

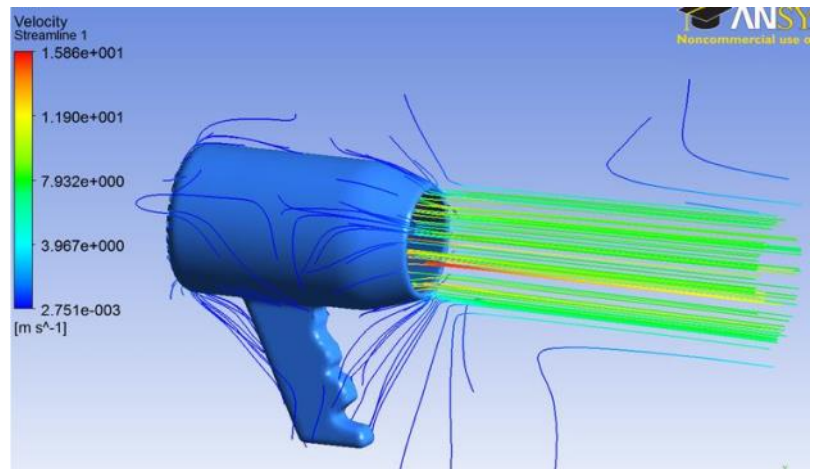
## Irvine Royal Academy—Technical Department

### Graphic Communication—Advanced Higher

# CFD—Computational Fluid Dynamics

CFD is a computer simulation method whereby the flow of **Liquids, Air, Gasses** and **Plasma**, etc. is predicted and reported on by coloured lines indicating flow. In the example shown, the blue lines indicate slow-moving air, whereas the coloured lines indicate fast-flowing air.

The simulation is used to predict how the flow of liquids, etc. is affected by the different shapes of objects that it passes.



In architecture, CFD can be used to work out if the shape of buildings, particularly when exposed to windy areas, or are particularly tall, can be altered to reduce the forces on the building, improving stability, etc.

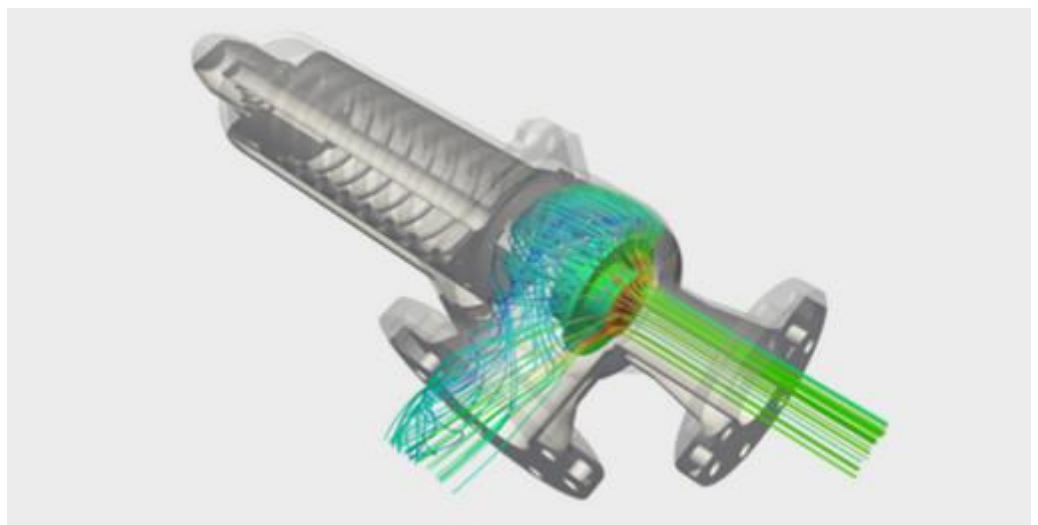
Note some of the things that can influence the results:

- Speed of flow of wind or fluid
- Shape of surrounding countryside
- Proximity of other buildings/structures
- Changes in temperature
- Changes in the material over time—eg erosion

By analysing the results of the CFD simulation at different settings, the designer can check for efficiency of different speeds of moveable parts, change the shape of car outlines, for example, make them more aerodynamic, change the shape of ship's hulls to make them pass through the water more easily (thus saving

fuel costs), alter the angle of wings and blades to reduce turbulence, etc.

Using CFD simulation allows a variety of designs to be tested before the real item is built, thereby reducing costs and reducing the chance of failure. Historically, designers may have used wind tunnels or water tanks to carry out the experiments.



Useful Videos:

<https://youtu.be/iPeoWQYyI18>