employees, a 60,000m² factory equipped with CNC technology and the capacity to manufacture turbines and generators for all hydro applications. It is also one of Alstom's largest manufacturing hubs for hydro power equipment, serving both Chinese and global markets.

Tianjin ALSTOM Hydro Co. Ltd is widely involved in large hydro projects including Three Gorges (14×700MW units) and Xianjiaba (4×800MW units). The 800MW turbines designed, engineered and manufactured by Alstom for Xianjiaba are the world's largest hydro turbines ever manufactured to date.

Challenges

A delivered runner (a core component of turbine units) weighs over 200 tons, with a diameter of over 8 meters and a height of almost 4 meters.

Tianjin ALSTOM Hydro Co. Ltd is responsible to manufacture the giant blades that will be mounting the runners for the turbine use. Miss Li Jungai technical team has the challenge to manufacture those 3 meters high, 3 meters wide turbine blade from a rough stock of at least 100 tons. *"With the increasing demand of hydro projects in China and overall, in Asia; we are asked to manufacture our blades faster, easier and with greater safety"* says Miss Li. *"We have to improve productivity every year on our 5Axis and Mill-Turn Machines. With the daily use of Spring Technologies Solutions, we didn't know we would not add benefits but multiply them!"*

Turbine blades shape is one of the most complex tasks for a NC programmer to master, even greater when the blade is 3 meters high! Count 80 hours of roughing operations on a single blade, at a rate of 3 blades every month, the room for Miss Li technical team of any mistake is equal to zero.

"One blade takes in average 50,000 single lines of G-Code to obtain the required surface quality after our machine milling operations; you can imagine how heavy is the task of programming and proving-out one blade on our NC Machine" informs Miss Li.

"Our engineers use NX to generate the tool-paths and we were used to directly send the program to the machine for prove-out, and thus, entering very long dry-runs sessions during which anything could happen, we were looking for off-line solutions to help us gain in productivity on our actual programs, and we found the perfect solution"...

Benefits

Simulation with NCSIMUL Machine

"We tried to use our CAM software to prove-out our tool paths, but the results were nowhere near as reliable as when we directly simulate our ISO codes with NCSIMUL Machine. With NCSIMUL Machine we are able to check and guarantee the accuracy of the tool paths of our NC machine-tool. We now use it systematically to check all our CAM tool paths. When you consider that a spindle head can cost 25,000 to 30,000 euros, as much as NCSIMUL Machine, it's easy to see why we got instant ROI! NCSIMUL Machine delivers undisputed productivity gains on our machines" explains Miss Li.

In the past, the programmers were required first to program the part according to their experience on the field, then prove-out the program on the machine to detect any errors or defaults, correct any eventual problems by direct re-programming on the machine itself or sending back the program to the CAM for further changes, and finally test again the changes on the NC Machine.

Now, time is saved by directly simulating the machine environment on NCSIMUL Machine, correct all programming or manufacturing errors that could happen, before even having touched a single cutter in the workshop. Prove-out times were dramatically decreased and real productivity gains were directly evident on the shop floor. Finally, the machines were fully used for production and no dry-runs were ever to be seen again.



"We also increased safety as we are able to detect any collisions, spindles stopped in the material etc. before they even occur. My operators are much more confident on their daily tasks and don't hesitate to put the putter at full speed!".
"With the use of NCSIMUL Machine, we increased productivity, improved safety and accelerated our manufacturing schedules" concludes Miss Li.

Optimization with Optitool

Another SPRING Technologies solution, Optitool brought great advantages to Miss Li team by Reducing Cycle Time, Improving Surface Finish and thereby reducing the overall cost per part in Tianjin ALSTOM Hydro Co. Ltd.. Managers who usually tend to reduce their costs would heavily invest in very expensive automation equipment and high-speed machinery. However, solutions for tool-path optimization can be a click away as it the natural extension of NCSIMUL Machine.

A program out of NCSIMUL Machine is error-free and all possible problems have been detected. This is time to run on this NC program the NCSIMUL Machine Optimization module: Optitool. NCSIMUL Machine has the ability to cut the tool path in very small segments and analyze the cutting conditions [amount of material removed etc.] in each one of them. It will then optimize feeds and speeds in the ISO program, depending on the second-by-second amount of material removed, the height and width of the cut, and the type of tool motion for each segment. Without ever modifying the original tool path [which represent the industrial know-how of the company], Optitool outputs a new NC program by proposing the best machining conditions with improved feed rate settings.

"With my team, we were often struggling choosing the right cutting parameters and feed rates based on our experience in Alstom, but with an average of 50,000 lines of code, it was really a challenge!" says Miss Li.

"With the use of Optitool, we gained more than 10% (thus more than 8 hours of machine time) in productivity by automatically selecting the proposed federate and optimizing our previous programs. We know optimize every program out of NCSIMUL Machine before sending them for production".

The optimized NC Codes produce constant chip load which typically result in parts with better surface finishes and reduce wear on cutting tools; time is saved on the programs, on the time the cutters are machining and thus on the cutting tools overall budget.

She concludes, *"My cutting tools last longer and my machines also run smoother! With the use of NCSIMUL Machine and*

Optitool, we don't add gains, but we multiply them!"

"My cutting tools last longer and my machines also run smoother! With the use of NCSIMUL Machine and Optitool, we don't add gains, but we multiply them!"

LI Jungai

Tianjin ALSTOM Hydro Senior Technical Engineer

