

StageRight products are used in arenas, stadium and convention center around the world, including the Staples Center in Los Angeles.

Powder Palace

HOW A MANUFACTURER OF SPORTING GOODS TURNED ITS POWDER OPERATION INTO THE CENTERPIECE OF ITS PLANT TO MEET ENVIRONMENTAL GUIDELINES AND IMPROVE PRODUCT QUALITY

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Clare, MI is a town of just over 3,000 people in the central part of the state. Often referred to as the gateway to northern Michigan and its recreational activities, Clare attracts visitors from all over the United States and other countries.

Manufacturing may not be the first thing that comes to mind when thinking of towns like Clare, but business is an important part of what makes the city thrive. One such business is The Rogers Group of Companies. The Rogers Group is a family-owned enterprise that develops unique products and services that have an expansive

impact in niche markets. The group consists of three operating companies: Rogers Athletic Co. Inc., StageRight Corp. and Filcon Inc.

Rogers provides a full array of football practice and field equipment including sleds, tackling dummies, assorted field training equipment and goal posts. Recently, the company expanded into the strength and fitness market with a line of power lifting racks, storage equipment, benches and plate-loaded weight machines. The Rogers Athletic name can be seen on training fields and in weight rooms of elite collegiate and professional programs, a large number of

scholastic athletic programs and U.S. government agencies.

Since 1984, StageRight has manufactured portable staging and seating platforms for arenas, stadiums, convention centers, hotels, colleges and universities, high schools, theaters and churches worldwide. Products include choral and band risers, meeting room risers, seating risers, orchestra pit covers and major event stages.

StageRight equipment can be found in hundreds of prominent institutions including the Staples Center in Los Angeles, New Orleans Convention Center and the Target Center in Minneapolis.

Filcon converts and packages film for both commercial/industrial and household use. The household segment of the business involves slitting large rolls of film, rewinding them on small paper cores and packaging them for a large consumer products company that sells the product throughout the United States and Canada. The commercial/industrial segment of the business consists of slitting and distributing films purchased from Dow Chemical to customers located throughout the world.

POWDER EXPANSION

In 2005, Rogers Group decided to expand the metal manufacturing facility that fabricates equipment for all its businesses by more than tripling floor space, adding 108,000 ft² onto an existing 45,000 ft² plant.

Managers decided to build the addition large enough to accommodate a new “state of the art” powder coating system that could provide leading edge technology for decades.

StageRight had been using powder coating for a long time because it was environmentally compliant and provided a tough finish for its high-quality steel products. The powder coat system in the old plant was more than 25 years old and unable to manage the full range of products and volume, so managers decided to build the addition large enough to accommodate a new “state of the art” powder coating system that could provide leading edge technology for decades. They decided to lay the system out in a linear design that would run along the entire 600-ft length of the building addition and build a wall to separate it from the rest of the facility.

The powder system would include many features aimed at managing the group’s wide variety of products. It would also be

designed as a showplace for the company by putting the powder operation on display as a commitment to first-class manufacturing and product quality.

The line processes parts of varying size and mass, so planning included a double track conveyor system consisting of a standard line with a 2 × 5 × 8 ft profile as well as a line with a 2 × 5 × 30 ft profile to accommodate football goal posts. The smaller line runs at 6–12 fpm, while the line for larger components operates at 4–6 fpm.

Designed in a long oval pattern, the conveyor features only four 90° turns for the longer parts. A unique load bar with a trolley assembly at one end allows parts to pass through the turns in a tight radius, preserving more space for manufacturing and warehousing requirements in the building addi-

tion. The two conveyors run alongside each other and use the same equipment. Product opening size for each line is the same but the line speed and route of the conveyor provide flexibility needed to process different product groups. The conveyor is interlocked with burners and pumps on the line to reduce output or turn them off if the line is stopped for an extended period of time.

Cleaning and pretreatment take place in a six-stage spray washer. Each stage has a single tank that supplies solution to two independent tunnels and riser systems, one for each of the two lines. Like many metal fabricators, The Rogers Group uses laser cutting equipment throughout the plant. The wash system is designed to remove the oxide that occurs on metal edges cut by laser.

Cleaning and pretreatment

stages include: Alkaline cleaner; tap water rinse; laser oxide removal and iron phosphate; tap water rinse; dry-in-place seal rinse; and RO water halo rinse.

Washer tanks and tunnels are fabricated from fiberglass for long life and easy maintenance. Fiberglass construction also provides insulating value and reduces gas usage for heating tanks one and three. Chemical feed to the tanks is controlled by an automated monitoring and feed system.

Environmental concerns were high on the list of priorities in designing the new powder process—the facility was already under EPA monitoring due to actions by other companies that had previously owned the building site. Powder coating offers a significant advantage over liquid paint in this regard and helps the company meet local and state environmen-

tal guidelines. Bag filtration on the washer cuts soil build-up in solutions and reduces water and chemical use, while elimination of floor drains minimizes the risk of any contamination leaking from the new building. The washer system and chemical storage areas are located in a sloped concrete pit which pumps to a blind sump capable of holding 150% of the largest washer tank. This containment system eliminates any possibility of spills.

APPLICATION EQUIPMENT

The powder booth was selected for its small footprint, simplicity of operation and fast color change capability. The first booth of its kind installed in North America, the round plastic booth has 12 automatic guns and a touch-up station at each end. The round configuration and seamless,

sandwich-wall construction minimize powder accumulation in the booth cabin and facilitate faster color changes.

Other features include a sloped floor with a downdraft air extraction system that minimizes powder build-up inside the booth and facilitates high transfer efficiency. Seamless ductwork substantially reduces the risk of color contamination with no cleaning and maintenance, while the mono-cyclone has a built-in sieve that screens out contaminants and provides easy cleanup. The cyclone uses a dense-phase transport pump for improved powder material handling without compressed air.

An integrated color management system uses PLC control to automate cleaning by pulsing compressed air over the gun exterior and throughout the powder path, including suction tubes, pumps, powder hose and gun. This process virtually eliminates color contamination. The feed center also allows powder to be sprayed directly from the powder manufacturer's original shipping container or from a dedicated hopper. This reduces the number

of hoppers and other dedicated equipment typically required to reclaim powder and lets operators use the shipping box for many of their colors.

The powder application system and controls provide exceptional control of powder flow and charging with individually programmable coating parameters that generate reproducible coating results and uniform film build.

The system allows color changes in less than 12 min, a capability that has improved the plant's ability to spray custom colors plus a wide variety of standard colors. As parts enter the booth, a light curtain reads the part shape and size and controls gun triggering. The dynamics of the 12 oscillating guns, coupled with sensing of part presence and location and firing only guns in the part path, provide excellent quality and reduce powder usage. The oscillator moves the guns up and down and also in and out to provide efficient application and to facilitate gun cleaning: When the gun mover pulls the guns back during color change the barrels are cleaned by a row of air nozzles located along

the vertical gun slots.

Many parts are coated without manual touch-up. One operator runs the entire powder room, including the manual touch-up when required.

ENVIRONMENTAL SHOWCASE

The environmental room was one of the keys in the design of the powder system. Managers wanted the application room to be visually impressive to show the company and its customers Rogers' commitment to top-quality finishing.

On the plant side of the room is an entire wall of glass panels in a convex shape that provides a clear view of the booth and application process. The room was designed around the application equipment, with the extraction duct, gun hose and cable runs beneath floor level. This provides a very clean appearance and unobstructed movement of personnel and equipment.

Special lighting with sunlight temperature provides accurate color rendering, while the ceiling is constructed of perforated panels that act as a plenum for the HVAC system and reduce

Seen here through the powder room's glass wall, the booth has multiple features that enable high transfer efficiency and fast color changes.



air current issues. The net result of these design features is an extremely clean, bright and functional powder rooms. The room size is large enough that movement around the equipment for cleaning and color change is simple and unobstructed, providing enhanced efficiency and safety. Powder is stored inside the room for easy access and to prevent exposure to moisture and heat. With the duct in the floor and the washer also in a pit, the conveyor line was designed with no elevation changes.

Two redundant PLCs, one located in the booth and the other in the load/unload area, run the powder system. In-house maintenance merged controls for the booth, ovens, and chemical preparation into a single, user-friendly system. This allows automation of start up, custom programs, and shut down.

The powder line operates in a steady state with a minimum of labor. The wall that isolates the system from the plant provides control of the atmosphere on both sides, isolates the powder system from dirt and provides an opportunity to control the heat gain that is normal around the ovens and washer. Ventilation fans and air make-up were installed to turn the air over inside the coating area. The two conveyors enter and exit through the wall from the load and unload area.

When the line was first started up, heat from the system was higher than expected and the powder room temperature was too high. An evaluation of system details revealed several minor issues, including:

- The oven exhaust fan was rotating in the wrong direction, leading to excess gas and heat rollout
- The HVAC system return duct was installed with too many



Powder application is via 12 automatic guns mounted on oscillators. Touch-up stations at each end of the booth are rarely used.

90° turns and obstructions, robbing the system of cooling capacity

- Oven vestibules were too short, allowing excess heat to escape
- Excess heat from the curing oven was interfering with temperature control in the powder room. A heat relief hood was used to remove the heat from the area near the powder room
- Doors were built that can be rolled into place to cover oven openings that are not in use and reduce energy losses.

Once these issues were corrected, heat in the powder room was reduced dramatically and the system used less energy. The ventilation fan is designed so that it can discharge warm air into the plant during the winter months or through the roof to atmosphere during the summer months.

IMPROVEMENTS

In keeping with managers' commitment to high standards of operation, StageRight has practiced an aggressive continuous improvement program that has led to several recent modifications that have provided improved efficiencies.

Considering that the powder

coating system accounts for 85% of the facility's total gas consumption, any improvement in energy efficiency is significant. Managed natural gas purchasing has resulted in limited-risk pricing and a more fixed gas cost for budgetary purposes. Replacement of conventional powder coatings with low-temperature-cure materials has also resulted in a significant reduction in utility costs.

In the pretreatment area, a cascading back-flow rinse system reduces water consumption and chemical usage, and plant personnel are in the process of diverting excess cure oven air to the dry-off oven to further reduce utility costs. In addition to these changes the plant continues to explore new and improved racking methods and different finishes for customers, including many new colors and some very bright metallic powders and high-performance coatings. ■

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