

## IN-SITU MACHINING FOR NORWEGIAN HYDROELECTRIC POWER PLANT

### NEW IMPELLER INSTALLATION REQUIRES MACHINING MODIFICATION

Andritz Hydro was contracted to manufacture and install a new impeller for the Hunsfos hydroelectric power plant in Vennesla, in southern Norway. The goal of the project was to increase the efficiency of the power plant. In order to accommodate the new impeller, Andritz Hydro recognized that they would need to have the turbine outlet machined to a larger diameter.

Goltens was contacted to evaluate the job and propose a solution. The job was far from simple in that the inside diameter of the outlet was roughly 3.5 meters and the surfaces to be machined were in some places flat and in others curved. Further complicating the job was the restriction on where Goltens could weld to secure the machining tooling in place.

Goltens evaluated the challenge and presented Andritz with a proposal for the completion of the complex job. Goltens in-situ technicians modified their existing tooling to accommodate the requirements by fabricating a rail that followed the exact radius of the curved surface for the machining bit to follow. Once tested, they deployed the tooling and a 3 man in-situ machining team to complete the job.

#### IN-PLACE HYDRO MACHINING SCOPE:

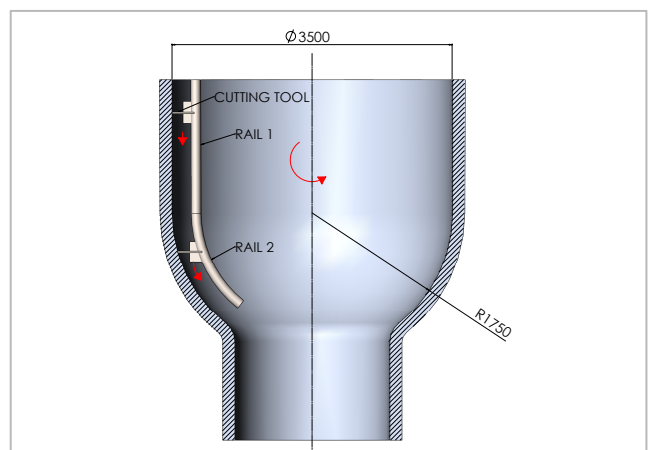
- On-site inspection of outlet housing
- Fabrication of special cutting assembly
- Machining an average of 3.5mm off the radius of the 800mm vertical surface and 500mm curved surface

#### IN-PLACE MACHINING RESULTS:

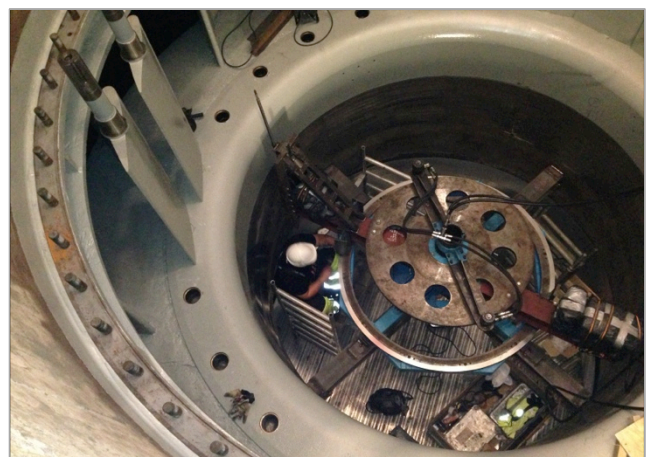
A three-man team from Goltens Oslo did this job in a period of 25 days, taking away an average 3.5 mm on the radius.

### HUNSFOS HYDROPOWER PLANT MACHINING

Turbine Type:	Kaplan
Plant Power Output:	77.6 Million KW hrs/yr
Turbine Outlet Diameter:	3,500mm
Vertical Surface Machined:	800mm
Curved Surface Machined:	300mm
Material Removed from Radius:	3.5mm



Rough diagram of turbine outlet



Turbine outlet machining in progress