

## Multiphysics icing analysis using HPC Cloud

### Fortissimo Experiment Facts:

- Industry Sector: **Aeronautical**
- Country: **Germany**
- Software Used: **UderEis**

### ORGANISATIONS INVOLVED

MT PROPELLER (End User) is a German SME and a leading manufacturer of propellers for small aircraft.

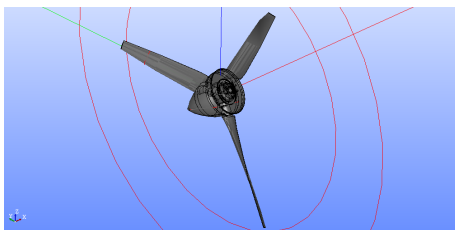
NORTHERN NUMERICS LTD (ISV) is a UK SME specializing in simulations of freezing phenomena for the aeronautical, automotive, naval, construction and process industries.

ARCTUR (HPC Centre) is a Slovenian SME, participating as an HPC provider.



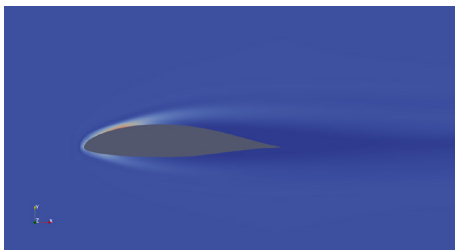
### THE CHALLENGE

MT Propeller aims to improve the design of ice protection systems for its propellers, shorten simulation times from one week to less than a day. This allows MT Propeller to incorporate the ice accretion simulations more efficiently in its design cycles. Increased computational resources through HPC uptake would allow MT Propeller to design more complex propellers for larger aircraft and analyse ice protection systems performance as installed on the aircraft.



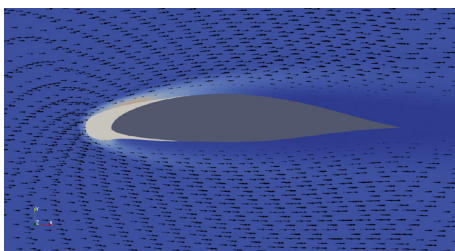
### THE SOLUTION

The Northern Numerics UderEis software offers some of the most advanced physical models for simulating ice accretion on aircraft components. UderEis is HPC capable and cut down the MT Propeller simulation times to less than a day. UderEis also allowed the simulation of ice accretion on rotating propellers. Using the computational resources of the Arctur HPC cloud it was possible to perform ice accretion analysis on a rotating propeller as installed on a small aircraft. A user-friendly GUI was developed, with detailed online tutorials for prospective users of UderEis to facilitate software adoption. The UderEis on-demand flexible licensing scheme is very competitive compared to licensing schemes of larger vendors.



### BUSINESS IMPACT

The dramatic reduction of ice accretion simulation times and the ability to analyse ice protection system performance on rotating propellers as installed on aircraft increase the reliability of the ice protection system and result in multiples of 10k € savings for MT Propeller. The shorter turnaround times on HPC platforms and correspondingly more efficient design cycles lead to a substantial reduction in the labour costs for design. Moreover, the new ability to analyse larger and more complex cases for larger aircraft allow MT Propeller to explore a new market and potentially increase their sales.



As for Northern Numerics, the availability of its products on the Fortissimo Marketplace and increased visibility will allow it to attract more business. Northern Numerics conservatively expects to double its sales volume. Both MT Propeller and Northern Numerics benefit from outsourcing computational resources and management to the Fortissimo Cloud on demand, with corresponding savings in the higher margin.

#### Fortissimo Experiment Partners:

- **MT-Propeller** (End User)
- **Northern Numerics** (ISV)
- **Arctur** (HPC Provider)

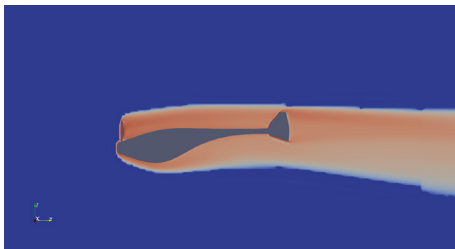
#### More Information:

[www.fortissimo-project.eu](http://www.fortissimo-project.eu)  
[info@fortissimo-project.eu](mailto:info@fortissimo-project.eu)



Northern Numerics LTD

ARCTUR



Arctur aims to increase its SAAS and PAAS sales by offering a new product in its portfolio, with annual sales increase.

## BENEFITS

- Reduced costs for simulations of multiple 10.000€.
- Reduced simulation times from one week to less than a day.
- Use of much more realistic physical models by the end-user.
- Reduced HPC costs for the HPC expert by outsourcing computational resources to the Cloud.
- Reduced software licensing costs by both the end-user and HPC expert thanks to the UderEis flexible on-demand scheme billed by core-hour.

## THE FORTISSIMO PROJECT

Fortissimo is a collaborative project that enables European SMEs to be more competitive globally through the use of simulation services running on a High Performance Computing cloud infrastructure. The project is coordinated by the University of Edinburgh and involves more than 100 partners including Manufacturing Companies, Application Developers, Domain Experts, IT Solution Providers and HPC Cloud Service Providers from 14 countries. These partners are engaged in over 90 experiments (case studies) where business relevant simulations of industrial processes are implemented and evaluated. The project is funded by the European Commission within the 7th Framework Programme and Horizon 2020 and is part of the I4MS Initiative.

**I4MS** Fortissimo is part of I4MS ICT Innovation for Manufacturing SMEs: [www.i4ms.eu](http://www.i4ms.eu)



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