

Press Release

Gräfelfing, 13. February 2012

Greener than Ever

Modern Drying Technologies Enable Better Energy Efficiency

Since 1967 Eltosch, a member of Hönle Group, has been developing and manufacturing drying systems for the graphics arts industry. In the beginning the Hamburg based technology company had focused on drying equipment for traditional inks and dispersion coatings. This led to the company rapidly developing into a pioneer for curing UV inks and coatings for the sheet fed offset market. Today, with over 10. 000 installations worldwide, Eltosch is one of the leading manufacturers internationally of drying systems for the printing industry.

20 years after the Rio declaration for environment and development it should be intuitive for every technology company to be involved in environmental protection. The printing industry sums up this vision as "green printing". Eltosch has undertaken major efforts to contribute to this vision.

Development of Energy Efficient IR/HA Dryers

Drying of dispersion coatings, UV inks and UV coatings in general is a technology which requires high amounts of electrical energy. Compared

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to the power needed for the mechanical part of a printing press, the power for the drying systems could reach at least the same level. It is therefore of the utmost importance to develop energy efficient drying systems as well as methods for optimal re-use of exhaust heat.

Technologies to dry oil-based and oxidative-drying offset inks are based on oxidative drying and penetration of binders into the paper. This process can be accelerated by infrared radiation. Mainly due to innovations in ink formulation, pure infrared dryers for conventional inks are rarely used today in printing presses.

The situation is totally different if we look at water based dispersion coatings. Protection characteristics against scratching, the possibility of fast post-processing along with enhancement possibilities of dispersion coatings for packaging or commercial print jobs have led to a continuously growing use of dispersion coatings worldwide. The drying of these coatings is based on the heating of the coating to evaporate the water in the coating. The common term for this process is called infrared/hot air drying or, in short, IR/HA drying.

Eltosch had already developed heat recovery systems for IR/HA dryers in the 1990s, which have been continuously improved over the years. By re-directing hot exhaust air back to the heating register and mixing it partly with fresh ambient air, the temperature difference between the input air temperature and the desired temperature of the hot air can be

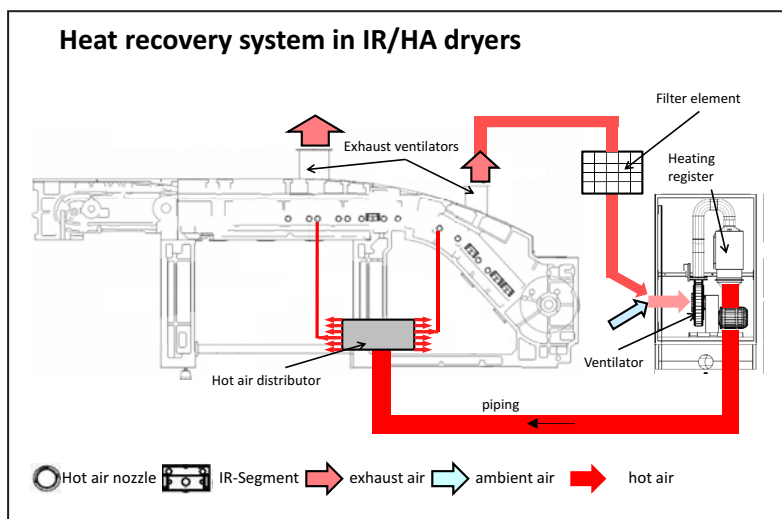
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minimized. Up to 30% of the heating energy can be saved in ideal conditions.



Schematics of a heat recovery system in IR/HA dryers

This kind of heat recovery system is easy to build and therefore has a short return on investment (ROI). Other possible systems, such as redirecting warm air from other sub systems or air/air heat exchange systems require more effort in development and hardware. Therefore the ROI is longer and currently not viable. If or when energy costs increase in the future, these types of heat recovery could well become more interesting.

Another promising possibility of energy savings in IR/HA drying technology is to avoid energy losses which occur during the distribution of

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hot air from the point of generation to the point of use. These losses have been minimized in the past by using isolated air distribution ducts. Ideally however, hot air should be generated directly at or at least very close to the point of use. The solution: heating elements inside the air nozzle. These nozzles have been used since 2002. Improvements to these technologies are not only conceptual but very probable.

Possibilities of Energy Savings in UV Curing Systems

Curing UV inks and UV coatings is based on the polymerization of monomers and oligomers by the influence of UV radiation. The photo initiators included in these inks and coatings split due to the influence of UV radiation in radicals, which then cause the monomers and oligomers to bind and build-up an immediate cured ink, or coatings layer.

Correct UV dose is crucial for the complete curing of inks and coatings, which is applied during the passing of the printed sheet below the UV module. Performance improvements in printing presses since 1992 consequently led to increased requirements for UV curing systems, since the same UV dose needs to be applied to the ink layer in a shorter time. Targeting an efficient UV curing system in view of environmental friendliness must involve the efficient conversion of electrical energy into UV radiation.

UV medium pressure arc lamps, which are currently used in UV curing systems, have been used since 1930. In 1984 Eltosch started manu-

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facturing and marketing UV systems based on this technology. Mercury medium pressure lamps emit radiation at UV-C (approx. 200 nm wavelength), UV-B, UV-A and up to the visible range. They also emit infrared radiation. Approximately 30% of the electrical energy used is converted into UV radiation and approximately 10% into visible light. The remaining 60% needs to be extracted as heat.

Since 1992 major improvements have been achieved with this technology. This was a result of the increased production speed of printing presses and developments having reached market maturity which has lead to an increased UV dose on the substrate for example:

- Water cooled UV modules.
- The introduction of dichroic reflectors for improved reflection of UV radiation with simultaneous absorption of IR radiation.
- Adaptation of UV spectrums for improved curing results for specific inks, such as opaque white.
- Optimization of reflector geometries for improved yield of UV dose.

Also real energy saving technologies have been implemented: around 1992 continuous power control in relation to the printing speed or the introduction of electronic power supplies in the year 2000, which allowed energy savings of up to 10% compared to traditional transformer and transducer systems.

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Heat recovery in UV systems is mostly effective by using recovery technologies in the water circuits inside the UV systems.

Another possibility to generate UV radiation is by using light emitting diodes (LEDs), which have been in use since 2008 in sheet-fed offset machines under laboratory conditions and in some first field installations.

LEDs - compared to mercury medium pressure arc lamps, have the following characteristics:

- An emission of narrowband UV spectra in the UV-A bandwidth (365 nm upwards).
- The efficiency is less than the UV systems currently available. Only about 10% to 20% of the energy input is converted into UV radiation. So currently, the LED technology from an environmental point of view is far less attractive than conventional UV systems.
- UV-LED inks are currently not as widely available as conventional inks on the market.

UV-LED technology, which in other industries has already reached market acceptance, could be a serious alternative in the future.

A precondition for this development will be more affordable LEDs as well as more affordable LED compatible press consumables. Until final market maturity of LED modules, some LED curable inks in limited availability can be cured very effectively by conventional medium pressure arc lamps.

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As a conclusion it can be stated that since the Rio declaration, many improvements regarding energy efficiency have already been achieved. Green printing is far more than an empty phrase. Especially for Eltosch, who, in the spirit of its pioneering outlook, is a trendsetter in environmental friendly systems.