Industrial Ventilation Technical and Scientific Co-operation to Publish Industrial Air Technology Design Guidebook

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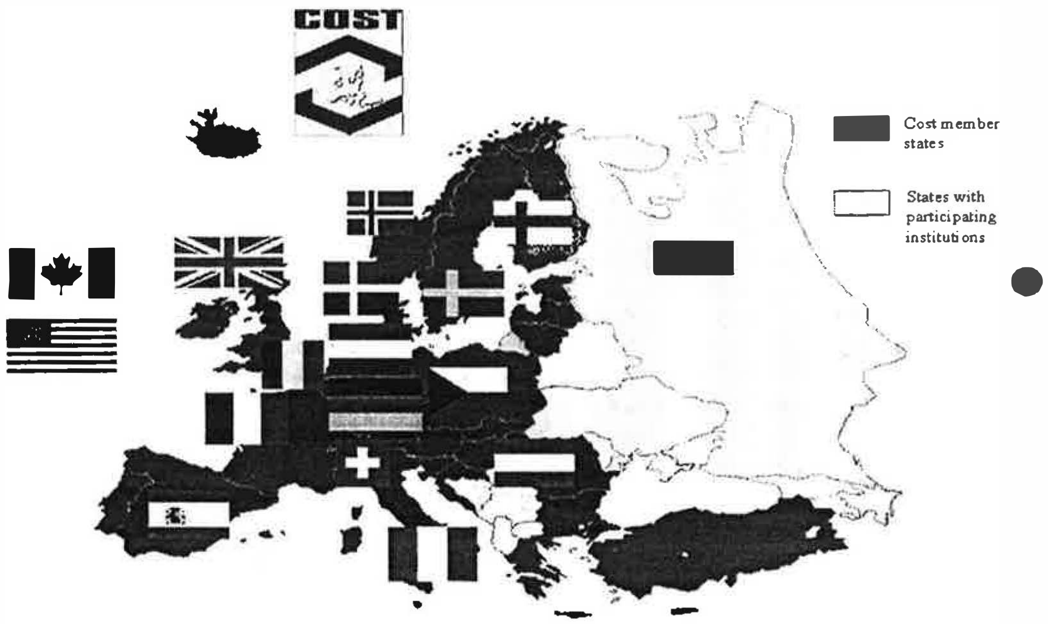
COST - European Co-operation in the Field of Scientific and Technical Research

COST is a framework for scientific and technical cooperation, allowing the co-ordination of national research on a European level. COST Actions consist of basic and precompetitive research as well as activities of public utility.

The goal of COST is to ensure that Europe holds a strong position in the field of scientific and technical research for peaceful purposes, by increasing European co-operation and interaction in this field.

COST has developed into one of the largest frameworks for research co-operation in Europe and is a valuable mechanism co-ordinating national research activities at European level. Today its nearly 200 Actions involve some 40 000 participating scientists from 32 European member countries and from nearly 50 participating institutions from additional 14 different countries. These networks represent a value of more than 2 Billion €.

COST Action G3 "Industrial Ventilation" (1996 – 2001)



Participating 18 countries: Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and United Kingdom and organisations outside COST family: ASHRAE/USA, ABOK/Russia, University of Toronto /Canada and SHASE/Japan.

Background

The available systematic information about industrial ventilation is very scarce. There are some handbooks, made by e.g. Hemeon (USA), Baturin (with its latest edition 1972), Heinsohn (USA), Goodfellow (Canada) and ACGIH (USA), but they don't cover the whole field of industrial air technology. There is actually no internationally accepted handbook available, and the designer has not any validated solutions at his disposal. According to the present state-of-the-art, both capturing and ventilating systems are designed to comply with know-how-rules (e.g. air exchange rate) and rarely achieve the targeted heat and contaminant loads. This expertise is not generated by systematic investigations but through experience from various plants under construction and in operation. This is obviously due to a total lack of approved design criteria and lack of European standardisation, which make effective ventilation design impossible.

Such a designing procedure leads to overdimensioned systems which cause

- high investment costs,
- high operating cost,
- high energy consumption and CO_2-emissions,
- problems with heat and contaminant loads.

In industrial premises the indoor air quality and the thermal conditions, i.e. working conditions, have a significant influence on productivity, quality of work, health and safety, life cycle of equipment as well as constructions and maintenance costs. In some cases adequate air quality and thermal conditions make production possible and/or improve the quality of the product (e.g. paper industry, food processing industry).

Approved target levels for industrial ventilation design do not exist. Furthermore, the design procedures are completely unhomogenous. Every designer does his own thing in his own way. Only in some cases there are country specific design criteria and design rules, but standardisation on a European scale does not exist.

Faced with competition from non-European countries, many enterprises suffer under the high financial burdens arising from high quality levels and increasing environmental requirements. Therefore, it is absolutely essential to create optimised and cost effective solutions for industrial ventilation systems. That means systems optimised for their special purpose, not overdimensioned following conventional design rules.

At the same time the competitiveness and export potentiality of European ventilation industry can be improved.

A general design methodology for industrial ventilation has been developed e.g. in Finland during the technology programme INVENT. The methodology has been commented on and its outline approved internationally. This Action is based on the experiences obtained in the INVENT programme.

Similar research work is carried out in different COST countries and extensive cooperation is needed. This Action gives the research units possibilities to establish connections between different countries, to exchange and to compare their existing know-how, and to develop new knowledge for common use.

There are standards for comfort ventilation under preparation (CEN TC 156) but they can not be applied to industrial ventilation. The European standards under preparation in TC 114, TC 137, TC 204 and TC 264 cover only a small part of the necessary contents.

Finland has recently made a proposal to CEN to start standardization in the field of industrial ventilation. This Action will provide a good basis for the standardization work.

By means of COST, wider participation can be achieved compared to the EU research programmes.

Objectives

The general aim of the Action is to gather the expert knowledge which exists internationally, to further develop it and to make it available for the designers as a Design Guidebook based on multidisciplinary approach.

This means:

1. A collection of information on the existing methods and criteria for the design of industrial ventilation methods.
2. Development of the design methodology with respect to different branches and country specific items.
3. Development of valid target levels for industrial facilities.
4. Development of new design criteria and tools to control contaminant sources.
5. Development of new innovative solutions to problems in industrial ventilation.
6. Development of tools for life-cycle assesment of industrial ventilation systems with respect to energy usage, environmental aspects and total lifetime costs.
7. Compilation of information packages on case studies inclu-ded in the Action
8. Identification of knowledge gaps.

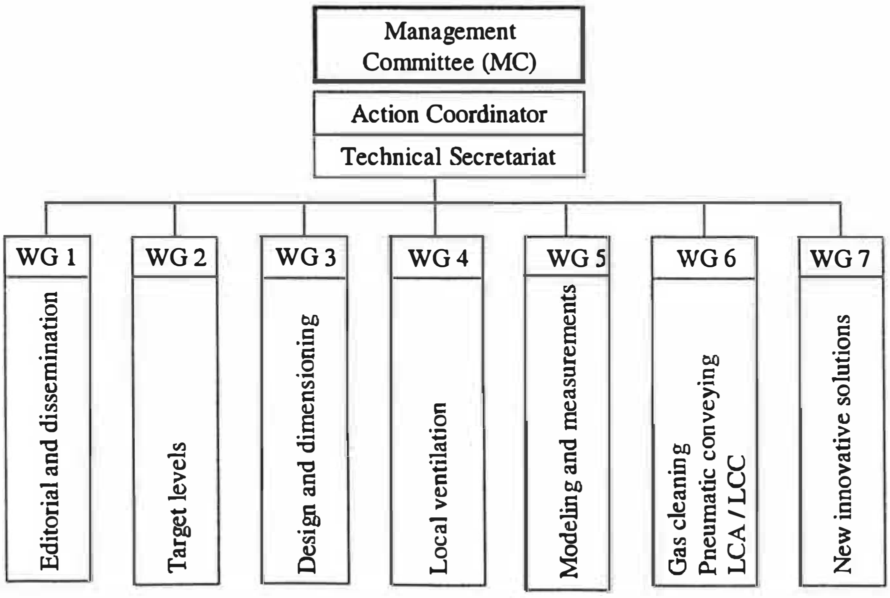
The produced information will be used as a basis for an Industrial Ventilation Design Guidebook but will also provide a good basis for the standardization work.

The idea of the Action is that all existing, fragmentary parts of design methodology are gathered, documented and structured so as to make it possible to use scientifically based new design criteria and methodology taking into account new theories and new developments.

Work description

The work is divided into seven work packages. The first work package concentrates on collection, evaluation and adaptation of design guidelines and standards existing in different countries and development of design methodology. In other work packages the main effort will be to develop new design criteria and tools in specified areas. Case studies will be made inside different tasks in order to evaluate new developments.
The total Research Budget is estimated to be more than 10 Million USD.

Organisation of COST Action G3



Connection between the COST Action G3 and the Industrial Air Technology Design Guidebook (DGB)

MATCHING OF DGB AND COST

DGB Fundamentals Block (Chapters 1.09.1998) - Chapter editors	**COST Work Group (WG)** **= DGB Block**	**Coordinator**	
A1/1. Air technology - description - H.Goodfellow/E.Tähti A1/2 Terminology - E.Curd A1/3. Design methodology - K.Hagström A1/4 Physical fundamentals - E.Curd	WG1 Editorial and dissemination	**WGL** **DWGL** **NAC** **APC**	**E.Curd** **B.Biegert** **H.Kubota**
A2/5. Physiological and toxicological considerations - R.Niemelä A2/6. Target levels - R.Niemelä	WG2 Target levels	**WGL** **DWGL** **NAC** **APC**	**R.Niemelä** **L.Olander** **K.Ikeda**
A3/7. Principles of air and contaminant movement inside and around buildings A.Zhivov/ A3/8. Room air conditioning - P.O.Tjelflaat/E.Shilkrot A3/9. Air handling unit and ductwork -J.Railio	WG3 Design and dimensioning	**WGL** **DWGL** **NAC** **APC**	**P.O.Tjelflaat** **K.Hagström** **N.Kobayashi**
A4/10. Local ventilation - L.Olander/B.Biegert	WG4 Local ventilation	**WGL** **DWGL** **NAC** **APC**	**L.Olander** **B.Biegert** **K.Tsuji**
A5/11. Design with modeling techniques - A.Moser A5/12. Experimental techniques - K.Sirén	WG5 Modeling and measurements	**WGL** **DWGL** **NAC** **APC**	**A.Moser** **K.Sirén** **Y.Kondo**
A6/13. Cleaning technology - P.Sjöholm A6/14. Pneumatic conveying, cleaning - M.Lampinen A6/15. Environmental life-cycle assessment - B.Steen A6/16. Economical aspects - S.Sainio	WG6 Gas cleaning Pneumatic conveying LCA / LCC	**WGL** **DWGL** **NAC** **APC**	**P.Sjöholm** **B.Steen** **T.Nishioka**
.	WG 7 New innovative solutions	**WGL** **DWGL** **NAC** **APC**	**A. Lommel**

WGL = Working Group Leader DWGL = Deputy Working Group Leader NAC = North American Coordinator APC = Asia - Pacific Coordinator