

## Excellence down to the last detail

One-stop service – from project planning to implementation

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*D.W. Renzmann Apparatebau, founded in 1968 and headquartered in Monzingen/D, is a leading manufacturer of high-quality washing machines and distillation units for the graphic arts and paint industry. The company's portfolio ranges from the development and manufacture of simple, robust manual washing machines to technically complex distillation units, washing machines for gravure cylinders, anilox rollers and miscellaneous parts, and the implementation of entire projects. This one-stop approach also includes intensive consulting and services after the conclusion of installations/projects. Customers can use the washing machines in the Renzmann lab to test various cleaning methods with their own machine parts (cylinders, rollers, containers, ink pumps etc). They can also watch a demonstration of washing solvent recovery using the Rotomax distillation unit. All test results are accurately documented and serve as evidence of the contractually warranted cleaning performance.*

At roughly EUR 700,000, the 2005/2006 project for Cellpack Packaging GmbH was one of the largest individual orders in the history of Renzmann.

### The initial situation

Cellpack invested EUR 7.5 million in the modernization of peripheral equipment at its German location in Lauterecken. A large part of this sum was spent on environmental and fire protection measures. In this context, the project of a new washing room was of particular importance, because the complete re-

moval of solvent-based substances from gravure cylinders and anilox rollers, and from parts such as pumps, doctor blade holders, splash guards, ink containers, ink pans and hoses according to the strict ATEX requirements, can help prevent fires. Taking into account the available space on site, the capacities of the washing machines and the Rotomax distillation unit needed to be such that continuous operation of the Schiavi gravure presses and laminators (lamination with and without solvent) working three shifts, five days a week, could be guaranteed.

### The implementation

However, there were some obstacles to be overcome before the washing room could be put into operation. Once they had received the go-ahead for the planning and implementation of the Cellpack project, Renzmann first had to obtain the approval of the appropriate authorities. Since the parts are cleaned with solvent (ethyl acetate), the washing room constitutes a potentially explosive area (hazard area) whose operation is subject to special laws and regulations, such as the ATEX Directive, the German Water Resources Act or the Federal Emission Control Act. Due to the excellent preparation of the application the project was approved without major conditions. As a result, Cellpack is today on good terms with the authorities.

The required modifications were to be executed as quickly as possible in order to minimize the loss of use of the washing room. Renzmann was able to meet this requirement to Cellpack's full satisfaction: the new washing room was finished in just four weeks (December 2005–January 2006), including all structural modifications, the installation of the washing machines and distillation unit (including piping, cabling and electrical connections), and operator training.

As a first step, all the old units were disassembled and disposed of, since they did not meet the ATEX requirements, the company's cleaning requirements, the occupational exposure limit values for hazardous solvents or the economic and logistic requirements of a state-of-the-art packaging printer. All these problems would be eliminated with the new washing room, and the solvent smell usually present in such rooms would be gone as well.

Then the entire floor was lined with solvent collecting pans made of stainless steel and covered with stainless steel bulb plates; polished stainless steel plates were installed

**Left:**  
The soiled parts are placed into the removable washing basket, which is then simply inserted into the parts washing machine.

**Right:**  
All plates on the walls and floor can be removed and cleaned in the parts washing machine.



on the walls up to a height of 2 meters. This approach, used instead of the usual floor and wall tiles, makes it particularly easy to keep the washing room clean. In case of heavy soiling, all installed plates can be removed and cleaned in the parts washing machine.

**The equipment**

The new washing room is equipped with four *Renzmann* units that use solvent as a washing agent and are therefore explosion-proof and compliant with ATEX requirements.

Parts washing machine

The parts washing machine is designed for cleaning ink pans, hoses, containers, doctor blade holders and small parts; it is equipped with a powerful washing pump/explosion-proof motor unit. This front-loading machine has a closed washing chamber and a separate, integrated solvent tank. The parts to be washed are placed in a removable washing basket, which is then inserted into the machine. The washing cycle may be started once the hinged door is closed. Spray rotors and a rigid rinsing system ensure excellent cleaning results, and removable strainers protect the spraying system, pump and connected pipes from obstruction or damage through parts such as screws. The filling level of the integrated solvent tank is controlled automatically (operating level; maximum filling level). Solvent vapours are removed quickly and completely from the unit by a powerful fan and pneumatic air inlet and air admixture flaps. In addition, the machine is equipped with a measurement and control system that monitors the solvent concentration. The automatic cleaning program consists of the following steps: washing – draining – rinsing – draining – interior air extraction which can also be selected individually.

Manual washing station

The manual washing station with integrated solvent tank is used to soak heavily soiled parts or very small parts. The parts are placed on



**Left:** The door of the cylinder washing machine, which is located outside the hazard area, is locked during washing.

**Right:** The cleaning module of the cylinder washing machine is located in the washing room.

a grate which is lowered when the pneumatic hinged lid is closed. Then a foot switch is actuated to start the solvent flow. The interior air extraction system, which consists of a powerful fan and vacuum flaps, ensures fast removal of solvent vapours in order to minimize the operator's exposure. After soaking, the grate is raised and the solvent drips off the parts. Then the washing solvent is drained from the station and the lid is opened. Now the operator removes the residues of ink, varnish or laminating adhesive from the parts using a safety hand brush. The brush is supplied with washing solvent by a pneumatic diaphragm pump that can also be used to fill and drain the station. The steps of the automatic washing program, washing – draining – air extraction, can also be selected individually.

Pump washing station

In this station, four pumps can be cleaned simultaneously with solvent on the inside and outside. The ink pumps incl. suction pipes, connected to explosion-proof power outlets, rinse themselves by circulating the washing solvent from the machine tank. The openings in the stainless steel lid, which can be removed completely for cleaning,

are closed by movable flaps so that virtually no solvent vapours can escape. The flaps of the respective pumps open under the pressure of the inserted suction pipe. The solvent vapours are removed by an air extraction device with air slots and an air in-take at the rear of the lid. The solvent tank in the station is drained and filled automatically.

Cleaning and handling of gravure cylinders

The focus of the extensive modification measures in the washing room was clearly aimed at the unit for cleaning gravure cylinders. The goal was not only to improve the cleaning results, but also the handling of the cylinders – both could be achieved. The success of the endeavour is due in part to the new crane system installed by *Renzmann*. A special feature of the unit installed at *Cellpack* is that the cylinders are loaded and unloaded in the preparation area (non-hazard area), while the cleaning module is located in the washing room (hazard area). »Best of all, we were able to install this unusual and technically sophisticated solution without an additional fire protection door«, says JÜRGEN SCHANK, director of project planning at *Renzmann*. The authorities and insurance compa-

**Left:** The cylinder washing machine is loaded and unloaded by means of a special support.

**Right:** In the preparation room, gravure cylinders with ink residues stand directly in front of the cylinder washing machine.





**Left:**  
Due to limited space in the washing room, the Rotomax distillation unit was installed outside the room.

**Right:**  
Container for used solvent (left) with a capacity of 4000 litres. Once the filling level reaches 1500 litres, the automatic distillation process is started. The clean (distilled) solvent flows into the container on the right.

nies were informed in detail about the planned unit so that *Renzmann* was finally given permission to install the cylinder washing machine.

Loading and unloading is accomplished by means of a special support that can hold up to four gravure cylinders (max. diameter: 300 mm/12", max. length: 2000 mm/78.75") at a time. The crane is equipped with a device from which the support with the cylinders is suspended at four points. The support places the soiled cylinders onto adjustable support rollers in the machine's pneumatic slide-in module; the rollers are driven by an external explosion-proof gear motor during the washing cycle. A stainless steel collecting pan is installed

beneath the slide-in module. This pan moves together with the module and prevents ink dripping on the floor. The machine also features exchangeable filter sets, a filling level control system and an interior air extraction system. The automatic washing program (PLC) includes the washing – rinsing – draining – air extraction steps, all of which can be selected individually.

### Solvent recovery

The dirty solvent from the washing machines is pumped into the first container (capacity: 4000 litres) of the *Rotomax* automatic distillation unit. This was the first installation of the *Rotomax* unit; to date about

40 machines have been sold. The unit is characterized by a maintenance-friendly concept, modern control technology and great user convenience. Due to the limited space in the washing room, *Renzmann* used an unconventional and proven solution in which the distillation unit was installed outside of the washing room. Once the solvent in the container reaches a filling level of 1500 litres, the automatic distillation process begins. The dirty solvent in the cylindrical boiler (an insulated dome with a flange-mounted heating floor) is heated (10 bar/145 psi and 185 °C/365 °F max.) until it begins to boil and evaporate. The solvent vapours condense in the water-cooled condenser, and

### New distillation unit with pre-evaporator

The latest *Renzmann* innovation is the *Rotomax-W* unit for the evaporation of aqueous-alkaline washing and rinsing agents. The condensed clean distillate is reintroduced into the rinsing water/washing agent circuit so that there is no waste-water. Unlike the used rinsing water and washing agent, the heavily reduced and concentrated residue is disposed of as hazardous waste.

Thanks to the distillation with the pre-evaporator, which takes place in two steps, the energy required per litre of evaporated water is cut by half. About half of the medium is evaporated under normal pressure in the pre-evaporator. The hot steam (100 °C/212 °F) generated during this process contains the energy supplied in the pre-evaporator and is piped into the heating floor of the distillation unit.

After being slightly concentrated in the pre-evaporator, the medium is sucked into the distillation boiler, in which a vacuum has been created. Due to the vacuum, the boiling temperature in the boiler is reduced to <60 °C (140 °F). This results in a temperature difference of >40 °C (104 °F) between the boiler contents and the steam from the pre-evaporator; consequently, the steam condenses in the heating floor and transfers its energy to the boiler contents. The medium in the boiler is concentrated until more than 95% of its original volume has evaporated.

The distillate from the pre-evaporator that condenses in the heating floor is sucked into the condenser of the distillation unit, where it joins the condensed vapours from the boiler. The distillate cools slightly in the condenser, runs into the vacuum unit and from there into a separate clean solvent container. The loss of liquid in the pre-evaporator (due to evaporation and to liquid being sucked into the distillation boiler) is compensated for by automatic refilling.

### Cellpack Packaging

*Cellpack Packaging* is part of the packaging division (created in 1935) of the *Behr Bircher Cellpack Group*. The company currently employs approx. 235 people at three locations in Germany, the Czech Republic and Switzerland. *Cellpack Packaging* manufactures flexible packaging solutions and different kinds of bags made of mono-films and multilayer films. Flexographic and gravure printing presses are used to print on these materials. The Swiss location in Villmergen produces bags and prints with flexo presses, while the German location uses gravure printing.

For the project described above, *Cellpack Packaging GmbH* invested approx. EUR 7.5 million in its peripheral equipment, but most of all in measures for improving environmental and fire protection. The company spent about EUR 1 million on a *Nordmeccanica Combi 3000* laminator, a machine that permits solvent-based and solvent-free duplex lamination of various film materials. A second such laminator is to be installed shortly. With a turret connecting both machines, even triplex lamination will be possible.

At the core of the production facility are three *Schiavi* gravure presses. The first *Schiavi* gravure press for printing on flexible materials was installed at *Cellpack Packaging* (then *Lony Folien*) in 1983. The ten-colour and seven-colour presses are designed for a printing width of 1260 mm (49.6"), while the eight-colour press has a printing width of 800 mm (31.5"). In addition, *Cellpack Packaging* is operating laminators and slitters.

The Swiss *Behr Bircher Cellpack Group*, managed by Prof Dr *GIORGIO BEHR*, has 1116 employees and is active in various segments of industry. In 2007 total sales volume reached CHF 330 million.

the clean distillate flows back into the second container, from where it is reintroduced into the washing process.

An agitator with scrapers (rotor) prevents incrustations on the heating surfaces of the boiler and ensures good heat transfer and high distillation output. It also stirs the solvent and keeps the discharge valve clean. After the end of distillation, the rotor discharges the highly viscous or paste-like residue through the open discharge valve into a disposal container. Additional manual cleaning of the distillation boiler is not necessary.

### Energy supply

Energy is supplied to the steam generator on the heating floor by thermal oil. This oil is first heated in an exhaust air cleaning system by *Dürr* that works with regenerative thermal oxidation (RTO); the system is operated with solvent-laden exhaust air from the printing process. This means that no external energy sources are required for the operation of the distillation unit (auto-thermic operating principle). Auto-thermic combustion is used to power not only the distillation unit, but also many other areas of the printing house. In the face of increasing raw material and energy prices, the cost savings realized in this manner constitute a considerable competitive advantage. **WOLFGANG BRANDT**, Director of technical equipment and maintenance at



**RTO exhaust air cleaning system.**

*Cellpack Packaging*, explains: »Normally our printing house would use about 65,000 m<sup>3</sup> of gas per month. Thanks to our exhaust air cleaning system, we were able to reduce our gas consumption to 10,000 m<sup>3</sup>.«

### All-round service

In addition to the detailed planning and implementation of the project, *Renzmann* also offers extensive after sale services. The services include regular maintenance of the units, fast elimination of any malfunctions and problems by competent experts, and training for the customer's staff.

Today, two and a half years after the conclusion of the project, *Cellpack Packaging* is still more than happy with the results. The washing

machine and distillation unit run continuously without appreciable problems in accordance with all applicable laws, regulations and guidelines. Since the installation of the new equipment, the cleaning results have improved and the washing time has been greatly reduced. The recovery of the used solvent lowers costs and contributes to the conservation of resources, while the elimination of the usual solvent odour in the washing room ensures a better and healthier working climate.

→ [www.cellpack.com](http://www.cellpack.com)

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