

## TURBO-MACHINERY DESIGN AND 'UPFRONT CFD'

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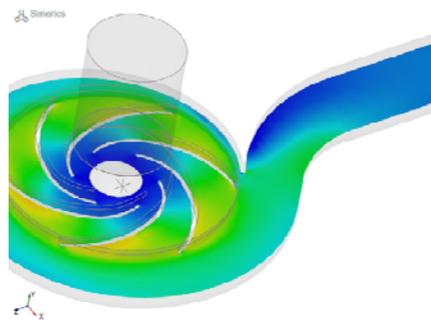
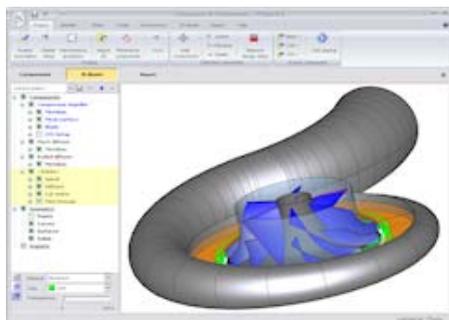
### ABSTRACT

**8020 Engineering** is a specialist Fluid Flow Simulation and Thermal Analysis Consultancy Company. We have a long track record of helping companies implement 'Design Friendly' or 'UpFront CFD' user environments that we believe will play an ever increasing role within the product development process.

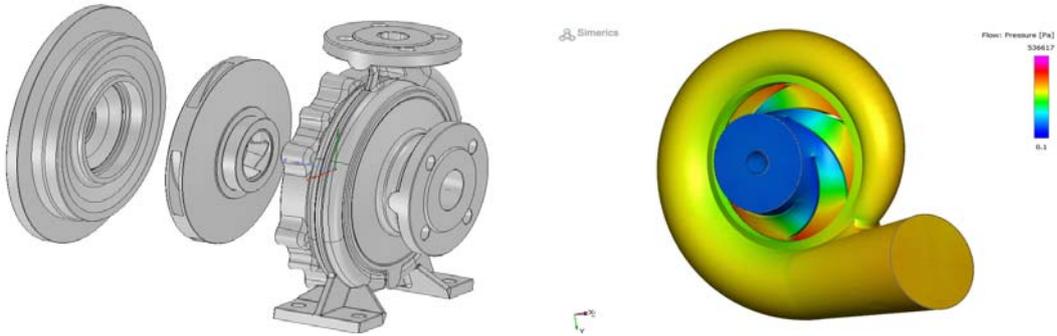
#### 'UpFront CFD' for Pumps and other Turbo-Machinery applications:

Over the last decade, our engineers have gained a tremendous amount of experience using 'UpFront CFD' on Turbo-Machinery and Mechanical Motion applications. Under the umbrella of '**8020CFD**', we have assembled a complete design, verification and validation simulation environment.

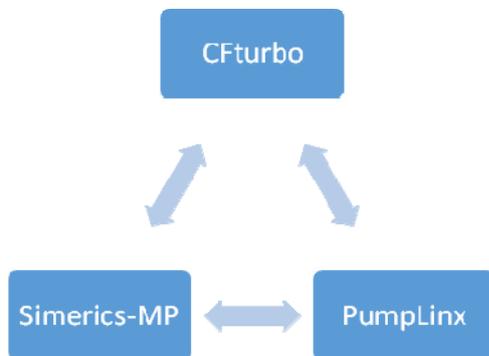
This presentation will illustrate how the design of a rotating machine, based on given performance criteria, can be automated and concepts tested 'virtually' using 'UpFront CFD' technology from one, integrated software environment in minutes.



Additional rotating machinery applications will also be presented including '**validated**' examples from a variety of Pump types, Fans and Compressors using the same 'Integrated' UpFront CFD technology and show how to determine performance curves, power and torque loadings which then allows for design improvement leading to an increase in the machine's efficiency.



**Turbo-Machinery Design Software:** (Blowers, Fans, Ventilators, Pumps, Turbines, Stators & Volutes)

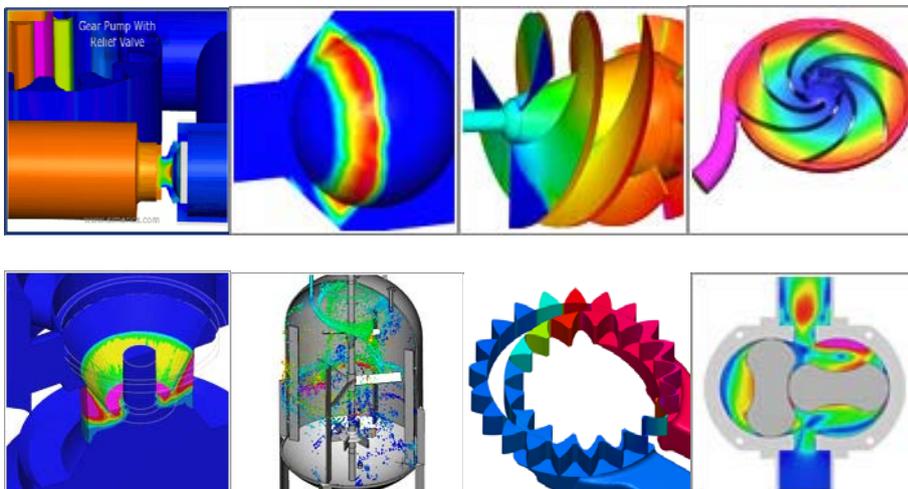


**CFD Verification for Mechanical Motion**

(Blowers, Fans, Ventilators, Valves....  
...Centrifugal/Axial Pumps, Compressors)  
Systems)

**CFD Validation for Positive Displacement**

(Gear, Lobes, Vane, Gerotors, Crescent,  
....Piston Pumps, Multistage &



The demonstration will start with CFturbo® and create an efficient preliminary design of new pump impeller, diffuser and volute casing. The set-up process is based on referring to the fundamental turbo-machinery design equations and empirical functions. These rules can also be customized by the user in order to integrate in-house expertise into new or adapted shapes which will be illustrated. Main dimensions, meridional contour and blading will be computed interactively and automatically. We will also show how volute casings can be dimensioned independently or in conjunction with the impeller design.

**PumpLinx®** is built on **Simerics**'s baseline technology to provide a transient 3-D CFD simulation, uniquely '**integrated**' and suited for the analysis and design of pumps and other fluid devices with rotating or sliding components. The capabilities demonstrated will be **the** automated mesh generation coupled with binary refinement and adaptation used to create efficient, high resolution meshes, even for large complex geometries with disparate length scales. The individual pump templates will also be shown that provide pump specific mesh generation for specialized components. An **accurate** aeration/**cavitation** model coupled with Simerics' numerical strength allows the user to accurately model high volume fractions of vapour and/or non-condensable gas. With regard to computational speed, **PumpLinx®** has been found to be typically five times faster than other CFD software for rotating applications so is best seen 'in action' and makes it an ideal tool for the product development process.

#### **SUGGESTED THEMES:**

'Simulation at conceptual stage, before cad'

'simulation adding value to business'