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Industry Health Check

Highlights of the 2006 NRMCA Industry Data Survey Analysis of 2005 Data

By Mike Forster, CPA, Vice President of Finance and Administration, NRMCA

Background

The Business Administration Committee of the National Ready Mixed Concrete Association annually administers the Industry Data Survey to measure performance as a health check for the ready mixed concrete industry. The survey is confidential and is administered by an independent certified public accounting firm. Individual company details are restricted to the company submitting the survey and the accounting firm. The compiled report provides significant amounts of sales and cost data, both regional and national, that producers may use to measure their performance against averages of other industry participants.

Trends

The 2006 survey includes results for 123 respondents, which is decreased from the 2005 participation level of 164 respondents, and also below the 2004 level of 155 survey responses. The average sales for the 123 companies responding with data for 2005 increased again this year to $74,038,503, after growing in 2004 to $50,522,832 and coming off doubling from 2002 to 2003 (the average sales reported for 2002 was $22,062,804 versus $44,215,463 for 2003). The trend continues to indicate that increasingly larger companies are impacting the survey results.

The average net sales price per cubic yard of concrete for a "Typical NRMCA Member" grew from $69.44/cyd in 2004 to $80.98/cyd in 2005, a net gain of $11.54/cyd. For 2005, "Industry Leaders" or the "Upper Quartile" that fell into the top 25% of overall performance had an average net sales price of $85.18/cyd, growing from $72.77/cyd in 2004, which was essentially flat with the 2003 price of $72.81/cyd.

The 2005 pre-tax profit raced up to $6.14/cyd, the highest since peaking in 1999 at $5.27/cyd. Historically after 1999, the industry average for the "Typical NRMCA Member" steadily declined through 2002, finishing at $1.58/cyd. The pre-tax profit decline was driven by rising costs in all categories, most notably material costs that increased more rapidly than the net sales price during the period. In 2003, the pre-tax profit rebounded to $2.30/cyd, and the climb continued in 2004 to $2.98/cyd and further inclined to the 2005 level of $6.14/cyd. The pre-tax profit growth for 2005 represents a 106% increase over the 2004 level.

The pre-tax profit for "Industry Leaders" also grew significantly, up 47% from 2004 to 2005 with the figure going from $6.55/cyd to $9.62/cyd. This pre-tax profit progress follows a recent trend when it fell from $4.63/cyd in 2002 to $4.44/cyd in 2003 (down $0.19/cyd).

For the first time, the 2006 survey (2005 data) results evaluated the "Bottom Quartile" to see how these respondents compare...
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Summary

The pre-tax profit climbed to $6.14/cyd in 2003, continuing to rebound and grow from $2.30/cyd in 2002 to $2.98/cyd in 2004. As in recent history, the survey data indicates that the “Typical NRMCA Member” benefited from economies of scale as the average size of the responding companies continues to grow. Larger scale provides advantages for price-volume purchasing of raw materials, opportunities to spread fixed costs more uniformly across company operations and the opportunity to increase management control over operations. The survey results and trends support elements of such occurrences.

The Industry Data Survey is a valuable performance measurement tool for benchmarking the ready mixed concrete industry. Although participation levels and company mix vary from year to year both nationally and regionally, the survey results are deemed statistically valid based on the sample size (almost 27% of estimated 2005 U.S. production of 456 million cubic yards) and grow more statistically valid as increased numbers of producers participate. The National Ready Mixed Concrete Association continues stressing the confidentiality of individual data submitted by participants and encouraging increased participation that is vital to gain the best measure of industry performance. Participants in the survey receive a full detailed copy of the results alongside an individual company profile that makes it easy to evaluate performance against compiled industry averages and also have the distinction of being able to highlight operational areas that might require attention to increase efficiency.

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and may be a bit less expensive about an hour east of Seattle, but residential projects still must adhere to some of the nation's strictest environmental regulations before blueprints lead to cars in the garage. For a development of 20 homes in the small city of Sultan, WA, construction plans proved the ideal time for a partnership of concrete supplier, contractor, developer and city and state officials to work toward a common goal: provide a superior construction project with minimal negative effect on the environment.

The end result, named Stratford Place, was the first plat in the state of Washington that utilized pervious concrete for all of its interior roadways, parking areas, sidewalks and driveways. The developer, CMI Homebuilders, Inc., worked with the City of Sultan in designing and gaining pervious concrete approval for use as the stormwater management system. For this city, as for the state, an “all pervious surface application” was a revolutionary approach to stormwater management and is believed to be the first plat in the state to handle all of its stormwater with pervious technology.

NRMCA has actively promoted the attributes of pervious concrete through its national network of field promoters and a dedicated website, http://www.perviouspavement.org/, aimed at providing information and resources to the construction industry on this important building material. As part of pervious concrete’s growing popularity throughout the United States, NRMCA also has created a pervious contractor certification program (http://nrmca.org certifications/pervious/) to help ensure the ready availability of contractors qualified to place the material.

In Sultan, pervious supplier Smokey Point Concrete of nearby Arlington, WA, worked closely with developer CMI Homebuilders and its president, Craig Morrison. An initial soils site survey was conducted and site-specific stormwater calculations were made to maximize the management of all stormwater. As more and more developers are realizing, the environmental reasons for using pervious concrete were clear. Pervious concrete:
- Eliminates untreated stormwater and creates zero runoff.
- Directly recharges groundwater.
- Mitigates ‘first flush’ pollution.
- Protects streams, watersheds and ecosystems.
- Mimics the drainage and filtration of bioswales and natural soils.
- Reduces surface temperatures and heat island effects.
- Provides a higher albedo surface reflectivity index (0.35 or higher).
- Eliminates need for expensive collection and detention systems.

But Smokey Point General Manager Scott Mickels and Morrison said that while pervious was a benefit to the environment, it was also a very impressive benefit to the bottom line of CMI Homebuilders, citing:
- It eliminated the stormwater catch basin structures within the plat.
- It eliminated the associated stormwater piping to detention areas and their subsequent cleaning.
- It eliminated the need for a detention vault and the many problematic issues such structures bring into a neighborhood.
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placed by Pervious Concrete, Inc. (PCI) located in Snohomish, WA. PCI is one of the leaders in the pervious concrete installation market in Washington state, having placed more than 32,000 square feet and 800 yards of pervious concrete to date. PCI’s total charge for the pervious concrete used at Stratford Place was just under $200,000.

“So CMI’s decision was a relatively easy one,” Morrison said. “Do I pay $460K or $200K to handle my stormwater? Clearly the best business decision was to utilize pervious concrete; the best environmental decision for CMI and the City of Sultan was to use pervious concrete.”

The Sustainable Development Task Force of Snohomish County provided additional details of Morrison’s decision to use pervious concrete.

“Morrison reports that the ‘chance of failure can be high if (the pervious pavement) is not laid correctly,’” stated the task force’s website. “Hot sun and breezes can be unforgiving.” Morrison said the traditional method to overcoming these obstacles in the field is to add water, but with pervious pavement, this strategy makes the pavement cream over, making it imperious. Here is where months of research and the right equipment led to success. CMI learned how to work the material in changing temperature and weather conditions using a different approach to traditional flatwork. Morrison said the pervious pavement comes out like “sticky pea gravel” and the trick is to use rakes to lay it in order to work with the short set time. Once CMI figured out the intricacies of working with the new material, they were able to increase their efficiencies from laying 20 trucks of material per day up to an estimated 35 trucks per day.

During the hard rains of November and December 2005, “no water left the site,” according to Morrison and Rick Cisar, Sultan city engineer who was so impressed with the Stratford Place demonstration project that he looked to try pervious pavement in a public street in town. The project was completed in May.

Mickels estimated Smokey Point has produced 400 more yards of pervious concrete after finishing the Stratford Place development, working primarily as the supplier to a new company started by Morrison dedicated to pervious placement.

“It took about 100 yards to get good at it and another 100 yards to get better,” said Mickels, recalling Smokey Point’s initial attempts to produce the proper mix.

• It saved the developer $260,000 over the traditional approach to stormwater management.

At Stratford Place, the cost of installing a traditional stormwater infrastructure of pipes, catch basins and a detention vault with lid for the plat’s 20 homes would have cost around $175,000 for all the materials and installation labor, Morrison said. The traditional 6” raised curbing and sidewalk cost was projected at $37,000 and the asphalt portion of road surfacing would have cost approximately $48,000. As a result of the decision to use pervious concrete, the developer was able to reclaim two lots of area where the needed storm detention vault and its associated perimeter structures would have been constructed. With the finished lot prices at $100,000 each in this area, the developer created an additional $200,000 savings.

Smokey Point’s 800-cubic-yard mix was

With the finished lot prices at $100,000 each in this area, the developer created an additional $200,000 savings.
Building with the Future in Mind

The Industry is Dedicated to Sustainable Practices

By Jim Ross

The cement and ready mixed concrete industry’s commitment to sustainable development is as strong as it has ever been. There is no doubting the importance of the global move toward sustainability, and no one is doing more than the companies in this sector to see it through.

The efforts are evident in the manufacturing process, where plants are conserving energy and decreasing emissions; in the end results, where sustainable products are used to produce homes, buildings and other structures; and in the overall corporate culture. Check the Web page of any major cement/ready mixed concrete company and you’ll find a “sustainable” section prominently featured. The companies compile special reports on sustainability and go to great efforts to communicate their values, goals and results. The industry as a whole has combined efforts through a number of initiatives.

“Sustainable development” is a popular phrase, but what does it really mean? Here’s a standard definition that has been cited in NRMCA presentations: Sustainable development is development that meets the needs of the present generation without compromising the needs of future generations. It encompasses all aspects of our impact on the earth: shelter, food, social welfare, health, ecology, etc. To be truly sustainable, one must leave the earth in equal or better condition for the next generation.

So, sustainability isn’t some slogan. It’s a complete way of doing business. It isn’t limited to scientific readings. Sustainability is also about people. This article will explain how industry in general has embraced sustainability and how some of the industry’s leading corporations are specifically dedicating themselves to this task.

Industry as a Whole

Cement is a critical part of ready mixed concrete, so any discussion of sustainability must begin there.

The Portland Cement Association (PCA) notes that domestic cement production accounts for less than 1.5% of U.S. carbon dioxide emissions. Still, the cement industry is one of the biggest energy users among manufacturers, spending more than $1.2 bil-
lion per year. There is a national push to reduce energy use – and to reduce emissions – so industry is always looking for better, more environmentally friendly methods to use in manufacturing. And it’s willing to set tough goals for itself.

In early 2003, the cement industry committed to reducing carbon dioxide emissions by 10% (from a 1990 baseline) per ton of cementitious product produced by 2020, according to the PCA. The industry also aimed to reduce by 60% (also from a 1990 baseline) the amount of cement kiln dust (CKD) disposed per ton of clinker produced by 2020.

Discussions are underway for a third target: focusing on plant-level implementation of environmental management systems, the PCA says.

In June 2004, the Cement Manufacturing Sustainability (CMS) Program was created. It’s a joint effort of the PCA, its member companies and federal agencies. The program includes a voluntary code. Manufacturers that adhere to the code agree to continue current environmentally sound practices and improve in seven areas. (Again, this list comes courtesy of the PCA.)

- Place the highest value on the safety and health of employees, neighbors and customers when producing and distributing cement.
- Implement effective controls that reduce or eliminate the release of pollutants to the air, land and water.
- Seek ways to manage wastes in a responsible and environmentally sound manner.
- Pursue improvements in energy efficiency and promote resource conservation.
- Seek ways to safely use recyclable wastes as raw materials, fuels and product components.
- Conduct mining operations in a responsible and environmentally sound manner.
- Participate with lawmakers, regulators and others to develop rational and effective environmental laws and regulations.

The program isn’t just a side issue for the cement industry. It is part of a multi-faceted response to the pressing problem of greenhouse gas emissions. President Bush wants to reduce those emissions by 18% by 2012.

Also helping to meet that goal is the Climate VISION program, a public-private partnership whose officials work with industry to find ways to improve production and develop/adopt environmentally sound tools. Cement is one of 12 participating industrial sectors, the PCA says.

According to the PCA, the industry has a three-part strategy to help with the VISION goals:

- Energy efficiency: Since the 1970s, energy consumption has gone down 33%, but U.S. plants continue to upgrade and improve.
- Product improvements: Such as including up to 5% of crushed limestone, as well as industrial byproducts like fly ash, to help reduce carbon dioxide emissions during manufacturing.
- Develop new applications.

The industry also participates in ENERGY STAR, a government program that offers businesses and consumers energy-efficient solutions. The goal: to help consumers save money and to help protect the environment.


There are also other groups, such as the World Business Council for Sustainable Development (WBCSD), a coalition of 175 international companies. Working with that coalition is the Cement Sustainability Initiative, a collection of 10 major cement companies that started in 1999.

Many of the industry’s leaders are involved in the above-listed programs, as well as other programs. Holcim has gone one step beyond and created a foundation to further recognize sustainable construction.

Now let’s take a look at what some individual companies are doing. The information comes from interviews, sustainability reports and company documents. Space is limited, so these accounts will feature only a fraction of what the companies are achieving and what goals they are setting. They all have won a variety of awards for their sustainability efforts.

**Buzzi Unicem**

When it talks about sustainability, the first thing Buzzi mentions is the “importance of the individual.” This means honoring employees, fairly treating shareholders, paying attention to customers’ needs and building long-lasting relationships with suppliers.

The second key value of sustainability is respect for the environment, expressed by the adoption of environmentally friendly business practices. The company wants to act ethically and create wealth and opportunities without hurting the environment.

So, how is Buzzi achieving its goals? Here’s one example: The company has started a modern cement production line in Cerritos, Mexico, combining the minimum specific energy consumption with the use of the most advanced environmental technology. In Selma, Mo., the current two production lines will be replaced by the end of summer 2008 with a five-stage precalciner, with high energy and environmental performances.
When the new San Francisco-Oakland Bay Bridge opens in 2012, it will have to do more than merely support traffic. To comply with a new state program, it also has to resist earthquake damage.

That’s why the people of CEMEX invested several years in research, developing unique mix designs for the project. These included a special lightweight, self-consolidating concrete mix, engineered to deliver added strength, elasticity and durability in saltwater. It was the only way the project’s 150-year lifespan could be achieved. And, after all, building stronger bridges is not just a good idea. In seismically active California, it’s the law.

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The company has 74 quarries in its cement sector. There are plans in place to return more than 80% of them to their local communities by using modern landscape engineering techniques.

Buzzi is committed to decreasing the amount of raw materials extracted from quarries. For many years the company has been using alternative materials coming from other production and consumption processes, such as mill scales, incinerator slag, stone rubble, foundry sand, water purification sand, blast furnace slags and ashes coming from thermo-electric power plants.

Reducing the amount of fossil fuels also is a priority. In 2005, the substitution level of fossil fuels improved, with maximum recovery percentages of 36% at Buzzi’s operation in Cape Girardeau, Mo. Buzzi’s goal for 2007-2008: Increase the average caloric replacement percentage from 12% to 20%. This will help control energy costs and reduce greenhouse gas emissions.

During 2005, the company got new baghouses for the controlling of dust in the kiln and raw mill of the cement plants in Italy, the United States and the Ukraine. In Europe, nine clinker burning lines were fitted with SNCR (Selective Non Catalytic Reduction) systems to control nitrogen oxide emissions and at the end of 2005, represent 100% of production in Germany.

California Portland Cement Company

Sustainability is a core value of the company. The CEO is behind it 100%. The senior vice president of operations and the vice president of engineering participate in all corporate energy meetings.

With that kind of leadership from the top, it’s no wonder California Portland is recognized as a leader in this area (see related item about the federal award it recently won) and a partner in the ENERGY STAR program referenced above.

The company’s efforts really got started in 2003, when it assigned an energy manager and started forming an energy management team, says Steve Coppinger, P.E., the company’s chief electrical engineer, who helped get the effort going.

Serving on the team were representatives from engineering, operations, maintenance, accounting, executive management and procurement. With ENERGY STAR’s help, California Portland developed a plan that featured goals, methods and targets. It focused on improvements to the compressed air system; electrical and lighting systems; mechanical systems and drives; and plant operations, engineering and maintenance. Employee awareness and education also were emphasized.

“Saving money was the motivating factor for the plan, and the team realized that even a 5 percent improvement could result in millions of dollars in energy savings each year,” Coppinger wrote in a recent article about the experience. “However, they also saw that this effort could save significant amounts of process emissions.”

The company was right on both counts. Cost savings stand at $3 million since 2004 and are still growing. And emissions have been reduced, as well, although exact statistics are not available.

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The corporate energy team meets every two months, rotating to different facilities throughout the company that stretch from Alaska to the northern border of Mexico. Changing venue allows local participation. Beyond the team, each major California Portland facility or division has its own local team.

But those aren’t the only teams. There also is a process energy team comprised of process engineers. It conducts periodic energy assessments on specific plant areas. It also brings in consultants and uses resources such as those available through DOE’s Industrial Technologies Program (ITP) to conduct energy audits, Coppinger wrote.

To compare its performance against that of comparable plants in the industry, California Portland uses software analysis tools such as ENERGY STAR’s Energy Performance Indicator (EPI) benchmarking software, ITP’s MotorMaster+ and Process Heating Assessment and Survey Tool (PHAST) from ITP’s suite of BestPractices tools, according to Coppinger.

All this work takes time and money. But there are payoffs in both the long term and the short term. California Portland believes its manufacturing costs will be reduced and that its products (as good as ever; these sustainability efforts haven’t diminished quality one bit) will be more attractive to companies building sustainable projects.

But more than anything, Coppinger said, California Portland is making this commitment because it’s the right thing to do.

Cemex

Cemex prides itself on respecting and caring for the environment. It seeks to preserve and improve the ecologies in which it operates and devotes considerable resources to environmental quality efforts. It has teamed with a number of environmental groups such as Conservation International, Keep America Beautiful affiliates, Adopt-A-Highway and the Wildlife Habitat Council.

The company’s ready mixed concrete environmental goals are as follows:

- Conserve water
- Reduce emissions
- Reduce solid waste and water
- Increase solid waste and water recycling

The company is proud of its record, especially in Texas. Cemex and the Houston ready mixed plants are voluntarily participating in the state’s Emission Reduction Program (TERP) and related Harris County program. Cemex has replaced 76 old mixer trucks in Texas with new and cleaner emissions trucks. More replacements are planned.

“The Houston operations have essentially eliminated the generation of solid waste materials through several practices,” Cemex’s environmental team reports in a memo summarizing its achievements. “These include returning concrete into new concrete loads; using admixtures for leftover concrete in mixer drums; returning concrete to cast concrete blocks to use at the plant for landscaping and separating operation areas; and returning concrete to a recycling company in order to be used as construction materials such as road base.”

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specific CO2 emissions by 20% by 2010,” according to Rolf Soiron, chairman of the board of directors, and Markus Akermann, chief executive officer. (In this calculation, 1990 is the base year.) “By the end of 2005, specific net CO2 emissions per ton of cement had been reduced by 14.7%. Lowering the clinker factor significantly contributed to this result.”

The company leaders also report that as Holcim expands, it continues to upgrade plant equipment and thus decrease atmospheric emissions. It intends to reduce NOx, SO2 and dust by 20% by 2010 (compared to 2004 levels).

It’s important to note that Holcim’s contribution extends beyond its individual performance and its membership in the larger groups. The Holcim Foundation for Sustainable Construction is a group that is recognized worldwide for its efforts. (The foundation is supported by Holcim Ltd. but is independent of its commercial interests.)

In spring 2006, the winners of the first

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Holcim

The Dow Jones Sustainability Index was created in 1999. It was the first global index to measure the financial performance of leading sustainability-driven companies. Needless to say, it is a very closely watched barometer and a very good indicator of which companies are shining stars of sustainability.

In September 2006, for the second straight year, Index leaders named Holcim “Leader of the Industry.” This award is excellent proof of how seriously Holcim takes its duty to be a sustainable company. But it’s only the beginning. The company’s sustainability priorities are as follows:

- Occupational health and safety
- Climate and energy
- Community involvement
- Stakeholder relations
- Sustainable construction

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Holcim Awards were named. There were more than 3,000 submissions from 118 countries. In all, 46 projects shared in prize money. The competition encourages sustainable responses to key issues related to building and construction.

Italcementi Group (ESSROC)
A dedicated Sustainable Development Steering Committee (chaired by the chief operating officer) was formed in 2002. Its projects include the minimization of CO2 emissions; the installation of control techniques and solutions for emissions reduction at kiln stacks (SOx, NOx and dust); sustainability reporting; internal training; sharing and promotion of best practices for the use of alternative materials and fuels; analysis of subcontracting policies and practices; and industrial hygiene and personnel health.

Some achievements: In 2005, six more cement plants were certified under ISO 14001, bringing the company total to 34. More than 75% of the company’s full-cycle plants should be ISO 14001 certified by the end of 2006. In North America, a certification program has also been initiated for seven cement plants.

Italcementi has committed to a voluntary target for the reduction of its emission factor per ton of cementitious products of 711 kg CO2 by 2008-2012. Other efforts to reduce CO2 include increasing energy efficiency through plant modernization; using thermal recovery from kiln and cooler exhaust gases to dry raw materials and admixtures and to generate electricity (co-generation); use of biomass as alternative fuel; use of alternative CO2-free raw materials; and reducing the clinker to cement ratio in the final product.

By the end of 2007, the company aims to have 80% of its kilns equipped with continuous emission monitoring (CEM) systems for measuring SO2, NOX and dust emissions at kiln stacks.

Perhaps the most important contribution is TX Active®, a photocatalytic principle for cement products that can reduce organic and inorganic pollutants in the air. “Paint, plaster, mortar or prefab materials containing this principle enable a significant reduction in polluting substances thanks to their photocatalytic, ‘self cleaning’ and ‘antipolluting’ properties,” Italcementi reports.

Lafarge
In Lafarge’s 2005 Sustainability Report, Oliver Luneau, senior vice president of sustainable development and public affairs, said, “Nothing can ever be taken for granted: Society’s needs are constantly evolving, and communities’ expectations are changing. We need to be able to listen, to state our ambitions and to be credible in our results.” Those sentiments certainly are echoed throughout the industry. In conjunction with WWF International, Lafarge in 2001 identified the key environmental areas in which the company needed to monitor its performance and set objectives. Then, in 2002, the Cement Sustainability Initiative published its action plan presenting the environmental objectives targeted by its members. Lafarge incorporated those objectives into its roadmap for the cement business.

Some of the company’s goals, as stated in the report:
We perfected liquid pigment and color dispensing systems, so you can rely on instant, accurate, uniform color for any size concrete coloring job.

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Photographed at the Wynn Las Vegas Resort and Country Club.
• More effectively embed sustainable development in the group’s strategy by cutting its worldwide net emissions by 20% per ton of cement and making sure at least 80% of quarries have rehabilitation plans. Some strategies to reduce emissions: replace carbonated raw materials with already decarbonated materials; replace fuels (use of alternative fuels, notably biomass); improve energy efficiency by modernizing plants and processes; use clinker additives (slag, fly ash, limestone, pozzolans, etc.).
• Increase the emphasis on sustainable development and relations with stakeholders by incorporating them into managers’ training cycles and ensuring consistency with the group’s internal goals.
• Develop a greater emphasis on listening and transparency with stakeholders.

Lafarge has met many of its goals and is working hard to achieve the rest. Some successes:
• 12.75% decrease in net CO2 emissions per ton of cement since 1990.
• 10% recycled raw materials used in cement business.

Lehigh Cement

Lehigh’s parent company, HeidelbergCement, which has activities in more than 50 countries, has identified three pillars of sustainable development: economy, ecology and social responsibility. And so far, the company is pleased with its performance all the way around.

Profitability was up in 2005. The company used more alternative raw materials and fuels, thus reducing consumption of natural resources. And it moved closer to its goal of reducing its specific net CO2 emissions by 15% – compared with 1990 – by 2010.

To reduce carbon dioxide emissions, the company is continuously modernizing its production facilities to maximize efficiency in cement production; replacing (whenever possible) clinker in cement with other materials, thus allowing a reduction in the energy-intensive production of the intermediate product clinker; and replacing fossil fuels (such as coal or oil) with alternative fuels.

The company tries to replace clinker with cementitious additives such as blast-furnace slag and fly ash. The goal is to reduce the percentage of clinker in cement across the group to 80% by 2010. It already has achieved a clinker content of 83% in 2004.

As for alternative fuels (tires, waste oil, plastic, biomass, etc.): These represented 13.2% of the total energy consumption across the group in 2003 and increased to 13.9% in 2004.

The end result: In 2004, specific gross CO2 emissions registered at 723 kg per ton of cement. Despite higher clinker production in Eastern Europe, Asia and North America, absolute gross emissions (at 39.6 million tons) were only slightly above the previous year’s level. Compared with the 1990 base year, the company already has achieved a reduction of 73 kg CO2 per ton of cement.

North America Lehigh has established six general goals:
• Education: Both internally and externally, building awareness of the role of cement and concrete in sustainable development.
• Science: Developing a more comprehensive understanding of the economics and science of sustainability.
• Associations: Identifying and influencing industry associations and alliances that will affect the sustainability of cement and concrete.
• Government Affairs: Partnering with regulatory and political entities that affect the use of cement and concrete in regard to sustainable development.
• Manufacturing/Operations: Producing products consistent with its sustainable initiatives.
• Marketing/Promotion: Promoting cement, concrete and aggregates as sustainable building materials.

Lehigh believes the industry must work toward fair representation of its products in rating systems such as LEED, and the company’s leadership is working with industry (i.e. PCA) to develop tools to promote sustainable building design, and to support an industry marketing approach whereby it is selling cement through promoting concrete.

“The Heidelberg Cement Group leadership principles provide a foundation for Lehigh’s Sustainable Development Committee to respond to the opportunities and challenges that the focus on sustainable development brings to our business,” said Jim Purcell, vice president/materials for Lehigh’s Pacific Region and executive sponsor of Lehigh’s North American Sustainable Development Committee. “The goals we have set in North America provide a framework for action within our regions and individual business units, both operationally and in serving the market.”

As you can see, the industry as a whole – and these corporate leaders in particular – have embraced sustainability as a way of doing business. Everyone is working hard to set and meet goals and improve as much as possible in this important area.

This article highlights only some of the industry’s achievements and is not meant to exclude any other company’s commitment to sustainable development.

Award Winners

In mid-September, 17 U.S. manufacturing plants won awards from the federal EPA’s “ENERGY STAR” program for their success in cutting pollution, reducing energy consumption and slashing costs.

The plants represent 6% of cement production capacity, 7% of wet corn milling capacity and 23% of auto assembly capacity, according to a government news release.

The cement winners:
• The Ash Grove Cement Company plants in Chanute, Kan. and Seattle.
• The California Portland Cement Company plants in Colton, Calif. and Mojave, Calif. (Note: The EPA also named California Portland its ENERGY STAR Partner of the Year for 2005 and 2006.)
• The Lafarge North America plants in Calera, Ala. and Sugar Creek, Mo.

EPA Plans

In mid-August, the EPA working with industry announced plant energy performance indicators for cement manufacturers. These performance indicators benchmark an entire plant’s energy use and allow companies to determine how efficiently each plant is using energy compared to the industry as a whole.

Check it out on the Web:
http://www.energystar.gov/index.cfm?c=in_focus.bus_cement_manuf_focus
Ever so gently guide a multi-ton behemoth mixer truck through a veritable minefield of an obstacle course with the barest minimum of mistakes? Check. Take a rigorous multiple choice exam filled with detailed technical questions? No problem. How about walking around a mixer truck specifically prepared with dozens of safety violations and being told to note them all in 5 minutes? Got it. Oh, just one more thing – you have to have a higher score than 28 other guys who are all ranked as top mixer truck drivers.

For Mike Hennekam of Rinker Materials, Cocoa, FL, being crowned the winner of NRMCA’s inaugural National Mixer Driver Championship in October in Orlando was either the culmination of a sterling career behind the wheel or just another ho-hum victory. He is no stranger to these events, having been a finalist four times in the Rinker state rodeo and a finalist for two years in the annual Florida Concrete & Products Association (FCPA) competition. But this event – held as part of NRMCA’s Fall Conference and Expo – pitted Hennekam against those 28 other drivers with much the same driving resumes as his.

While Hennekam earned the top prize of $2,500, he did so by the barest of margins, according to the panel of judges who represented more than a century of industry experience.
ence. Second place went to Kenneth Blair, Concrete Company of Springfield (CONCO), Springfield, MO, who earned $1,000, and the $500 third-place prize was received by Tony Jackson of Maschmeyer Concrete Company of Lake Park, FL. Each driver and the remaining 26 participants were praised by NRMCA leadership at a dinner and reception held at the Fall Conference host hotel, the Buena Vista Palace.

“They are the heart and soul of our companies,” said John Carew, chairman of NRMCA’s Operations, Environmental and Safety Committee, during remarks made soon after some 400-plus people in attendance gave the drivers a standing ovation when they were called to the podium.

“They are the face of our companies, the people who represent our industry,” added Peter Brewin, chairman of NRMCA’s Board of Directors. “You take the blame for all sorts of mistakes. You are the best of the best and I’m so proud to be standing in front of you and talking about what you do for a living.”

Brewin, Carew, other board members, Fall Conference attendees and exhibitors praised the event, which was planned a year ago by an association team headed by Carew and Senior Director of Operations & Compliance Gary Mullings. All the logistical challenges were surmounted, culminating in the pre-dawn hours of a cool Central Florida Sunday where Mullings and a small army of NRMCA member volunteers made sure the hotel parking lot was marked properly for the 7-stage challenge course; 10 trucks were ready and another properly prepared for the walk-around visual inspection. Meanwhile, NRMCA Senior Director of Education and Training Eileen Dickson and a handful of her association colleagues were making final checks on the exam, which each driver took the following day.

Soon after sunrise, a local disc jockey played some vintage ’70s and ’80s songs to further pump up the crowd, which filled the two sets of bleachers that flanked the parking lot. Drivers had to begin with perhaps the most challenging part of the course setup, driving straight forward through a series of 10 tennis balls without knocking them from their rubber pedestals. Drivers had to then drive straight in reverse through those tennis balls, again trying to negotiate a barely 2-inch opening between the tires and the two rows of tennis balls.

The left turn component of the course measured the drivers’ ability to judge the clearance around the tires while turning. The right front tire had to be placed as close to the

Winning Michael Hennekam of Rinker Materials lifts the champion’s trophy.

In the first and toughest challenge, a driver goes through a series of tennis balls.

The best 29 mixer drivers in the land.

Judges jump into action at the front stop challenge.

Judge Taylor & Judge Deboer check the measurement on the backing challenge.
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Drivers had to judge the location of their right rear tandem wheels while simulating backing to a weigh scale. Driving in reverse, drivers were told to place their right rear tires inside a marked box that represented a weigh scale. The tire tread could not touch any part of the line that forms the box.

When judges finished tabulating each driver’s score on the challenge course, mixer truck inspection and exam, Hennekam emerged as the winner, with Blair and Jackson very close behind.

Hennekam began his career with Rinker in 2003 after having driven some 1.5 million miles as a tractor trailer driver. Blair has 22 years’ experience driving a mixer truck for CONCO and was a finalist of his company’s driver rodeo. Jackson has five years of service with Maschmeyer and has been a mixer truck driver for seven years. Like Hennekam and Blair, he has competed in driver competitions, in his case in the FC&PA statewide event for the past three years.

The enthusiastic response about the event has prompted calls for NRMCA to hold it each year, in conjunction with the annual Fall Forum & Expo.

For information on how your company can participate in the 2007 Driver Championships, please contact Gary Mullins at 240/485-1161.
As Barbara Wolcott stated in her article, “Sustainable Building: Future Friendly Pays Back,” (Permanent Buildings & Foundations Magazine, August 1998), sustainable construction is “simply making educated choices to provide for the present, without compromising future generations’ resources.” In this age of environmental awareness, coupled with astronomical growth, we have become more sensitive to the concepts of sustainable building. Stemming from the “green movement” within the construction industry, sustainable building is a means of providing for the necessities of residential and commercial development, while limiting that development’s negative impact on the environment to a minimum.

Concrete is a versatile product that has existed in various forms for centuries. In fact, its durability alone makes concrete a natural choice for sustainable construction. However, only recently has concrete become known for its significant role in protecting and enhancing our environment. Choosing concrete as a construction material actually helps protect our natural resources and offers consumers benefits that are not available from other building materials.

Cement, Concrete and the Environment

Many people use the terms cement and concrete interchangeably. More accurately, cement is only one of the ingredients used in the production of concrete. Portland cement is the fine powder that when mixed with water binds the sand and coarse aggregate into the material we call concrete. In layman’s terms, cement is to concrete as flour is to a cake. In a normal concrete mix, cement constitutes about 10-15% of the total weight.

Portland cement is one of the most widely used materials in the world today. In the United States alone, more than 120 million metric tons of Portland cement is used annually. Of that, approximately 75% is used in the manufacture of ready mixed concrete. Of all the ingredients used in concrete, cement is the only one that has any energy intensive consequence. The other materials – sand, stone or gravel and water – have very low energy requirements. Additionally, these other materials are readily available almost anywhere. Because they are locally produced, fuel requirements for handling and transportation are minimal.

That being said, it should be noted that the cement industry has taken several steps over the last few years that make their environmental record worthy of promotion. Since 1975, the U.S. cement industry has both increased its energy efficiency and reduced its greenhouse emissions by 33%. Of the four construction material manufacture processes (petroleum refining, steel production, wood production and Portland cement production), cement makes the lowest demand on U.S. energy consumption, accounting for only 0.3%. Additionally, the industry recycles 75% of its cement kiln dust and in 2001 alone recycled 53 million scrap tires, used as fuel in the cement kilns. Together, this makes concrete a very energy efficient building material.

The Environmental Benefits of Concrete

By Philip Kresge, NRMCA National Resource Director
Let’s take a look at some of today’s concrete applications and the role they play in sustainable development.

Recycled & Reclaimed By-Products in Concrete

For years, fly ash has been used in concrete mixes, providing a high quality product in an economical fashion. Fly ash is a by-product of coal-fired generators used to produce our electricity. In recent years, ground granulated blast-furnace slag (GGBFS), itself a by-product of the steel industry, has been used in concrete mixes as well. These supplementary cementitious materials (SCMs) exhibit cementitious properties when in the presence of Portland cement and water. The result is a high-strength, low-permeable concrete mix that will provide long lasting structures and pavements.

Use of SCMs typically reduces the amount of Portland cement required in concrete by anywhere from 10-30%. However, recently mixes have been designed utilizing much higher replacement values (up to 50% replacement in some cases). By incorporating higher percentages of these recycled materials, concrete not only becomes a more favorable material for sustainable construction, it also helps to extend the lives of our landfills.

While we often think of our natural resources as being endless, we must remember that they are anything but. In some areas, quality aggregates for concrete are already at a premium. The main focus of sustainable development is preservation of our resources for future generations. With that in mind, does it make sense to waste quality aggregates on generic fill material? Flowable fill utilizes more recycled and/or by-product material than new in its manufacture. Waste sands, foundry sands, crushed glass and fly ash, as well as other non-spec materials, can all be used in flowable fill, sometimes in fairly large quantities. This allows the producer to save the quality materials for manufacture of concrete and reduces the need for additional aggregates. Use of recycled and reclaimed materials in flowable fill also reduces the amount of material that would normally end up in the waste stream.

Insulated Concrete Forms

Insulated Concrete Form (ICF) systems have numerous benefits to the design and construction communities. Ease of construction, reduced man hours per project and considerable acceleration of the total construction timeline are just a few. Perhaps one of the biggest benefits is the energy savings realized with ICF construction. When combined with the thermal mass of concrete, an ICF wall can easily achieve insulation factors of R-30 and higher. An average reduction of 30-40% in annual heating and cooling costs is commonplace with ICF construction.

But the environmental benefits go beyond here. Utilizing ICF systems for above-grade construction can save as many as 13 trees per house, based on an average 2,000-square-foot home. Additionally, because of their minimal weight, transportation costs of ICF components are considerably less than conventional construction materials, resulting in lower consumption of fossil fuels and therefore less environmental impact. ICF systems have been identified as “Energy Star” products by the Environmental Protection Agency (EPA), qualifying ICF construction for special mortgage considerations.

Durability is certainly a key to sustainability in regard to construction. The solid construction of an ICF structure is synonymous with durability, providing security against the elements. In tests performed at the University of Texas, ICF construction was one of only three wall types that could withstand the impact of debris from a hurricane or tornado. (Not surprisingly, the other two – cast-in-place concrete and core-filled concrete masonry units – both utilized ready mixed concrete.)

Concrete and Cool Communities

As urban growth continues, densely developed areas or “heat islands” become more common. These heat islands are areas of concentrated development where due to dark roofs, loss of vegetation and dark pavements, ambient air temperature can increase by 7 to 10 degrees Fahrenheit over those of suburban and rural areas. The typical reaction is to “crank up the air conditioning.” However, this only leads to an increase in energy consumption and related emissions. Studies indicate that smog increases approximately 3% for every degree of temperature.

The Urban Heat Islands Pilot Project, Many people use the terms cement and concrete interchangeably. More accurately, cement is only one of the ingredients used in the production of concrete.
Advantages of using OMYA Calcium Carbonate in concrete

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- Better workability
- Improved finishes
- Reduced excessive bleeding due to improved particle packing
- Reduced segregation
- Improved fire resistance compared to fly ash concrete
- Lower pump energy
- Reduced abrasion
- Significant reduction (up to 90%) in efflorescence due to less capillary effect

Applications for OMYA fillers

- Ready-Mix
- Precast
- Shotcrete
- Self-Compacting Concrete
- Bricks
- Blocks
- Pipe
Concrete in focus

is a “cradle-to-grave” assessment of a product. More recently, a “cradle-to-cradle” approach has been desired, counting on the re-use/recycling of materials after demolition.

Concrete stacks up well in any comparison. Concrete uses fewer raw materials for manufacture than other pavement materials. With its rigidity and durability, concrete pavement has a much longer service life than flexible pavements. And at the end of its service life, concrete is 100% recyclable. The crushed concrete can be re-used as aggregate for new concrete or utilized as base material.

Concrete is a durable material that actually gains strength over time and conserves resources by reducing maintenance and the need for reconstruction. These are just some of the reasons that concrete should be the building material of choice for structures and pavements as we make sustainable development the accepted practice of the construction industry.

Pervious Concrete

Speaking of stormwater management, with our increased development, the percentage of pervious land space has decreased significantly. The stormwater runoff across these impervious areas has had a negative impact on the quality of our aquifer. A 1995 EPA study found that “urban runoff contributes to damage in more than 26,000 river and stream miles, and pollutes more than one million impaired lake acres.” As a result of the study, the EPA has directed states to assess their waters for runoff damages and to create watershed-based programs to repair existing damages and prevent further erosion and pollution.

Once again, the ready mixed concrete industry has the answer. Pervious concrete pavement can play a key role in any stormwater BMP. As part of an infiltration system, pervious concrete allows stormwater to seep into the ground, replicating as close as possible the pre-development permeability of the site. Groundwater is recharged and water resources are preserved. Stormwater runoff is reduced and therefore runoff quality is improved. In many cases, pervious concrete pavement eliminates the need for retention ponds. Use of pervious concrete will minimize the reduction of permeability and maximize the ability to develop on smaller parcels of land, a key to low impact development (LID).

Cradle-to-Cradle Assessment

Environmental life-cycle assessment (LCA) is a procedure used to systematically evaluate the environmental impacts of a product or system. An LCA considers environmental impacts from all possible sources, including extraction of raw materials, manufacture, service life and demolition. In other words, LCA

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For applications of 8,000 pounds or less, the SL-0890 Tru-Track Super Alumilite is the self-steering lift axle of choice weighing in at just 848 pounds including wheels and tires. Incorporating the same features as the SL-1190 Tru-Track Alumilite, this lower capacity model is ideal for “bridge formula” configurations allowing you to carry increased payloads and improve your bottom line.
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Steve Bradley
Regional Mgr.,
Dallas, TX

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Researchers, engineers, architects, contractors, concrete producers, public works officials, material suppliers and concrete industry professionals are invited to attend. Topics include:

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- Low Slump SCC
- Placement Methods
- Architectural SCC
- Applications and Case Studies
- Performance Specifications and Testing

**Ultra Fast Track Construction**
- High Early Strength Concrete
- Machinery and Robotics
- Slip Forming Techniques
- Concrete Pumping and Conveying
- Applications and Case Studies
- Early Age Testing

**Extended Service Life**
- Low Permeability Concrete
- High Strength Concrete
- Mass Concrete
- Hot and Cold Weather Concreting
- Applications and Case Studies
- Performance Specifications and Testing

Industrial Concrete Floors
- Super Flat Floors
- Controlling Moisture
- Controlling Curling and Cracking
- Applications and Case Studies
- Performance Specifications and Testing

The symposium will culminate with a high performance concrete project site tour and demonstration in the Dallas area. A product expo featuring 24 companies that offer products and services for high performance concrete applications will be open during the conference.

With the focus on high performance concrete, the 2007 Concrete Technology Forum will provide a venue for researchers, contractors and product manufacturers to inform the industry about state-of-the-art developments, new construction techniques and product formulations that optimize concrete performance.

Visit www.ConcreteTechnologyForum.org to register for the symposium and to find additional information on the program agenda, co-sponsors and exhibitors.
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Setting the Standard for Measuring PTO Fuel Use

By Robert Sullivan, NRMCA Vice President of Government & Legal Affairs

In a major victory for the industry, NRMCA successfully negotiated Section 11144 of SAFETEA-LU, directing the Internal Revenue Service (IRS) to study the non-propulsive fuel usage of ready mixed delivery vehicles. This provision also directed the IRS to propose options for implementing exemptions for such non-propulsive fuel use but only if the exemption is “administratively feasible.” The term “administratively feasible” means that the agency must find the exemption to not be unduly burdensome to administer.

In December of 2005, the IRS issued a notice in the Federal Register of its intent to carry out the non-propulsive fuel use study. A month later, a meeting was arranged with IRS representatives at NRMCA headquarters in Silver Spring, Md. During this meeting, the IRS indicated that it wanted to see if it was possible to develop a test procedure that would isolate the fuel use of the power take-off (PTO) operations of ready mixed delivery vehicles. This requirement is very different from how PTO fuel use is calculated at the state level since most states do not tax fuel consumed during the time ready mixed delivery vehicles are off the public roads. According to the IRS, the new test procedure would then be used to calculate an average PTO fuel use percentage for the entire ready mixed concrete industry.

To meet the IRS’ requirements, NRMCA staff designed a comprehensive PTO fuel use test that discretely measures the total fuel consumed by a ready mixed delivery vehicle in the manufacturing of ready mixed concrete. The essential elements of the test procedure are summarized in Table 1.

Assuming the IRS fully adopts the NRMCA test data, the 22% non-propulsive fuel use test results could form the basis for a tax credit of approximately $24 million dollars per year.

Table 1: NRMCA PTO Test Procedure

<table>
<thead>
<tr>
<th>Trip</th>
<th>Power Take-Off</th>
<th>Truck</th>
<th>Phase 1 Load</th>
<th>2 Transport</th>
<th>3 Unload</th>
<th>Return</th>
<th>4 Wash</th>
<th>5 Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engaged</td>
<td>Loaded one way</td>
<td>Mix concrete ingredients</td>
<td>Agitate concrete</td>
<td>Discharge concrete</td>
<td>Agitate residual</td>
<td>Not simulated</td>
<td>Concrete, some residual</td>
</tr>
<tr>
<td>2</td>
<td>Engaged</td>
<td>Empty both ways</td>
<td>Simulate load time as in trip 1</td>
<td>Agitate residual</td>
<td>Simulate unload time as in trip 1</td>
<td>Agitate residual</td>
<td>Wash agitating drum</td>
<td>Some residual</td>
</tr>
<tr>
<td>3</td>
<td>Disengaged</td>
<td>Loaded both ways</td>
<td>Mix aggregate and water</td>
<td>Drum not turning</td>
<td>Simulate unload time as in trip 1</td>
<td>Drum not turning</td>
<td>Not simulated</td>
<td>Aggregate and water, same weight as concrete</td>
</tr>
<tr>
<td>4</td>
<td>Disengaged</td>
<td>Empty both ways</td>
<td>Simulate load time as in trip 1</td>
<td>Drum not turning</td>
<td>Simulate unload time as in trip 1</td>
<td>Drum not turning</td>
<td>Simulate wash time as in trip 2</td>
<td>Nothing</td>
</tr>
</tbody>
</table>
System 65

The bucket mounting, by means of double link attachment, permits ultimate bucket support during scooping up and emptying. The variable spacing between buckets allows adapting of the system to the conveying requirements. Furthermore, technical aspects like high conveying capacity, high conveying speed and elevation distance as well as quiet action of the system are characteristics. The use of high wear resistant components results in long service life of the entire chain system.

DIN system

Bucket elevators with DIN system are characterised by their simple design. It is a tried and proved way of attaching the buckets.
The NRMCA PTO fuel use test procedure involves four separate trips. Trip #1, which is the benchmark trip, involves a normal delivery of a load of ready mixed concrete from batch plant to customer. Trips #2-4 are simulation runs that mirror Trip #1 as closely as possible. Each simulation run varies only in the condition of the mixer drum (weighted or empty) and the status of the PTO (engaged or disconnected). The fuel tank is topped-off with a metered pump after each trip, and total trip fuel use is recorded along with time, mileage and other required information on a PTO test reporting form provided by NRMCA. The average fuel consumption in gallons per minute for each trip is then calculated by dividing its total amount of fuel consumed by its total duration. Adding the fuel consumptions per minute for turning the loaded drum during phases 1 through 3 and for turning the empty drum during phases 4 and 5 yields how much fuel is needed to turn the drum during the entire operation. Dividing this value by the total fuel consumption yields the percent PTO fuel use.

NRMCA member companies enrolled 248 ready mixed concrete trucks across the United States in the test procedure. Based upon the compiled test results, NRMCA was able to determine that on average 22% of a ready mixed concrete delivery vehicle’s total fuel is consumed for PTO operations. That is, on average, 22% of the total fuel consumed by a ready mixed delivery vehicle goes exclusively for the manufacturing of ready mixed concrete, but not for moving the vehicle or transporting the load of concrete.

A 22% industry-wide fuel tax exemption would be substantial. In 2005, the national ready mixed concrete production was 455,876,000 yards. Benchmarking studies show that .99 gallons of fuel is consumed for each yard of concrete delivered. Therefore, 451,317,240 gallons of diesel fuel were consumed in ready mixed concrete operations in 2005 and 22% of this fuel, or 99,289,793 gallons, was used exclusively for PTO operations. Assuming the IRS fully adopts the NRMCA test data, the 22% non-propulsive fuel use test results could form the basis for a tax credit of approximately $24 million dollars per year.

The PTO Fuel Use Test devised by NRMCA is state-of-the-art. When properly executed it produces a highly accurate result. The test has the added benefit in that the data it produces is derived from real world ready mixed concrete delivery operations. Given these factors, the IRS should have a high level of confidence that it will be “administratively feasible” to provide a 22% fuel use exemption for the ready mixed concrete industry.

For more information on NRMCA’s PTO efforts, contact Sullivan at 240/485-1148 or rsullivan@nrmca.org.
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Acceptance Criteria for Durability Tests

By Karthik H. Obla, NRMCA Senior Director of Research & Materials Engineering and Colin L. Lobo, NRMCA Vice President of Engineering

Introduction

As we make the shift toward performance-based specifications, it becomes necessary to identify durability tests and criteria that can be used to define performance. Strength-based criteria for mixture proportioning, jobsite acceptance and referee testing for low strength situations are well established. These concepts are statistically based and balance the risk between the producer and purchaser. Similar concepts are also appropriate for other performance tests and criteria.

Current durability provisions in industry standards rely on the water to cementitious materials ratio (w/cm) and a concomitant specified compressive strength level that serves for acceptance purposes. For almost all cases, the specified w/cm is intended to control the permeability of concrete to fluids and chemicals in solution that cause durability problems. Strictly speaking, w/cm is a prescriptive limitation intended to control a performance property, permeability. However, with current mix design technology, which includes the use of a variety of supplementary materials and admixtures, there is a wide variation in permeability properties at the same w/cm based on how the mixture is proportioned. One commonly used alternative to specifying maximum w/cm for concrete designed to withstand aggressive environments (chlorides, sulfates etc.) is to specify performance criteria based on ASTM C 1202, Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration, commonly referred to as the Rapid Chloride Permeability (RCP) test. Figure 1 illustrates a typical setup of the RCP test. While the method has its detractors, it is one of the only standardized tests that provides a reasonably good indicator of the permeability of concrete. One of the problems is that the developers of the test intended it for more controlled use in laboratories rather than for acceptance of concrete from samples obtained at the jobsite.

Many state transportation agencies and other engineers are using ASTM C 1202 in their specifications primarily for mixture qualification and some even include it for concrete acceptance. There seems to be a greater desire among agencies to use this test for concrete acceptance purposes. Before this is widely practiced, we believe that certain knowledge and understanding is required in order to use this test in an appropriate manner. This article discusses acceptance criteria based on ASTM C 1202 as an indicator of permeability. The concepts will also be applicable to other performance tests that are not currently in common use.

Testing Variation

The first and foremost aspect that needs to be kept in mind when selecting a test for qualification or acceptance of concrete is a consideration of the precision of the test method and the associated risk to the producer and purchaser of rejecting or accepting acceptable or defective product, respectively. Compared to the strength test (ASTM C 39), the RCP test (ASTM C 1202) tends to have a larger testing variability. In ASTM C 39, the precision statement indicates that the within test coefficient of variation (V) of companion 6 x 12-inch cylinders prepared in field conditions is 2.9%. It states that the acceptable range of individual cylinder strengths prepared from the same sample of concrete and tested by one laboratory should not differ by more than 8.0%. In comparison, ASTM C 1202 reports a single operator coefficient of variation (V) to be 12.3%.
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with an acceptable range of 42%. While the precision estimates are not directly comparable due to the method used in developing them, they serve to illustrate that the variability of C 1202 test results can be on the order of six times higher than that of the strength test results.

Let us try to put these numbers in some perspective. An acceptable range of 42% for the RCP test suggests that if we get two results from the same sample, one of 800 coulombs and the other of 1200 coulombs, they are still within the acceptable range of testing error. However, if we get two strength test results of 4000 psi and 6000 psi, clearly that is not within the range of testing error. Let us consider a project scenario with a specified strength of 5000 psi and a specified RCP test value of 1000 coulombs. Clearly the 4000 psi strength test result is a low break and is a cause for inquiry. Does a RCP test result of 1200 coulombs deserve an inquiry as well? Given that the acceptable testing range is 42%, it is quite possible that the 1200 coulomb result is due to normal testing variability. A retest of another set of specimens made from the same batch of concrete may very well yield a value lower than 1000 coulombs. In this case the test result of 1200 coulombs should not be a cause for inquiry. To avoid these problems, one must develop a rational, statistically-based acceptance criteria for the
states that the strength of concrete shall be considered satisfactory if the test results, defined as the average of at least two cylinder strengths, meet both the following criteria:

1. Arithmetic average of any three consecutive cylinder test results equals or exceeds specified strength ($f'_c$)
2. No individual test result should be less than $0.90f'_c$

For simplicity in this article, let us define terminology for specified "permeability" based on ASTM C 1202 test results as $p'_c$ where the test result is the average of at least two specimens. Based on strength provisions, it is proposed that the RCP test results of concrete shall be considered satisfactory if both the following criteria are met:

1. Arithmetic average of any five consecutive test results is equal to or lower than specified permeability, $p'_c$
2. No individual test result should be above $1.30p'_c$

When the permeability acceptance criteria are compared to the strength acceptance criteria, two things become obvious:

1. The concrete producer has to design mixtures for a required average RCP test value, $p'_c$, to be lower than the specified permeability, $p'_c$, unlike the case of strength where required average strength, $f'_c$, is designed to be higher than specified strength, $f'_c$. This is because with permeability measures, a lower value is more resistant to fluid ingress (and therefore more durable) than a higher value.
2. The proposed permeability criteria using the RCP test are slightly more lenient. This is a reasonable approach to accommodate the five to six times higher testing variability of the RCP test as compared to the strength test. Taking the arithmetic average of five consecutive tests instead of three is proposed to reduce the influence of the higher testing variability and reduce the risk of rejecting acceptable concrete. The higher allowance proposed for an individual test result compared to the specified permeability is to accommodate the larger acceptable range of single operator performance.

Establishing Statistically-Based Acceptance Criteria

If the specified strength, $f'_c$, is greater than 5000 psi, ACI 318 Section 5.6.3.3 states that the strength of concrete shall be considered satisfactory if the test results, defined as the average of at least two cylinder strengths, meet both the following criteria:

1. Arithmetic average of any three consecutive cylinder test results equals or exceeds specified strength ($f'_c$)
2. No individual test result should be less than $0.90f'_c$

For simplicity in this article, let us define terminology for specified "permeability" based on ASTM C 1202 test results as $p'_c$ where the test result is the average of at least two specimens. Based on strength provisions, it is proposed that the RCP test results of concrete shall be considered satisfactory if both the following criteria are met:

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2. The proposed permeability criteria using the RCP test are slightly more lenient. This is a reasonable approach to accommodate the five to six times higher testing variability of the RCP test as compared to the strength test. Taking the arithmetic average of five consecutive tests instead of three is proposed to reduce the influence of the higher testing variability and reduce the risk of rejecting acceptable concrete. The higher allowance proposed for an individual test result compared to the specified permeability is to accommodate the larger acceptable range of single operator performance.
results. It is these authors’ opinions that the allowance of 30% higher RCP test result compared to the specified value is a conservative approach to address the testing variability. Other more robust criteria can be established when a better measure of jobsite sample test variability can be determined.

Case Study

What target average permeability is required for a specified permeability, $p'_c$, of 1500 coulombs?

Assume an overall coefficient of variation of RCP test results (includes testing and batch to batch variation) to be in the range of 30% for general construction testing. This is a reasonable number for good quality control and is based on actual data for a particular project communicated to the authors. The strength and RCP test results for an actual bridge project for a given class of concrete are illustrated in Figure 2. ACI 214R, Evaluation of Strength Test Results for Concrete, reports an overall coefficient of variation of 9% to 11% for strength test results as “good” control in general construction testing.

This case is evaluated by three approaches.

Current Approach

Currently, there are no industry-recommended statistically-based acceptance criteria for the RCP test. Consequently, the test result above the specified permeability is considered a “failure” and a cause for inquiry. Using fundamental statistical concepts that assume a normal distribution of RCP tests, a concrete producer will have to choose a level of risk and design mixtures accordingly. If a 99% confidence level (or a 1 in 100 failure rate) is chosen for an individual test (this is the same confidence level used for calculating required average strengths by ACI 318), the required average permeability for the mixture can be calculated as follows:

$$p'_c = p'_c - 2.33 (V \times p'_c)$$

Where $V$ is an estimate of the coefficient of variation (standard deviation expressed as a percentage of the average) of test results obtained during the course of a project.

This can be expressed as follows:

$$p'_c = \frac{p'_c}{1 + 2.33V}$$

Assuming a coefficient of variation, $V$, of 30%, and $p'_c = 1500$ Coulombs, one gets $p'_c = 882$ Coulombs.

This approach is obviously overly conservative and is even more stringent than the current ACI 318 approach for acceptance of concrete for strength. Clearly this approach requires a concrete producer to design a mix for an extremely low average permeability, $p'_c$.

Approach Identical to ACI 318

In this case, equations identical to Equation 5.1 and Equation 5.3 in ACI 318 Code are considered

$$p'_c = p'_c - 1.34 (V \times p'_c)$$

results in

$$p'_c = 1070$$  coulombs
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Proposed Approach

The approach that was proposed earlier in this article can be mathematically expressed as the following two equations:

\[ p'_{cr} = 1.1 \times p'_{c} - 2.33 \times (V \times p'_{cr}) \]

results in \( p'_{cr} = 971 \) coulombs.

This will cause the producer to design for an average permeability, \( p'_{cr} \approx 971 \) coulombs.

Clearly this approach, while better than the current approach, is still conservative since it does not account for the higher testing variability of ASTM C 1202 compared to ASTM C 39. Note that the value of 1.34 in the first equation in this approach derives from \((2.33/\sqrt{3})\) and is tied to the acceptance criteria that the average of three consecutive tests should equal or exceed the specified value.

It is not appropriate to subject two test methods with widely different testing variability to the same level for concrete acceptance.

\[ p'_{cr} = 1.3 \times p'_{c} - 2.33 \times (V \times p'_{cr}) \]

results in \( p'_{cr} = 1143 \) coulombs.

This approach will allow the producer to design the mixture for an average permeability, \( p'_{cr} \) of 1143 coulombs.

This is the most reasonable approach that takes into account the higher testing variability of the RCP test as compared to the strength test. The Table below summarizes the \( p'_{cr} \) determined by the three different approaches:

<table>
<thead>
<tr>
<th>Approach</th>
<th>( p'_{cr} ) Coulombs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current (no single test result below specified)</td>
<td>882</td>
</tr>
<tr>
<td>Approach similar to Current ACI 318 Strength Provisions</td>
<td>970</td>
</tr>
<tr>
<td>Proposed approach</td>
<td>1143</td>
</tr>
</tbody>
</table>

Acceptance Criteria

A comparison of the acceptance criteria for tests performed from samples obtained at the jobsite can be summarized as follows:

(continued on page 49)
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permeability, $p_{c}$. These criteria need to be established to be acceptable at a higher permeability level and this relationship probably needs to be developed by a research program similar to that used to establish the criteria for strength of cores.

Specimen Curing

The type of curing and testing age for the RCP test specimens should be clearly specified. This test being very sensitive, it is imperative that initial curing in the field, if it is proposed to be used, should be in strict accordance to those required for strength tests (ASTM C 31 Section 10.1.2). Subsequently, it is desirable to allow at least 56 to 90 days of moist curing of the test specimens. This allows the slower reacting pozzolans such as fly ash and to some extent slag to be used to attain low RCP test results. If the curing time is limited to 28 days of moist curing this might force the use of more expensive supplementary cementitious materials and preclude the use of fly ash and slag. This is not a desirable approach for specifying concrete. The design professional should evaluate whether using results after a 90-day curing period provides a better indicator of the potential performance of a structure that is intended to have a 50+ year service life. In cases where waiting for 90 days before accepting concrete test results is not feasible, an accelerated specimen curing approach that has been widely tested by the Virginia Transportation Research Consortium (VTRC) can be adopted. This curing method specifies 7 days of moist curing at 73°F, followed by 21 days of immersion in hot water maintained at 100°F. The results obtained by using this accelerated curing procedure have been found to correlate well

Referee Testing

ACI 318 includes provisions in the event of strength test results that fail to meet the criteria. The criteria for cores obtained from the structure are that the average of three cores should be equal to or greater than 0.85$f_{c}$ and each individual core should not be less than 0.75$f_{c}$. These criteria allow for non-standard curing conditions of concrete in the structure and the process of removing core specimens. The criteria are more lenient than standard cured strength tests.

The same concepts for referee testing are appropriate for RCP tests on cores removed from the structure. Tests on these cores cannot be expected to comply with the specified permeability, $p_{c}$. These criteria need to be established to be acceptable at a higher permeability level and this relationship probably needs to be developed by a research program similar to that used to establish the criteria for strength of cores.

### Comparison of Acceptance Criteria

<table>
<thead>
<tr>
<th>Approach</th>
<th>Acceptance criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Individual tests $\leq p_{c}$</td>
</tr>
<tr>
<td>Similar to ACI 318 Strength Provisions</td>
<td>Individual tests $\leq 1.1p_{c}$</td>
</tr>
<tr>
<td>Proposed approach</td>
<td>Avg. of 3 tests $\leq p_{c}$</td>
</tr>
<tr>
<td></td>
<td>Individual test $\leq 1.3p_{c}$</td>
</tr>
<tr>
<td></td>
<td>Avg. of 5 tests $\leq p_{c}$</td>
</tr>
</tbody>
</table>

90 days of moist curing of the test specimens. This allows the slower reacting pozzolans such as fly ash and to some extent slag to be used to attain low RCP test results. If the curing time is limited to 28 days of moist curing this might force the use of more expensive supplementary cementitious materials and preclude the use of fly ash and slag. This is not a desirable approach for specifying concrete. The design professional should evaluate whether using results after a 90-day curing period provides a better indicator of the potential performance of a structure that is intended to have a 50+ year service life. In cases where waiting for 90 days before accepting concrete test results is not feasible, an accelerated specimen curing approach that has been widely tested by the Virginia Transportation Research Consortium (VTRC) can be adopted. This curing method specifies 7 days of moist curing at 73°F, followed by 21 days of immersion in hot water maintained at 100°F. The results obtained by using this accelerated curing procedure have been found to correlate well
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has been acquired by
The undersigned acted as financial advisor to Compañía de Cemento Argos S.A.

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The design professional might be concerned with relying on concrete acceptance test results based on later age testing if it is anticipated that the concrete structure will be exposed to a salt environment at an earlier age, such as for marine structures. In order to better answer this, ASTM C 1556 chloride diffusion test was performed on fly ash concrete specimens, which tend to reduce permeability slowly. Fly ash concrete specimens that were subjected to chloride immersion at 28 days showed high chloride diffusion coefficients after 60 days of immersion in solution; but very low diffusion coefficients after one year of chloride immersion. At early ages, fly ash concrete tends to be more permeable and allows the chlorides to penetrate easily. However, beyond 56 days, the permeability of fly ash concrete reduces rapidly and the chloride front cannot easily progress into the concrete. This results in a reduction in chloride diffusion coefficient. Therefore it can be seen that even for the slower acting Pozzolans such as fly ash, it is appropriate to use a 90-day or an accelerated 28-day RCP test requirement for concrete acceptance because these mixtures have been found to attain low long-term chloride diffusion coefficients in spite of the early age chloride exposure.

Readers are cautioned that ASTM C 1202 is not a perfect test and only provides a reasonable indicator of concrete permeability. It does not work well when concrete contains high concentrations of ionic solutions, such as when inorganic corrosion inhibitors are used. In some regions, the aggregate characteristics are such that it is very difficult to obtain low coulomb values even with very durable concrete mixtures. Finally, in regions where this test is not currently performed, it will take a while for laboratories to achieve the necessary proficiency to perform this test for acceptance of concrete. Current laboratory inspection and personnel certification programs do not qualify a facility to perform ASTM C 1202. In such cases, the alternative is to use the current specification and acceptance criteria with w/cm and strength.
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This article presents an approach for using the rapid chloride permeability test, ASTM C 1202, for concrete acceptance for permeability. It illustrates that the current approach of rejecting concrete based on test results that exceed specification limits is not based on sound statistical principles. An approach based on the ACI 318 strength test acceptance provisions, modified to take into account the higher testing variability of ASTM C 1202, is proposed. The advantages of this approach are: 1) It provides a performance measure of the intended performance property for which current w/cm limits are not that reliable; 2) Good quality concrete is not rejected due to the inherently higher testing variability of ASTM C 1202; and 3) The value of the required average permeability, $p_{c}^{*}$, is more realistically achievable and avoids high cementitious factors that will be more prone to cracking.

Also it is noted that a single RCP test result should be the average of two specimens. More care is necessary for initial curing of RCP test specimens in the field and they must be cured for a longer period than 28 days. It is suggested that 90 days of moist curing or an accelerated 28-day curing environment is most desirable. Even though much of the discussion in this article is centered around ASTM C 1202, a similar approach is recommended for other tests such as the shrinkage test (ASTM C 157) or the Air Void Analyzer test, all of which tend to have a higher testing variability than the ASTM C 39 compressive strength test.

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Rear, of Lehigh Cement Co. and chairman of the NRMCA P2P Steering Committee, said, “The new Speakers Bureau will significantly improve NRMCA’s ability to communicate P2P to a much wider audience.”

The P2P Initiative

The P2P Initiative was created to address issues regarding performance-based specifications and their benefits to the construction industry. The primary goals of the P2P Initiative are:

1. Leverage the expertise of all parties in the construction process – producers, contractors, engineers, architects – thereby improving the quality of concrete construction.
2. Elevate the performance level of the concrete industry.
3. Foster innovation and accelerate the acceptance of new technologies.

Performance-based specifications encourage innovation, cost-effective construction and quality control. This is accomplished by addressing the performance requirements of a project and allowing the concrete producer and contractor to develop details of mix design and construction methods. Performance-based specifications result in concrete that is more consistent throughout a project. Designers will have confidence that concrete will meet their performance criteria since concrete producers will be certified and their proposed mix designs will undergo strict quality control procedures.

NRMCA is working with industry groups that include contractors, architects, engineers, and product suppliers to ensure the entire construction team has input into the details of performance-based specifications. Most of these tools are freely available for download at www.nrmca.org/P2P.

Members of the P2P Speakers Bureau have been trained to deliver presentations and seminars of varying length and topics related to performance-based specifications. Anyone interested in a speaker for a group meeting or company training program should contact Lionel Lemay of NRMCA at LLe may@nrmca.org or 847-918-7101.
The Favorable Cycle of Fundraising and Results

By Jennifer LeFevre, RMC Research Foundation Program Director

It’s a fact of life in the world of research: without funding, little can be accomplished. But once there is a taste of success, a positive outcome often results in more successful fundraising leading to more beneficial research. This has certainly been the case for the RMC Research Foundation. As more people learn of the significant impact foundation projects and programs are having on the industry, they have become supporters or extended the support even more.

In an effort to help increase the exposure of the RMC Research Foundation and help to raise money in a fun way, Henry Batten of Concrete Supply Co. in Charlotte, NC, suggested holding a golf tournament fundraiser as part of NRMCA’s 2005 Business Administration Conference. The first ever RMC Research Foundation Fundraising Golf Tournament was a modest success financially and a tremendous success in getting the word out on the foundation’s work. Building on that success, Batten teamed up with George Roberts with McNeilus/Oshkosh to co-chair the 2nd Annual Fundraising Golf Tournament at NRMCA’s 2006 Fall Conference & Expo, where the Business Administration Conference and Operations, Environmental and Safety Conference & Expo were co-located. The second tournament was an unqualified fundraising triumph, netting over $25,000 for the RMC Research Foundation. Participation in the tournament sold out weeks ahead of the event and the 54 sponsors of the tournament...
(please see box) helped the foundation set a single fundraising event record.

The golf tournaments and other grassroots fundraising projects help to raise the awareness of the work of the RMC Research Foundation. Once people learned of the real benefits that are provided to each and every ready mixed concrete producer, many individuals and companies chose to support our efforts for the first time or decided to extend their original support. The original fundraising efforts, the renewed campaign and the two successful golf tournaments have established a significant endowment, the interest from which has gone to support dozens of important programs that have improved the concrete industry and increased the knowledge base and professionalism of its personnel. The “wins” for the concrete industry continue to grow. Partnering organizations such as the National Ready Mixed Concrete Association were able to use data from foundation-funded studies to advocate for regulatory changes, which ultimately reduced regulatory costs in air permitting fees and secured an exemption from OSHA’s hexavalent chromium rule. Other foundation programs have also helped to improve the environment and protect the health and safety of our workers and the communities the industry serves. The Ready Mixed Concrete LEED Reference Guide has been distributed to hundreds of people, educating them on the positive environmental benefits of concrete and the importance of sustainable development. The Prescriptive-to-Performance (P2P) movement has made tremendous gains based on findings from research supported by the RMC Research Foundation. Other projects related to concrete applications will benefit the industry as well, such as the crushed concrete aggregate study, which has the potential to save the industry $75 million annually.

On the educational side, it is hard to imagine where the industry would be today without the creation of the Concrete Industry Management program, which, along with the flagship program at Middle Tennessee State University, has now expanded to Arizona State University, California State University–Chico and the New Jersey Institute of Technology. The RMC Research Foundation was one of the first and main financial supporters of this invaluable program and is committed to continue helping it grow. The commitment to advance the education of current industry personnel is also strong as the foundation has funded the development of several important industry certifications, and a new Sales Manager Training Course just recently unveiled. The Spanish translation of NRMCA’s Truck Mixer Driver Manual and Concrete Delivery Professional certification program will help to expand training for Spanish speakers and ultimately help the industry recruit more drivers. These projects are just a small sampling of the wide array of programs that will keep the industry moving forward.

The RMC Research Foundation is closing in on reaching its goal of establishing a $20 million endowment that will provide $1 million in annual program funding in perpetuity. Although we aren’t quite there yet, the multitude of benefits that the work of the RMC Research Foundation provides to the concrete industry and communities we serve will no doubt perpetuate additional funding until that goal is met.

The RMC Research Foundation would like to thank all those companies who generously sponsored the 2nd Annual RMC Research Foundation Fundraising Golf Tournament at NRMCA’s Fall Conference & Expo this past October.

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How to Benefit from NRMCA Internet Promotion

By Glenn Ochsenreiter, NRMCA Vice President, Marketing & Promotion

The last issue of Concrete InFocus carried an article on promoting concrete on the Internet. This article focuses on how members and partners can benefit through participation in NRMCA Internet promotion programs. (Last issue’s article is available for review at NRMCA.org/WebPromotion.)

Gain Customers and Additional Site Visitors with NRMCA Reciprocating Links

Educate Your Site Visitors to Create Buyers

NRMCA has so far created six “Websites for the Industry” to help you turn browsers into buyers. Four of the six sites are currently ranked number one on Google for the related key search terms. When you provide links from your site to these outstanding concrete-application specific sites, many of your visitors will return to your site with a higher interest in doing business. Your site will also gain first-time visitors through links from the NRMCA sites. Through this approach you are also relieved of the challenge of posting comprehensive application-specific Web information and maintaining it.

Five of the NRMCA sites focus on specific applications – ConcreteParking.org, PerviousPavement.org, FlowableFill.org, ConcreteBuildings.org and GreenRoofTops.org. These sites contain comprehensive information on their topic. For example, the pervious site includes all the content from the best-selling booklet that provides an engineering overview on the subject, Pervious Concrete Pavements, produced by PCA and published with NRMCA. NRMCA’s most recent Web site is ConcreteHelp.org. This site serves as the central hub that we direct specifiers to who need assistance on any ready mixed concrete topic. Comprehensive information is provided on concrete benefits in general and links are provided to all our application-specific sites.

Enhance Your Site’s Position in Search Engine Results

Under the theory that Web sites provide links to other sites that their visitors will consider high-value, Google and other search engines use the Web as a “voting platform” to point to the best sites for categories of information. Therefore, the key to gaining site visitors is to be linked to by other sites – both because visitors on those sites can click on those links directly to reach your site and because the links elevate your site value in the eyes of search engines, raising your position in search results. In particular, a link from a top-rated site such as the NRMCA sites is valuable in Google’s site-value algorithm.
Benefit from NRMCA’s Search Engine Ad Investments

NRMCA is investing significantly in search engine advertising in 2007 based on encouraging test results in 2006. These ads, which appear on the same page with regular search results, are effective in bringing additional targeted visitors to NRMCA sites. By participating in NRMCA reciprocating Web programs, members and partners can connect with a share of those visitors.

How To Enable Reciprocating Links with NRMCA Sites

NRMCA sites offer separate link referral pages for non-profit promotion partners, specifier sites and NRMCA members (this service is not offered to producer/associate non-members). The only requirement for gaining such a link from a specific NRMCA site is that a reciprocal link be provided to that NRMCA site. NRMCA provides how-to linking information and attractive link graphics for all the sites at NRMCA.org/Link. State affiliates and non-profit concrete promotion organizations that want to participate in NRMCA’s reciprocating link program should contact Jenna Burnworth at jburnworth@nrmca.org or 240-485-1157. NRMCA producer and associate members interested in mutual links should contact Michelle Barringer at mbarringer@nrmca.org or 240-485-1143.

Concrete Promotion Partners: Obtain Specifier “Project Planning” Leads – Join the Project Assistance Network

All the “Websites for the Industry” prominently offer free project and planning assistance to specifiers. NRMCA lists on each site our non-profit promotion partners in North America who have joined our Project Assistance Network for that site and application. Many of the specifier assistance requests represent significant promotion and sales opportunities. NRMCA forwards requests to the appropriate geographic partner.

State affiliates and non-profit concrete promotion organizations that want to join the Project Assistance Network should contact Jenna Burnworth at jburnworth@nrmca.org or 240-485-1157.

Promotion Partners and Members: Benefit From CPA Parking Lot Leads

Concrete Pavement Analyst (CPA) software has proven to be an effective tool to assist promoters in demonstrating the long-term advantages of concrete parking compared to asphalt. On ConcreteParking.org, email links of trained CPA personnel are listed so that specifiers can request a consultation that compares the two materials. NRMCA will list on request concrete pro-
motors and sales people who have been trained to conduct such presentations using Concrete Parking Analyst software – contact Burnworth at jburnworth@nrmca.org or 240-485-1157.

Future Opportunities Abound

New promotion and marketing opportunities are developing rapidly as the Internet expands its position as the tool of choice for professionals seeking information.

NRMCA is exploring video search engine advertising, a concrete promotion site for promoters and new sites on self-consolidating concrete, architectural concrete and the green benefits of concrete. Concrete-Help.org will also be regularly expanded to become the ultimate specifier assistance site that it is intended to be.

NRMCA invites you to take advantage of NRMCA Web opportunities that exist today and to stay tuned for rapidly expanding possibilities in months and years to come.
The Perfect Storm:

The Impending Workforce Crisis

By Greg Smith

In the movie The Perfect Storm, a small fishing vessel has the misfortune of encountering the worst Mother Nature has to offer. Just like this boat, today’s employers are facing a combination of conditions just as threatening as this boat faced on the high seas. If businesses don’t prepare today, they could face a similar misfortune.

Over the next decade, the leadership talent pool (35- to 44-year-olds) will be reduced by 9%. That number will further shrink to 10% by 2020, according to the U.S. Census Bureau, International Database.

Tamara J. Erickson, co-author of Workforce Crisis, delivered a thought-provoking presentation at a recent Society of Human Resource Management (SHRM) conference. In her presentation, “New Models of Work: Avoiding the Coming Crisis of the Changing Workforce,” she points to five issues that all employers should be concerned about.

**Issue One:** Not enough bodies. The growth in the working-age population is “screeching to a halt.”

**Issue Two:** The workforce is getting older. The U.S. population 2000-2010 shows a rapid growth in the over-55 workforce. This means the leadership pool is shrinking.

**Issue Three:** Inappropriately skilled workers. Over the next decade, only 30% of the 21-year-olds will obtain a college degree. The bottom line is HR will have to change the “requirements” of job descriptions to “desires.” and employers will need to spend more time educating and training their workforce, Erickson said.

Additionally, organizations face increased ethnic, generational and racial diversity. These diverse values and generational differences place greater demand on managers and leaders. Sadly, the educational system is not prepared for a knowledge economy needed to produce high performance in organizations. Employers will have to fill the gap. They also need to be looking at ways to converge HR and training as a standard practice to keep pace in a highly complex labor market. Organizations need to be gearing up for this now.

Are your managers and leaders able to cultivate the diverse talents of diversity, generational differences and shifting talents? Will they be able to lead teams to increased productivity and high performance? Have you put plans in place to increase professional development in your organization? If your answer is no, or you are not sure, you may have a greater reason to be concerned.

**A Solution**

Cultivate the potential of each person. Build greater flexibility in your work hours. Discover what satisfies and dissatisfies each generation. I assured a client recently that engaging in a retention plan to address issues would put her organization in a better position to gain rather than lose her workforce to retirement or the competition. Her organization is already seeing the boomers looking for greater flexibility in taking time off for leisure. But at the same time these boomers want to stay employed. Meanwhile, the 35- to 45-year-olds are looking for more family time and are less willing to take on greater responsibility.

I recommended a plan that combines the following:

1. Start with a sound hiring strategy for the best talent that meets or exceeds current and future needs.
2. Create a plan for retaining new and identified existing talent in the organization.
3. Examine workplace dimensions such as leadership, communication, training and recognition.
4. Examine, train and coach with a leadership style for existing managers and for up-and-coming leaders in the 25- to 34-year-old group that focuses on maintaining and enhancing team member self-esteem, behavior (what team members do rather than their attitudes or personal characteristics), and encourage team member participation in decision making and problem solving.

Fortunately, there is still time to act in putting your organizational plan in place. Recognize the world around you is changing. It includes the new millennium workforce that has totally different needs and expectations. It is about adapting. Prepare now and avoid being caught in the storm.

Greg Smith shows executives and business owners how to reduce employee turnover and build high retention workplaces. He has written seven books and more than 300 articles on business management. He speaks at conferences, conducts management training and is the president of a management consulting firm, Chart Your Course International, in Atlanta. Phone him at 770-860-9464 or email greg@chartcourse.com. More information and articles are available at www.ChartCourse.com and www.HighRetention.com.
Cement Burns and Buffer Solutions

By Jim Warren, President, Force Field Technologies, Inc.

“...you can have change without improvement, but you can’t have improvement without change.”

Skin problems caused by contact with wet cement or cement dust mixed with sweat have been around since cement was first used. Lack of knowledge, understanding or wisdom has allowed this problem to exist to this day. There have been thousands of articles, studies and reports describing the dangers of what causes cement burns, irritant cement contact dermatitis and hexavalent chrome allergies. Suggested first-aid treatment is always “rinse with cool water and seek medical attention if irritation persists.” If you are in a state of persistent irritation, you have waited too long. Immediate treatment and neutralization is imperative. Spray-applied buffer solutions used on the job site meet this need.

Buffer Solutions

Chemical buffers belong to a particular group of compounds that have the ability to alter the pH of acids and bases. They can reduce the pH of alkalis or increase the pH of acids. Buffering solutions addressed in this writing are those containing phosphate salts. These salts in solution have a pH of approximately 5.5. Phosphate buffers have the ability to reduce the pH of wet cement from 13.0 to 5.5. This change is instant upon contact.

Calcium Hydroxide

All cement contains calcium oxide. When calcium oxide is mixed with water, it becomes calcium hydroxide. Calcium hydroxide is present in wet cement and has a pH of 12.5 to 13. Calcium hydroxide is the agent that causes cement burns and chronic irritant dermatitis.

Cement-Caused Skin Problems

A cement burn is an event. It is caused by prolonged exposure to wet cement. Chronic irritant dermatitis is a disease caused by routine daily contact but at less time of exposure.

Preventing cement burns and/or chronic irritant dermatitis caused by calcium hydroxide may be accomplished in three ways.

1. Never come in contact with wet cement or cement dust.
2. Wear waterproof, dustproof, clean, well-fitting personal protective equipment.
3. Neutralize pH of skin areas affected by applying a buffer solution.

PPE will work if used properly. The problem is that workers resist using it. It’s either too hot, too cumbersome, too expensive, unavailable or they just don’t want to wear it. Using the wrong type of PPE can result in additional injuries. Gloves work only if they are the right kind and kept clean and dry inside and replaced regularly. Studies show that on average, glove use does not reduce cement contact dermatitis.

The use of a spray-applied pH buffering solution presents a commonsense approach to avoiding skin damage caused by calcium hydroxide. The affected area should be drench sprayed within minutes of exposure. This is an after-the-fact procedure. Spraying in the morning before work will not protect you all day. Buffers do not create a barrier, but they neutralize and adjust skin surface pH to 5.5.

When a phosphate buffer solution comes in contact with wet cement, there is a chemical change. Cement is no longer cement and calcium hydroxide is converted into another compound. This change happens safely and instantly upon contact with no heat generated. The remaining residue now has a pH of 5.5. The skin surface is also pH 5.5, exactly what it should be. The aggressive alkaline nature of wet cement has ended.

This worker received a cement burn while wearing gloves.

Buffer Solutions

Chemical buffers belong to a particular group of compounds that have the ability to alter the pH of acids and bases. They can reduce the pH of alkalis or increase the pH of acids. Buffering solutions addressed in this writing are those containing phosphate salts. These salts in solution have a pH of approximately 5.5. Phosphate buffers have the ability to reduce the pH of wet cement from 13.0 to 5.5. This change is instant upon contact.
Cement Burns

Cement burns normally occur after a half hour or more of exposure to wet cement. It takes time for calcium hydroxide to penetrate and destroy the different skin layers. Washing with water and/or pH neutral soap is of little or no help once calcium hydroxide has penetrated the top layer of skin. It’s below the skin surface and will continue tissue destruction until it expends all of its hydroxide energy. The only hope at this point is to neutralize the calcium hydroxide and stop the burn process. Spray-applied phosphate buffer solutions have proven to safely neutralize calcium hydroxide even after skin penetration. Buffers stop the burning process upon contact. If the burn has developed into an open wound, do not use a buffer without seeing a doctor.

Irritant Dermatitis

Chronic irritant contact dermatitis is much more common than cement burns. Workers in the trowel trades have more cases than ready mixed concrete worker. Chronic irritant dermatitis is normally restricted to hands and forearms. Hands appear to be callused, but in fact it is layers of dead skin build-up caused by tissue destruction caused by chemical insult over months or years. Hands are normally inflamed, dry, itchy and fissured. Bleeding in the fissures is common and many times leads to infection. Affected workers find healing to be difficult or impossible. Healing is impaired because worker skin is at a high pH due to daily contact with wet cement. Consistent use of a sprayed buffer solution during the day can easily adjust skin pH to 5.5. This allows skin to heal naturally. Buffer solutions are not medicine and are not intended to be. They are only designed to change skin surface pH.

Hexavalent Chrome Allergies

Over the past few years, there has been a controversy about the presence of hexavalent chrome in cement. Hexavalent chrome is an allergen to some people. It is not the writer’s position to take either side of the debate but to submit information that could be at least part of the solution.

Hexavalent chrome is water soluble at a very high pH or a very low pH. Because it is water soluble, it can soak into skin and ultimately through skin cell walls. There it binds with cell protein and elicits an aller-
Buffer solutions have been available for years and have successfully helped hundreds of ready mixed concrete companies, concrete contractors, cement manufacturers and other related trades to avoid cement burns, cement dermatitis and chrome allergies.

References and suggestions for use of buffering solutions and cement burns may be found on the Internet at www.cdc.gov. Search “cement burns” or “cement dermatitis,” or go to www.neutralite.com for downloadable publications.

The views and opinions expressed in this article are those of the author and do not necessarily reflect the views and opinions of the National Ready Mixed Concrete Association.

To Treat or Avoid?

If a worker is being seen for chronic irritant dermatitis, he will be prescribed a topical steroid cream to treat inflammation. A 1-ounce tube will last two weeks. If there is an infection problem, the tube will last two weeks as well. Problem is that topical steroid creams can only be applied for a few weeks before they begin to cause skin to become so thin that it punctures or tears easily. Treatment must stop at that time to allow skin to recover from the treatment. Meanwhile, the worker faces re-occurrence of irritant dermatitis. It becomes an endless cycle.

Seeing a dermatologist for a cement burn is similar to above depending on severity. A burn may require hospitalization and months to heal. Worst case scenarios require skin grafts and/or amputation. There is no reason to assign a dollar cost to this.
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Fire Resistance of Concrete Structures

Part 1: Walls
First of a two-part series on the technical aspects of fire resistance and concrete structural components

By Erin Ashley, NRMCA Director of Codes and Sustainability

Before the advent of technology based active systems, fire protection for buildings relied almost exclusively on passive fire protection. However, as active fire protection systems were developed, the relative importance of passive systems for reducing smoke and fire spread through compartmentalization and fire resistant components has been slowly diminished in the building codes.

Building codes require designers to provide fire protection for buildings by combining “active” fire protection systems with “passive” fire protection systems. Active fire protection systems include smoke detectors, sprinklers and other systems that activate in the presence of smoke or fire. Passive fire protection uses the building components and layout to reduce the risk and spread of fire by providing non-combustible fire rated walls, floors and roofs. These building components help to compartmentalize the building so a fire that starts in one part of a building does not spread to other parts of the building. The concept of combining active and passive fire protection systems is called balanced fire protection design. Implementing balanced fire protection design provides the highest achievable level of protection.

Balanced fire protection design is a relatively new concept in the construction industry. Before the advent of technology based active systems, fire protection for buildings relied almost exclusively on passive fire protection. However, as active fire protection systems were developed, the relative importance of passive systems for reducing smoke and fire spread through compartmentalization and fire resistant components has been slowly diminished in the building codes.

The primary goal of building codes is to protect public safety (life). While reliable active fire protection can achieve this goal, the additional advantage of passive systems in a balanced design is to minimize damage to the owner’s property. In some opinions, this may go beyond the minimum standards for public safety that needs to be established in building codes, but it is clearly in the owner’s interest to retain use of the structure after a fire. More recently, building codes have adopted the use of active fire protection features in lieu of non-combustible fire resistive construction. This concept is called “trade-off.” Simply put, designers are permitted to reduce or “trade-off” the amount of passive fire protection by implementing additional active features. The concrete industry continues to oppose the trade-off concept and supports the balanced design concept. Without the balanced design approach, one relies solely on the effectiveness and reliability of a mechanical system to provide the needed fire protection for the building. Fire containment provides a reliable method to reduce the spread of fire and smoke even in the presence of mechanical system failure. For the building designer, fire containment can be provided through the use of fire resistive concrete walls, floors and ceilings. Although fire resistive containment and construction includes all structural members, the focus of this article will be on fire resistant concrete walls.
The fire resistance of concrete walls is directly impacted by the choice of aggregate. Historically, concrete has performed well in large structural fires due to its non-combustibility and low thermal conductivity. The most common method of determining a structural member’s performance in a fire is by a series of tests leading to a fire resistance rating. Fire resistance is defined as the ability of the structural member to withstand exposure to a fire without loss of load bearing function or ability to act as a barrier to spread a fire. The most common test method for determining fire resistance in the United States is the ASTM Standard E 119, Test Methods for Fire Tests of Building Construction and Materials. ASTM Standard method E 119 is a fire test that exposes the structural member to a standard fire on one side of the wall. For the structural member to pass the test, three criteria must be met – structural stability, integrity and temperature rise on exposed face.

Concrete structural members tend to perform well in the ASTM E 119 test. However, unlike steel, the concrete fire resistance cannot be determined by calculating a single critical temperature. The temperature within the concrete member cross section is not uniform throughout the fire exposure; therefore, the thermal and mechanical properties of the concrete vary with time and location of fire exposure within the section. The calculation of fire resistance in concrete is further complicated by the wide range of aggregates and other properties of concrete used in the concrete member. Results of fire tests and fire ratings are very specific to the assemblies tested.

Aggregate can amount to 60-80% of the total volume of concrete; therefore, the choice of aggregate directly impacts the performance of concrete during a fire. As the temperature rises in a concrete wall, the strength of the wall is diminished. Figure 1 shows the strength temperature relationship for carbonate aggregate, sand-lightweight aggregate and siliceous aggregate. While the siliceous aggregate concrete strength is reduced by half at temperatures of 1200ºF, the carbonate and lightweight aggregate concrete maintains near 100% of its original strength.

In lieu of performing standard fire tests on walls, building codes permit designers to calculate the fire resistance rating using analytical methods. These would generally be more conservative than fire ratings obtained from fire tests. Two methods exist for determining the fire resistance of concrete walls: empirical or the more complicated analytical process. ACI 216.1-97, Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies, provides a simplistic empirical method for determining fire resistance of concrete walls. Table 2.1 from ACI 216, reproduced here, provides the minimum equivalent thickness required of a concrete wall based on aggregate type to achieve a fire resistance rating of one hour to four hours. For solid flat concrete walls, the actual thickness is equal to the equivalent thickness. For walls that are more complex, such as cast-in-place walls that are not flat (varying thickness) and concrete masonry walls, the equivalent wall thickness is determined using formulas provided in ACI 216.1-97. A more complex analytical method for determining fire resistance of a concrete wall, with examples, is provided in ACI 216R, Guide for Determining the Fire Endurance of Concrete Elements.

As seen in Table 2, the use of structural lightweight concrete can significantly improve the fire resistance of concrete walls as can be observed from the reduced thickness required for the same fire rating compared to concrete with normal weight aggregate. Concrete walls using lightweight aggregate maintain between 90-100% of their original compressive strength at tem-

<table>
<thead>
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<th>Aggregate Type</th>
<th>Minimum equivalent thickness for fire resistance rating, in</th>
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<tr>
<td></td>
<td>1 hr</td>
</tr>
<tr>
<td>Siliceous</td>
<td>3.5</td>
</tr>
<tr>
<td>Carbonate</td>
<td>3.2</td>
</tr>
<tr>
<td>Semi-lightweight</td>
<td>2.7</td>
</tr>
<tr>
<td>Lightweight</td>
<td>2.5</td>
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The spalling phenomenon is not well understood but conventional theory states that spalling is chiefly caused by the increase in water vapor during elevated temperatures. Temperatures exceeding 1000°F due to the low thermal conductivity of the lightweight aggregate. Due to the slow temperature rise of concrete members, the minimum required thickness to achieve a particular fire resistance is decreased; therefore, less concrete is needed to achieve the equivalent fire performance of normal weight concrete.

The thermal conductivity of concrete is temperature dependent and varies based on the type of aggregate. Figure 2 shows a comparison of the thermal conductivity of concrete based on aggregate type. 1.6 W/mK for siliceous concrete, 1.3 W/mK for calcareous concrete and 0.8 W/mK for lightweight concrete. Thermal conductivity is described in units Watts per meter Kelvin (W/mK), and is defined as the quantity of heat, \( W \), transmitted in time through a thickness, \( m \), in a direction normal to a surface, due to a temperature rise, \( K \). Lightweight aggregate has low thermal conductivity due to the high temperature manufacturing process, which expands the aggregate and imparts air voids into the concrete. Simply put, the lower the thermal conductivity of the concrete, the slower the concrete will rise in temperature when exposed to a fire. The low temperature rise of concrete provides the material’s exceptional strength during a fire event.

The fire resistance of concrete assumes that all concrete remains in place during the fire event. The beneficial properties of concrete in a fire are reduced if concrete spalls during elevated temperatures. The spalling phenomenon is not well understood but conventional theory states that spalling is chiefly caused by the increase in water vapor during elevated temperatures. If the concrete cannot naturally dissipate the pressure increase due to the increase in water vapor, the pressure exceeds the tensile strength of the concrete and spalling occurs. It could be related to a difference in the coefficient of thermal expansion of the aggregate relative to the cement paste. In that sense, carbonate aggregates are more compatible with cement paste than siliceous aggregate. In some cases, the choice of aggregate can be reduced based on the choice of aggregate. High strength concrete tends to be more susceptible to spalling due to its reduced pore volume and low diffusion of water vapor during elevated temperatures. Research at NIST has demonstrated that high strength concrete with synthetic fibers will have reduced spalling because as fibers melt, they provide paths for vapor to escape. Lightweight concrete is less susceptible to spalling due to its increased permeability, which allows water vapor to expand into voids, thus relieving internal stresses.
Concrete construction provides an excellent means for achieving the required fire resistant rating required by code. The choice of aggregate determines the required thickness of the concrete wall to achieve the designated fire resistance rating. It’s the designer’s responsibility to select the minimum wall thickness to provide the appropriate fire resistance rating. However, the minimum thickness of the wall can change depending on the type of aggregate used in the concrete. Therefore, it is imperative that the concrete producer understand the impact of choice of aggregate on the fire resistant attributes of the building components.


Erin Ashley is director of codes and sustainability for the National Ready Mixed Concrete Association. She provides technical support to NRMCA members and state affiliates regarding local building codes and standards and promotes the adoption of statewide minimum building codes. She represents NRMCA on various national building code committees and green building standard committees. Ashley provides education and training programs for concrete producers, contractors, engineers and architects with a focus on building codes and sustainability. She is a doctoral candidate in reliability engineering at the University of Maryland. She holds a Master of Science in Reliability Engineering and Bachelor of Science in Fire Protection Engineering from the University of Maryland.

For more information, contact Erin Ashley at eashley@nrmca.org.
This is the third article in our series on how to go from outstanding salesperson to superior sales manager. In the first article we gave an overview of some of the key attributes, skills and attitudes necessary to make this sometimes difficult transition. In the second article, we discussed the sales pipeline and how to manage it as a sales manager. In this article, we are going to discuss measurement systems and benchmarking.

The ability to effectively measure sales team performance is a topic that has perplexed many companies and is an important subject of conversation. While sales dollars are the ultimate result, a large number of factors can introduce “static” into the sales figure and make the individual performance of a salesperson much harder to actually gauge. The local and national economy, competitive pressures in each individual territory, the potential market available in a given territory, these are but a few of the types of “static” that impact the numbers.

Having raised the issue of static, it then makes us consider what metrics we should actually consider for our dashboard. I personally like the dashboard analogy, because just like the speedometer on your dashboard is a big gauge, so are your actual sales. But a small dial like a gas gauge can also be very important. So what we need to do is consider what gauges are most important for your business and focus on them. Cars don’t report measurements for spark timing in the engine just…
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For the optimal career path, NRMCA now also offers the Certified Concrete Professional (CCP™) career track, leading to the top professional designation in the industry. The CCP™ designation gives ready mixed concrete industry employees the fundamental technical, operational, sales and managerial information needed to prepare for and enhance careers in the industry.

Whether you support your own needs for professional development and/or those of your company, no matter the size of the organization or the stage of your career, at every step make continuing education a key to success.

NATIONAL READY MIXED CONCRETE ASSOCIATION
like there are many things we could measure in the selling process but must choose not to.

Some of the items we could choose to measure are:
- Sales revenue
- Total profitability
- Number of customers
- Profit margin
- Number of prospects
- Customer profitability
- Sales activity
- Product mix
- Market share
- Won/loss ratio
- Market potential
- Time spent in front of customers
- Number of opportunities in the pipeline
- Time spent on other activities
- Where we are in the selling process
- Sales by market segment
- Percentage of business by customer and top 10
- Expense related metrics
- Competitor’s performance
- World class performance in other businesses and many others too numerous to list.

The key is to focus on a handful of gauges – two or three big gauges and two or three small gauges. As a sales manager, you work with your sales team to drive both efficiency and effectiveness. Efficiency means more sales contact per day or week with the right decision makers. Effectiveness means improving the ratio of sales coming out of the sales pipeline versus leads coming into the pipeline. As a sales manager, you can measure many more things and monitor them, but you want to make sure you do not tax your sales team’s effectiveness by burdening them with too much reporting or analysis. It is easy to forget it is a tax, but time not spent on the phone, email or in front of customers is selling time lost.

For the sake of this discussion, let’s pick our handful to be:
- Big gauges
- Small gauges
- Sales dollars
- Number of active sales opportunities
- Profit margin
- Won/loss ratio
- Market share
- Expenses versus plan

While I think customer profitability is probably one of the best big gauges you can have, it has been my experience that most companies cannot accurately measure this with their current IT systems so it is not included. Also, to fire customers because they are not profitable, you need unwavering confidence in your numbers.

So how do we use these gauges in the day-to-day management of our sales team? We need to have the processes in place to collect and regularly report these numbers in order to use them. Sales dollars, profit margin and expenses versus plan should be able to be siphoned off the ERP, order entry, billing or accounting systems you run. That should be pretty straightforward data to acquire. Market share, number of active sales opportunities and won/loss ratios require data to come from the sales force. It can be done as simply and economically as having paper forms or Excel spreadsheets sent in periodically, or with Web-based sales systems like www.salesforce.com or full-blown customer relationship management systems like Siebel. There are as many choices as you would ever want. If it is the first time your organization has ever implemented a defined selling process, I recommend you start on paper or Excel (so you can cheaply refine the process) and move to other methods later if you see fit. There are many consultants on the selling process who can guide you through a process or methodology if you are new to this or in any way uncomfortable.

Once you have the processes in place, you can get down to managing the business and improving sales performance. Define some goals with each salesperson around your metrics. Make them achievable, but not slam dunks. This part is tricky for the new sales manager since he or she doesn’t know all the details of each territory. In a territory with many competitors and cut-throat pricing, the goal may be to maintain market share and increase margin by achieving a more profitable product or customer mix. In another territory where market share is low and competitors number less, there could be a wildly different strategy. This is when sitting down with the salesperson and having a dialogue about the territory begins to pay dividends. Not only does it ensure that the strategic decisions are made more accurately, it also helps protect the enterprise in the event of a salesperson retiring or leaving the organization. A wise man once said to me that a sales manager should spend 50% of his time in the field coaching salespeople and learning about the market. I still believe that is true. We just have to ensure that the new salesperson makes sure to coach and not take over the sales calls or local decisionmaking or you won’t be cultivating future sales managers.

So we have our measurement system in place and the numbers are starting to come in. First we need to benchmark amongst our internal sales team. What does the average member look like in the metrics? What are the top performers doing? As the manager, you can spend more time on that analysis and begin to see trends that can help the entire sales team. After you feel comfortable that all of the bugs are out of your process and your

Define some goals with each salesperson around your metrics. Make them achievable, but not slam dunks.

full-blown customer relationship management systems are:

numbers are accurate, it is time to begin benchmarking outside your organization.

What kind of performance are your competitors producing? You need to locate sources of information like industry trade groups, consultants or publications that can help you understand how your team rates against the competition in some of these metrics. The same holds true for world-class performers who are not necessarily in your marketplace. Even if you manage to get your team to become the top performers in your marketplace, there are other teams out there you can learn from. It could be any other business that outperforms your team and allows you to learn and continuously improve.

Measurement and benchmarking are two very important new processes for the neophyte sales manager to learn. They provide a framework to objectively discuss performance. This helps a new manager to push through the emotional issues that can occur, especially if he or she was promoted from that same group of sales professionals. By giving constructive feedback and coaching the sales team, a new manager can become a superior sales manager and lead a winning team.

For more information on NRMCA’s promotion program, contact Pool at 281-702-4557 or vpool@nrmca.org.
Managing Little League

The Art of Sales Management

By Tim McMahon
Strategy Mapping Selling

Sales management is, of course, a great deal more than a series of strategies, techniques or methodologies. It’s mostly about people – specifically salespeople – and about a sales manager’s ability to motivate and guide people to the highest levels of personal and business success.

If it were only that easy! All the “motivating and guiding” doesn’t do much unless sales managers have the fundamental ability to lead their reps effectively through change – and change is what we’re talking about today – change in the ready mixed market, change in customer expectations and perceptions, change in finding new and better ways to do the job of selling. So what does it take for a ready mixed sales manager to be a leader, to develop the trust and confidence of salespeople and to guide them through the often painful (but necessary) process of finding new and better ways of selling today? Maybe it’s going to take some new sales management skills!

It seems that just about everything I know about sales management and leadership – at least the important things – I learned some years ago...from a bunch of 9-year-olds! Now, I feel a little embarrassed admitting that considering all the management courses I’ve attended (and taught). I always came back from those classes fired up with new ideas and techniques guaranteed to make me a great sales manager, more or less, but six months later I was still in the less category. But that was until I became a Little League coach.

My 9-year-olds were baseball players. I’d been roped into Little League by my son, Casey, and considering that I know as much about baseball as I do about differential calculus (I think that’s an auto part or something), I did a respectable job of it. In fact, on the ball field I actually did all the things I’ve heard about in sales managers’ school: I motivated; I coached; I built winning strategies; we won games; everybody was happy and somehow it all worked. Unfortunately, the non-existent pay plan for Little League managers dictated that I continue in sales management. Fortunately, however, I did learn four key principles of Little League management that applied even better to sales management...and to quote the poet Robert Frost, “that has made all the difference.”
I: Who Wins the Game?

Let me tell you about Chris. Nice guy. Coach of the Little League “Orioles” last year, but no kid wants to be on his teams. I suspect he thinks this is real Major League baseball. If pressed I’m not sure he could tell the difference between the ball diamond behind the elementary school and Fenway Park. Chris gets all worked up during every game and spends a lot of time yelling at his team. I think Chris is confused about who really wins the game.

Now I’ve gotten worked up a time or two myself. I even got thrown out of a game once for arguing with an umpire and kicking dirt on his shoes. (I’m not real proud of it – the umpire was 13 and had on brand new Reeboks). My point isn’t that Chris shouldn’t be that upset over the game, it’s that he needs to stop taking winning or losing so personally – he’s hurting his players more than he’s helping them. Chris doesn’t understand that a manager is not a player. Only players can play the game and only players can win or lose. The manager’s only job is to help the players win – and to win himself at managing!

Sometimes the hardest thing for a sales manager to accept is that he or she is no longer in the game – a player, i.e., the sales representative. As managers we no longer get to win or lose at selling. We can become winners only in the game of management. Think of it this way: if the true objective of the salesperson is to make sure the customer wins, then the objective of the sales manager is to make sure the sales reps win. In short, we’re out of the game, kicked upstairs and not allowed out on the field of play with the customers – except when invited or to give some advice or encouragement. We get to pick the team, create the game plan, and send in plays...that’s about it. We can’t do the sales job for them.

Who wins the game? The sales reps...and hopefully their customers!

II: You Gotta Have A Game Plan!

Bernie is a baseball coach...a professional. He coaches the JV team over at the high school and gets paid for it, so I guess that makes him a “pro.” I met him a few years into my “coaching experience” when Casey turned 14 and Bernie and I coached the “Pirates” together. Managing little kids was easy compared to teenagers. With little kids you teach them how to hit, where to stand, tell them when to run, where to throw the ball and encourage them a lot. They need, want and expect to be told what to do – and some percentage of the time will actually do it. Teenagers however, have a different agenda; they don’t want to be bothered with “rookie” basics. According the Bernie, “You don’t really direct experienced players – the best you can do is kinda point ‘em in the right direction and herd ‘em that way. They’ll head pretty much there if they think you know what you’re talkin’ about.” In other words, with experienced players, don’t try to lead them by always focusing on basic skills and tactics; “herd” them in the right direction by having a solid “game plan.”

It has often amazed me how much salespeople are like my baseball players. Sales trainees and relatively inexperienced sales reps really need – and want – coaching and direction to develop solid skills. At that stage of their development they need to be continuously trained and reminded of what we think of as “the basics.” Most sales managers are pretty comfortable with this kind of managing and coaching, if only because those skills are firmly established and come easily. But salespeople, like Little Leaguers, someday grow up to become “experienced sales professionals” who are looking for their managers to provide something more: a “game plan” for success. “Give me the strategy, Boss; call in a play when you see a way to do things better and let me do the rest!”

For many of us then, the coaching and managing skills with which we’re the most familiar and know how to use the best don’t really apply to the most important – and highest producing – segment of our sales force. Ask yourself this question: “Do my most experienced people think that I have a real game plan for success? If so, could they
tell me what it is?” An effective manager
needs to become a chameleon – leading
young salespeople with solid tactical coach-
ing and leading the experienced with a solid
game plan, sending in tactics as the sale pro-
gresses, and letting the sales reps execute. In
short, if you want to manage the “pros,” “Ya
gotta have a game plan!”

III: Play the Bench
Have you ever seen a Little League team
in which the “good” players seem to always
be in the game (and get all the attention)
while the “benchwarmers” play only for the
minimum time required? It’s sort of gener-
ally accepted that if he wants to win the
game, the coach really has to play the
“stars.” I never gave it much thought until
we were driving home after a game and
Casey asked me how the kids on the bench
would ever get any better if they never got
to play. Good question. From that I learned
to refocus my coaching efforts toward the
kids that needed me.

An effective manager needs to become a chameleon – leading
young salespeople with solid tactical coaching and leading the
experienced with a solid game plan...

There’s a “bench” in every sales organiza-
tion too, and it’s filled by good, average
salespeople. They’re not failures (those get
cleared out pretty quickly). No, the “bench
reps” are the ones who do their job consist-
tently, steadily and reliably but without a lot
of fireworks and fanfare...and they usually
don’t get a lot of management attention. It’s
not surprising then that management likes
to apply itself to the “sales stars” who can
deliver the big deals, make the big plays, can
put the organization “over the top” in the
race for quota...and gives them the lion’s
share of management time. Beside which,
sales managers (all ex-stars themselves) have
a lot more in common with the “stars” than
the “bench.” By most standards, managing
the “bench” just isn’t near as much fun as
working with the “stars!” The truth is, how-
ever, that our “stars” need the least amount
of our time.

The most successful sales organizations –
like the best teams – are not the ones with
the most stars but rather those with the
greatest depth, i.e., the strongest bench. To
develop it ready mixed sales managers need
to refocus their time to play the bench.

IV: You Need the Right
Equipment to Win
Nine-year-old Joey was a good little ball
player whose dad had once made all-state in
high school. Dad willed Joey his personal
championship glove and home-run hitting
wooden bat...and Joey was determined to
use them and be “just like dad.” But times
have changed and Joey won’t even be com-
petitive...and it’s dad’s fault.

Yes, even Little League has gone high-
tech. Gloves are bigger, with deeper pockets;
and catching a ball has gotten easier. Bats
have changed too because aluminum ones

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CIM Auction at the World of Concrete®

The 2007 CIM Fundraising Auction is scheduled for Thursday, January 25, 2007
at 12 pm at the World of Concrete® in Las Vegas. The 2007 CIM Auction will
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please visit: www.concretedegree.com/auction
hit farther. Joey simply can’t be fully competitive with out-of-date equipment no matter how much talent he has – he’ll be consistently outplayed. So unfortunately, what was good enough for dad isn’t good enough for Joey – and understanding that may be difficult for both of them.

The “equipment” of selling also has changed. Computers, email, the Internet, CRM software, on-line marketing encyclopedias, product configurators, cellular phones and wireless data communications, territory mapping and analysis software – these are only a few of the tools that have proven to not only increase the productivity of salespeople but also their sales effectiveness. In short, automated salespeople often have the ability to outsell their non-automated (and perhaps even more talented) competitors. They have the advantage of technology to be more efficient, help them provide better customer responsiveness and service and to more tightly focus their marketing and sales efforts.

A “problem” is that sales managers can be a lot like Joey’s dad. We know what worked for us as sales reps and we’re most comfortable managing reps to work the same way. So salesperson Joey and his sales manager “dad” may both find it difficult to adjust to this change and may delay upgrading their “selling equipment” until it’s too late. As in baseball, the best equipment is no guarantee of winning, but among competitors, when all other things are equal, the best equipment becomes a source of advantage.

Putting it all together, it’s the simple concept that a sales manager isn’t a “designated hitter” or “clean-up” batter on the sales team. He or she is a resource provider, a mentor, an advisor, a planner and a leader on the path to success. The job is making sales winners, not being one. The job is assuring that salespeople have the tools they need for competitive advantage – equipment, skills and a strategy – or “game plan” – for success!

That’s Big League sales management!

NRMCA Gears Sales Management for the 2000s and Beyond

When NRMCA’s Educational Activities Committee (EAC) approached the RMC Research Foundation to fund development of a ready mixed concrete-specific workshop for sales managers, one thing was for sure. Its content had to not only include a real awareness of the recent time period where the market environment changed dramatically but also include tools for what looks like another market turn. As the nature of selling changed to require a ready mixed concrete sales rep to be a consultant who could pinpoint and solve customer problems, and not just sell concrete at a price, focus evolved to building long-term relationships with customers. As the nature of personal selling changed, so has the role of the sales reps’ sales manager.

Today’s sales managers must be more sensitive to a sales rep’s needs. They must coach more than control, coordinate more than monitor. They must not only direct the activities of the sales force and personally sell key accounts, but they are also expected to assume a greater responsibility for directing and coordinating the short- and long-term efforts of the company. Their career success depends greatly on their ability to adapt. It’s a huge task. Market orientation, relationship selling and territory management now include use of multiple sales strategies, deciding and implementing the organizational structure and design, recruiting, coaching, integrating technology, training, forecasting and budgeting, presenting plans to senior management, addressing ethical and legal problems and coping with product shortages based on international issues.

No class on sales management can effectively cover all that in a two- or three-day seminar. First of all, no person could ever mentally download that much classroom material and integrate it in practice. Second, sales managers are far too busy to attend multiple workshops. In response to the challenges, an EAC task force researched how NRMCA could give sales managers the tools they needed. In the end, a new seminar format was developed. Traditional class time was integrated with online learning and Web conferencing over a five-month period of time, recognizing that taking the big management challenges and working on industry specific solutions with a cross-country peer group would allow the “best of the best” to share and evolve with the industry’s changing environment.

The new course launched in September 2006 at the RMC Research Education Center in Silver Spring. With laptop computers and a real producer sales management territory issue, five teams of sales managers spent two days learning how to analyze facts and figures to develop a plan and solution that looked at the big picture revenue challenge as well as managing staff to get there. Things they considered were if they had the right sales reps, were they in the right place, and if alternations needed to be made, what the options were. Were the financials the sales managers received from management and the reps telling the whole picture? How do they measure accuracy and pertinence? What else did they need and how does one get numbers and facts? How does a sales manager ask for help from his/her boss? What do you ask for? In other words, how does a sales manager build a nimble, world class sales force that maximizes tools to produce immediate revenue and secure long-term customers? Over a five-month period of time, the class will interact with each other and an executive sales management coach to build skills.

With the inaugural class’ success, NRMCA will continue to offer the workshop to the industry on a semi-annual basis. Classes will be facilitated by Tim McMahon, author of the accompanying article, “Managing Little League.” His coaching, mentoring and training experience with ready mixed concrete producers, as well as a broad range of others, adds a depth for all who participate.

The sales management program development was funded by the RMC Research Foundation and is fully certified by the Professional Society of Sales & Marketing Training. It is part of NRMCA’s STEPS accreditation program, conferring 21 elective hours. For further information, check www.nrmca.org or call NRMCA’s Education Department at 240-485-1166.
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Please note: The column contained here should in no way be considered a substitute for competent legal counsel. It is only meant as a guide to help employers know when it is necessary to consult an attorney on issues pertaining to labor-management relations and other workplace issues.

Q&A

My state has adopted intrastate drivers’ hours-of-service (HOS) tolerance guidelines. Can I allow my drivers to operate under these guidelines?

Yes, but only if they operate exclusively in intrastate commerce. A driver who normally operates in intrastate commerce is subject to the federal HOS regulations for the following 7 or 8 days (depending on whether the driver is on a 7 or 8 day schedule) after he or she makes an interstate trip. For example, both North and South Carolina have adopted intrastate tolerance guidelines. A driver based at a plant in North Carolina making a delivery across the border in South Carolina would have to operate under federal HOS rules for the next 7 or 8 days after crossing the state line because he or she engaged in interstate commerce.

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Best Sellers from the NRMCA Bookstore

1. **2PPB – Pervious Concrete: When it Rains, It Drains** – As customers and influencers in every part of the country are under increasing pressure to move toward increased sustainability, the many “green” and economic advantages of pervious concrete are attracting more and more attention. This promotional brochure, developed through the NRMCA-sponsored Concrete Collateral Working Group, and targeted to owners and architects, clearly makes the case for pervious. As interest in pervious continues to grow, these brochures should be left behind on every promotion and sales call. Package of 50 (also sold in packages of 200 and 500). ($57 members, $57 non-members)

2. **2187 – Compilation of ASTM Standards Relating to Concrete** – Contains 43 ASTM specifications, practices and test methods relating to cement, fly ash, slag, silica fume, admixtures, aggregates and concrete. Included in the ASTM Manual of Aggregates and Concrete Testing. Reprinted by NRMCA in January 2005, it contains the most recent versions of the ASTM standards at that date. ($45 members, $100 non-members)

3. **2PCP – Pervious Concrete Pavements** – Pervious concrete as a paving material has generated tremendous interest due to its ability to allow water to flow through itself to recharge groundwater and minimize stormwater runoff. This introduction to pervious concrete pavements reviews its applications and engineering properties, including environmental benefits, structural properties and durability. Both hydraulic and structural design of pervious concrete pavements are discussed, as well as construction techniques. ($15 members, $15 non-members)

4. **2PSD9 – Hand Signals for Mixer & Contractor Guides** – Don’t compromise on safety, place one on every truck. 8” x 10” adhesive decal containing nine of the most common hand signals (Enter, Back In, Back Up, Pull Forward, Stop, Raise/Lower Chute, Start Pouring, More Water, Stop Pouring) with English and Spanish text. ($5 members, $8 non-members)

5. **2PCIP100 – Concrete In Practice** – Package – Concrete in Practice Sheets are short 1-page discussions on various concrete topics and are written in a “What? Why? And How?” scheme and are intended to provide information in a non-technical format. The CIP topics are researched and written by members of NRMCA’s Research Engineering and Standards Committee. These are a great resource to give to your contractors and customers. **English CIP Full Set** 2PCIP100 – contains 20 sets of each CIP topics 1-39. **Spanish CIP Full Set** 2PCIP100es – contains 20 sets of each CIP topics 1-39. ($200 members, $750 non-members); **English Single Set** 2PCIPs & **Spanish Single Set** 2PCIPses. ($25 members, $100 non-members) continued on next page

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Best Sellers continued

6. **2PICF50 – Commercial ICF Promotion Brochure (Pkg. of 50)** – This attractive and informative 4-page 8.5” x 11” promotional brochure, designed for commercial building owners, lenders, engineers, specifiers and others, outlines the many economic and “green” benefits of Insulating Concrete Form (ICF) technology. Developed through the NRMCA-sponsored Concrete Collateral Working Group, the brochure covers ICF’s many advantages, with helpful illustrations and appealing photos of complete projects. ICFs are attracting more and more attention every day, winning converts from competing wall systems. Make these brochures a part of every promotion and sales call. Also sold in bundles of 250 and 500. ($57 members, $57 non-members)

7. **2P183 – Guide to Preparing Job Descriptions CD-Rom** – The NRMCA Guide for Preparing Ready Mixed Concrete Job Descriptions has been completely revised and is now in CD-ROM form (MS Word). It now includes more than 200 sample job descriptions submitted by some of the leading concrete firms in the country. These job descriptions can be easily downloaded and customized for your company’s use. ($46 members, $184 non-members)

8. **2P159 – Concrete Plant Operator’s Manual** – Jointly prepared by the Concrete Plant Manufacturers Bureau and NRMCA, this manual is a comprehensive guide for the batch plant operator. It includes valuable information on materials, batch tolerance and aggregate moisture, calculations, plant maintenance, safety and more. ($23 members, $92 non-members)

9. **2HYDRO – Pervious Hydrological Software Resource CD-ROM** – An important pervious concrete reference tool filled with technical and promotional resources, including Pervious Concrete Pavements, an outstanding reference that covers pervious applications and engineering properties, environmental benefits, structural properties and durability. The CD also includes an analysis tool on hydrological design, based on the Pervious Concrete Hydrological Analysis Program, which illustrates the behavior of pervious concrete systems in relatively simple situations. (1-5 copies $25 members, $35 non-members); (6 or more copies $15 members, $25 non-members)

10. **2P188 – Truck Mixer Driver’s Manual** – This manual educates truck mixer drivers about concrete and customer relations. Completely updated for 2004, it also highlights driver duties, safety precautions, equipment inspection and maintenance procedures, and what the driver should do in case of an accident. This 64-page manual is easy to understand and contains common sense information every driver should know. ($12 members, $48 non-members); (20 or more copies $10 members, $40 non-members)

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BMH Systems is expert in the design and manufacturing of Central Mix Plants and Concrete Mixers. The company is focused on providing tailor-made solutions to meet the specific needs of each customer. Always aiming for our customers to be the best of their league, we put an emphasis on the excellent quality and consistency of your concrete. BMH’s RollMaster® reversing drum mixer is the most profitable type of mixer for the ready-mix industry. It provides you with an edge over your competition by offering supreme consistency, very low operating costs and superior durability. RollMaster® is guaranteed for 3 years or 500,000yd³.

ENVIRONMENTAL

Enviro-Port, Inc.

10953 Dunbarton Road P.O. Box 175

Gratiot, WI 53541

Tel: (608) 922-6264

Fax: (608) 922-3370

E-mail: enviropt@mhtc.net

Website: www.enviro-port.com

Enviro-Port offers 100% ready-mix reclamation for the Ready-Mix and Precast producers. Enviro-Port will help manage your plant’s process and storm water. New is our add-on system for producers that have existing reclaimers and/or pit systems that desire 100% reclamation with grey water reathering. Visit our website at: www.enviro-port.com.
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Concord Concrete Pumps Inc., 1608 Broadway St., Port Coquitlam, BC, Canada, V3C 2M8

View interactive pump photos at: http://www.concordpumps.ca/65m/fl ash-65.swf

"In the first two pours we pumped in excess of 1600 cubic yards. Not bad for the first two days at work."

-Jim Ainsworth, Vice President, Pumpco Inc., August 2006

Good luck.
I wish you all success.

Mr. Isidro Flores
President and Owner
Concord Concrete pumps Inc.

"It is my pleasure to introduce to you the largest concrete pump in the world; 5 sections Z-fold, 5 inch line, 300 yards/220 cubic meters per hour."

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Mr. Isidro Flores
President
Concord Concrete Pumps Inc.