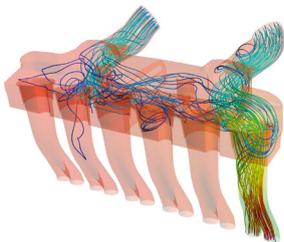


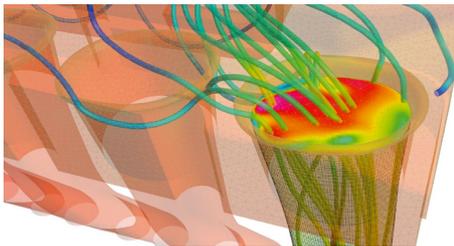
HPC-Cloud-based Additive Manufacture

Fortissimo Experiment Facts:

- Segment: Automotive
- Application Domain: CFD
- Application: RBF Morph



ANSYS



The Company

HSL is a hi-tech centre for the development of new products. With hundreds of products handled over the years, the company has developed experience with materials, traditional and innovative manufacturing technologies, prototyping, dies and moulding. HSL is an SME and a market leader in both Additive Manufacturing and the rapid production of prototypes. In recent years Additive Manufacturing has emerged as a viable mainstream production technology. Overcoming technical and bureaucratic obstacles has allowed 3D printing to grow as a cost-effective option for small and medium scale production together with the ability to produce complex shapes not achievable by standard manufacturing processes. This flexibility in design enables the optimisation of components, a reduction in manufacturing time by almost a third and a halving of production costs by reducing the waste of materials and energy.

The Challenge

Despite the clear advantages of Additive Manufacture, current design tools have been developed for traditional manufacturing procedures and are not flexible enough. This limits the potential of 3D printing. CAE tools are able to suggest new shapes and accurately predict the behaviour of components making them a natural choice in the design chain. However, and especially when dealing with complex Computational Fluid Dynamic (CFD) simulations, shape optimization can be a prohibitively expensive task for SMEs. The objective of this case study is the development of an optimisation service. The goal is to demonstrate the validity of such a service by optimising a prospective industrial artefact, a Lamborghini 12-cylinder airbox.

The Solution

Numerical grid parameterisation using a mesh morpher avoids the time consuming task of mesh generation (that can take up to 70% of the total analysis cost). Access to CFD simulation through the Fortissimo HPC Cloud allows a further speed-up in calculation times reducing the time to market and to return on investment. Using a collaborative, interactive, cloud interface helps analysts and clients to work together and to be integrated in the value chain, increasing customer satisfaction and building better products more effectively.

The development cost of a new air-box, estimated as 250k€ using a standard approach, can be reduced to 75k€ using the HPC cloud service. Based on a forecast that, over the next two years, HSL will undertake three new air-box optimisations each year and that, compared with traditional CAD methods, there is a cost saving of 175k€ per optimisation, the annual saving is equivalent to 525k€.

Fortissimo Experiment Partners:

- HSL (End-user)
- University of Rome Tor Vergata (Domain Expert)
- RBF Morph (ISV)
- CINECA (HPC Provider)

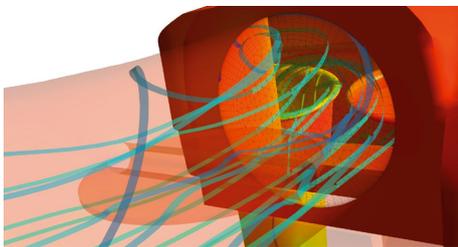
More Information:

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(rbf-morph)[™]



The Benefits

HSL expects that the new service will see the development of a business department with two to three staff, potentially growing to five to six staff after three to four years. For UTV it is estimated that thanks to the new know-how acquired the relevant department will increase its industrial research services. The economic benefit is estimated to be between 40 to 70k€ per year in a five-year plan. Finally, this case study comprises a success story for CINECA, in the application field of high fidelity CFD, that is estimated to bring in at least two new SME customers per year, with an approximate 5% increase in revenue for commercial services.

Having access to the RBF Morph morphing tool combined with CFD analysis powered by HPC opens a wide range of business opportunities. In parallel with existing rapid prototyping services, HSL can now propose to its clients alternative component designs corresponding to appropriate performance indicators. For HSL, offering a shape optimisation service in parallel with its existing core business of rapid prototyping activities, represents an opportunity to establish customer activity over a range of key R&D areas. HSL is ready to offer the developed tool to a range of existing clients in the automotive industry, anticipating for the next two years, a total revenue growth of 16% per year in that sector.

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 123 partners including Manufacturing Companies, Application Developers, Domain Experts, IT Solution Providers and HPC Cloud Service Providers from 14 countries. These partners are engaged in 53 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 is part of the I4MS Initiative.

I4MS Fortissimo is part of I4MS ICT Innovation for Manufacturing SMEs: www.i4ms.eu



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