



CLASS

Conference 2012

Cloud Assisted Services

High Performance Computing in Hydropower

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$$\rho \frac{\partial \bar{v}}{\partial t} = \rho \bar{F} - \nabla p - \rho \bar{v} \nabla \bar{v} + \mu \nabla^2 \bar{v}$$

$$\nabla \cdot \bar{v} = \text{div } \bar{v} = 0$$



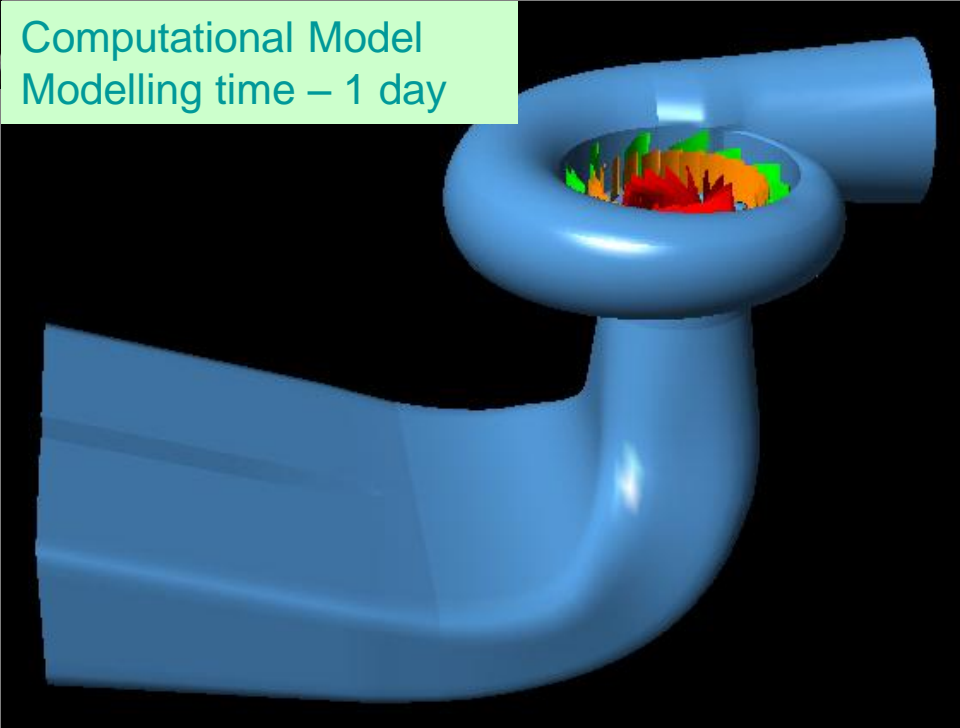
Leonardo Da Vinci 1513

Real Model
Production time – 1 month



Turbine model

Computational Model
Modelling time – 1 day



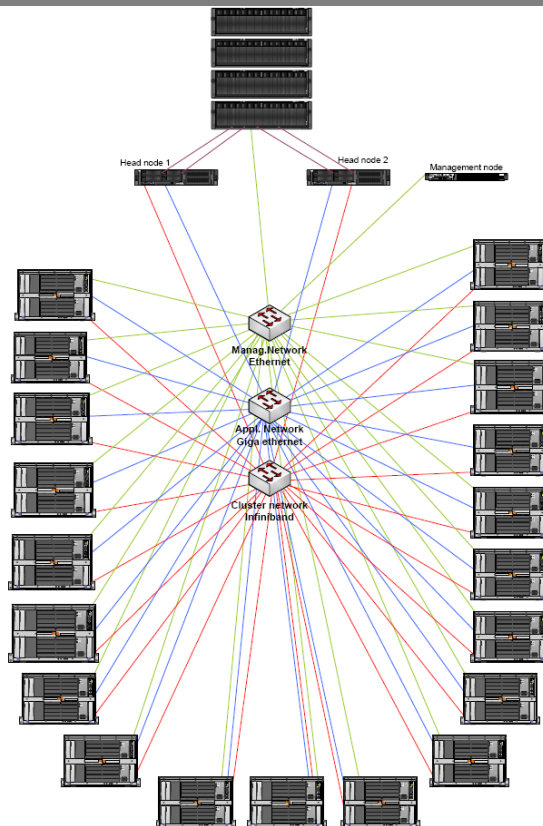
Accuracy



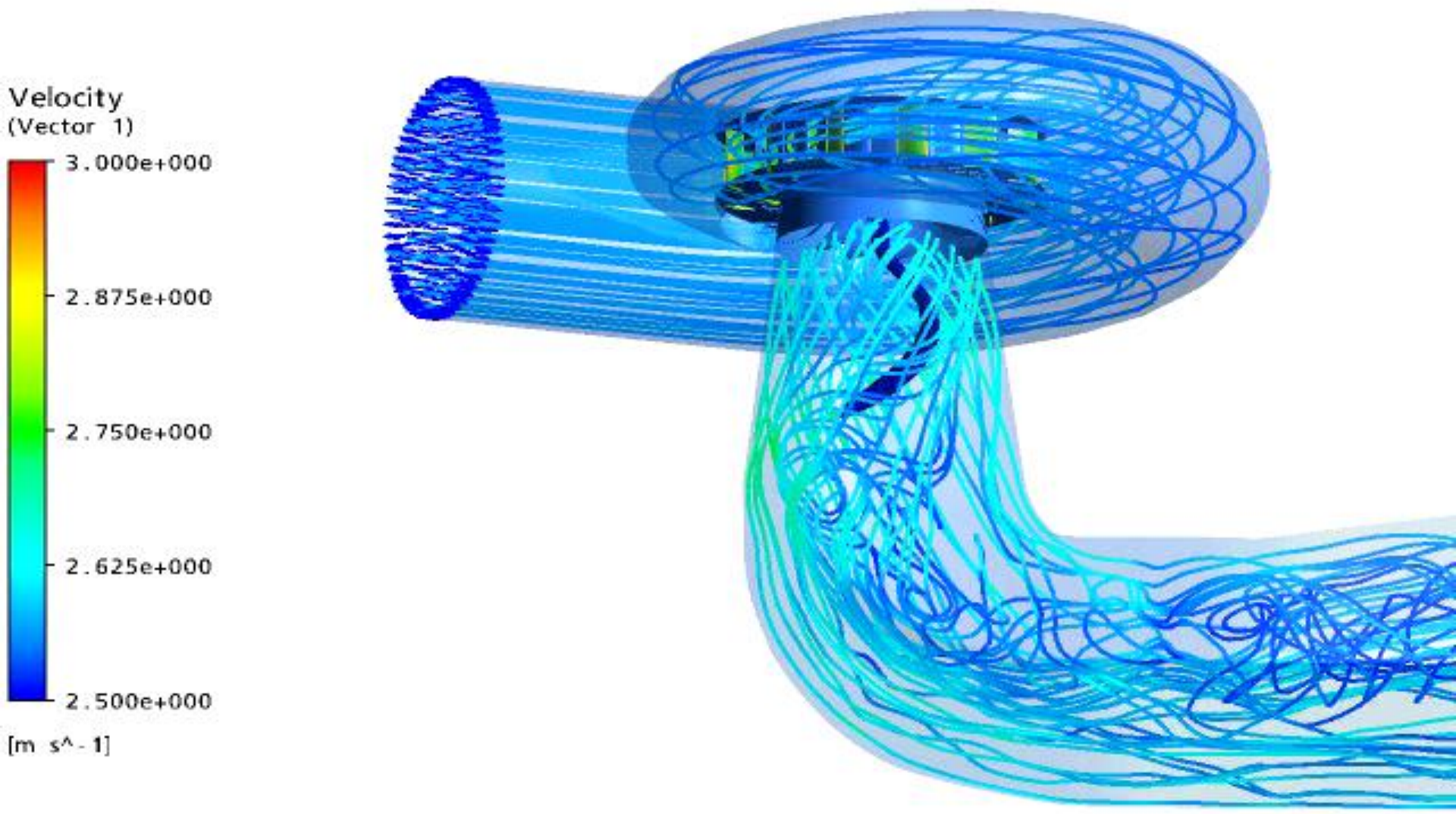
Time is money



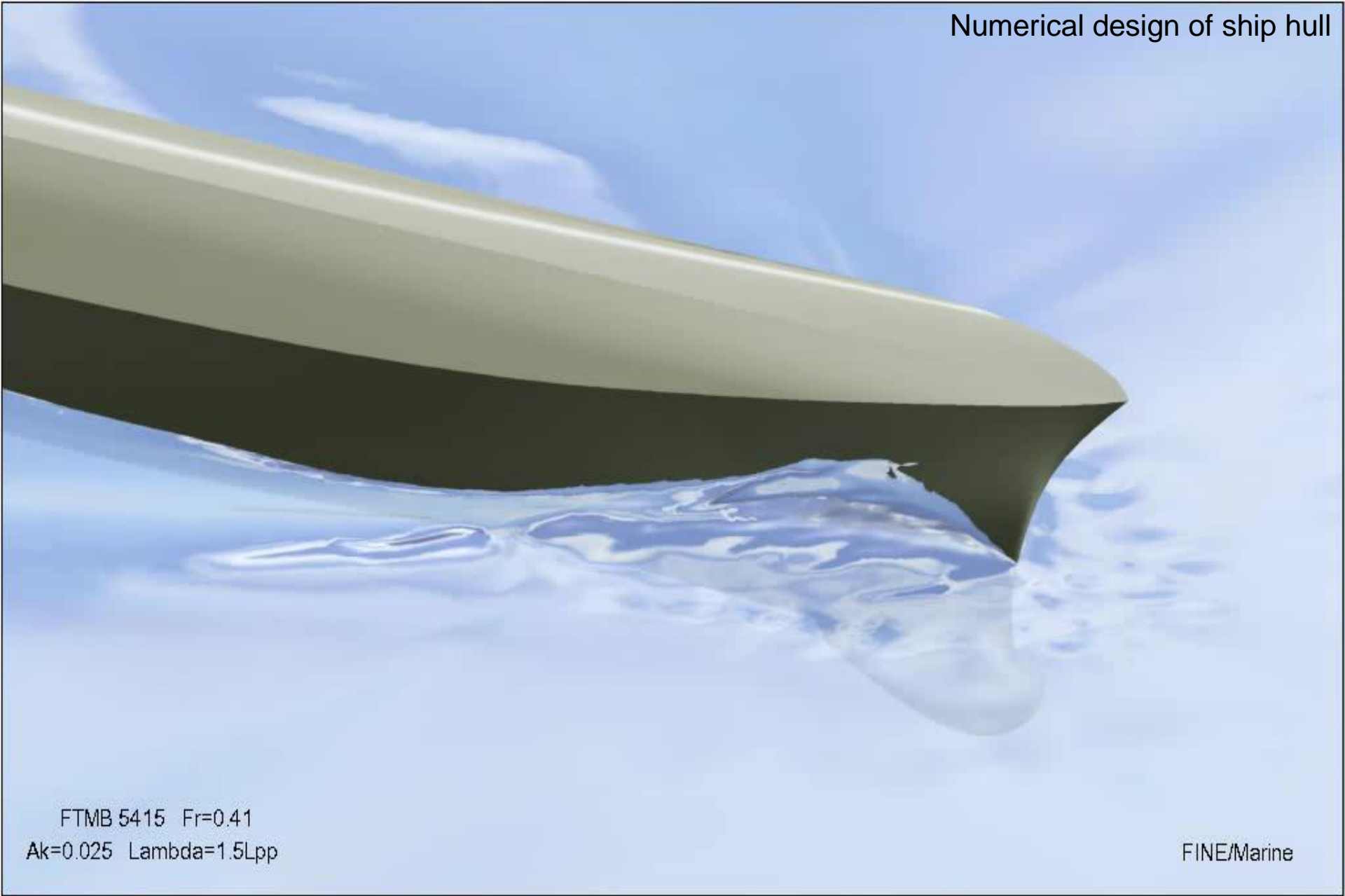
Supercomputer in Turboinštitut d.d.



Number of proc. cores: 2048
RAM: 4TB
Hard disk: 40TB+
Cluster network: Infiniband
Weight: cca 3.5t



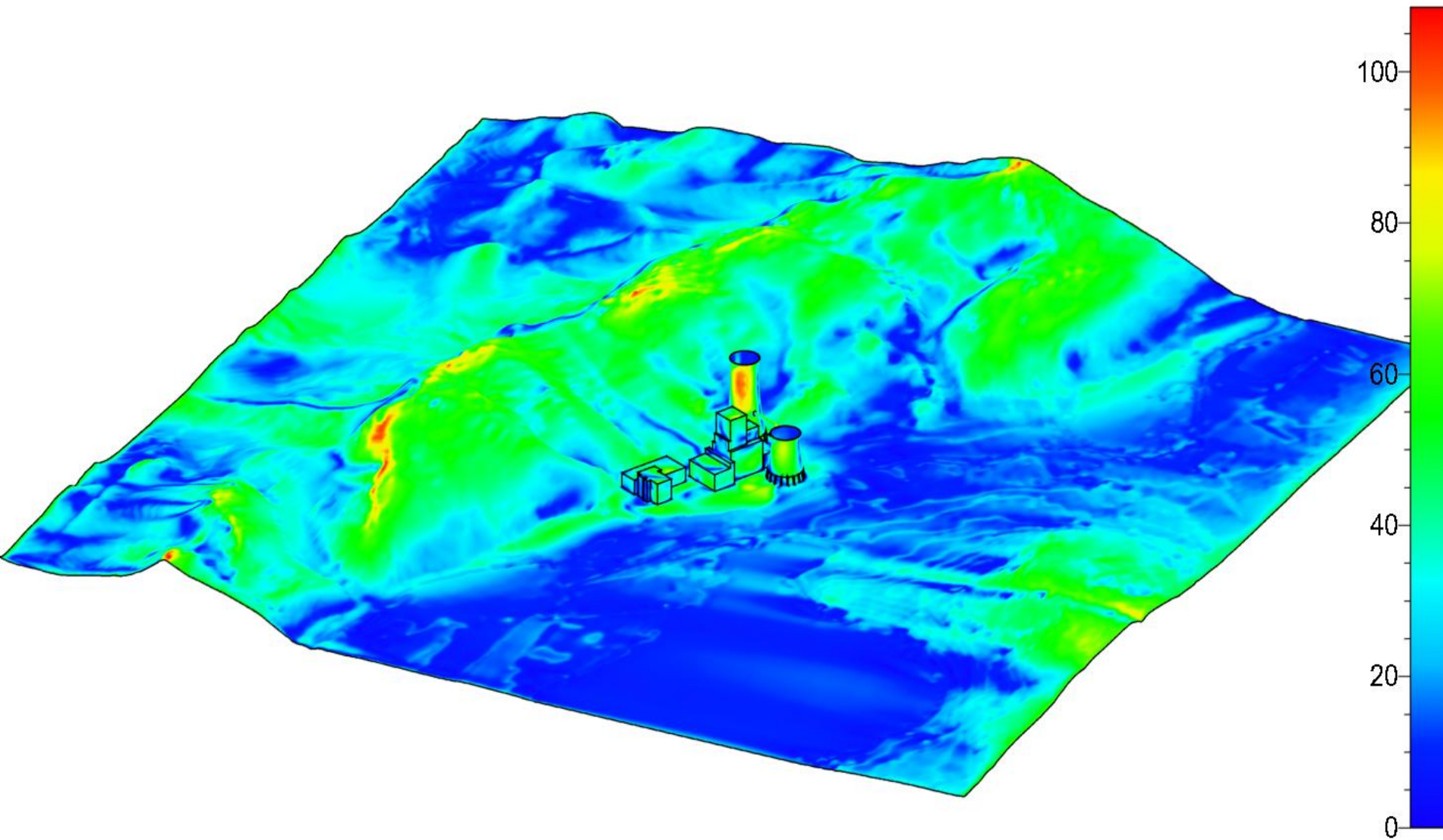




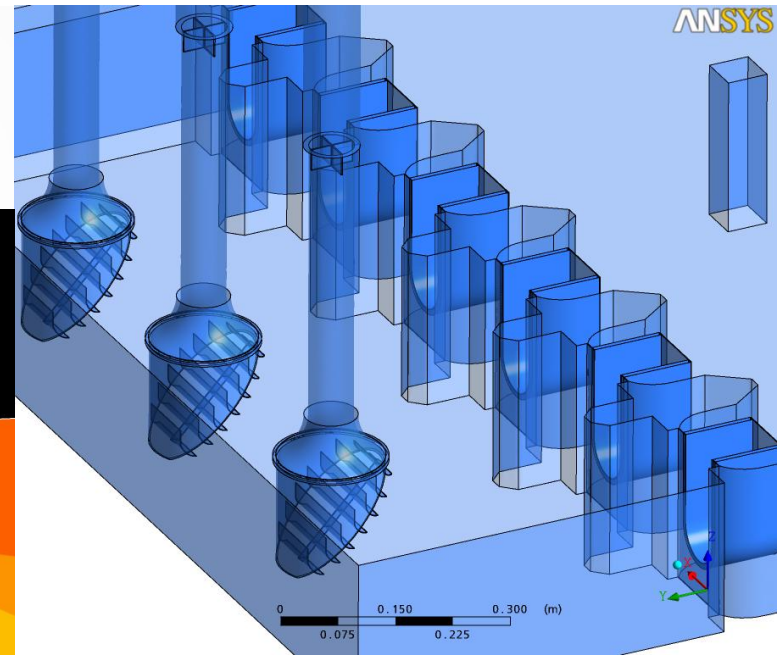
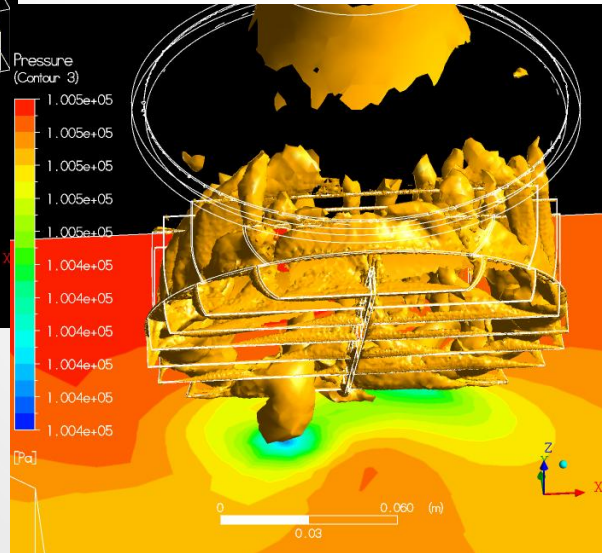
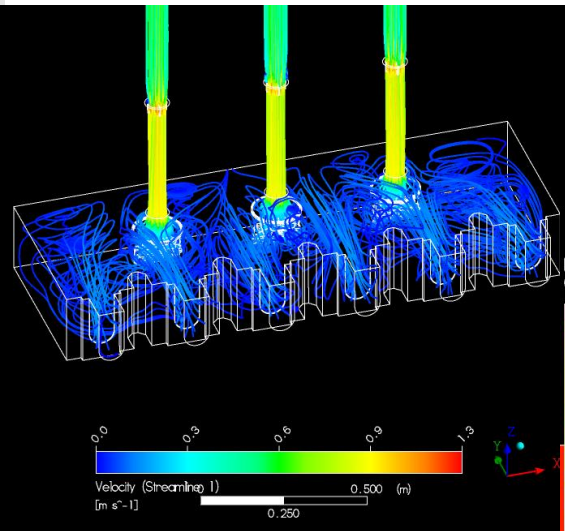
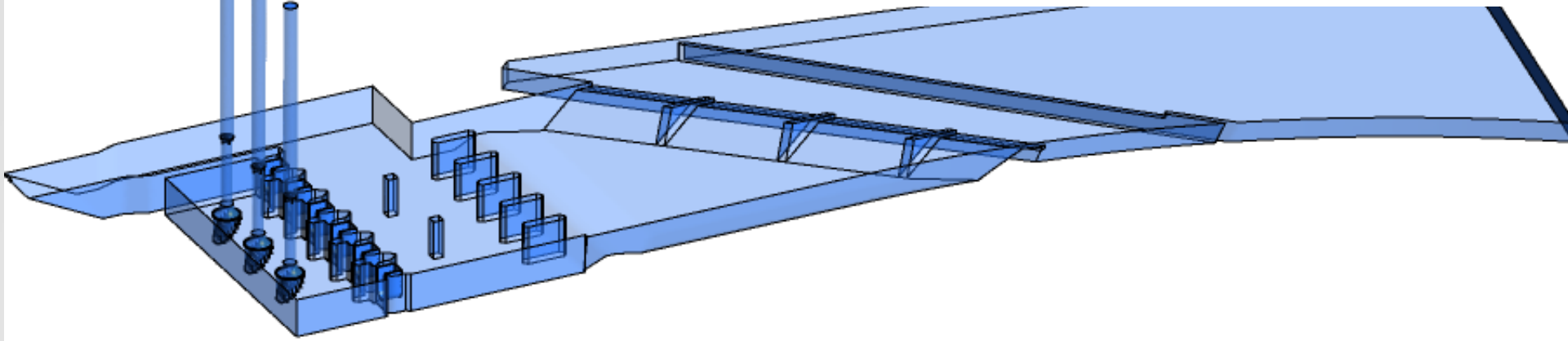
FTMB 5415 $Fr=0.41$
 $Ak=0.025$ $\Lambda=1.5L_{pp}$

FINE/Marine

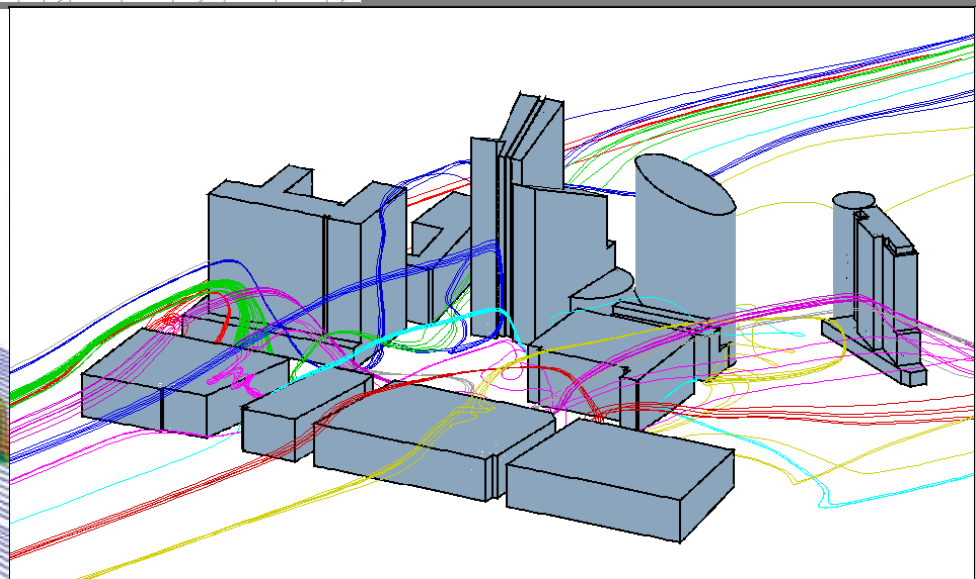
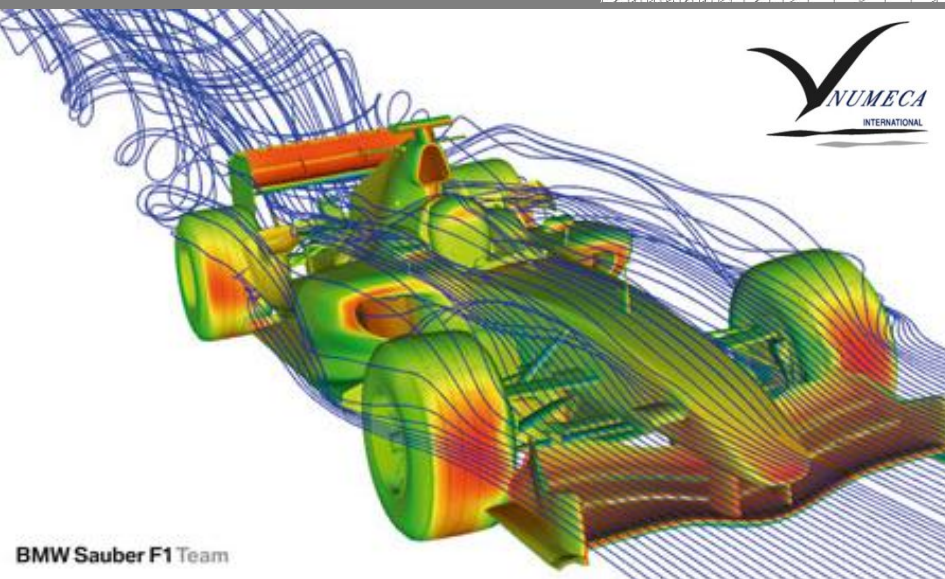
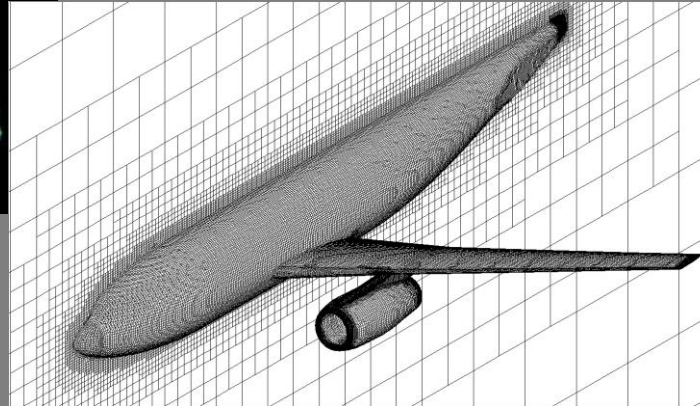
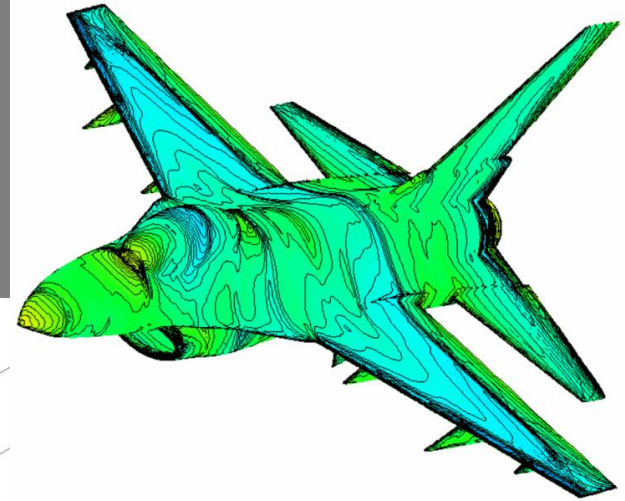
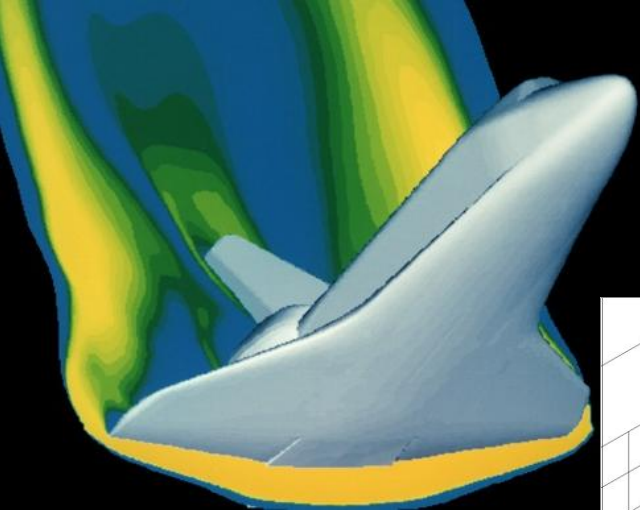
Wind analysis around thermal power plant



Vertical pumps for cooling water in nuclear power plant

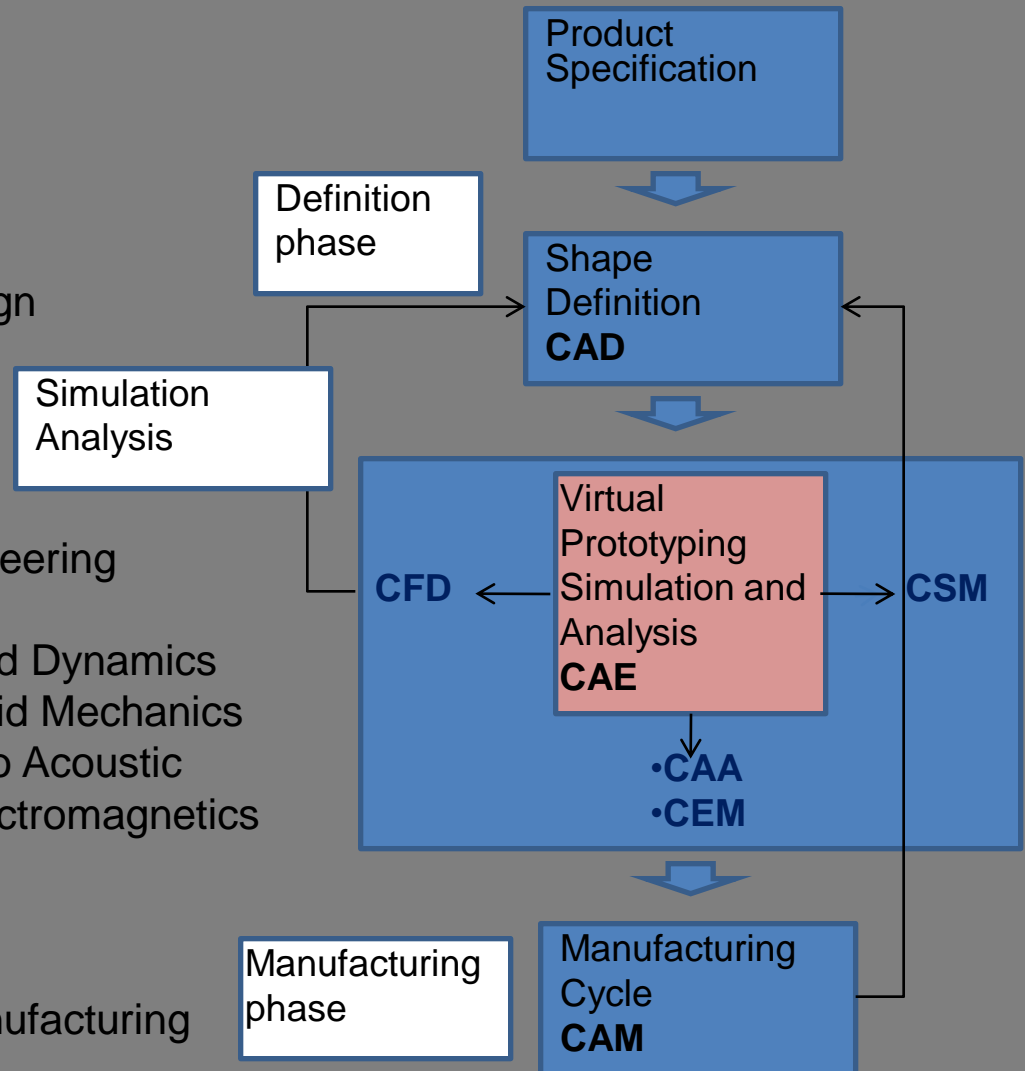


Various CFD applications



- Virtual Prototyping

- CAD – Computer Assisted Design
- CAE – Computer Assisted Engineering
 - CFD – Computational Fluid Dynamics
 - CSM – Computational Solid Mechanics
 - CAA – Computational Aero Acoustic
 - CEM – Computational Electromagnetics
- CAM – Computer Assisted Manufacturing



Thank You

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