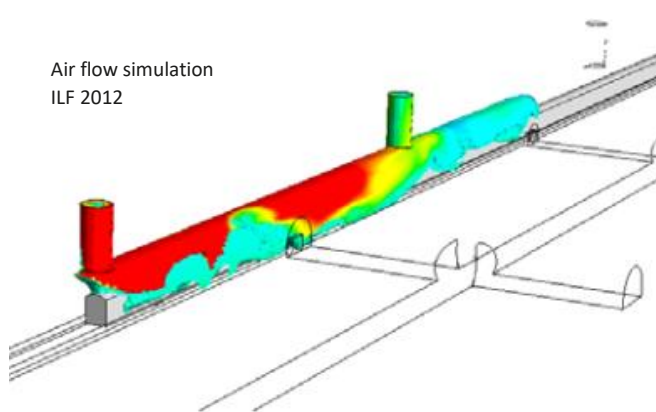


Use Case 08a: Air flow simulation

Purpose

Numeric simulation of air flows in tunnels is used to model the aerodynamic, thermodynamic, exhaust gas and fire scenarios that occur during operation of the tunnel, ensuring safety and comfort for users. It can be used so to optimize the dimensions of the tunnel and for dimensioning ventilation and safety measures.

Most currently available solutions consist of one-dimensional network analysis software and two or three-dimensional computational fluid dynamics (CFD) software.



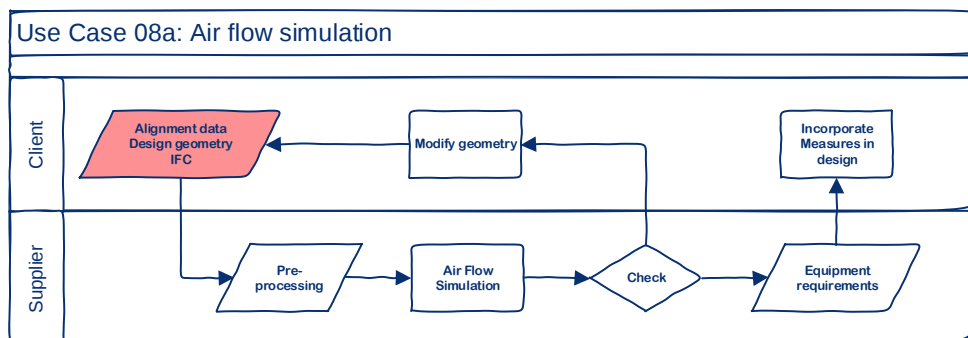
Current practice generally involves generating the geometrical input in the simulation application itself. The obvious use case if more tunnels are modelled as part of the civil design will be to exchange the geometry from the civil modelling software to the simulation software. This use case is similar to use case 08b (Hydraulics Simulation) but has been separated from it as the simulation is generally performed by different disciplines.

Requirements for IFC-Tunnel:

IFC Tunnel should be capable of exchanging the geometrical input for the simulation software. The required Level of Geometry will be determined by the needs of the simulation software, but essentially an internal air space needs to be exchanged with information describing the composition of the boundary materials and their surface roughness. For thermodynamic simulations there should also be information covering the thermal properties of the lining and surrounding rock.

Geometry:

It can be assumed that the existing geometry descriptions for volume objects, triangulated face sets, sweeps and extrusions together with the existing alignment descriptions are sufficient.



Semantics:

Semantics play a minor role for this use case, but spatial containment and an element naming are important for locating the tunnel sections. In addition, attributes describing the surface and thermal properties could be useful.

Links with other UCs:

Input use cases:

- UC 3 – Exchange of alignment and major road/railway parameters (to be harmonized)