

Energy savings, less pollution

A new system uses air recirculation to improve the process of painting and saves energy in the bargain.

> The application of paint is a difficult industrial process. Many paints contain organic solvents that are hazardous to human health and the environment. As companies are under pressure to reduce emissions and decrease their operating costs, a crucial area of optimization is the paint booth. ABB has responded with the development of an air recirculation system combined with solvent disposal and a state-of-the-art energy saving process.

The new paint booth air recirculation process, which is designed for use with only robotized automation, begins after the washing stage. The polluted air is not vented outside. Instead, it is 90 percent recycled in the booth after it has been treated. This recirculation system not only allows air reutilization, but the solvent concentration in the booth has a ratio that is in line with full optimization of the solvent burning process, and the solvent concentration in the booth is monitored and maintained within safe limits.

The solution uses a specific air duct that extracts 10 percent of the air flow and sends it to a regenerative thermal oxidizer (RTO). This extraction is counterbalanced

by a small flow of air from the outside. This process is very stable with very little influence from outside conditions. However, it requires a very efficient washing process and a specialized dust filter.

Thanks to this recirculation process, the air is solvent saturated. It then goes through a high temperature ceramic chamber, where its temperature is raised to 780 °C after which it enters a combustion chamber. At this temperature level, the solvents auto-combust and are fully eliminated. This solvent-free air flow – with a temperature of 835 °C – is then sent through a second ceramic chamber where it is cooled to + 60 °C before being vented to the outside.

With the exception of the start-up phase, the amount of energy consumed by this system is close to zero, and thermal efficiency is close to 95 percent. The air flow is periodically inverted to increase the ceramic temperature. The process fully conforms to environmental laws in application in almost all countries.

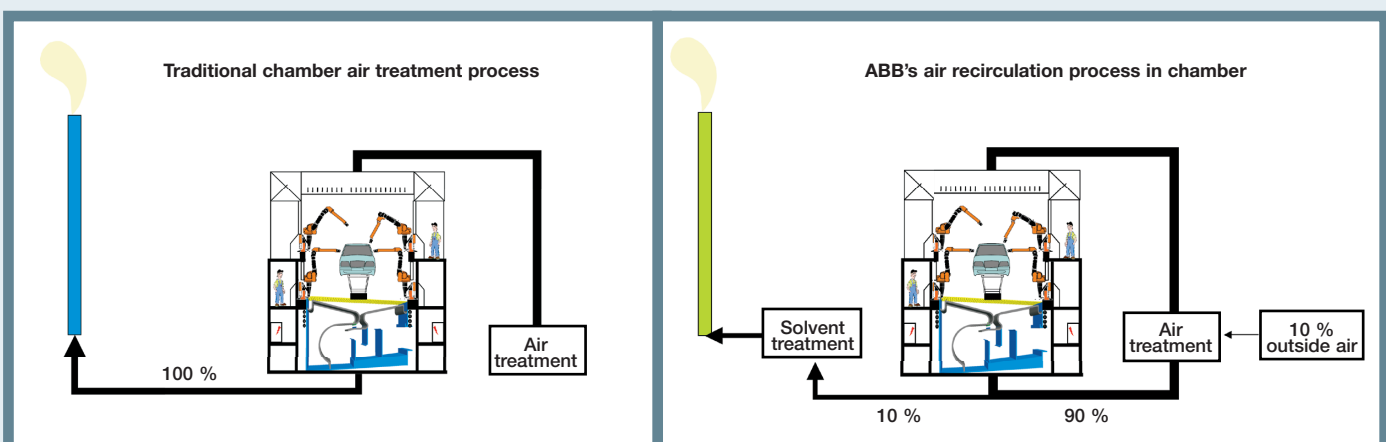
Another significant source of savings is in the outside air conditioning process. Compared to a traditional scheme, ABB's process reduces the quantity of fresh air used – and hence the energy consumed – by a factor of 10. The closed-loop system for water used at this stage also provides savings.

The system is modular and uses a plug and play approach so it is easy to install, has



The air circulation chamber, in the middle of the diagram below, is where the solvents autocombust.

a small footprint and is fully compliant with environmental regulations. The energy savings can be up to 30 percent when compared with existing lines, which represents a 9 percent reduction in the total annual operating cost of the paint process. Not to mention by automating the process entirely, no employees are exposed to hazardous materials. ☉



The amount of energy consumed by ABB's system, at right, is close to zero, and thermal efficiency is close to 95 percent. The recirculation system requires a fully robotized process which produces further savings: It reduces paint consumption (and thus cost) and hence environmental impact.