Industrial Ventilation Design

New Developments – Roundtable Discussion

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Ventilation 2006 Conference
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Content

- Examples of CFD Applications in Industrial Ventilation
- CAE Methods for Industrial Ventilation
- Case Studies AFC
- Conclusions
- Trends
- Discussion
Applications

Test-Workplace

Cleanroom Workplace

Pharma Production

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Applications

Kitchen Hood (REEXS)

Freeze Dryer

Pharma Production - Filling

Machine Loading

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Computer-Aided Engineering (CAE) Methods

- Protect men from product
- Protect product from men (or environment)
- Minimize risk of:
  - investment in ineffective systems, not functioning concepts
  - expensive fix-ups, warranty claims
  - low user acceptance of ventilation concept
  - obstruction of work process, collisions with equipment

- Minimize cost (Installation & running)
- Certification for authorities (FDA, EMDA)
Computer-Aided Engineering (CAE) Methods

- Computer-Aided Design (CAD) (2D & 3D)
- Virtual Reality Production Plant Simulation (Workflow)
- Potential Flow Calculation (See Design Guide Book)
- Real-Time Flow Solvers (Flow Explorer by AFC)
- Computational Fluid Dynamics (CFD) for more complex situations ➔ Most of the situations!
  - Flow inside pipes
  - Indoor flow (contaminant distribution)
  - Hood design & Optimization
Case Study: Test Work Bench
Case Study: Blister production line in pharma industry
Case Study: Clean Room
Case Study: Design Optimization
Case Study: REEXS
Conclusions

- **Integration**: Seamless integration of CAE methods in design process
- **Early**: Apply CAE for the first concept ideas and throughout the design process!
- **Expertise**: Is required for CFD & CAE. Experienced users get fast & reliable results
- **Outsourcing**: Strong outsourcing partners available with huge know-how
- **Communication**: Between software packages & between people
- **Visualization**: Good presentation & visualization of results
Trends

• **Time to market**: Will further shrink ⇒ efficiency in CAE methods wanted

• **Rule of thumb**: Are well known by engineers. But most situations today are complex and ask for simulation tools ⇒ CFD!

• **Integration**: Further integration of the CAE methods into the design process. Accessibility by all participants.

• **Virtual Reality**: Better communication of complex results to customer

• **Cost**: More attention to first and operating cost in the future!

• **Energy**: Higher priority on energy aspects ⇒ fuel price…

⇒ The future is CFD, the future is **e-ventilation**
Question to the audience:

- What are barriers to computerized design?
- Any reports on CFD failure in practice? WHY?
- Need for simple CFD Primer (guideline)?
- Industrial Ventilation Problems in Practice? ➔ Please report!