

A Publication of Lakehead Constructors Inc.

SPRING 2012



Look to Lakehead

BP DOME PETROLEUM,
SUPERIOR, WISCONSIN
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"SMART" SAW PREVENTS
HAND INJURY
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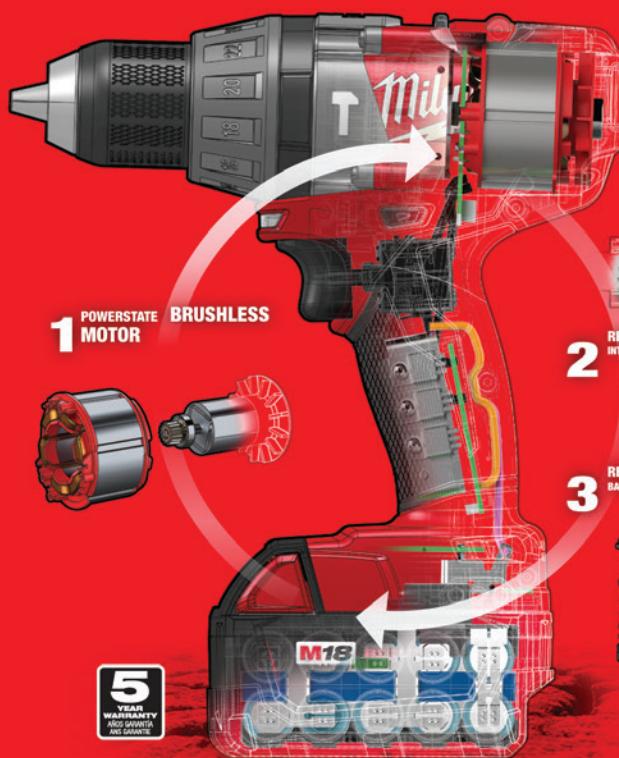
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Greetings, All,

I would like to welcome you all to our second annual issue of *Look to Lakehead*, and I hope you find the articles interesting and informative. I would like to thank the contribution of our valuable trade partners, suppliers and subcontractors; without them, this publication would not be possible.

For nearly a century, Lakehead Constructors, Inc. has been providing construction services to the upper Midwest. We continue to lead the way in safety, quality, innovation and service to our customers by continually investing in people, equipment and technology. In this very competitive business, the dedication of our quality employees and highly skilled tradespeople is necessary to achieve our goal of becoming the contractor of choice for our customers. Our good relations with owners and labor allow us to form alliances on significant projects to benefit all parties.

In this issue, you will also find several interesting articles, including a great article concerning the Sawstop safety technology implemented at Lakehead, which had an immediate positive result. Safety is a core value at Lakehead Constructors, Inc., and we care deeply about personal safety on the job and at

home. You will also find articles on our expanded refractory and equipment and heavy-lift departments.

It has been 20 months since our original ISO 9001-2008 certification was achieved in August 2010, and this was a major event, considering there are only a handful of construction companies in the country with this designation. I am pleased to report that we had an excellent audit and received an unconditional recertification in August 2011. I hope you find the article on our ISO status enlightening.

In closing, I would like again to thank our employees, suppliers, subcontractors, unions and associates, who make Lakehead Constructors the great company it is.

Best regards,



Brian Maki
President and CEO

Lakehead Constructors

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Mission Statement

The mission of Lakehead Constructors is to provide innovative, reliable and high-quality services to clients throughout the upper Midwest. We treat our clients honestly and provide services that represent an excellent value. We fulfill our mission by developing highly trained and loyal employees who work as a team to anticipate, identify and respond to clients' needs.

Vision Statement

Lakehead Constructors' vision is to be the contractor of choice for our clients. Our exceptional employees allow us to partner with clients to continually identify ways to improve existing services and to build on Lakehead's experience and quality innovation to adapt our expertise.

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Core Values

In support of LCI's objective of being the most admired contractor, we are building on a framework of strong corporate values.

Safe Production

- Record production with lack of injuries
- Good housekeeping and orderly work areas
- Well-maintained equipment, proper training and procedures
- Looking out for and correcting each other
- Safe conditions, safe behavior

Customer Focus

- Listening to the customer
- Being responsive and on time
- Meeting quality expectations
- Help the customer succeed

Creating Economic Value

- Doing the right things right the first time
- Elimination of waste and inefficiency
- Breakthroughs in productivity and technology

Bias for Action

- Getting things done
- Reduced red tape
- Barrierless
 - Call anybody you want
 - Management by fact
 - Plan the work – work the plan

Trust, Respect and Open Communication

- Open access to information
- Constructive conflict
- Delegation to the appropriate level
- Toleration of failure in pursuit of business success
- Encouraging the acceptance of different opinions
- Feeling an obligation to explain your actions to those they affect
- Gender and racial diversity

Group/Individual Accountability

- Behaving in line with our core values
- Being responsible for our actions
- Providing plans/standards/expectations
- Holding yourself and/or the group to a high standard of performance
- Walk the talk

Integrity

- Doing what you say you're going to do
- No hidden agendas
- Doing the right thing
- Being truthful
- Zero tolerance – not walking away from a situation
- Be credible

Teamwork

- Actively involve others in decision-making
- Know when to take a leadership role and when to be an active member
- Recognize the value of teamwork and the synergy it creates

Recognize and Reward Achievement

- Celebrating successes
- Stress training and development
- An effective appraisal of performance
- Giving a simple thank-you

Environmental Stewardship

- Going beyond compliance
- Being socially responsible
- Anticipating and addressing potential impacts before they occur
- Personal accountability
- Operating to conserve the environment for future generations

These core values are important to our future.

Everyone will be judged on his or her support of and commitment to them.



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On the Cover:

LCI erecting heavy steel and setting equipment at a northern Minnesota power plant, utilizing a Terex Peiner SK575 tower crane and a Manitowoc 999 crawler crane.

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Safety: Planning to Make a Difference

by Stephen Jones, Vice President of Safety and Field Resources

"One could say that you can plan to do the work and leave safety considerations out, but one cannot do the planning to work safely and not plan the work!" (Nelson, 2002, 69)

As part of the company's commitment to Zero-Injury, Lakehead Constructors, Inc. implemented safety planning as a mandatory practice for all projects. Effective safety planning involves reviewing areas of concern that are common to every project; assessing hazards specific to a project; identifying necessary skill sets, training needs and equipment needs; and ensuring regulatory requirements are adequately addressed.

To what degree do we plan for safety? To the extent necessary to identify and eliminate all risk of injury to employees, as well as damage to equipment or property and the environment.

Effective planning as a Zero-Injury process is comprised of a number of practices that occur at different phases and levels of the project, including: pre-project planning meetings, Job Hazard Analysis (JHA), daily safety meetings and formal pre-task planning. All of these processes require participation and involvement from project managers, safety personnel, field supervision, field employees, subcontractor personnel and other critical support personnel.

Thorough planning is necessary to maximize the value of the effort and provide the best opportunity for implementation and execution of safety across the project at every level. Effective planning not only increases the likelihood of safe performance but generally has the added benefit of improved communication and coordination, increased productivity and higher quality.

One of the most important and successful Zero-Injury planning processes that has had a positive impact on our safety performance has been the implementation of the pre-task safety-card process. The pre-task card is a field document completed prior to performing any major task. It's a planning tool that

helps supervisors plan their work through assessment of the specific hazards and safety requirements necessary for safe execution of each major task. The plan is reviewed with the entire crew assigned to the task, and all personnel sign off on the written plan. Supervisors are encouraged to involve their crews in assessing the task and completion of the plan. If there is a need to change or deviate from the plan, the requirement is to stop work; reassess the task; and create a new plan, addressing the change before going forward. Used consistently and effectively, this planning tool ensures safe task execution and is vital to achieving Zero-Injury performance. The company averages in excess of 2,000 completed cards each month.

Secondary benefits from this level of active safety planning are increased supervisor/crew involvement and ownership of the safety process. As the front-line personnel performing the work, foremen and crew members will have detailed knowledge of the work scope, and they can identify potential problems and use their experience and knowledge to determine the most effective way to eliminate risk associated with the tasks they perform. Involving everyone in the planning process increases awareness, efficiency and produc-

tivity. Having a plan prior to starting work not only creates heightened safety awareness, but, through better communication and coordination, elimination of nonproductive time chasing needed parts, tools and equipment is achieved. When the foreman and the crew are all on the same page, safety and workflow are improved. Doing things right the first time is always more productive, and safety and productivity are greater when fewer mistakes are made.

Safety planning at all levels promotes and contributes significantly to the company's efforts to create a Zero-Injury culture. Pre-project planning and pre-task card completion and quality are measured as leading indicators of program effectiveness and participation in the Zero-Injury process. This reinforces the expectation that execution of safe work practices, safe work performance and safety excellence are company initiatives, not just a departmental priority.

Plan Your Work; Work Your Plan.

If You Fail to Plan, You Plan to Fail

Reference

Nelson, Emmitt J. The Employer Safety Guidebook to Zero Employee Injury. Houston: Nelson Consulting Inc., 2002.



ISO 9001 – Quality Corner Update

by Shawn Rojeski, Manager, Corporate Quality

It's been almost 20 months since Lakehead was officially recognized as being ISO 9001 certified and almost 34 months since we started the ISO journey. Compared to our almost 100-year company history, this is a relatively short timeframe in our overall company story. During this timeframe, the ISO journey has changed the way we do many of our normal, everyday tasks. Many processes have been standardized, and some have been simplified. In other cases, the procedures are completely new. With the implementation of ISO, there is also the downside in which I have heard some say we just made more paperwork or that we do some things just to "make the auditor happy." I've been challenged to explain why we are doing them and what benefits LCI will get from them. These are some of the steppingstones we are now addressing on the next stage of our ISO journey.

As happens with many new company directives or initiatives, unless employees see an immediate benefit, they automatically assume it's just a new "fad" or "flavor of the month." What I mean by that is this new directive will be pushed hard and worked on for a short time, and then management will lose focus and it will fade off, only to be used as a marketing tool or on the company billboard for a short period of time. This has not been the case with our ISO certification. We have already seen some of the benefits of the program since its inception, but, more importantly, quality is considered a core value of our business here at Lakehead Constructors. This means top management will continue to work on it and support it. This is exactly what is happening with the ISO program.

Because quality is a core value at Lakehead, it helps us achieve the real benefits of what the program is designed for, mainly because we give it attention each and every day. We integrate the program into our daily business operations and try to make it a regular part of our daily routine for all of our employees. One way we have been successful is by keeping the way we do things simple and consistent and by continually improving what we do. This improvement applies to what we do not only internally but also externally by monitoring what our customers think of our work. Customer satisfaction is an important part of a successful construction project.



Internally, when processes and procedures become cumbersome, they create a roadblock to get work done on the construction sites. During the implementation stage of ISO, we started out by writing our processes and procedures the way we thought we were doing them. Shortly after we began to complete our internal audits of our quality system, many of the procedures we had written didn't exactly match what we were actually doing, and we needed to modify them. Some were modified; others we found were not needed, and we eliminated them. The language in the ISO standard is purposely nonprescriptive to allow for a great deal of flexibility when applying the requirements to a specific business. This is the main reason any business, regardless of its business type, can become ISO-certified.

Externally, we monitor customer satisfaction on every project we complete. We ask for feedback in 16 important aspects of the project, including items such as schedule, quality, productivity, safety, the project personnel and many others. When that information is returned to Lakehead, we review and analyze each customer satisfaction survey individually. Any response that doesn't meet the customer's expectations is immediately acted upon by the appropriate manager in the main office. We find out what the reason is we didn't meet the customer's expectations and take appropriate action so that it will not happen again. We continually work to be better and not make the same mistake next time on any project.

Staying focused on our core business values, including but not limited to our company's Zero-Injury philosophy and the ISO program, will not only make us better and more efficient but will also help us in reaching our goal to be the contractor of choice.



BP Dome Petroleum, Superior, Wisconsin

Lines 1 and 5 Piping Replacement

by Larry Wallin, Senior Project Manager

The BP Dome storage facility in Superior, Wisconsin, is a propane production and storage facility and has been in operation for more than 40 years. Propane is extracted from natural gas product liquids received in batches from the neighboring Enbridge Pipeline facility. The unused portion of the product is then reinjected back into the pipeline stream for a closed-loop production of the propane product.

The local BP Dome Superior facility takes contractor safety and employee well-being very seriously, which

is demonstrated by its 41-plus-year company history of having no serious lost-time accidents to either contract or full-time employees. Lakehead Constructors is equally proud of its record of zero incidents during the last three years of full-time maintenance and capital project work on-site. Lakehead has been involved with general maintenance activities for a period of almost 20 years on site and provided some of the original plant construction at its inception, including the original pipeline supply to the facility.

To further describe the operations of the facility, it is useful to understand its product. Propane is a natural-gas liquid (NGL), which is refined, produced and stored at the site. Propane is defined as a colorless, gaseous alkane. It is readily liquefied by compression and cooling. It melts at 308 degrees below zero, and the boiling point is 42.2 degrees below zero. Propane occurs in nature in natural gas and (in dissolved form) in crude oil; it is also a byproduct of petroleum refining. It is used chiefly as a fuel.

The site contains six approximately 82-foot-diameter spheres, which contain roughly 43,900 barrels of NGL product each. After refinement through the depropanizer unit, the final product is transferred to the smaller “bullet”-shaped vessels in the area of the truck load-out facility, which have a capacity of 67,000 gallons.

Distribution of the propane product from the truck load-out facility is by tanker-style trucks, which haul the product out of the facility for distribution by local suppliers. The volume of truck loads per day hauled from the facility varies and is mainly dependent on demand generated by weather conditions by customers who utilize the product for heating fuel. The area of distribution to suppliers can be as much as a 400-mile radius. BP operates a similar facility on a smaller scale in Rapid River, Michigan.

Planning for the BP lines 1 and 5 piping replacement began in November 2010 and continued through spring 2011. Site construction began in early June and was focused on inspection of existing piping both buried and above ground.

Buried piping was exposed for inspection through *non-mechanical* excavation, which was achieved by hydroexcavation with vacuum trucks for the duration of this inspection. Pipe coating repairs and pipe replacement were performed as required as this pipe was exposed. Environmental permitting was performed in conjunction with local and state authorities.

Lakehead Constructors, Inc. utilized as many as four HydroVac units at a time to perform the 4,000-plus-cubic-yard excavation.

Caissons for new pipe and equipment supports were also hydroexcavated to a depth of 12 feet prior to drilling to a final typical depth of 50 feet. Each location drilled for a support was supplied with a rebar cage prior to placement of concrete to final elevation.

Although engineering of the project is not yet complete, the estimated quantity of pipe scheduled for installation is approaching 2,000 feet.

Another project goal is to increase the operational capabilities of the facility with respect to the flow of product through pipelines by installing new valves for control and emergency shutdown. Due to the larger-diameter piping, the weight of some of the valve equipment approached 10,000 pounds. Valve skids, which are a localized concentration of control and manual valves, will approach 50 tons when assembled. Instrumentation and work for valve actuation are also being performed as required.

Similar to most significant construction projects, the division of work by trade and various production-specific aspects performed by BP and its representatives, require a great deal of coordination among these entities, not to mention the requirement of maintaining regular plant production with brief outages for tie-in activities related to the new equipment. All of the coordination requires a great deal of interpersonal activity between the owner,

Lakehead's diligence to quality control during field fabrication activities has resulted in an overall weld-defect count of zero to date. Radiography, visual and various other non-destructive testing procedures are used throughout the performance of the fabrication and monitored by subcontracted testing agencies to ensure full compliance with applicable codes.

the engineer, the material subcontractors and various construction trades and subcontractors involved in the project. The construction supervisors for Lakehead involved in the project strive to minimize coordination issues and conflicts with operations on a daily basis, as well as plan the work for identification of safety-related hazards and internal permitting requirements of the owner. Although easily stated, the previous mentioned coordination is a dynamic, continuously evolving condition that requires diligent attention to be effective in minimizing plant operations during construction and startup.

Quality control of construction activities, as well as document control of engineering construction documents, both electronic and paper, were handled under Lakehead's ISO 9001 Program. Lakehead's diligence to quality control during field fabrication activities has resulted in an overall weld-defect count of zero to date. Radiography, visual and various other non-destructive testing procedures are used throughout the performance of the fabrication and monitored by subcontracted testing agencies to ensure full compliance with applicable codes.

With an anticipated project completion of fall 2012, the need to continually focus on safety and the daily impacts on plant operations will be ever-present and will rely heavily on the influence of Lakehead's Zero-Injury program. Daily safety meetings, combined with daily plant activity meetings, highlight the areas of safety concern and the need to plan according to these concerns.

Although challenging, the construction work brings a sense of accomplishment with each completed phase of construction and brings the client that much closer to the modernization of its operations.

Notes from the Equipment Department

by John Lohse, Equipment Department Manager

It's the people and the ability to respond to our customers' emergencies that make an equipment department what it is. Yes, having the best and latest equipment helps, but it is people that make the difference. Let's look at the equipment department through Lakehead's four core values of safety, quality, service and innovation.



LCI is shown with two Grove rough-terrain cranes working at approximately 70 percent capacity, lifting a derailed locomotive back on track.

Safety is the number-one core value at Lakehead Constructors, and safety is every employee's job. Our goal and expectation is that no employee will be injured. In the equipment department, we take safety to the highest standard. Our positive attitude helps us stop, think first and then respond. We use many different tools to successfully accomplish the job. Some jobs require large pieces of equipment, and it is the operator who is responsible to make sure everyone is on the same page. Completing an Operator Task Card prior to any work being completed achieves that goal. We also make sure the latest safety devices are installed in our equipment, such as load moment indicators in the cranes. Our new cranes have GPS and backup cameras, and operational data is available online.

Our operators understand they are the captains of the equipment they run. They have the authority to shut down the equipment or the job if a safety item needs correction. The job will continue only when the appropriate correction has been made. We utilize work tools, such as lift studies. Our ISO work instructions spell this out in detail and are easily understood by all. During any use of a man-basket or when we are within 20 feet of a power line, we stop and study the work. A complete understanding of the job requirements and hazards is a necessity. After the job is understood, proper paperwork is completed, documenting all identified hazards and plans to mitigate or eliminate the hazard, again thinking safety first.

Quality is upkeep on all equipment, no matter its age. We certify all measurable equipment and record our findings. It is important when you need to torque a bolt to know for sure your torque wrench is reading properly or when you are using an engineering level, a laser or a total station that it is reading properly and documented. Quality is a main focus on the job, and it's our job to give our employees prop-



erly calibrated tools and equipment so they can achieve that standard.

Our cranes, personal lifts, forklifts, and trucks and trailers are all given daily inspections, including inspections at each service. In addition, we utilize an independent third-party inspector to provide annual inspections — again showing our commitment to quality.

Service is an area we understand completely, and we understand the importance of on-time delivery. We understand emergencies and how to play out our part when called. We answer our phones 24 hours a day, 365 days a year. When you need us at 2 a.m., we are there to service your needs. Shown in this photo is our response when called to a locomotive that derailed. We provided two cranes and top-notch people to deliver what the customer needed. We were on-site quickly and completed this job in short order. With properly trained personnel and state-of-the-art cranes, making this tandem lift on a very heavy railroad locomotive is made to look easy.

Innovation is demonstrated in the technology of our new 80-ton Grove

crane. When ordered, we chose to have Crane Star installed on it. This allows us to monitor how the crane is being used from the convenience of the home office. The basic technology for this and other telematics solution has been around for many years but is only now beginning to come of age in the crane or aerial-lift industries. It will revolutionize the way cranes are used, and Lakehead Constructors recognizes this, as we are first in using this technology. We are planning on adding two new cranes this year with this technology. The 80-ton is the crane on the left in the picture lifting the locomotive. Crane Star will also e-mail or instant-message if the crane needs immediate attention. It is set to send that communication so we can correct any problems that may have occurred before we have an accident.

How may we help you?

"Smart" Saw Prevents Hand Injury

by Ryan Nelson, Safety Director

It seems, despite all of the advances in technology, we are still left with many of the same time-tested solutions to safety challenges in the workplace. These include the basic fundamentals of planning, communication, education and providing the right equipment to perform the job. While a solution where all hazards could be "engineered" out of the environment would be best, we still find many hazards are managed with protective equipment and guarding.

With all of the technological advancements in other areas, such as smartphones, would it not seem that there could be a tool designed that addresses some of the contributing factors to traumatic injuries,

such as human error and incorrect tool use? Could there not be a true engineering solution, where a layer of protection beyond following the manufacturer's requirements for safe use and providing personal protective equipment or guarding exists as the last defense for injury prevention?

Recently, we have had the opportunity to evaluate the performance of just such a tool; we could call it a "smart" tool. The technology in this device removes the physical hazard prior to the traumatic injury occurring, and it has been designed into one of the most notoriously dangerous tools in the construction workplace: the table saw.



Deployed "brake pawl"

Table saws cause traumatic injuries both in the workplace and at home. There are approximately 60,000 medically treated incidents per year involving table saws, including about 3,000 finger amputations. Beyond the physical and emotional effects on the injured employee of an amputation, direct costs of a finger amputation can easily exceed \$100,000 in medical and wage-loss benefits.

A few months ago, an LCI carpenter was using a table saw to rip-cut a 30-inch pine two-by-four. This was a journeyman carpenter with more than 30 years of experience in the trade using a saw that had all required guarding and protective devices installed. The material jammed, and the employee's fingers were placed directly in the spinning saw blade. The incident fortunately involved only a minor laceration, as opposed to a much more significant injury; this is due to the technology that exists in table saws manufactured by a company called Sawstop. The saws are equipped with a safety system that detects when someone accidentally contacts the spinning saw blade.

In most cases, such an accident would result in a traumatic injury, which could include amputation of fingers or a portion of a hand. In an incident involving a Sawstop product, the blade instantly stops; injuries generally range from minor lacerations, similar to a paper cut, to an incident where the skin has not even been broken.

The following is a summary of the saws' technology and how it works (www.sawstop.com):

The table saw blade can carry a small electrical signal, which the safety system continually monitors. When skin contacts the blade, the signal changes because the human body is conductive. The human body has a relatively large inherent electrical capacitance and conductivity, which cause the signal to drop when a person contacts the blade. Wood has a relatively small inherent capacitance and conductivity and does not cause the signal to drop. The change to the signal activates the safety system. A heavy-duty aluminum brake stops the blade. The blade stops within milliseconds of detecting contact, quicker than a car airbag deploys. During this time three things happen:

- *An aluminum brake springs into the spinning blade, to stop the blade.*
- *The blade's angular momentum drives the blade beneath the table, removing the risk of subsequent contact.*
- *Power to the motor is shut off.*



In order to stop the saw, a fast-acting brake stops the blade when contact is detected. The brake includes a heavy-duty spring to push a block of aluminum, called a brake pawl, into the teeth of the blade to stop the blade from spinning. The spring is held in compression by a fuse wire until contact is detected. When contact is detected, the system sends a surge of electricity through the fuse wire to burn the wire and release the spring. The spring pushes the brake pawl into the teeth of the spinning blade, and the teeth cut into the aluminum and bind, thereby stopping the blade. All this happens in about 3–5 milliseconds, or 1/200th of a second. At the same time, the angular momentum of the blade causes the blade to retract below the table and the power to the motor is shut off.

Resetting the saw is easy. It takes about five minutes to replace the \$69 single-use brake cartridge and blade.

As a result of this incident, LCI removed all saws within the organization that did not have Sawstop technology. This included portable contractor saws as well as shop-cabinet saws. In addition, we have shared this story with others, including LCI customers, with the hope that people take the time to review the value added to safety efforts in an organization by the addition of this product.

Reference

www.sawstop.com, *The World's Leading Maker of Safe 10-inch Table Saws – Sawstop Web*. 16 Mar 2011.

Centralized Purchasing

by Cory Schmidt, Purchasing Manager

The success of any construction project is largely based on three main components: labor, equipment and material. With material costs accounting for what is sometimes 40 percent or more of the overall project costs, it would appear the materials aspect of the construction process is the logical place to start focusing our attention on how to improve the services we provide. In addition, the construction industry is facing increased and fierce competition. This, in turn, forces the competing companies to cut overall construction project costs — without impacting the safety, the quality, or the level of service to the end client. Senior management at Lakehead Constructors had a vision to address this issue, and it started with forming a centralized purchasing department/process.

In the first quarter of 2009, LCI transitioned personnel, created the purchasing department and had in place a full-time purchasing manager. One of

the first responsibilities of this position was to create a purchasing process for everyone to follow. The process was first put into a flowchart and, later, written procedures were created to support the newly created process. These procedures included such processes as jobsite purchasing, office/department purchasing, receiving inspection and the approved supplier process. In the past, project managers were accustomed to writing purchase orders for any construction materials their projects required. With the implementation of a purchasing manager, they now had another resource to request assistance from, which, in turn, gave them a direct benefit of being able to spend more hands-on time managing the construction project.

As with any new process, the centralized purchasing process was a challenge to implement. Not only was the purchasing manager responsible to write the new procedures, but all

affected personnel also had to be trained on the new process. In addition, the ISO 9001 system had additional requirements that needed to be met, such as: ensuring product meets specified purchase requirements, controlling our suppliers, controlling where we purchase the materials from and evaluating the suppliers.

With the implementation of the centralized purchasing process, Lakehead was able to realize a few advantages relatively quickly. Some of the advantages included:

- Implementation of a supplier registration program/pre-approval process
- Assured compliance with customers' contractual needs and project specifications
- Implementation of annual agreements for pre-negotiated pricing
- Development and maintenance of an approved supplier list
- Working with suppliers to anticipate our needs and locally stock highly utilized products



[illegible]

- Continually working to resolve project manager concerns or problems with suppliers
- Pre-arranging and setting up supplier agreements for jobsites which are "out of the area"
- Cross-referencing and utilizing subcontractors' capabilities across all projects companywide
- Continued pursuit and utilization of the best-performing suppliers, measured by service, quality and price
- Reviewing the performance of significant suppliers annually

One item in the list of advantages above that has saved significant time is that of the supplier registration and review process. Lakehead implemented an online, electronic form that any company can complete and submit to the purchasing manager. Due to the requirement of our suppliers being approved, any company that anticipates doing business with Lakehead

can fill out the required form ahead of time and submit it, and the system will automatically e-mail the forms to the purchasing department. This way, the approval process can be started early and potentially avoid any delays while getting approved. Although it is not a lengthy process, any minor delay that can be avoided is an end-result benefit to the construction project.

Another significant change that was implemented when we created the centralized purchasing department was that of the subcontract process. Previously, each of the project managers had the responsibility of creating and processing the required subcontracts for his or her job, with final approval from the CFO. Under our centralized purchasing system, the awards of all subcontracts are reviewed and authorized. Our centralized approach allows us to support the project managers' needs more effectively. Included in the subcontract support group are both

purchasing and accounting personnel. It is their responsibility to prepare documents, obtain lien releases and ensure that we have the proper certificate of insurance from the subcontractors. This not only creates uniformity and stability in the process, but it also produces a subcontract that is consistent each and every time, meets Lakehead's internal requirements, meets the client's requirements and allows the individual project managers to stay focused on managing the construction project.

With senior management's continued commitment and support of the above program, we have been able to show documented material savings in all aspects of the Lakehead purchasing process. The continued savings from material and subcontract purchases ultimately result in a lower bottom-line cost of the construction project to our valued clients.

Lakehead Constructors' Refractory Services

by David Koski, Project Manager

Lakehead Constructors has been servicing the refractory needs of iron-mining plants, powerhouses, lime plants and foundries for 34 years. In 1978, the new agglomerators on northern Minnesota's Iron Range needed local emergency services and periodic scheduled refractory maintenance services for the region's taconite processing facilities. Lakehead Constructors answered this need, forming a refractory services department within the company. Experienced refractory workers from the area bricklayers and laborers unions were tapped to bring their expertise to this challenge.

Refractory work in the plants grew over time. Initial refractory services included manual deslagging of the furnaces, demolishing replaceable worn or damaged refractory materials in the grate-kiln-cooler systems, prepping and then gunniting or casting and pouring back into place the new refractory materials. Soon, advances in demolition were developed, and the routine technique of jackhammering by hand was replaced with the use of remote-controlled robotic demolition machines in areas of dangerous overhead repair areas. Jackhammers attached to these tracked or wheeled articulated hydraulic arms vastly increased the safety of this heavy-material, dangerous physical removal operation! It is not uncommon to remove and replace half a million pounds of refractory material in a 14-day repair period.

Increased removal efficiency of the demolition machines, supplied by Brokk and Husqvarna, has reduced agglomerator plant down time for scheduled monthly minor deslags and repairs. Lakehead's refractory workforce knowledge and experience grew rapidly with each major pelletizer line outage repair we performed as the years went by. The growing refractory expertise embraced the new and improving refractory application methods as they were developed and has grown to the point of utilizing

the most advanced shotcreting methods of refractory application available.

Shotcreting decreased costly rebound materials and improved the wear ability of the applied refractories, replacing much of the process areas previously pump-casted, again increasing overall efficiency and shortening plant downtime for the repairs. Shotcreting expanded in ability to include shooting sand and cement mixes for repairs to thin patches over exposed concrete rebar areas and even in overhead applications. Stainless-steel anchors are shot in where necessary to bind the shot-patching materials to the original concrete in these specific applications.

Lakehead Refractory crews have perfected stack deslagging, flash-gunning surface coverings and repairs while working off Spider movable platforms. Bricking both standard and ported kilns, removing and installing precast refractory sections, and installing new precast refractories designed from their experience on these repairs in the plants are all done on a regular basis.

Lakehead Refractory equipment has grown to include three remote demolition pieces of equipment — a Brokk 250, a Brokk 180 and a Husqvarna 310 — all of which help meet the needs of our customers. Our experience has grown to include zinc and foundry furnace refractory removals and repairs, lime plant kiln refractory linings, powerhouse boiler lining repairs and replacements, and even cement foundation demolition and replacements. Gunniting equipment has advanced to include a new hydraulically driven, variable-speed gunnite pump to infinitely control the application pressure and the rate of refractory materials for optimally placed material quality. In addition, Lakehead developed and is currently using a unique system of dust control in the refractory process to eliminate silica dust exposure while applying the refractory materials.



Lakehead refractory crews complete training on the equipment at the jobsite, with the manufacturer field representatives present, to ensure optimal usage of the refractory equipment. This training, with the manufacturer present, will also ensure that the equipment is being used properly and safely, and this results in the best quality of work possible at each job. Lakehead refractory safety records are impeccable in this extremely heavy, physical type of work.

With Lakehead's new centralized equipment shop, warehouse and office located in Mountain Iron, Minnesota, 24-hour-a-day emergency refractory repair response time has decreased significantly. We are able to get equipment and repair crews started on the job quickly, with local employees living and working in surrounding communities available at a moment's notice to bring their 34 years of experience to these challenges.

In all aspects of the refractory repair, from assisting the plant in efficiently cooling down the work areas to a safe entry temperature for our employees and the equipment to efficiently perform refractory repairs, to cleaning up the job site at the end of the repair, any time of the day or week, Lakehead Constructors can handle all your refractory needs.

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