

# SOFTWARE SUPPORT FOR PROJECT SAFETY AND HEALTH

By Thomas Mills

**W**ithout question, construction is a physically demanding and risky business. Since 2000, the construction industry has averaged more than 1,200 fatalities annually. This reflects a 20-percent increase in fatalities from 1992 to 2006 and is the largest fatality rate of any industry, but is third to mining and agriculture in fatalities per 100,000 workers.

Not only are there humanitarian reasons for improved construction safety and health, but there are significant financial costs too. According to the National Institute of Occupational Safety and Health (NIOSH), each construction fatality costs society \$867,000 (2003 dollars). Although there are no readily compiled records on construction costs for injury and illness, the National Safety Council (NSC) estimates that nonfatal occupational injury and illness nationwide costs \$131 billion to \$145 billion (2000–01 dollars) for all industries.

In 2001, the construction industry alone was assessed a direct cost of more than \$36 million in penalties for construction health and safety violations. Most know that by improving the safety record, experience modifier costs are lowered, and lower insurance costs result allowing for greater competitiveness. Therefore, it is advantageous to pursue all avenues to improve on-site safety awareness, culture and actions.

## THE ABCs OF BEHAVIOR-BASED SAFETY

It should go without saying that the U.S. construction industry has significant ground to make up in its advancement toward creating a healthy and safe work environment. All employers are obligated to provide a safe and healthy workplace, and although construction is a strenuous and demanding job, it should be no different.

Many construction safety personnel use multiple strategies for on-site safety management; dominant in these strategies is the concept of behavior-based safety (BBS). This is a strategy that works toward modifying a worker's behavior through structured behavioral interventions intended to minimize unsafe behaviors. This is not an attitude adjustment, but a systematic mechanism to intervene in unsafe behaviors and replace them with positive behavior patterns. This effort is reinforced with the ABCs of BBS. The "A" is for "activators" that precede the "B," or "behaviors," that result in consequences, or "C". In

effect, activators direct the behavior, and the consequences are a result of the behavior.

Scientifically, BBS is a strong and well-supported approach to on-site safety but should not be the sole method of reliance for on-site safety management. Several other strategies include the following:

- integrating on-site health and safety concerns into project management Critical Path Method
- developing a design-for-safety method
- creating a systems-based safety

## IMPLEMENTING ON-SITE SAFETY IN SOFTWARE

Project safety is at least as important as other project-management functions, including cost and schedule management, yet it isn't always given its due relative to cost and schedule. CPM project-management software applications, including Primavera Planner and Microsoft Project, are being increasingly utilized to manage projects of all sizes. These software applications are prevalent throughout the construction industry, and although not specifically designed for on-site safety management, they provide an excellent opportunity to integrate on-site safety within the daily cost, schedule, resource management and reporting features. This integration of safety to CPM links project-specific tasks or activities from the CPM schedule to either internal (to the CPM) or external Activity Hazardous Analysis (AHA) or Integrated Work (IW) documents.

The integration of the AHA into the CPM provides a twofold aid in managing jobsite safety. First, it requires subcontractor safety input at the beginning of the project and can be done at the same time as scheduling and resource information is being supplied. Second, the AHA becomes an active interface in the CPM schedule, and reports can be generated similar to schedule and cost reports. For instance, when two- or three-week look ahead schedules are run, a "heads-up" safety report identifying the following is directly linked to the activity and can be output at the same time: activity-specific hazards; prevention and mitigation activities; PP&E and other safety equipment needs; responsible party assignment; and any training that is required.

As components of the AHA link directly to scheduled activities, any slips or advancements in the schedule have

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no adverse effect due to the hazards being linked to the activity. There are two other beneficial associations that result when this approach is used: A field can be placed within the safety table to allow monitoring compliance or incidence occurrence, and active hyperlinks can be placed within the safety view to allow site personnel to link to external documents including MSDS sheets, activity checklists, on-line training modules, etc. In effect, linking CPM to AHA becomes a proactive alerting system that can assist field personnel in identifying what health and safety measures are needed, when they are needed and where they are needed in near real time. Filtering opportunities can be incorporated so that the information can be managed and not become overwhelming.

There are several approaches that can be taken by general contractors or construction managers as they investigate and implement the integration of CPM and on-site safety. There is a stand-alone “home brew” approach that uses a consultant to custom design the solution, or the user can purchase third-party software that is specific to integrating CPM with on-site health and safety. Microsoft Project and Primavera Project Planner are simple, preconfigured database/spreadsheet applications that provide users with insight and a little programming experience to internally integrate and link a project-specific AHA directly to project activities. One software developer, Conceptual Arts in Gainesville, Fla., is field testing a similar product known as SalusLink ([www.saluslink.com](http://www.saluslink.com)).

There is a need to place on-site safety management in the forefront of construction management, and the linking of CPM activities to on-site health and safety AHA provides one method toward meeting that objective. ♦

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