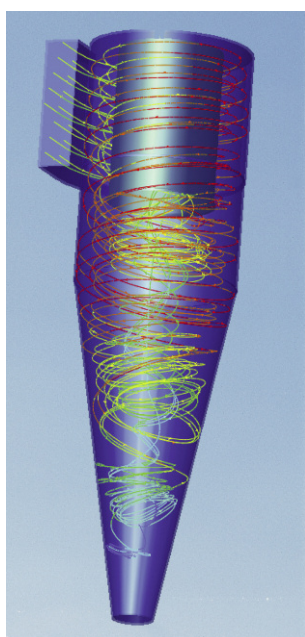


WE CLEAN THE AIR.



FLOW SIMULATION IN OUR RANGE OF SERVICES



Simulation technologies are becoming more and more important in development processes. Numeric flow mechanics (Computational Fluid Dynamics - CFD) is frequently used for solutions to technical problems concerning flows.

Keller Lufttechnik has been using CFD simulation for several years in product development. The technique has proven itself as a very good alternative, since complex flows can only be analyzed - if at all - with

extraordinary complex efforts. Keller Lufttechnik possesses extensive knowledge and engineering know-how in the field of high-tech flow simulation.

Numeric flow mechanics is a valuable tool in accelerating the development process and optimizing the product's characteristics. Any risks undertaken in the development process can be significantly reduced. CFD simulation has become a standard tool when undertaking flow analyses.

With this experience, Keller Lufttechnik is capable of supporting various industries in their product development processes and overall system design.

WIDE RANGE OF APPLICATIONS

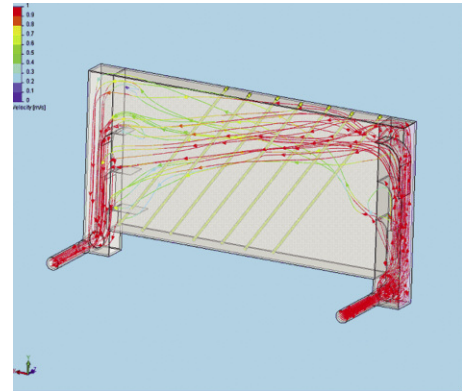
CFD simulations are feasible in various applications, such as the automotive and aircraft industries, in machine tool fabrication, in process engineering, plant construction, heat and power generation, or at collection systems.

We have applied CFD simulation in a wide range of applications in the field:

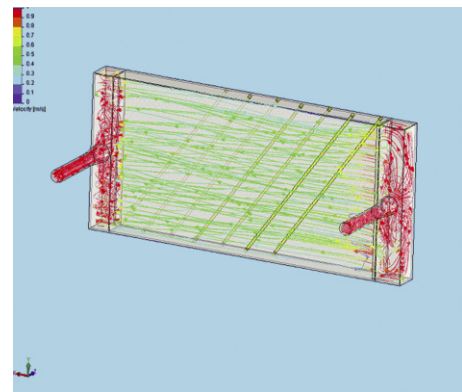
- Calculation of flow direction, pressure loss, heat transition from gases and fluids into collection points, pipelines, and separation systems
- Calculation of diffusion and collection of pollutants at the source
- Assessment of room ventilation technologies
- Design of Push-Pull Systems to collect gaseous pollutants
- Optimization of extraction at machine tools
- Design of collection systems such as vortex hoods, dust covers, injector nozzles, nozzle plates, exhaust walls, annular receptacles
- Optimization of adsorption systems for optimal gas diffusion
- Testing and optimization of flow direction prior to separation systems such as baffle plates, pressure relief boxes and conduits
- Calculation of the resistance characteristics of penetrated components such as perforated metal plates.

RESULTS OF FLOW SIMULATIONS

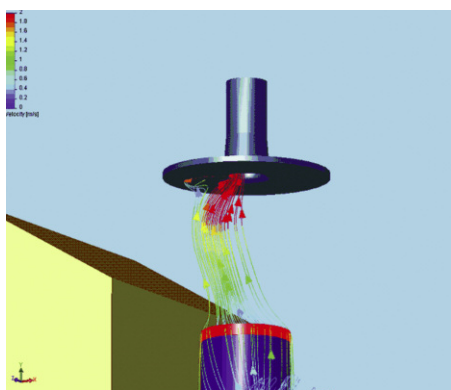
CFD simulation ensures detailed insights into complex flow behaviours. Cause and effect of flow phenomena are localized, visualized and simulated. Fluid forces, temperature fields, flow velocities, pressure, material concentrations, etc. can be evaluated at any time, and located and presented in different configurations (e. g., 3-D images, animations). With the assistance of simulation models, it is possible to effect parameter models wherein various alternative design ideas can be tested. The CFD simulation provides valuable information that will prevent costly errors. Immediate effectiveness of promising models can be achieved in very early stages.



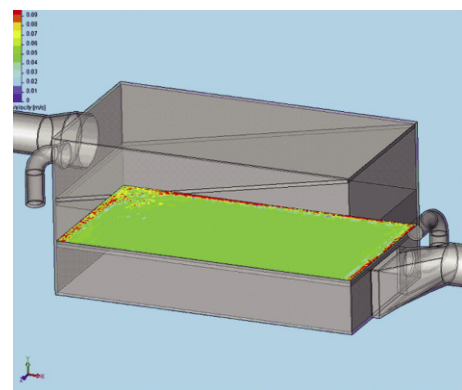
Gas reactor before flow optimization



Gas reactor after flow optimization



Calculation of diffusion and collection of sources of pollutant emissions



Optimization of gas diffusion in adsorption systems

ADVANTAGES OF SIMULATIONS

COST SAVINGS

In the development process of components, it is already feasible to present various alternatives so that a pre-selection can be made. Advantages can be identified and the efforts required for the construction of prototypes can be reduced.

TIME SAVINGS

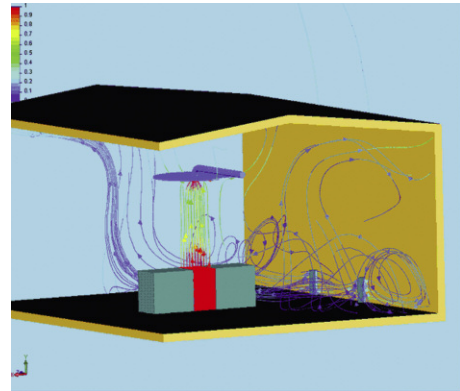
Simulations are already incorporated into the development process. The behaviour of your component can be analyzed in each stage of its development. Development phases are reduced since the configuration and simulation can be accelerated based on the CAD data. Product development cycles are becoming shorter and shorter, and the time gained offers considerable advantages concerning your competition in product development.

QUALITY IMPROVEMENT

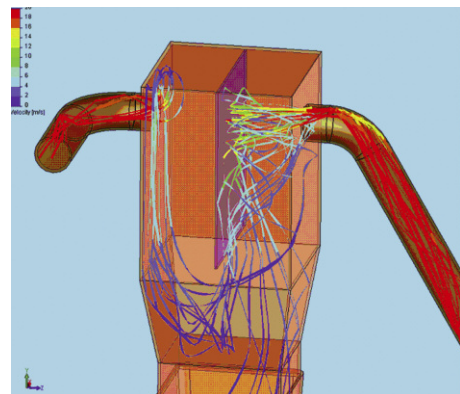
It is possible to pinpoint the weak points of existing components with the aid of simulation. For example it is possible to identify turbulences within the components. A corresponding modification of the components can be effected immediately, optimizing their function.

BETTER INSIGHT

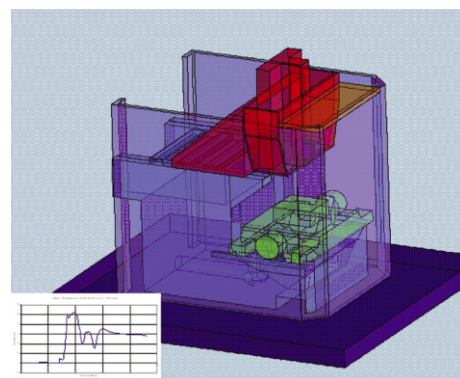
Simulations visualize, for instance, activities such as velocity fields in flows. You obtain deeper insights into the operational value of your system. This is particularly important for complex processes which are often difficult to access.



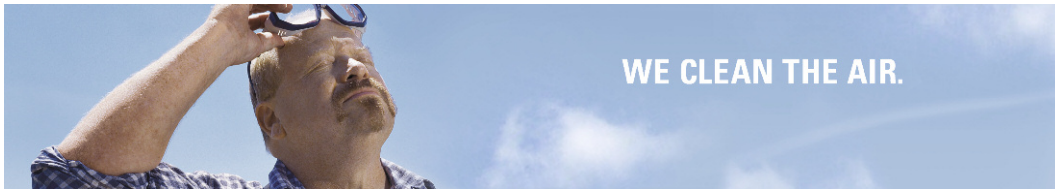
Testing or design of technologies for enclosure ventilation



Optimization of baffle plate and cyclone separators



Model of the extraction of cooling lubricants on machine tools, illustrating the velocity direction



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