FINN-PIMEX – A Tool for Contaminant Control

Heinonen K, Säämänen A
VTT Automation, Safety Engineering, Tampere, Finland

Introduction

The presence of airborne contaminants in the production environment can create problems to products, production equipment and personnel. The improvement of the production environment is a complex task and therefore, unprofitable control measures are common. PIMEX and similar equipment (1-6) combines video picture of the work and simultaneously measured data from the sensors detecting e.g. airborne contaminants. Link between problem calling conditions and work can be analysed with the aid of video picture in which graphical presentation of data is superimposed. When the cause of exposure is analysed, the control measures can be selected more precisely. The equipment has successfully been used in several companies to improve production environment.

FINN-PIMEX System

FINN-PIMEX equipment is totally computer driven system though the video image and the voice are stored with the S-VHS tape recorder. The graphs of the measured data and the video picture are shown on the computer screen in real time during the measurements. The measured data and video image are synchronised with time code. The time code is stored both on the database of measured data and the videotape. A code identifying the tape and the database is also stored on the videotape. After the measurement, it is easy to make fast searches to the data using different kind of criteria (e.g. signal level, user classification, user marks). The system automatically searches from the video tape the frame corresponding to the search criteria and show the video image. The measured data is read from the database and shown in graphs (bars and time series) simultaneously with video image every time the video is played. During the measurement, the user can utilise classification, mark and notes properties of the FINN-PIMEX. These entries are stored in the database in order to facilitate the later analyse.

The FINN-PIMEX system is capable to record continuously two channels analogue signal in rate of 3 Hz and video picture for 4 hours (cassette capacity 4 hours). The system can be used also together with equipment using RS 232 data transmission channel (e.g. airborne particles counter). However, the use of the analogue signals for the data transmission makes the system independent of the measuring devices.

The computer is equipped with Fast FP/S 60 video capture card and National Instrument Lab-PC + data acquisition card. The video cassette recorder is Panasonic AG-7350 equipped with time code generator and RS 232 serial port. The measured signal is transmitted from analyser to data acquisition card using the wireless PG 1 digital data transmitter and receiver. The video picture is shown in the computer monitor in a

separate window. In the video picture window, the overlay properties of the video capture card are used. The overlay is adjusted by using commands of the MCI driver.

Applications

The FINN-PIMEX system has been applied in several different environments and with many different measuring equipment such as dust, gas, solvent and noise monitors, particle counter and thermal comfort analyser.

Flour Dust and – Amylaze in Bakeries

Bakery workers are the most important group exposed to flour dust in Finland. The mean flour dust concentrations at the worker's breathing zone has reported to be about 6 mg/m^3. Also, the α-amylase enzyme causes problems in bakeries. Based on the findings of previous studies special attention was paid on the manual weighing of α-amylase containing flour additive. Company and laboratory trials were done to find out the most efficient local ventilation system and feasible routines of work for manual weighing stations used in the bakeries. The laboratory experiments showed that the local ventilation (local exhaust + local supply) alone is not efficient enough to reduce worker's dust exposure below 1 mg/m^3. Proper work practices and good workstation ergonomics, analysed with the aid of FINN-PIMEX system, seems to be an important factor in exposure control during manual weighing. With combination of good work practises and efficient local ventilation the worker's dust exposure was reduced below 0.1 mg/m^3.

Dust in Pharmaceutical Factory

A drug production line was transferred from one factory to another. In order to make improvements for the new production line, FINN-PIMEX exposure analysis were performed. During the visit in the company industrial hygiene measurements and PIMEX-filming was done. After the filming, the video was shortly watched together with the personnel. WISP procedure was used to collect improvement ideas. The main coal was to reduce the exposure to the minimum.

It was shown that the exposure could be held under 1/10 of the OEL. About 15 preventive measures were suggested and the innovative idea generation process continued after the study. Many technical improvements noticed due to the project and the company personnel learnt to solve future problems in this manner. However the focus is in the future when new production is planned.

Discussion

The company personnel found out many possible control measures when the exposure problems were visualised with the FINN-PIMEX. The exposure problems were visualised to the group of company personnel immediately after the measurements. The persons still remembered the way they worked and from the FINN-PIMEX video they could see it from a new point of view. They realised the correlation between the way of working and their exposure. While the causes of exposure were visualised, the group members could focus on most critical phases (6) and use their own special expertise to solve the exposure problem (4). Some of the ideas were quite easy to implement and

were tried out immediately. The efficiency of the improvement was monitored with the video system.

If the information of the exposure problem is only mean exposure of 8 hour it often is difficult to choose the most efficient contaminant control measures. The worker may have several different tasks where the exposure is possible. If the exposure problem can be divided to subparts the whole problem could be solved part by part. Detailed information of the exposure problem can help to focus the control measures on main reasons of the exposure. The FINN-PIMEX can visualise and make understandable the exposure (7) and show the reasons for high exposure immediately after the measurements. The visualisation and search properties of the FINN-PIMEX are the key factors in contaminant control.

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