IFA
Institut für Arbeitsschutz der
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Focus on IFA's work

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Ventilation in production shops and workshops

Problem

Plant and machinery are frequently operated in production shops and workshops with surface temperatures higher than that of the surrounding atmosphere. This leads to an upward flow of air (thermic airflow) which, in the absence of a ventilation arrangement, forms a circulatory flow (Illustration 1). The airflow initially transports hazardous substances released in the working area to the ceiling, as desired, before transporting them back down into the employees' working area, which is not desired.

Exhausting the air from the ceiling does not generally prevent the return flow. In ventilated shops, an unsuitable air flow pattern may even favour this return flow of foreign substances in the air, for example when the supply air is fed into the room from the ceiling (Illustration 2).

Activities

An improved air flow pattern concept was developed and tested in practice in co-operation with university researchers and manufacturers of ventilation systems.

Results and Application

With the latest generation of ventilation systems, source ventilation, fresh air is fed into the shop at low level for pressure compensation, and the contaminated air exhausted in the ceiling region. This arrangement prevents the return flow of air (Illustration 3).

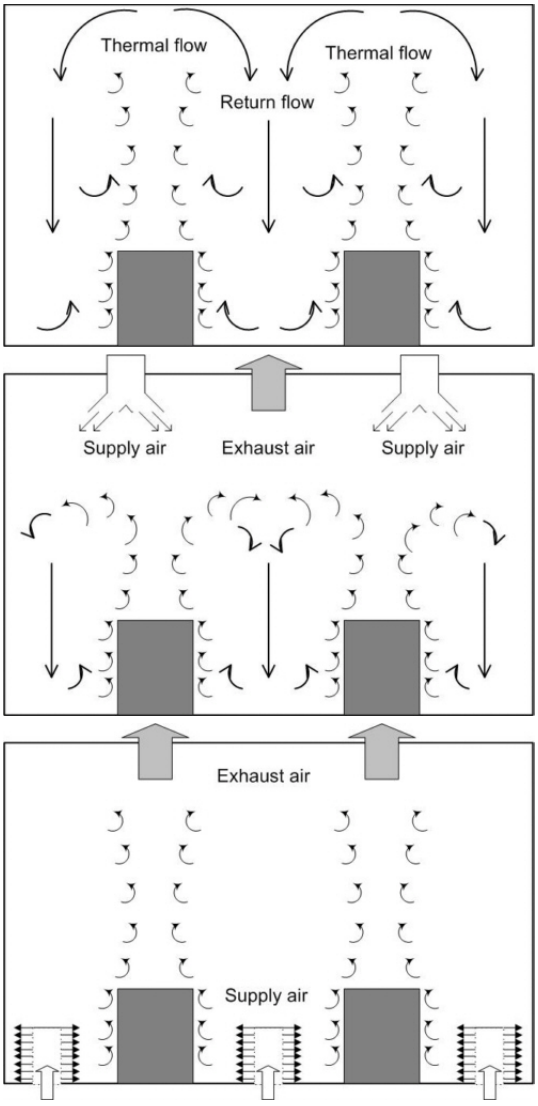

Illustration 1: Thermal rise on hot surfaces (top),
Illustration 2: Unfavourable downward air flow pattern (below)
Illustration 3: Ideal air flow pattern, from the ground upwards (source ventilation, bottom)

In order to prevent the air flow pattern being influenced by disturbance flows, the supply air must flow out of the vents at a very low flow velocity (low momentum). Source ventilation can be used in any room containing sources of heat. Source ventilation systems have already proved effective in assembly shops, mechanical production shops, shops accommodating plastics injection installations, and foundries.

Area of Application

All sectors of industry and workshop businesses

Additional Information

- VDI 2262-3: Workplace air – Reduction of exposure to air pollutants – Ventilation technical measures (06.11). Beuth, Berlin 2011

- VDI 3802-2: Air conditioning systems for factories – Capture of air pollutants at machine tools removing material (03.12). Beuth, Berlin 2012

- Gezielte Belüftung der Arbeitsbereiche in Produktionshallen zum Abbau der Schadstoffbelastung. Schlussbericht zum Verbundvorhaben 01 HK 216, gefördert mit Mitteln aus dem BMFT-Programm “Arbeit und Technik“. Verein der Förderer der Forschung im Bereich Heizung-Lüftung-Klima Stuttgart, Stuttgart 1993

- Pfeiffer, W.: Luftreinhaltung am Arbeitsplatz – Allgemeine Hinweise. Kennzahl 130 210. In: IFA-Handbuch Sicherheit und Gesundheitsschutz am Arbeitsplatz. 34. Lfg. VI/99. Hrsg.: - Deutsche Gesetzliche Unfallversicherung, Berlin. 2. Auflage. Erich Schmidt, Berlin 2003 – Losebl.-Ausg. www.ifa-handbuchdigital.de/130210

Expert Assistance

IFA, Division 3: Hazardous substances: handling – protective measures

Expert Committee woordworking and metalworking of the DGUV, Hanover

Literature Requests

IFA, Central Division

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