

PROGRESS AND TRENDS IN AIR INFILTRATION AND
VENTILATION RESEARCH

10th AIVC Conference, Dipoli, Finland
25-28 September, 1989

Paper 24

A PERSPECTIVE ON THE AIVC

Willem F. de GIDS

MT-TNO
P.O. Box 217
2600AE Delft
The Netherlands

1. Introduction

The AIVC nowadays is an established "Centre" on infiltration and ventilation research. It is well known throughout the world. This position has not been reached easily. But years of hard working and critical managing of the Centre was a necessity. The Centre, operating agent, staff and steering group, has to think about the future. Resting on your wings is dangerous and finally will lead to abolition.

The question is:

What can a centre like this really mean for society in the future ?

To answer this question one has to go back in time and follow the developments till to day.

2. Past and present

2.1 Past

The centre has started as a result of discussions in the energy load calculation annex (Annex1) about the role of infiltration in the energy load of a building.

The specialists at that time did use codes mostly taking into account a constant ventilation rate. Infiltration was in most cases not taken into account. Many comparisons of measured and calculated data failed.

The specialists at that time thought that infiltration was an important missing factor. From that moment on a group of experts in infiltration started to discuss about the level of knowledge on infiltration processes in buildings.

They recognized big differences in the knowledge and understanding in the different countries. One country had a lot of experimental work done, while others did more on explaining the process of infiltration. They found many aspects on which infiltration was based where data and knowledge was missing.

The conclusion was that answering the question on energy load of infiltration could only be attacked by a close international cooperation. And after some time of preparation the Centre was inaugurated.

Eight countries (U.K., U.S.A, Denmark, Sweden, Italy, Switzerland, Canada and the Netherlands) from 1979 on worked together in a joint funded project. The main objectives of the Centre were very roughly summerized:

- gathering all available published work
- evaluation of that work
- stimulate new research
- disseminate information.

The means to reach the goals were:

- production of technical notes
- producing handbooks
- distribution of a newsletter
(Air Infiltration Review)
- organisation of conferences and workshops.

A staff of about five people was trying to reach the goals. They were guided by a steering group, while the operating agent was managing all administrative and financial aspects. To give some examples of the results:

- Yearly conferences with published proceedings
- Handbook Air Infiltration Control in Housing
- Air Infiltration Calculation Techniques Guide
- Air Exchange Rate and Air Tightness Measurement Techniques Guide
- Technical notes:
 - * Air infiltration Glossary
 - * Validation and Comparison of Mathematical Models
 - * Windpressure Data
 - * Ventilation Strategy
 - * Survey of Current Research
 - * Airborne Moisture Transfer
 - * Standards on Ventilation and Air Tightness

The aim to improve the understanding of the complex air infiltration processes and at the same time reduce infiltration in buildings became a reality. The success of the Centre was there.

2.2 Present

Many countries then began to realize that not being a member of this centre became a problem. They did not get all the available knowledge. Moreover the member countries made a lot of progress due to international cooperation in research and in the application of it. Five new countries became member of the centre.

At this moment the Centre is funded by thirteen member countries. West Germany, Finland, Norway, Belgium and New Zealand joined the centre since the inauguration as members. There are a few countries at this moment interested to become a member of the centre, for instance France and Japan.

The role and work of the centre was not "steady state" but can be described as "dynamic". After some years focussing on infiltration the scope was broadened to ventilation.

The centre got its present name:

Air Infiltration and Ventilation Centre.

Since a few years the air transport related indoor air quality and comfort aspects became part of the workprogram of the centre. Also the flow in the room and efficient ways of ventilation and removal of contaminants needed to be studied.

The scope of the centre is growing and becomes wider. Some other annexes had finished their work. Interesting results had to be published. The centre could easily carry out this type of work because of their experience in writing technical notes. The summary report of "Inhabitants behaviour with regard to ventilation" was published by AIVC.

Some new technical notes:

- * Multizone Simulation Study
- * Building Air Flow Simulation
- * Air Change Efficiency
- * Infiltration and Ventilation/ Comfort and Indoor Air Quality
- * COMIS Fundamentals

are planned to be published in the near future.

The work-power of the centre is at this moment about seven people. New is that people from other countries come to the centre to work there on special items for several months. This is an old wish which becomes reality at this moment. This is a new way to improve international cooperation.

3. Perspective

Past and present may be seen as successful international cooperation between countries in the centre.

The real question for the members of AIVC is :

What new facts can we deliver as a result of our work to the society. Moreover, is the money invested to reach that available and well spend.

One has to realize that there is more than infiltration and ventilation research. The enormous environmental problems in the world put also a pressure on us. We have to consider our contribution on solutions. Taking that as a starting point for our perspective, it seems to me that a variety of new items comes to us.

The importance of infiltration and ventilation as a key parameter for indoor air quality and comfort must be our motivation to undertake new projects. Specially where the interaction between other specialists play an important role. Interdisciplinary work has to be undertaken.

Hygienists, medical doctors, designers of new building and installations need our special attention.

Infiltration and ventilation must be a normal partition in the education of all types of professions. We still have a lot of existing knowledge which did not really found their way to practice.

On the other hand new research has to be started. There are still questions which cannot be answered with the existing knowledge.

For instance the questions :

- What is the overall exposure of a housewife, a young child, an elderly due to typical indoor air pollutants during their stay in our existing housing stock.

- What effect can infiltration and ventilation have on that exposure.
- Can we improve our ventilation systems in that way that a positive effect of it can be reached.

The questions given have to do with indoor air quality. But at the same time we cannot have the situation that we waste energy and moreover are misusing energy and put an extra burden on the quality of our outdoor environment.

From that standpoint one can easily see new investigations for our future.

To give answers on the questions mentioned above, we need tools to evaluate situations in buildings. These tools will be mainly models. To be more specific, my opinion is that there will be a need for all kinds of models coupled to each other.

Our models are far from adequate to answer all questions.

Some items which need to be studied :

- The interaction between multizone flow and room air flow. Specially when the connection between the two is a large opening or even large openings. The flow through large openings (for instance the turbulence effects) is not quite well known and play on the other hand an important role in the transport of pollutants through the building.

- The existing models must have the possibility to communicate with each other. Again the flow over large openings is highly dependent on the temperature difference. If this will be only estimated in the ventilation models, we might miss a good insight in this effect.

- Input data such as pressure coefficients and air leakage data need to be gathered and studied. The availability of it must be in the form of data-bases.
- Absorption, desorption, condensation etc. are factors who strongly influence the pollutant levels in the rooms. Data from experiments is lacking at this moment. Models has to be modified on this point
- The behaviour of occupants need to be studied in more detail than till now. Occupants spent their time in different rooms. They have a significant influence on the production of some pollutants and they are the predominant factor in the proper use of the ventilation systems.
- Development of good design procedures controlling infiltration to minimize the use of energy is still not a fulfilled item.
- The development of ventilation strategies depending on building style, behaviour, local circumstances like weather and concentrations of pollutants outside the building is necessary.
- Since energy is not any longer an economic but also an ecologic factor, we have the task to develop new ventilation systems which also for the transport of air use the real minimum of energy. Better fan efficiencies, grids and ductwork with lower pressure losses, better control systems need to be developed.

4. Conclusions

Looking to the past we can conclude that the centre has fulfilled a very positive role in the international cooperation on infiltration and ventilation research.

We have made good progress, the centre is running well, but we have to be careful not to be apathic.

The centre must try to achieve a permanent position in the dissemination of results in the field of infiltration, ventilation, air transport related aspects of indoor air quality and indoor environment.

The centre must play a major role in initiating new research on items which are important to answer questions for the future.

The means they use at this moment are adequate to reach that goals.

The groups to be reached need to be wider than the group of infiltration and ventilation research people.