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THE ROAD TO RELIABILITY

CENTURY ALUMINUM PLANT MAKES
A BREAK FROM ITS REACTIVE PAST

A Reprint from *Reliable Plant* magazine
September - October 2008

Life Cycle Engineering

4360 Corporate Rd
Charleston, SC 29405
Phone: 843.744.7110
www.LCE.com

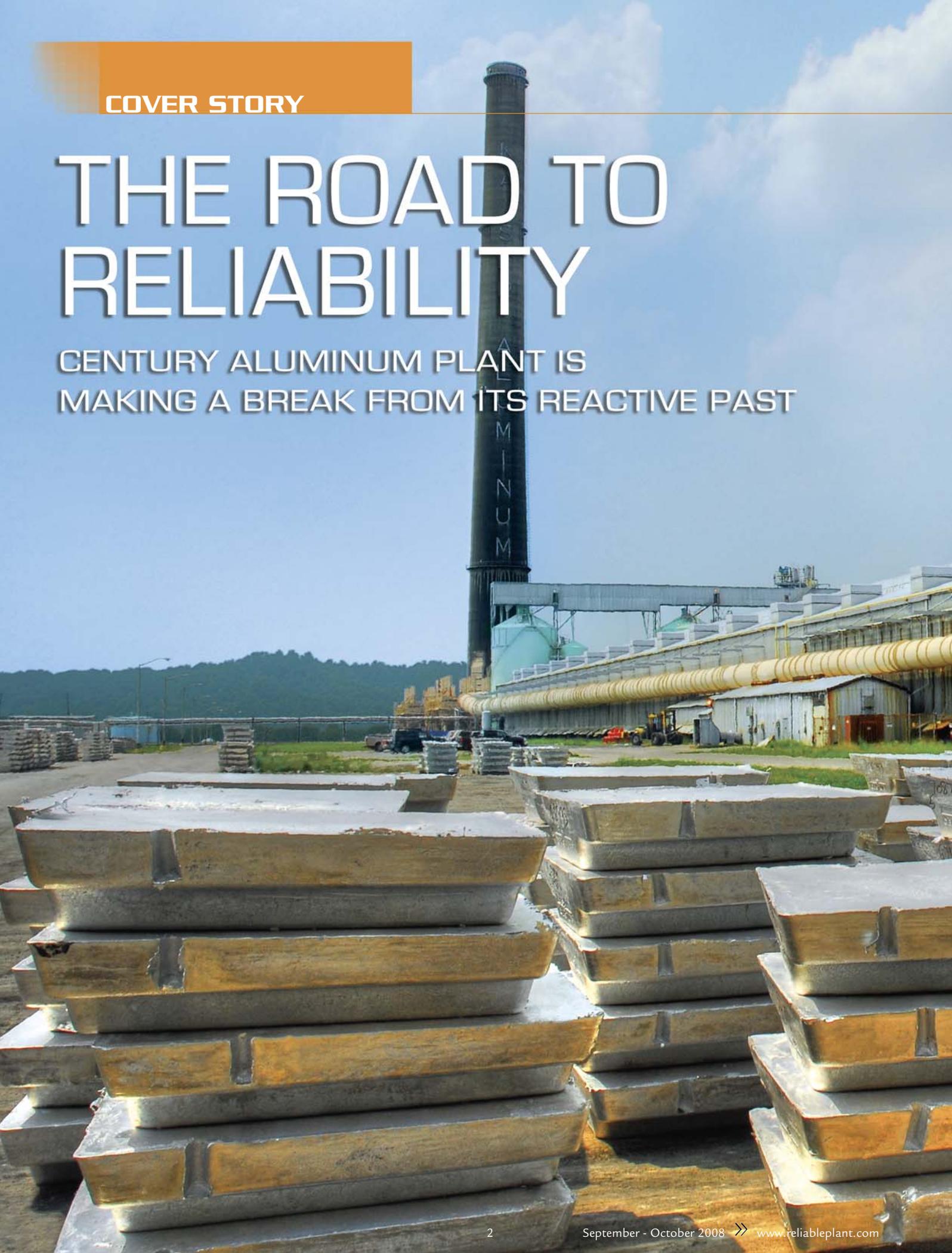


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COVER STORY

THE ROAD TO RELIABILITY

CENTURY ALUMINUM PLANT IS MAKING A BREAK FROM ITS REACTIVE PAST



BY PAUL V. ARNOLD



"I read Reliable Plant magazine's articles on companies that have achieved a high level of excellence and payback in the area of reliability. I've had a vision of Century Aluminum someday being on the cover of your magazine ... in three or so years. But, perhaps now is the time for a story about a company in great need of reliability improvement - one that realizes the need, has the want-to and has made the decision to embark on the journey. It's kind of a crazy idea, but maybe it is time."

- e-mail from Lowell Pistelli, Century Aluminum's corporate reliability excellence manager, to *Reliable Plant* in February 2008

It is time.

It is time to offer up just such an organization as a role model, as a hope, for all of the traditional manufacturing plants that fight tooth and nail each day to keep the machines running and get product out the door. These traditional plants constitute the majority in the U.S. industrial sector. Plants that are best in class in the area of reliability - the Toyotas, Cargills, Eli Lillys, DuPonts, etc. - are the minority. The traditionals, for a variety of reasons, face an uphill battle in

their efforts to be competitive and viable. They must work twice as hard to make half the progress of best-in-class plants.

There comes a time, after many years of firefighting, forced overtime and "dealing with it", when a traditional plant longs for something more ... and decides to take action. This is an important step in the reliability maturation process, and it's



one not everyone feels comfortable taking. Plants with the guts and the wherewithal to take it are worthy of praise and, in this case, a magazine cover story.

“We want to be a reliable plant,” says Scott Carte, the reliability excellence facilitator for Century Aluminum’s smelting plant in Ravenswood, W.Va. “When you are reliable, you keep good data so you can make good decisions. You don’t shut down production. You have planned time to fix things before they hurt you. You eliminate the sources of failures. You are valued – not by the way that you react to fires, but by the manner in which you prevent them.”



⚡ The plant employs 175 maintenance workers, including 150 in skilled trades positions.

⚡ Jeff Carpenter (left) and Linda Sibley prepare to hoist a motor.

Photos by Ed Connors, Ed’s Photogenics

ABOUT CENTURY ALUMINUM

Company: Century Aluminum owns primary aluminum capacity in the United States and Iceland, as well as an interest in alumina and bauxite assets in the U.S. and Jamaica. Century’s corporate offices are located in Monterey, Calif.

Focus plant: Century Aluminum facility in Ravenswood, W.Va. The site was built in 1957 by Kaiser Aluminum. It is one of the oldest operating aluminum smelters in the world. The plant celebrated its 50th anniversary on September 22, 2007.

Plant employment: Approximately 675 employees, including 175 maintenance workers (25 in managerial positions, 150 in skilled trades positions). The plant is the second-largest employer in Jackson County. Trades workers are represented by United Steelworkers union Local 5668.

Plant products: Molten primary aluminum and low-profile primary aluminum sow. The plant produces 375 million pounds of aluminum annually. The aluminum made in Ravenswood ends up in a variety of products. The plant’s biggest customer is Alcan, which was part of Century until 1999, when the rolling operations were sold. Auto makers (GM, Ford, Toyota, etc.) are also among its customers, as is Boeing and the U.S. space program.

Progress begins with a long, hard look in the mirror and the ability, the openness, to talk about what you see.

“We have to be open about it,” says Carte. “The first step is admitting that you have a problem.”

It is the symbolic “line in the sand” that separates where you have been and where you want to be.

Fully reactive maintenance. Frequent breakdowns. A lack of data and equipment history. Band-Aid repairs. Skewed recognition and compensation. Finger-pointing. No time for planning, scheduling, preventive maintenance, predictive maintenance, and implementation and utilization of root cause activities. Century Aluminum has been there and done that. It is a part of its past, and it is moving on.

REASONS FOR REACTIVE

The Ravenswood plant celebrated its 50th year of operation in 2007, but maintenance and production workers will tell you ‘07 also marked another golden anniversary.

“Fifty years of being in a reactive mode,” remarks millwright Paul Roach, who has worked at the site for 10 years. “I think the plant was pretty much set up from the beginning on more of a reactive basis.”

Plant manager Jim Chapman agrees.

“What we have done for the past 50 years is work in a breakdown mentality,” he says. “That is the way they have been trained and that is what the expectation has been.”

The reasons behind that relate to, among other things:

Size: Ravenswood is a low-amperage smelter (currently 93 kiloamps) trying to compete against smelters backed by three or four times the power. The thinking was that hustle could make up for muscle.

A focus on quotas: “We’ve considered it more of a production plant,” says millwright Linda Sibley, who has worked at the site for 32 years. “The philosophy has been, ‘It’s what goes out the door that counts. It’s not how well the machinery is running. Get it running long enough to get it out the door, to reach the quota for the day.’”

Perceived excellence: “We’re good at reactive maintenance,” says Roach. “When it’s an emergency, we shine.”

Dollars and sense: “We thought we were saving money by not spending it on the equipment,” says Carte.

The reality, in retrospect, has proved otherwise. Health and viability are components of working smarter, not harder. It is indeed about how well the machinery is running. Reactive greatness only gets you so far. And, total cost – good or bad – will always matter most. (Remember the line

from the old Fram oil filter ads: “You can pay me now or you can pay me later”?)

CLEARING THE AIR

Examining past practices and habits can be similar to cleaning out your attic at home. It’s important to go through every box and determine what to keep and what to throw. What doesn’t fit anymore? What’s old and outdated? What makes you say, “What was I thinking?” The process, and the resulting conversations, can be quite cathartic.

It’s OK to question. It’s OK to vent. It’s OK to admit ...:

■ *“When your whole day is centered on saving the world, it’s hard to get much accomplished.” – Jack Payne, millwright and 10-year plant veteran*

Reactive work has constituted nearly all of the maintenance department’s time and attention, especially in the last 15 years when the plant shifted into what employees call “survival mode.”

In this environment, you can’t plan.

“We started adding planners again three years ago,” says maintenance planner Todd Harrison. “The previous ones had transitioned into other roles. We now have three planners for 150 maintenance tradesmen. We have done some planning, but when you are in such a reactive mode, it’s next to impossible to do much planning. It’s all about putting out fires.”

You can’t do much preventive work.

“You try to stay on the preventive maintenance schedule, but you don’t have a chance to do the PMs because of all the emergencies,” says Clyde Whitney, an electrician for the past 32 years.

You can’t review and rationalize the PMs.

“Probably one-third of the PMs are no good,” says maintenance manager Jim Doeffinger, who has worked at the plant since 1980. “We waste time doing irrelevant PMs. We need time to go through them all.”

■ *“Everybody is tired of the Band-Aid effect. It’s ‘put a Band-Aid on it, get it up and get it running.’ The biggest need is to have the time, personnel and materials to fix stuff right.” – John Wilson, equipment operator and 20-year vet*

Managers and skilled trades personnel

will tell you that the pinch and the protocol have had nothing to do with a lack of desire or skills.

“People want to fix things right,” says Carte. “It frustrates and disappoints them when they have to patch and do repairs that they know won’t be a permanent fix.”

Adds Whitney, “The two main ingredients are the manpower and the materials. It’s not a matter of skills or knowledge. It’s a matter of means.”

■ *“We do some root cause, but it’s all after the fact, and then what do we do with it? ‘This is why it failed.’ Great. What are you going to do to change it? ‘I don’t know. I just wanted to know why it failed.’ It didn’t change anything.” – Doeffinger*

The quote sheds light on a shortfall of many traditional plants. It’s important to have information. But it’s much more important to be able to do something with it – to be able to turn info into proactive battle plans. The Ravenswood plant admittedly has struggled with maintenance information. Part of that stems from the fact that mechanics are often nabbed by production employees to make on-the-spot repairs. Little of that impromptu work gets captured. Another facet is that the plant has gone through three computerized maintenance management software systems (a legacy system, a dedicated CMMS and a component of an enterprise-wide system) in recent years. Doeffinger says a big share of equipment history has been lost in the shuffle.

“We aren’t even putting tickets in for some stuff right now, so you don’t know what work is being done by some people,” says Carte. “We hardly have any data at this point, so we don’t have a history of what’s been going on. What failures have we worked on in the past? Is it giving us clues to what will be coming up? What failures have been occurring? What was the root cause or causes of those failures?”

■ *“The relationship between maintenance and production has been poor ... to the point of cussing each other out.” – Carte*

Again, it comes down to frustration with the traditional setup and the hustle and bustle of trying to get product out the door. Add in the fact that a smelter is a tough place in which to work – it’s exceptionally hot and far from a cleanroom environment – and tempers are bound to flare.

“It’s a waste of time to point fingers now and say, ‘It’s maintenance’s fault’ or ‘It’s production’s fault,’” says Roach. “Everyone is to blame. We are all in this together.”

THE SEEDS OF SUCCESS

We are all in this together. That is the nature of Century Aluminum’s road to reliability. The past is the past. Let bygones be bygones. Rip off the Band-Aid, even though you know it will sting (and probably pull out some hairs). What happens now impacts and involves everyone.

Plants that seek to address reliability fail most of the time when their efforts are created or viewed as a maintenance department initiative. You may get some surface improvements, but the impact is neither substantial nor lasting. Century Aluminum was cognizant of this when, in the summer of 2007, it decided that change was necessary in order to have a future in Ravenswood and in the global aluminum market.

“We tried change in the past with just maintenance, but it only goes so far,” says Carte. “It doesn’t work. You aren’t developing, educating, making people aware on the production side. They aren’t part of it at all, so what do they have in it? If they don’t see the results of it, they definitely aren’t in it. This is the only way that it can be. It has to be total alignment.”

Plant manager Chapman agrees.

“When you say ‘reliability,’ everybody thinks ‘maintenance,’” he says. “We got together and discussed this. Some of our pitfalls in the past have been that production has never been on board. We know now that without a joint effort, it’s doomed to fail.”

Two personnel moves set the tone for what was to come.

Pistelli, the engineering and maintenance manager (and a 30-year employee) at the plant, was groomed in July of that year for the new post of corporate reliability excellence manager by chief operating officer and executive vice president Wayne R. Hale. Pistelli would be responsible for helping Ravenswood and the other Century plants see the light about reliability improvement.

The plant then made a break with tradition by naming Carte as the facilitator – the plant leader – of the new reliability initiative.

Carte was a lifelong production worker who most recently was a production general supervisor in the pot room.

“That was a visible way to get out of the silo thinking,” says Doeffinger.

Leadership stresses, however, that Carte was not chosen because of his outside-of-maintenance background.

“The plant picked the right person for the job,” says Pistelli. “The fact that he’s from production doesn’t make it work. His desire to make it work stands out.”

Carte met some initial hesitation from the maintenance crew, but won favor through open dialogue and by explaining that he had their backs as much as he had those in production. Endorsement from the maintenance manager also paid dividends.

“Jim told them, ‘We have Scott running it. It’s good to have someone from production leading this. It’s important to tie maintenance and production together,’” says Carte.

Operators seem ready to tie the knot.

“By improving equipment uptime, we will have a less stressful environment. By having the equipment running when we need it, it helps us do the job safely and correct,” says Greg Greathouse, a cell operator for the past six years in the pot room.

Just as important to building the foundation has been the support and involvement of corporate and plant management.

Hale has provided the vision, sponsorship, leadership, funding and stamp of approval from on high. His mission has been to make common sense common practice.

» Electrician Clyde Whitney has worked 32 years at the plant.



» Century Aluminum’s Ravenswood site is situated adjacent to the Ohio River.

“While he believes in expansion and growth, he also believes in preserving the assets that he has,” says Pistelli. “Looking over the corporation, he recognizes the need for reliability at each site to hold on to the assets that you have and operate them to their full capability.”

Chapman is funneling time and resources to the cause, and serving as the executive sponsor of both the overall reliability initiative and its steering committee.

Everyone has taken notice.

“Never before have we seen this type of support from up above,” says Jeff Carpenter, the maintenance/production supervisor in the rodding department.

“That is a very good sign.”

Such breaks from the past have converted doubters and “flavor of the month” naysayers and gotten plant workers focused on the task at hand.

“We, as the people on the floor, realize that we have to have this for the survival of this plant and our jobs and for future employment,” says operator Wilson. “We realize that this is the best thing that we can do. This place is important to the employees, the support jobs, the retail businesses in the area, everyone.”

Adds Carte, “We’re not doing this for bragging rights or anything. It’s to give ourselves a future.”

THE MAKING OF A NEW MAINTENANCE SUPERHERO

Like most traditional plants, Ravenswood has long lauded the reactive hero, the mechanic who rides in to save the day when the equipment breaks down.

“People are used to being rewarded, recognized, patted on the back for a breakdown that they got back on line,” says plant manager Jim Chapman.

The site, though, is working to create a new, proactive hero.

“The guy who identifies a minor issue and takes care of it before it leads to a

major stoppage, the one who has ideas on how to make the machines more robust and sees them through to completion – they need to be held up as heroes,” says reliability excellence facilitator Scott Carte.

Getting there will require educating both workers and managers.

“It’s a change, and some people will be scared,” says maintenance manager Jim Doeffinger. “The thinking is, ‘If everything is planned, then what good am I? They won’t need me anymore to be the hero.’”

MILEPOSTS ON THE ROAD

The plant is less than a year into a reliability journey that could very well take five or more years ... just to reach a “good” level. Best in class? That’s way in the distance. Even so, there have been a host of calendar entries that point to progress. Mileposts on the road to reliability have included:

Reliability case study: Century Aluminum decided not to go solo on this new quest. It hired Life Cycle Engineering as its consultant in October 2007. The first action was to send managers to an LCE “opportunity case

workshop” in Charleston, S.C. The class showed the comparative costs of a reactive plant and a reliable plant. The Ravenswood team realized that going proactive could bring tremendous returns.

Initial assessment: As a way to determine where the plant stood in relation to established standards and practices of reliability excellence, LCE performed a full site evaluation which spanned from November to late December 2007. The report gave Ravenswood an initial assessment score of .159 on a scale of .000 to 1.000, placing it deep in the “reactive” category. The consultancy defines categories as: reactive (.000 to .399), emerging (.400 to .549), proactive (.550 to .749) and excellence (.750 to 1.000). This created a baseline and a confirmation of need.

“Some managers viewed it as ‘we’re not that way at all,’” says Doeffinger. “When I saw the scores, I said, ‘That sounds about right to me.’”

Adds Carte, “You can debate the score, but the purpose was to see that you are a totally reactive plant. It showed we have much work to do.”

Master plan: In March, the consultancy finalized a personalized road map to take the plant from Point A (reactive) to Point B (proactive). Action items and long-term time-

lines were defined to address needs and close the gaps identified in the assessment.

Steering committee: Chapman and Carte worked with LCE to create a cross-functional steering committee in April 2008 to lead the new initiative; provide support to focus groups; and align systems, structure and controls to support reliability. The committee, consisting of five managers and two trades workers, includes a purchasing manager, material handling manager, services manager, technical manager, maintenance manager, cell operator and millwright. Committee members and additional plant managers went through change management training in April to prepare themselves and others for the journey.

Groups: Focus groups were created in May and June to oversee reliability’s influence on five key areas of opportunity. Each group contains seven people (the vast majority of which are trades workers) whose job functions are tied to a specific facet of reliability excellence. Groups include:

- Work control – focus on specific aspects of maintenance work identification, approval and execution
- Operational improvement – focus on overall equipment effectiveness (OEE) and loss elimination

- Planning and scheduling – focus on aspects of maintenance planning and scheduling
- Material management – focus on aspects of material management and procurement
- Reliability engineering – focus on aspects of preventive and predictive maintenance, and failure elimination

Communication: The pursuit of change has a tendency to breed rumors and misinformation, especially in the early stages. Leaders got proactive to ensure the correct message was provided to plant employees. In May, Carte created brochures and posted signs that spelled out the purpose, goals and deliverables of the initiative. (Text from the first sign is found in the sidebar on Page 11.) He followed that up with a brochure in June that introduced the groups and their members, quantified early progress, outlined current activities and answered general questions on the minds of workers.

Current state: The focus groups led “brown paper” activities in June and July that mapped out current processes and displayed areas of opportunity.

“The groups sit down and put the brown paper on the board,” says Carte. “You affix notes and mark it all up. You go over – from the perspective of a maintenance supervisor, a production supervisor, operators, a scheduler/planner, a maintenance technician – how you currently work. When you map it out, it’s like Spaghetti Junction in Atlanta – all of the highways cross each other. It shows that you have a mess. Some people think they are doing it the right way, but when you map it all out, you see the truth.”

Focus groups began “white paper” activities – mapping out the desired future state for processes – in August.

Pilot area: In June, the steering committee chose the rodding area to be the test site for focused reliability enhancement projects.

“This area is critical,” says department supervisor Carpenter. “This area can never be shut down or it creates a major impact.

We have to provide anodes to the pot room and meet its quantity needs every day. We have to stay here until the total is met.”

Focus groups will spend six months to prescribe and enact measurable changes.

SPELLING OUT THE DETAILS OF THE INITIATIVE

Century Aluminum reliability excellence facilitator Scott Carte created a flyer this past spring that outlined the details of the reliability initiative. Here is text from that flyer, which he titled “The Bridge to the Future: Reliability Excellence”:

What is Rx? Rx is reliability excellence. It is a method to increase the life and usefulness of assets. It is a way to improve the business. It is not just a maintenance program. Rx has started, and it will take several years to implement.

Why are we doing Rx? It is our opportunity for Ravenswood to fully achieve its potential in reliability, lower costs and increased profitability. It is one of the cornerstones of building a long-term, viable future.

What is in this for me? The deliverables are a proactive work environment

where you are valued, doing the job right, with reliable equipment when you need it.

How will we implement Rx? People from various job functions and individual areas from the plant will populate focus groups. The focus groups will work on the following processes – work control, material management, reliability engineering, operational improvement, and planning and scheduling.

The focus groups will complete a brown paper identifying how things are done today and a white paper to determine how things will be done in the future. The work results of the focus groups will be implemented in a selected pilot area of the plant. These enhanced practices will be migrated into all areas of the plant.

“The project is drawing light to this area,” says Carpenter. “Hopefully, we can create some lasting improvements.”

HOPE FOR THE FUTURE

Hope is a good word, but it also reflects guarded optimism. The plant and its reliability initiative are on the right path, but they are not out of the woods yet. Potential roadblocks are on the horizon. These include:

Change: It is hard to change practices that have been in place for decades. It’s also a challenge to keep transformed areas (and workers in those areas) from falling back to old, comfortable practices.

Fatigue: Reliability improvement is a long-term process. Century believes it will take three to five years alone to get to a solid level of reliability. It may take three to five additional years to achieve a measure of excellence. Such a trek can tire people out.

“If we get halfway there in five years, there will be tremendous improvements in this plant,” says Doeffinger. “Along the way, though, we will be going through the valley of despair. You have to retain your focus. You just have to hang in there.”

BONDING WITH SMRP

Century Aluminum is gaining knowledge on best practices through its involvement with the Society for Maintenance & Reliability Professionals.

Ravenswood maintenance and engineering leaders first gained exposure to reliability best practices when it became a charter member of the Mid-Ohio Valley Maintenance Council, gaining a new view of how plants – including General Electric and DuPont – use reliability as a part of operations. It found its way to SMRP by speaking with a colleague who worked for Cytec Industries, a chemical company.

The plant then joined the efforts of fellow MOVMC members to form an SMRP chapter and become an executive sponsor in that area of the country.

Century’s involvement has grown to where it serves as the proxy of Certified Maintenance & Reliability Professional exams at a local vocation school and is a CMRP sustaining sponsor. The company currently has one CMRP – Hawesville, Ky., employee Kayne Grace. Several others plan to take the test soon.

A tug on resources: Reliability improvement isn’t the only game in town. The plant is also performing a feasibility study to raise production by increasing amperage, a huge undertaking.

“That could drain resources and turn people’s attention,” says Carte. “Plus, there are other initiatives, there is always training ... something is always coming up.”

Bright spots, though, far surpass the gray. The corporation is high on Ravenswood.

“The company and its leaders see a future for this place,” says Carte. “They see Ravenswood as a part of their future. The capacity increase is an example of that. They want to do the right things while the aluminum market is good to make us viable for a long-term future. They are backing us and giving us the support to put us on the road to reliability excellence.”

The near future for Ravenswood includes an increased use of predictive maintenance technologies.

“We want to bring on oil analysis, vibration analysis, thermography,” says maintenance engineer Ed Austin, a 21-year plant vet. “That’s part of the master plan.”

And, it includes increased staffing. “Our next stage of commitment is to add planners, schedulers and reliability engineers to get the entire infrastructure around that system to support it,” says Chapman.

That’s welcome news to guys like Doeffinger. “We’re talking about increasing capacity and spending money,” he says. “From a maintenance standpoint, this is heaven.”

A NOBLE CAUSE

The past is the past, but on the road to reliability, it’s OK to take a glance in the rear-view mirror.

“We really love this plant,” says Pistelli. “Scott’s dad worked here. My dad worked here. This is what gave us our livelihood when we were kids, and it does to this day. That is what is kind of making this a noble cause. It’s about more than just the job.”

If you don’t know where you’ve been, you don’t know where you are going. Century Aluminum’s plant in West Virginia is going ... in the right direction. <<

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