

# COILWORLD

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- ***Tale of Two Coil Coaters—  
Five Years Later***
- ***Upgrade Boosts Coil Coaters  
Capabilities***
- ***Galvalume Metal Conversions  
of Flat Roofs***

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The Steelscape Kalama team who worked on implementing the company's paint temperature control system. p. 8



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# Tale of Two Coil Coaters— Five Years Later

By: Eric Slind – Steelscape, Inc.  
With: Mike Bonner – Saint Clair Systems, Inc.

In April of 2007 we, at Steelscape, took a major step in our continuous improvement journey when new Paint Temperature Control Systems were simultaneously implemented on the continuous coating lines at our Kalama, WA and Rancho Cucamonga, CA facilities. In the January/February 2008 issue of Coil World we reported on our initial progress through the first nine months of operation. Now, five years later, we return to examine the long-term results of this project.

## A Quick Recap

To begin, a quick recap of the goals and objectives that drove this project and the results we reported five years ago is in order. The primary goals and objectives set forth included:

- 1) Ensuring that paint temperature could be controlled at a targeted value on each coater to reduce viscosity variation.
- 2) Reducing the quantity of petroleum solvents added to our paints by a minimum of 50%.
- 3) Improving the consistency and repeatability of the painting process to increase the finish quality and first-pass yield of painted products.

During the system selection process, the team extended these criteria to include:

- Get paint to the target temperature quickly
- Prevent damage to delicate paint formulations
- Clean up quickly and easily at color change
- Be operator-friendly and easy to use
- Interface readily with the existing line control system
- Require minimal maintenance

In addition to the project being completed on-time and on-budget, the results observed and measured over the first nine months of operation included:

- Paint temperatures were easily controlled, with target temperatures consistently achieved at each coater, resulting in better paint viscosity control both during a run and from run-to-run
- A drum of paint could be heated from 65°F to 90°F in less than four minutes
- Paint film thickness variations across the strip were virtually eliminated
- Finish quality of the painted strip surface (gloss, appearance, etc.) showed significant improvement
- Improved paint application control resulted in a direct decrease in paint consumption
- Reduced paint consumption decreased the number of paint shortages caused by exceeding estimated usage
- Reductions in solvent additions in excess of 60%, (shown in Figure 1) resulted in significant cost savings for 2007 over 2006.
- Paint defects, such as solvent pop, were reduced by 75% from previous levels due to lower solvent levels in the paint
- Environmental compliance was improved due to

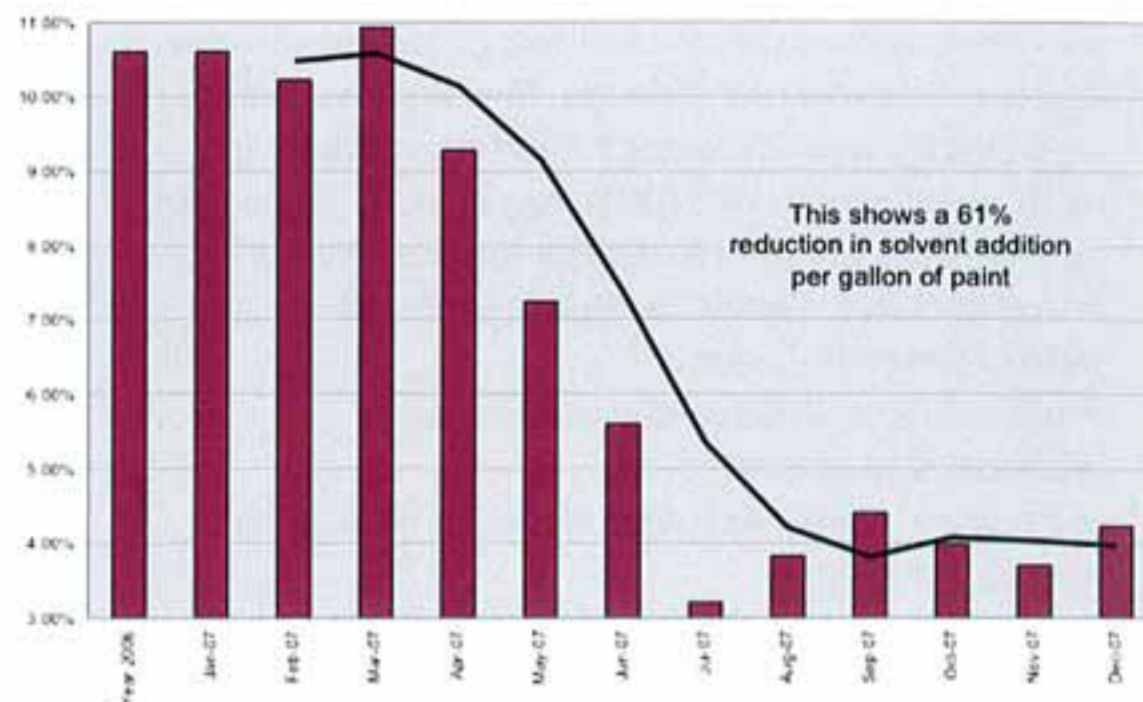


Figure 1: Percent Solvent Added per Gallon of Paint

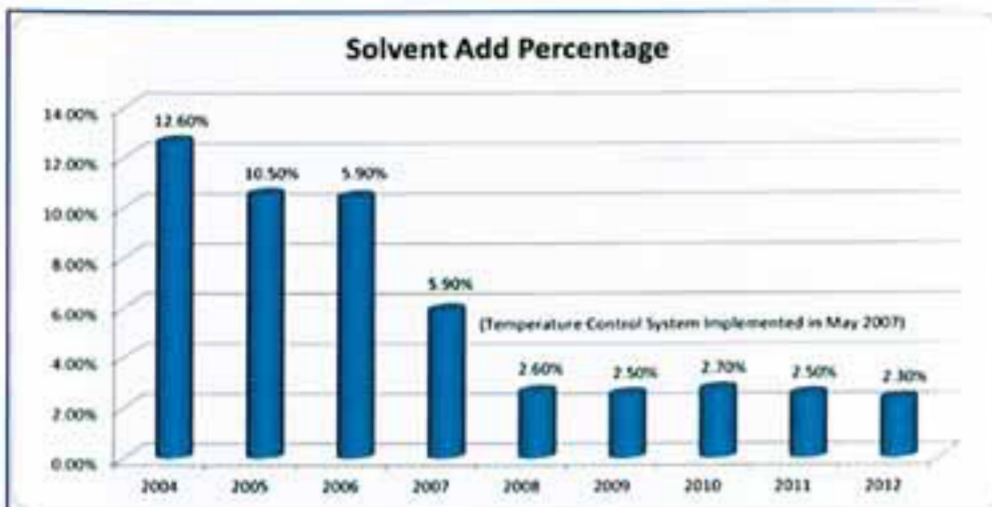
reductions of naphthalene and paint volatile organic compounds (VOC's) produced during the paint curing process.

If you wish to review the original article in greater detail, it can be found at: <http://stclairsystems.com/images/stories/articles/a-tale-of-two-coil-coaters-coil-world.pdf>

## Flash Forward Five Years

Over the last five years, the goals and objectives set forth for the temperature control system remain intact. In fact, changes in the marketplace have driven smaller batch sizes and shorter leadtimes as customers attempt to manage their costs through tighter inventory control. The temperature control system has played a key role in our ability to adapt to these changes. Just as VFD's (motor controllers) provide the ability to accurately control speed and load cells provide the ability to accurately control nip and kiss pressure, the temperature control system has provided the ability to use temperature as a tool – another control parameter that can be manipulated to assure the predictable performance of the line. In fact, the Paint Line Associates have deemed the Saint Clair Paint Temperature Control Equipment to be an integral part of the painting process. Just a few of the improvements that have made it possible to meet the ever-changing demands of the market include:

- Paint film thickness variation throughout a production run, both edge-to-edge and head-to-tail, has been minimized, resulting in a direct decrease in paint consumption and a higher quality, more consistent painted coil.
- Decreased variation in paint consumption has reduced the number of paint shortages caused by exceeding estimated usage.
- Adjustments to compensate for paint film changes



**Figure 2: Percent Solvent Added per Gallon of Paint**

that were required during longer production runs have been reduced from making 3-5 changes per hour of coil run to virtually none.

- Handling of, and exposure to, solvents by Paint Line Associates has been significantly reduced.
- Solvent-related finish quality defects over the painted strip surface (blisters, solvent pop, etc.) have decreased by 95% compared to results prior to the addition of paint temperature control.

From its inception, one of the key factors in this implementation was the system's ability to control reducing solvent consumption. Solvent costs were as high as \$11.00/gallon when the system was installed, and these same solvents now exceed \$13.00/gallon! The team originally set a target to reduce solvent additions by 50%. As shown in the recap above, during the first few months of operation, solvent addition for viscosity adjustment was reduced by 61% from an average of 10.5% to around 4%. Continuous improvement in the process since that time has resulted in further reductions, with solvent addition now at around 2.3%, bringing the total reduction to more than 75%. As *Figure 2* shows, this has become the "new normal" over the last five years.

In addition to the material cost of the solvent, decreasing solvent addition has a direct, positive impact on quality. During the first few months of operation, a 75% reduction in solvent pop and blister defects was observed, but the subsequent improvements have now resulted in a 95% reduction of these issues. This quality of finish has become the new standard against which all products are judged. But, as it turns out, the benefits of diminishing solvent addition are not limited to material cost and defect reduction.

When running some products, especially those coated with a heavier paint film, it was often necessary to reduce line speed to control the build-up of solvent fumes in the curing oven and avoid reaching the "Lower Explosive Limit" or LEL. The more solvent added to the paint, the higher the concentration and the slower the line would have to be run. The reduction of solvents being added to the paint achieved with the implementation of the temperature control system reduced oven LEL's by as much as 33%! This has allowed these products to be run at higher line speeds with no loss of quality. This equates to higher throughput and, therefore, greater efficiencies – which means lower cost and higher margins – as well as an improvement in the ability to meet the shorter leadtimes that our customers are now demanding.

Never to be minimized is the environmental impact posed by the solvents used in the coating process. One of the solvents closely watched in environmental circles is naphthalene. On August 22, 2007, Steelscape joined the National Partnership for Environmental Priorities (NPEP), pledging to reduce its naphthalene usage by a minimum of 30%. At the time, the Kalama painting operation was using 89,750 lbs. of naphthalene per year, and therefore, we were committing to reduce that amount by about 27,000 lbs./year. The solvent reductions realized through the implementation of the temperature control system actually resulted in an 80% reduction of naphthalene usage – a savings of nearly 72,000 lbs./year! As a result, in April 2011, Kalama won the coveted EPA National Partnership Environmental Award and has now saved more than 350,000 lbs. of naphthalene over the last five years! In addition to the positive health and safety aspects of this reduction, from an energy perspective, this is the equivalent of taking more than 25 cars off the road each year for the last five years! Similar results have been achieved at the Rancho Cucamonga site as well.

Solvent usage is not the only area of significant savings resulting from this implementation. Though not included as part of the original justification, the reduction in paint film thickness variations, both from edge-to-edge and head-to-tail, has resulted in a nearly 2% decrease in topcoat consumption.

Even the way that paint is stored and handled has been affected by this system. Prior to 2007, in an attempt to stabilize the temperature of the paint being brought to the coater, a heated paint storage area was located directly adjacent to the line. This room was held at a constant 90°F. As noted above, with the implementation of the temperature control system, the paint could be reliably heated from 65°F to 90°F in less than four minutes, therefore, this heated paint staging area was no longer necessary. This not only represents a 100% reduction in energy usage, at a savings of approximately \$3,000 per year; in keeping with our lean orientation, the area was converted to locker storage for the Paint Line Associates, allowing them to keep their PPE and personal belongings closer to their work space.

Of utmost importance in the long-term evaluation of any capital project are the reliability and maintenance of the equipment during constant operation. In any continuous coating line, time is of the essence and operation/maintenance teams do not have extra time to be operating and/or maintaining problematic equipment. To this end, during the system selection process, the team added two important criteria regarding system operation and maintenance:

- Be operator-friendly and easy to use
- Require minimal maintenance

Among the primary reasons that the Paint Line Associates have deemed the Saint Clair paint temperature control equipment to be an integral part of the painting process is not only the consistency and repeatability that the system brings to the process, but also the fact that it is extremely easy to use, providing virtually "set and forget" operation. In addition, over the last five years of continuous operation, it has proven to be extremely reliable with minimal maintenance. Preventative maintenance has consisted of checking and (if



**Figure 3: EPA National Partnership Environmental Award**

necessary) adjusting the water chemistry every month and replacing seven water filters every three months.

Ron Hurst, who was the Paint Area Manager at the Rancho Cucamonga facility during the 2007 implementation, and who later became the Plant Manager, often said, "This was one of the easiest capital project implementations that we've ever done – and once it was installed, I've never had to hear about it again!"



**Figure 4: The Steelscape Kalama Team:**  
Back Row: Bill Dugas, Andy Mason, Jeff Lindeman, Mike Monaghan  
Front Row: Dan Shepherd, Matt Guler, Eric Slind

### Advanced, Proven Technologies

Advanced and proven technologies, such as the Saint Clair Paint Temperature Control Systems, have been instrumental in the continuous improvement programs implemented at Steelscape's facilities over the last five years. In fact, the success of the Rancho and Kalama projects led Steelscape to add Paint Temperature Control Systems to its other strip coating facilities in Shreveport, LA, and Fairfield, AL. The enhanced processes have produced direct cost reductions, improved product quality, enabled award-winning environmental compliance, and eliminated non-value added work, thus improving associate morale.

The demands of the marketplace over the last five years have changed dramatically and the team's foresight in 2007 made this system a key factor in adjusting to the new landscape. Now, the team, shown in Figure 4, is turning their attention to the reduction of cleaning solvents as the next logical step along the continuous improvement path for the coating process.

And the journey continues...

### Author Bios

**Eric Slind** is the Process Engineer for the Steelscape Inc. Kalama, WA Paint Line. The company is the largest supplier of pre-coated steel in the Western United States. He is a degreed metallurgical engineer with significant experience in processes involving application of metallic and polymer based coatings, continuous process improvement using tools like Six Sigma, Lean and Statistical Process Control incorporating team activities, and aluminum metallurgy and extraction. **Michael R. Bonner** is the Vice President of Engineering & Technology for Saint Clair Systems, Inc., a leading supplier of process temperature control equipment for industrial fluid dispensing systems. A degreed electrical engineer, over the years he has spent time in a wide variety of industries including audio systems, medical equipment, HVAC and appliance controls, metal stamping, even the manufacture of gasoline pumps. For the last 16 years, however, he has focused on the science of point-of-use temperature control in fluid dispensing processes.

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As part of Centria's Ambridge facility retrofit project was the upgrade of its accumulator tower.

## Long Upgrade Commitment Boosts Coil Coater's Capabilities

One of the plants run by a Pennsylvania-based provider of custom coil-coating services is bigger and better than ever, thanks to multi-year, multimillion-dollar improvement program.

Since 2005, there have been a number of significant upgrades at the Ambridge, PA, facility of Centria Coating Services. Headquartered in Moon Township, PA, Centria bills itself as the leading independent aluminum coil coater in the business. Much of the material handled at the Ambridge facility is aluminum and

Galvalume. The plant also coats stainless, cold rolled, and galvanized steel substrates.

Approximately 20% of the material the plant coats is used by Centria's sister company that manufactures Architectural Building Systems and other building-construction products. The majority of Ambridge's capacity is consumed by toll-coating customers. About 50% of that toll-coating volume goes to various, high-end building products, according to Jim Connelly, the plant manager.

### Eight Years of Upgrades

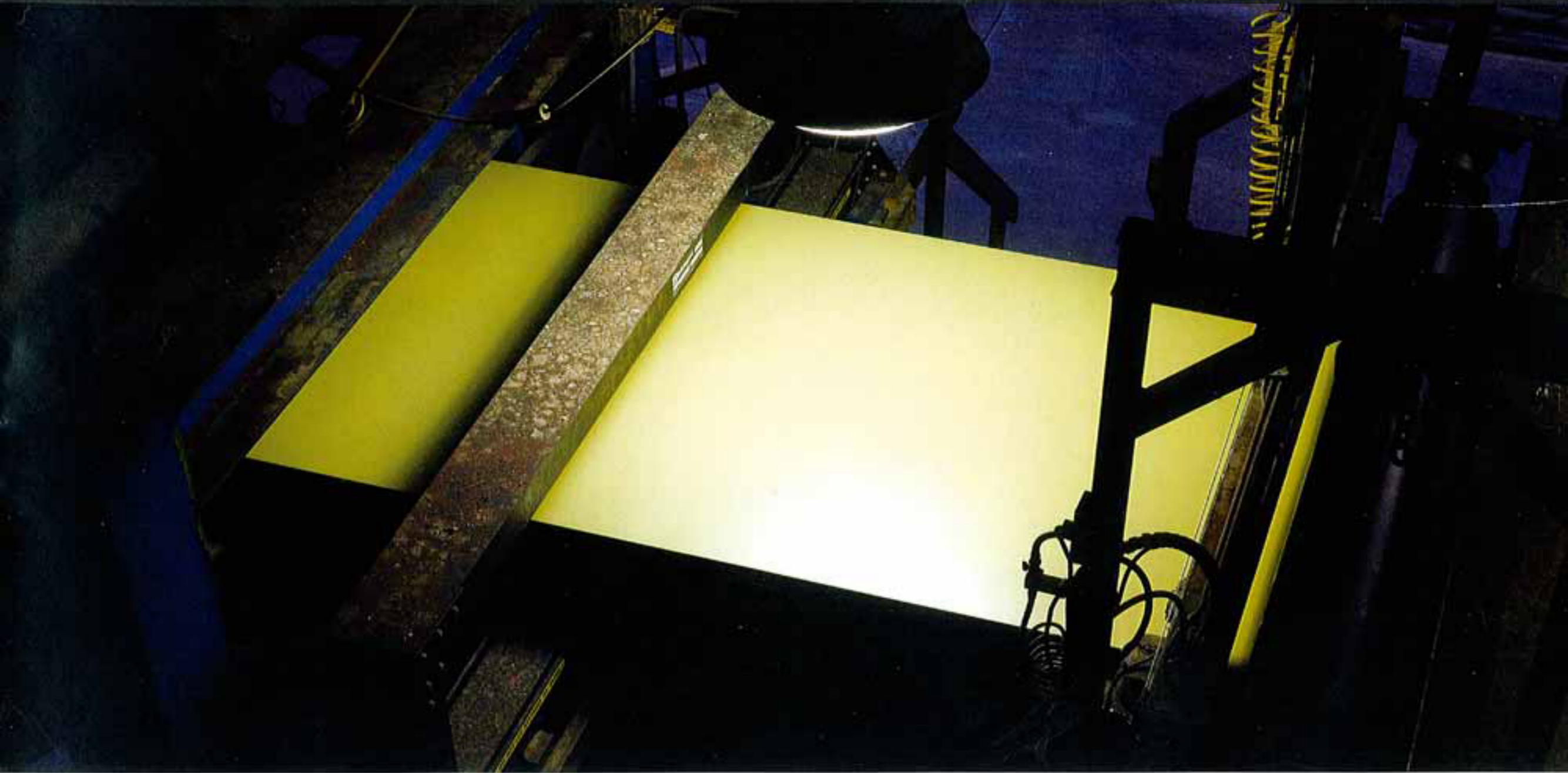
Since 2005, Connelly reports, Centria has invested more than \$9 million in upgrades at the Ambridge facility. For one thing, the warehouse has been expanded by 40,000 sq. ft., bringing the total size to 360,000 sq. ft. In addition, an improved electrical system has allowed the plant to double its line speed and paint substrates up to 49" wide.

Other major changes include upgrades to the finish and prime coater ovens, steering system, and accumulator tower. In addition, Ambridge has added a new off-line embosser. Previously, the plant only had an embosser in-line with the paint line. With this new investment, the plant can emboss a wider range of products and has improved the product quality and flatness.

One of the most important changes at Ambridge is the upgrade to its "wet" section. When Connelly came to the plant in 2007, one of the first things he did was turn to Chemetall Americas, New Providence, NJ, the plant's wet-section supplier. Over the years, "Chemetall has been a valuable supplier for us," Connelly says. "On a regular basis, a company representative visits and reviews our records to make sure all the control processes in the wet section are running within their specifications. And if any issues develop, they correct the problems."



A metal strip moves onto the recoiler prior to the coil being prepared for packaging.



A painted strip passes under inspection lights where it is checked for defects.

In 2007, Connelly asked this trusted supplier to evaluate Ambridge's entire wet section. Chemetall produced "a very thorough evaluation that recommended a number of changes," Connelly recalls. Acting on this evaluation, the plant undertook a complete renovation of its wet section. This included replacing and expanding the cleaning tanks, as well as major changes to the brush section, pumps, and filter system.

#### **Cleaning a Coil**

In its wet section, Ambridge uses a pair of chemicals that it has relied on for more than a decade. One of these chemicals, a multi-metal cleaner called ChemetallKleen 4010, is used on coil surfaces in an initial cleaning stage that comes after oil has been removed from the coil in a stripping tank. In this first cleaning stage, the coil moves through a soap tank and brush section before application of the cleaner.

In the second cleaning stage, the coil passes through a soap tank, a rinse tank, and squeeze rolls before pretreatment with the other chemical, Permatreat 1500. Then the strip is ready for the prime coater.

#### **A Look at the Paint Line**

The paint line at Ambridge handles material thicknesses down to .010". The plant can apply up to 15 different paint systems to meet a variety of specifications. Coatings applied include polyesters, Kynars, and plastisols. (The plant handles special plastisol jobs requiring application of 8 mil layers on both sides of the coil—something very few firms can do, according to Connelly). Typical film thicknesses are 3 mil for the primer and 7 to 8 mil for topcoats.

A key upgrade to the paint line came about 10 months ago, when Ambridge installed a St. Clair Systems heat exchanger system. Paint fed through the heat exchanger is maintained at the temperature specified by the paint manufacturer, Connelly explains. For example, paint is cooled down in the summer and warmed up in the winter to the optimal temperature. The result is more uniform side-to-side coating of the strip, which saves paint.

The heat exchanger is capable of maintaining paint temperatures of 70°F for the primer and about 90°F for the finish coat with a precision of  $\pm 1^\circ\text{F}$ , Connelly says. "It's been a fine system for us."

The many improvements, both mechanical and operational, have enabled Centria's Ambridge facility to provide increased production volumes and greater versatility, all with improved quality. ●



A portion of the Ambridge facility's exterior was included in the multi-year, multimillion dollar Improvement program.