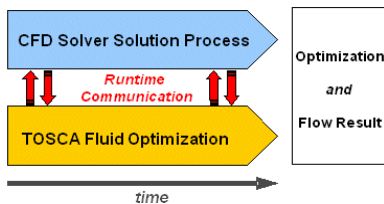


## TOSCA Fluid 2.0.0

TOSCA Fluid is a modular system for the topology optimization of channel flow problems in conjunction with standard CFD solvers. Starting from a design space mesh, the optimum topological design of a flow channel is determined by TOSCA Fluid automatically. After the optimization procedure the geometry of the optimized channel is provided.

A completely new, efficient and fast optimality criteria approach (OC) specifically designed for the application with CFD problems ensures a fast optimization process. Due to this sophisticated optimization approach and direct CFD solver runtime coupling **only one CFD solver run is necessary** for the whole optimization process. TOSCA Fluid therefore is the right tool for large real world CFD models.

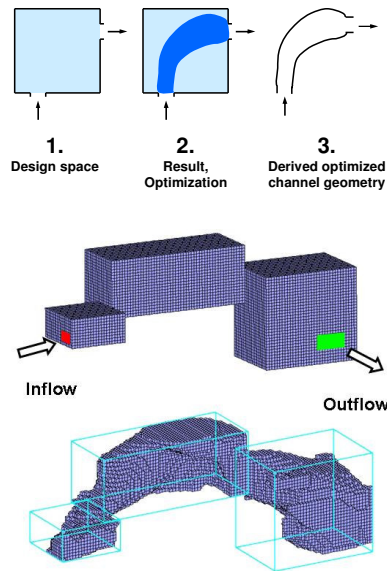


Optimization with TOSCA Fluid – runtime communication with a CFD solver

With its capabilities for process integration and its unique performance TOSCA Fluid is an important resource for the development of new, innovative products and gives a fast return-on-investment. The user can work with standard CFD solvers in his/her pre- and post processing environment and does not need additional training in a new CFD environment.

## TOSCA Fluid.topology

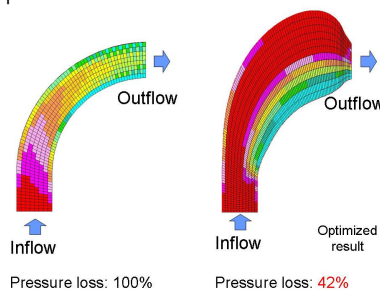
Topology optimization using TOSCA Fluid.topology calculates an optimal design proposal from the given design space (mesh) under consideration of the primary flow field variables. After the CFD analysis and simultaneous optimization process a result geometry for the optimized channel is derived:



Channel derived from design space mesh – principle and example

The optimization is an iterative process that is directly coupled to the CFD solver iterations.

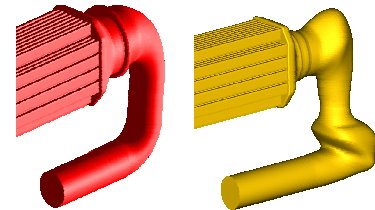
The objective of the optimization algorithm is to reduce the total pressure loss between inflow and outflow regions in convective transport-dominated, steady state channel flow. This is achieved by suppressing energy-dissipating back flow and vortex regions in the flow domain. The resulting channel designs show significantly lowered pressure loss:



Optimization with TOSCA Fluid – minimized pressure loss

Due to the utilized optimization approach TOSCA Fluid does not need any

geometric design parameters but works directly with cells of the mesh. Therefore TOSCA Fluid can be used efficiently with large 3D CFD models:



Existing design      Optimized design

Optimization of an EGR cooler

## General Capabilities

- Stable, fast optimization algorithm
- CFD-simultaneous optimization – only one CFD run needed
- Geometric parameterization of the model is not necessary
- Efficient handling of large models
- Solver interface: STAR-CD V4, FLUENT 12
- Graphical user interface for definition, start and post processing of the optimization
- Parallel operation support and restart capability

## Contact

### Get in touch with us

- if you need more information
- if you are looking for a competent, flexible engineering service provider, who can solve your analysis and optimization problems.

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