A global perspective for project owners on managing construction risks

In this issue:
- Risk management of new building materials and processes
- Hazard analysis and risk profiling
- **Emerging markets**
- Alternative construction methods
- Pitfalls and challenges in the design and engineering process
- Quality management
- **Vendor selection/management**
Welcome

New building products and processes demand more rigorous hazard analysis

Hazard analysis and risk profiling

Emerging markets

Alternative construction methods

Pitfalls and challenges in the design and engineering process

Quality management

Vendor selection/management

An enterprise risk management ‘A holistic healthcheck’
Welcome

This issue is designed to provide construction project owners and project managers with a global perspective on managing risks associated with major construction projects.

Changing demographics, globalization of competition, increasingly complex regulatory and liability environments, evolution of alternative project delivery systems and constantly shifting political landscapes are just some of the issues that construction project owners and managers must deal with when considering if, when, where and how to build new facilities or renovate existing ones.

As part of a broader process to create an Enterprise Risk Management (ERM) approach to construction project risk, Zurich has analyzed the main risk elements associated with eight critical phases of a project lifecycle, as demonstrated on the Project Timeline below.

In this publication, we will address a number of risk management challenges that may arise at any stage of the project lifecycle. The articles aim to raise awareness of some of the critical risk issues associated with major construction projects. We will explore how with proper risk identification and application of appropriate risk avoidance, risk mitigation or risk transfer mechanisms, project owners and managers can increase the likelihood of their projects being delivered on time, on budget, safely and within desired performance parameters.

Within the pages of this Insight, it is impossible to address in detail the myriad risk management challenges and problems that can occur on a major construction project. At best, we can only scratch the surface. Our goal is to simply raise readers’ level of awareness of a few critical issues that should be taken into consideration as they begin evaluating their needs for major capital improvement projects and introduce the concept of a holistic, ERM approach to project lifecycle risk management.

We hope that you find this publication interesting and of value in your own project planning and execution and we would welcome your thoughts and observations.

Kind regards,

Terry Gray, Global Head of Construction – Zurich General Insurance

Terry Gray is responsible for developing and overseeing Zurich’s worldwide construction business. He has more than 24 years of financial and risk management experience, including six years in the construction industry and more than 14 years in the insurance industry.
New building products and processes demand more rigorous hazard analysis

A contractor in today’s environment faces challenges on many fronts. Changes in customer expectations, introduction of new building techniques and materials, along with the ongoing expansion of suppliers from around the world each provide an issue worthy of careful consideration. At a time when the world economy is slowly recovering from recession, the time and resources required to analyze risk are stretched to capacity.

While prudence dictates sound fiscal policies, both project owner-managers and their contractors must be careful to avoid returning to the ‘fly-fix-fly’ method of analysis. This can occur when assumptions are made about the quality and safety of materials and processes in the construction process.

While the movement to more sophisticated methods of analysis has taken place, it is worth considering whether your contractors have the appropriate triggers in place to ensure a proper analysis is conducted. Project owner-managers should consider whether any of the following events have occurred with regard to your project:
• Has your contractor recently changed suppliers?
• Has one of your contractor’s primary suppliers started utilizing a new manufacturer?
• Based on cost concerns, has your contractor made the decision to incorporate new or different products into your building process that have different physical or chemical properties from their predecessors?
• Is your contractor taking existing materials and now utilizing them in new applications?
• Have you made changes to your current building processes or procedures?
• Is your contractor now venturing into projects different from previous experience?

If your answer is yes to any of these questions, consider the following:

Successful contractors will indicate that they have moved well past a rudimentary, ‘after the fact’, method of analysis whereby you use a product or procedure, suffer a failure or fault, adjust accordingly and then move forward. Continually adjusting materials and processes based on changes in personal or industry loss experience may result in additional risk. Moving beyond this methodology is especially desirable in the early stages of the introduction of a new product or procedure since the ‘first to fly’ often suffer the most grievous losses.

In this competitive environment, many contractors are selecting new suppliers of materials based on costs or location of projects. While the materials themselves may be similar in design and application, the quality of the supplier and manufacturer should be examined. There have been several recent cases where manufacturers failed to meet minimum specifications, resulting in construction defects that overwhelmed both the supplier and manufacturer; further resulting in losses to the contractor and potentially the project owner-manager. Contractors should ensure that the companies in their supply chain build to appropriate standards and have quality control processes in place to ensure compliance with those standards. If there is doubt, the opinions of independent third-parties should be considered.
The drive for cost control or improved performance is leading to the introduction of new materials in all facets of construction. In some cases, these products are completely new in design while others represent a change in product composition. Experience has shown that even slight changes in product design, such as fittings, wiring, etc., can have major impacts on performance when introduced. When considering new products, contractors need to ensure that the material has undergone rigorous testing by recognized authorities to simulate the use, environment and lifespan of the intended application.

With increasing efforts underway to build ‘green’ in both residential and commercial projects, contractors will be utilizing new materials in traditional structures as well as traditional materials in new applications. While advancement in technology is positive, contractors must conduct quality assessments to ensure that they reflect changes in material selection or application. Again, the key is to ensure that quality testing involving the material simulates the environment in which it will be applied.

Given a challenging economic situation and the need to bring in new business, many contractors are expanding the types of projects they will consider, sometimes expanding beyond their traditional types of projects and comfort zones. However, when bidding and winning projects outside their ‘norms’, project owner-managers need to ensure that their contractors possess skills and knowledge both appropriate and transferable to the new project or the consequences in terms of quality, timeliness of completion and cost overruns may be significant.

In the course of operations, a contractor will make many decisions regarding material choice and application techniques. The sheer number of decisions required can overwhelm a company trying to ascertain their level of risk without some guidelines in place. There are a number of hazard analysis techniques available to the contractor that range from basic to the advanced. Each has a place and value depending upon the nature of the operation undergoing review and the depth of analysis desired. While the contractor needs to select the analysis method that best fits their operation, there are fundamental elements that should be included in any review.
The first element is a guide or ‘tickler list’ that assists the ‘evaluator’ or team in developing the ‘hazard assessment’. The guide serves to provide structure to the analysis and provoke thought and insight. Without such a guide, contractors will often fall back on personal or historical knowledge that can leave gaps in the analysis. Once the potential hazards are identified, the process should then assign a severity weighting. This measure indicates the potential magnitude of a loss event. While a primary consideration is financial, reputation, legal and other impacts of the loss event should be considered. Once a severity level is established then the analysis should assign a frequency rating for the event. Combined, these fundamentals will result in a ‘catalog’ or list of hazard scenarios that allow the contractor to decide what steps are necessary, if any, to protect the company from loss.

Completing an analysis of risk can seem like a time consuming and complex process, but can actually be completed quickly by employees with relevant skills. For complex reviews, third parties can be hired to assist with analysis as well as reviewing any hazard analysis completed by others. It is important to remember that if you fail to analyze risk prior to loss events you will likely be analyzing them after the event.
Hazard analysis and risk profiling help owners and managers deliver projects on time and on budget.

Even before ground is broken, a project hazard analysis and Total Risk Profiling™ can be indispensable tools to help owner/managers of major construction projects gain insights into controlling the significant risks inherent in any major project. Risk profiling can facilitate the identification of vulnerabilities and loss triggers, and encourage mitigation of potential consequences that could hinder the timely completion and margins of your projects.
As illustrated in the customer examples that follow, the benefits of a formal hazard analysis approach to project risk management include:

- identifying the greatest threats from a corporate/strategic perspective and/or the key risks to success of an individual project
- capturing the main elements of the risk mitigation action plan as agreed by the project team or senior business management executives
- indicating where resources can be most effectively deployed in the mitigation and/or transfer of the key risks, to improve project and enterprise profitability
- enabling full documentation of the project’s key strategic risks and satisfying the risk assurance requirements of the project and its stakeholders
- creating more relevant management information about project risks that can be applied to more efficient operation of both current projects and future tenders.

These benefits can be achieved through the utilization of focused project risk assessment methodologies designed to establish a practical risk approach that can yield long term value for the life of the project and beyond. Systematic approaches to hazard analysis deliver more effective hazard identification, assessment and risk improvement.
These kinds of project-oriented hazard analysis methodologies are generally applied from the ‘bottom-up’, and are more directly focused on the specific technical aspects of the individual project. This risk-based approach can pay significant dividends by helping project managers achieve effective on-time/on-budget completion of construction projects.

**Total Risk Profiling™ offers a broader view**

While hazard analysis is beneficial for managing on a project by project basis, there is a broader, more comprehensive approach called ‘Total Risk Profiling™’ (TRP™) that can deliver effective risk and opportunity assessment at the enterprise level. TRP™ can help you aggregate and apply the learnings of multiple projects toward more profitable management of current projects and more accurate bidding of future projects. TRP™ is a team-based, enterprise risk management methodology that employs a ‘top-down’ process, which is much broader in scope allowing you to identify strategic vulnerabilities, assess worst-case loss scenarios and address corresponding risks. TRP™ can help the strategic risk manager embed repeatable assessment processes and build a risk-aware culture, both within each project team and across the management of the enterprise.

The major goal of risk profiling is to improve the business decision-making process by identifying exposures early and suggesting mitigation strategies to reduce or eliminate such risks. Risk profiling is traditionally applied to business operations, project risks or new initiatives that have longer time horizons and/or enterprise scope. As seen through the diagram below and the following customer stories, there can be significant cost savings in using both hazard analysis and risk profiling methodologies for the early and repeated identification and mitigation of risks. This transparency can be especially important in today’s uncertain economic environment, as firms face different operating challenges and strategic directions.

**Example one: Managing the hazards of new plant construction**

Recognizing the growing importance of ethanol as an alternative fuel, a global agricultural products company saw an opportunity to respond to increasing demand by building two new ethanol plants in the U.S. Given the firm’s extensive experience acting as a general contractor on its own behalf, the company planned to act as the general contractor for the construction of its own plants. However, the firm’s prior experience as a general contractor was primarily the maintenance and repair of its existing plants, representing a level of complexity and risk considerably lower than building new plants from the ground up.

The underwriter on the company’s owner-controlled insurance program for its maintenance operations met with members of the customer’s management team to discuss the increased levels of enterprise risk associated with the ambitious project. These risks

---

**Application of hazard analysis**

Source: Zurich
mainly revolved around the project owner’s responsibility to choose prime and subcontractors who would reliably and safely complete the work within the timeframe and budget.

After intensive discussions and analysis, team members identified the inherent risks mainly as those associated with making the right decisions with regard to prime and sub-contractors. The insurance carrier agreed to provide the company with detailed information about contractor quality as well as insights on corporate structures and decision-making criteria that would help the customer more clearly identify its financial goals with respect to the construction projects.

The typical hazard analysis methodology involves getting all parties into a room at an off-site location with as much relevant project information as possible (project specifications, flow charts, etc.) to undertake an exhaustive review of potential risks across the lifecycle. The goal is to reveal inherent risks i.e. vulnerabilities or hazards, loss triggers and potential consequences that could represent significant threats to on-time/on-budget completion. In most cases, the hazard analysis process also involves a site visit and consultation between a risk engineering professional highly experienced in the discipline of hazard analysis and the project owner’s team, including any external engineering consultants or contractors.

Example two: Consistent hazard analysis helps reduce surprises

A global manufacturer of aluminum products has utilized hazard analyses time and again on a broad range of processes, including its own construction projects. The company’s main objective is to identify factors such as cost overruns, project planning, environment-health-safety (EHS) issues, constructability, operability, technology and other issues that may be relevant to ongoing decisions about a project. Utilizing a rigorous gated approach combined with robust safety management based on project risk analyses, the firm seeks to reduce surprises during project execution.

Another proponent of formal hazard analysis is a global mining and precious metals extraction firm that conducts exhaustive project reviews at approximately the 30-40% project completion phase. The company frequently utilizes established hazard analysis methodology as a key determinant before moving from one phase of construction to the next. It is not unheard of for a project to be suspended at one gate stage if risk profiling suggests that it may be potentially unprofitable. So valued are Total Risk Profilings™ by the company that it is now training its own engineering teams to conduct internal risk profiling reviews on a myriad of smaller projects across its far-flung, global operations.

These examples show how Total Risk Profiling™, risk profiling and project hazard analysis methodologies can seamlessly complement one another as tools to manage business challenges of various scopes. But whether Total Risk Profiling™ is applied for broader risk profiling or hazard analysis is used for individual project risk management, the fundamental value is similar – providing the owner/manager with enough relevant information and risk insights to make informed decisions about potential risks and management efficacy of any major construction project. A robust risk profiling and management framework can help increase sustainability by minimizing the potential for financial issues and other lifecycle threats to derail your enterprise.

Linda Conrad
Director, Strategic Business Risk Management, Zurich Risk Engineering

Linda leads a global team responsible for delivering strategic Enterprise Risk and Resilience Management (ERM) solutions and insights to multi-national customers.
Emerging markets

Balancing opportunity and risk in the emerging markets
Political risk is part of our world: social upheaval in Bolivia, reports of corruption in Thailand, interference by local authorities in China, terrorist bombings in Indonesia or a coup in Honduras. No region is immune. Yet in spite of these risks, many organizations are looking to emerging markets for future growth, often requiring new construction or the expansion of existing facilities to help drive that growth. In turn, construction project owners and contractors that had previously confined themselves to local or regional markets, are looking to emerging markets for future growth. And as companies of all types have expanded their global reach, their exposure to political risk has multiplied.

With economic growth within many emerging markets still positive, in spite of the global economic crisis, their appeal is strong. Continued positive growth rates in emerging markets are grounded in long-term demographic changes expected to take place in coming years. Estimates suggest that the world’s population will increase by two billion people over the next 30 years and another billion in the following 20 years. Nearly all of this increase will be in developing countries, according to the World Bank’s World Development Report 2006. For this transformation to take place, developing countries will continue to need an enormous investment in infrastructure. Companies expanding abroad to take advantage of emerging markets will also need to expand their overseas infrastructures, i.e. new construction or expansion of existing facilities. When functioning as project owner-managers, these companies face all the same political risks as their contractors.

Uncertain business climates
Economic and political reforms have thus far generally improved business climates in many developing countries, but the evolution has been an uneven process creating many uncertainties. Increased political stability and transparency in some emerging markets, such as the former communist states of Eastern Europe, have been matched by worsening conditions in parts of Africa, Central Asia and even Latin America. Changes in political leadership have often reversed the course of once-friendly governments, with contracts re-opened for negotiation, and government policies implemented to gain control of foreign-owned projects.

The biggest challenge and most common error that companies moving into emerging markets can make is to underestimate the political risks they face. Comfortable with the current political climate or the strength of their joint venture partner at the
At the outset of a project, the companies often fail to assess adequately the potential volatility of the country, region or partner on a long-term basis. They fail to realize that a partner with impeccable political connections can quickly turn into a liability with a change in regime.

Assessing the risks
The typical engineering and construction company understands construction risk extremely well, its customers fairly well, and foreign countries little, if at all. These firms may be the best in their class at erecting steel towers or designing and building hydroelectric dams, but don’t necessarily know how to begin assessing the political risk of a contract in certain emerging markets. The construction risk is familiar and quantifiable; the political risk is indefinite and new. Therefore, it is incumbent upon the project owner-manager to seek out appropriate guidance and counsel regarding the political, economic and social risks within countries where plans call for new construction or the expansion of existing facilities.

Growth in the emerging markets is often predicated on an assumption of stability and that fiscal and economic reforms will continue. But history has repeatedly demonstrated that economic growth in emerging markets is uneven, particularly where growth is isolated in certain sectors of the economy. Even model economies have succumbed to sudden economic downturns – often the forerunner of currency controls and restrictions in converting profits to hard currency for dividend payment or debt service.

Global protection
Given that political risk is largely unavoidable, the question hinges around how the risk can be mitigated. Evidently the contractor must be required to do a thorough analysis before any contracts are

Many governments of emerging markets are turning to the private sector to finance, build and deliver essential services, including telecommunications, energy, transportation and water services. Private sector builders and contractors are responding with a vigor not seen since the early 1990s to seize opportunities in developing regions, most notably in Asia, Central and Eastern Europe, and Latin America.

While offering enhanced opportunities, these projects also come with formidable political risks. Consider:

- abrupt changes in a host government, or a host government’s mindset, can lead entities or agencies to breach contracts or expropriate a builder’s or contractor’s equipment and other assets in a developing market
- the unlawful calling of guarantees and non-honoring of sovereign guarantees can cost a contractor its investment, in whole or in part
- an act of war, civil strife, sabotage or terrorism can damage or destroy a developer’s equipment or other physical assets
- a currency crisis can leave the infrastructure developer unable to convert currency or transfer it out of the country
- the wrongful calling of bonds, when a contractor operating in an emerging market is subject to the unlawful calling by the local government of various types of guarantees, such as bid and performance bonds.
signed. Understanding the political, economic and legal context of a country is the key. Utilize multiple sources in the beginning, since relying on a single source of information or legal advisor may lead to a myopic view of reality. Secondly, plan for contingencies. Conducting business takes more time in emerging markets. This includes the most routine functions, such as buying cement, to the securing of licenses and permits. However, more dramatic contingencies also need to be considered, such as civil unrest that may prevent the movement of workers and material or a rapid change in the security situation. These contingencies will almost certainly mean lost time and money.

Products such as political risk insurance, covering such risks as expropriation, inconvertibility or political violence, can be a key component of a company’s global risk management program. Political risk insurance provides balance sheet protection for catastrophic risks a company may be exposed to when it is operating in the emerging markets – for example, the seizing of heavy equipment or the inability to repatriate profits.

Using a global insurer with local market risk expertise and political knowledge will help owner-managers better mitigate political risks in emerging markets; therefore providing greater certainty that projects will be completed on time and on budget.

The risks of confiscation, expropriation and nationalization (‘CEN’) are just part of the many risks faced by companies doing business in the emerging markets. Zurich looks at numerous political, economic, historical and legal issues when evaluating the risk of CEN in a given country.

Project-specific characteristics, such as the sector (power, water and natural resource projects present a higher risk profile) or the contractual agreements (governments may not honor their contractual obligations in times of crisis) influence the CEN risk of a given project.

Source: Zurich
In recent years, many owners have considered using ‘alternative’ construction project delivery methods designed to improve the speed of construction, control risk and provide additional savings over the more conventional construction methods. Alternative methods include fast-track construction, joint venture with single or multiple partners, design-build, construction manager or general contractor at risk where the owner either directly hires or acts as the actual construction management entity.

It is important to note that if your company is not the owner of a construction firm, the management of a major construction project probably does not represent your major area of expertise. While your firm may have a division or group involved as construction professionals, the core focus of your company will necessarily remain on the manufacture, sales and delivery of your primary product.

It is in such situations where the construction professionals experienced in alternative project delivery methods can be highly valuable. Working in partnership with the owner-manager, the construction specialist can more effectively execute alternative delivery methods and allow the project owner to achieve the project goals while minimizing disruption and risk.

The owner seeking to use any of these construction alternatives requires access to a significant amount of experience in their execution. Perhaps even more important, the owner needs to exercise the correct foresight to engage construction industry leaders who can bring the proper perspective to the table. The construction partner chosen by the owner should offer a reputation based on trust, experience and a successful track record of project completion within agreed upon expectations.

For a joint venture partnership to be successful each partner must bring to the project both the skills and talents necessary to uphold their end of the agreement, but also the expectation that the other partner(s) will also follow through with their responsibilities. Each partner brings a unique perspective, talent and experience to the project. Correctly executed, all partners involved, including the owner, will benefit from the cumulative talent directed and focused at overall project success.

In fast track or design-build construction, the owner or general contractor must be able to successfully manage the construction process at an increased speed often being dependent on design build plans and just in time supply to be ahead of the fast-paced construction schedule. Where the owner is
engaged as the construction manager, or has taken on the responsibility of hiring one, the management skills and experience of the owner-manager’s team are often the deciding factor resulting in success or disappointment. Again the selection, management and partnership of the parties must be coordinated and focused if the project is to first attain, and then successfully execute a fast tracked project while minimizing or eliminating the increased risk factors imposed by a fast track project schedule.

In summary, when alternative project delivery methods are employed, it is often not the method selected that will ultimately determine a project’s success or failure, but rather the selection of the talent that will execute the method chosen. The owner should concentrate on first establishing the ultimate target of the construction process (the end game). Next, the owner must concentrate on partnering with a construction industry leader best capable of hitting the ultimate target. Ultimately, by working together and communicating clearly about expectations and goals, the partnership will select the best alternative method of project delivery to complete the project on time and on budget.
Pitfalls and challenges in the design and engineering process

Design errors are one of the major causes of construction cost overruns and delays. Past studies have shown that up to 75% of problems encountered during construction are generated in the design phase*. Constructability issues, incomplete plans and insufficient design details are some of the more common design errors/omissions encountered on construction projects. When these errors are not identified and corrected during the design phase, they are likely to manifest during or after construction. Consequently, they may result in more substantial delays and cost overruns.

Recent cases illustrate how design problems can severely impact project schedules and budgets:

On a US project, a geotechnical engineer incorrectly designed a foundation piling system. Several months after installation, the piles and corresponding structure began to experience considerable settlement and structural distress. Work on the project was stopped and the owner was forced to hire a third party to evaluate and remediate the problem. When the project was finally completed, it was nearly 200 days late and over budget by approximately USD 21 million.

On a commercial building project in the UK, a developer incurred over GBP 40 million in losses after a structural defect began to manifest in one of the buildings shortly after completion. The defect was attributed to improper structural design and the building was deemed unstable. As a result, the developer had to demolish and rebuild most of the structure. Although the developer’s loss included the additional costs to rebuild the structure, three quarters of their loss was actually attributed to consequential damages from the loss of use of the building during its closure.

The solution

Design errors can occur on all construction projects, but early identification of these errors allows for early rectification without significant impact to the construction. Some best practices that can help project owners to minimize the risk of severe design issues include:

Robust consultant pre-qualification procedures
Avoid selecting project design consultants on price or aesthetics alone. Instead, establish a pre-qualification process that also evaluates the consultant’s:

- direct relevant technical experience
- resources and ability to sufficiently staff for your project.

Typically, this should be provided to the project owner in the consultant’s ‘Statement of Qualifications’. This document should identify:

- project/professional references
- ownership/affiliations
- litigation history (Professional Indemnity claims)
- technical specialties
- organization and project management systems
- key members of your project team
- budget/pricing techniques
- proven experience with contemporary design techniques such as Building Information Modelling (BIM).

Establish early communication between all parties
Early involvement of all parties (owners, design consultants and contractors) during a pre-construction phase provides a better opportunity for everyone to understand project requirements and design briefs.

Allow sufficient time for the design phase
Fast track construction projects are under tight schedules and are more prone to design problems due to the limited amount of time available for design review and correction. Particularly when dealing with more complex or aesthetic designs, it is best to go for traditional procurement and ensure sufficient time is allocated to the design phase.

Use independent peer reviews when possible
As a best practice, engage a third party consultant or constructor to conduct design reviews and constructability assessments. A fresh set of eyes is better able to identify design errors and omissions.

Ensure your project is adequately insured
Make sure your design professionals carry a sufficient level of coverage under their Professional Indemnity (PI) policies. In both our claims examples, the project owners’ only way to recoup their losses was through pursuing the negligent design professional’s PI insurance. However, project owners need to be mindful of the fact that a design professional’s PI policy typically covers all of the firm’s projects and these policy limits may be impacted by other claims.

Design errors/omissions can be costly and while these best practices can help project owners to reduce the risk of a severe design related loss, they do not eliminate the risk entirely. To protect themselves from the unexpected, owners may want to consider an Owner’s Protective Professional Indemnity (OPPI) policy. OPPI is an umbrella-type project PI cover that sits above the design professional’s insurance and protects the owner in the event that the design professional’s insurance limits are insufficient for the size of the claim, are eroded due to other claims or were subjected to other events that might encumber the design professional’s limits.

Audrey Lau
Underwriter, Zurich Construction Professional Indemnity
Audrey Lau specialises in construction professional liability risks and underwrites annual and project specific programmes for contractors, construction professional service firms and major project owner/developers.

Tom Miller
Vice President, Zurich Construction
Tom is responsible for the underwriting management activities of Zurich’s Subguard® coverage and its Contractors and Architects & Engineers professional liability products.
‘Doing it right the first time’ is the goal of any practitioner in every field of human endeavor, whether laying a brick or writing a new software application. However, in few realms are the stakes of getting things right – or the consequences of getting things wrong – as high as in the arena of major construction projects, where errors can cost millions of dollars and months of lost production and profits.

Contractors and project owners around the world understand the importance of reducing costly, even potentially disastrous, construction defects. As the tempo of commercial construction picks up in the wake of the global recession, identifying, preventing and, when necessary, correcting construction defects will continue to be a major concern for project owners, who are the ones who ultimately must absorb the costs.

If work has to be redone after the project is built, these costs can be significant. Among the most serious construction defects are those associated with the primary building envelope, i.e. the interior and exterior walls and roof structures.

In situations of major leaks or settling, a $20 Million building could potentially cost $10 Million in re-work, penetrating and exhausting all insurance and resulting in huge business interruption costs.
Selecting contractors with formal quality management programs

For project owners, there are many benefits to working only with contractors having formal quality management protocols. For one, working with such a contractor will reduce project costs and completion time, while enhancing safety. For another, a robust quality management program is also likely to reduce the potential for construction defect claims and warranty call-backs, minimizing rework and punchlist items and reducing business interruptions for the project owner. The challenge to project owners is the relative scarcity of contractors and subcontractors with formal quality management programs – estimated to be only between 5 and 10 percent of the industry overall.

If there are many benefits to the project owner in researching and selecting contractors with formal quality management programs, there are also many obvious benefits to contractors as well. The maintenance of quality management programs creates a high-performance team atmosphere and a culture of continuous improvement, making it possible to work toward a zero rework environment. As a result, the contractor’s reputation for workmanship, efficiency and few, if any, reworks will result in referrals by satisfied customers.

Consequences of poor quality management can be dire

Construction defects due to poor quality management can be costly in the extreme, including the potential for serious injury or death. One such example was the 2004 partial collapse of Terminal 2E at Paris-Charles de Gaulle Airport, which took the lives of four people. The extremely advanced design, which included a high, vaulted ceiling, left little margin for safety in the event of construction defects that might compromise the structure.

Following a lengthy administrative review and enquiry, the collapse was attributed to a number of interconnected causes, rather than a single, overriding design or structural fault. The design of the arched, concrete roof proved to be insufficiently flexible to withstand normal stress factors. In addition, strength was further compromised by a series of openings and metallic pillars piercing the structure.

Zurich believes that as an industry, construction quality management systems are in an early stage of development – similar to where construction safety management systems were in the 1960s. But industry leaders are beginning to recognize and quantify both the direct and indirect benefits of robust quality management systems. From our own analysis of customer’s losses, we have determined a direct correlation between quality and safety excellence.

Specifically, our customers with the best safety records tend to be the same group of customers as those with the best quality records. The simple message is this: Construction companies with a track record of safety excellence tend to be better managed companies with more sophisticated quality management programs. Furthermore, better managed construction companies, having robust safety and quality management programs in place, are more likely to deliver your project on time and on budget.
Most common construction defects ('CD') reported

- Building envelope and structure
  - door, window and exterior wall deficiencies
  - roof leaks
  - damp proofing and waterproofing deficiencies
  - deck and balcony deficiencies
  - foundation movement.

- Infrastructure
  - drainage deficiencies
  - road and driveway deficiencies
  - electrical and High Ventilation Air Conditioning deficiencies – condensation
  - plumbing and other leaks to internal systems – ‘wet walls’
  - sound, vibration, odor, vapor transmission and code compliance deficiencies.

- Approximately 75 percent of CDs involve water in some way.

It was also reported that to minimize costs, construction was executed as closely to practical design limits as possible, allowing little margin for error. It is very likely that a robust quality management protocol throughout the construction process might have identified and corrected design and construction shortcomings as they occurred, saving both money and lives in the long term.

Zero defects the ultimate goal

Formal quality management programs will vary in detail from one contractor to another. However, there are a number of components and activities that owners should insist upon, including:

- 100 percent verification that every piece of material delivered is correct for the job. Roughly 20 percent of CD losses involve the removal and replacement of incorrect materials.

- Over-inspect early work to make sure crews are following instructions properly from the outset, with large numbers of photographs taken to document.

- The contractor and owner’s representative should do weekly quality tours to identify any non-conforming work.

- The pre-closure inspection should include the taking of additional photographs to document that work was completed properly and up to the design specifications.

The ultimate goal of any quality management program is the execution of a building project completed on time, on budget and with zero punchlist construction defects upon completion. An impossible goal? Not at all. It can and has been done by contractors with serious commitments to the maintenance of and adherence to formal quality management programs. The challenge for project owners is to investigate, choose and partner exclusively with general contractors that have demonstrated their commitment to such programs. Such a search process can make the difference between a project delivered on time, on budget and ready for business versus a costly remediation process that can result in months of lost production time and millions of dollars in additional expense.
Keys to improving quality
As the project owner-manager, the following points should be communicated to your contractor before and throughout the construction process:

• The contractor should develop a thorough knowledge of your needs and expectations as the customer.
• The contractor must improve processes that define, produce and support your products.
• Processes, not people are the problem.

• Gain control over processes by working with employees and managers to identify and eliminate process problems.
• Review process performance and make adjustments.
• Make every employee responsible for quality.
• Provide training resources, e.g. Risk Engineering.
• Measure and review process performance (metrics).

Using an effective photo documentation process before areas are closed-in or covered-up will assist in litigation – ‘prove your innocence, not defend your guilt’.

• Third-party inspection firms can and should be used to identify deficient areas of construction.
• Hire the best inspection company, not just the lowest price.
• Flood test a representative sample of windows/door assemblies to determine the quality of installations – 2.5 percent to 10 percent sample size is becoming an industry standard.
• Having an effective warranty call-back process in place that quickly addresses post-completion owner-customer service issues will reduce litigation.

Quality management ‘lessons learned’ – Keys to successful project delivery

• Have an effective document retrieval system for the time period of the statute of repose or other international legal time requirement where the work was completed.
• Document corrective actions made either prior to or after construction completion.
• Document ‘as-built’ construction conditions – maintain accurate record drawings.
• Select subcontractors based on past quality performance, not just price.
• Make sure your contractor provides adequate supervision of subcontractors’ installed work.
• Hire the following consultants if the contractor does not:
  – Design peer review consultant.
  – Waterproofing/Roofing consultant.
  – Sound and vibration consultant.

Richard Andrews, Senior Consultant, Zurich Risk Engineering
Richard has over 35-years of experience in the construction industry ranging from estimating, engineering, procurement and project management for Owner’s and General Contractor’s on a wide variety of project types. He has extensive construction claims preparation, evaluation, prevention, defense, settlement and dispute resolution experience.
Vendor selection/management

Careful vendor selection and management can help reduce default risk on capital projects

Organizations, both public and private, depend increasingly upon key contractors and supply chain partners for the delivery of goods and services that are critical to their key objectives and performance. The default of, or a failure to perform by a provider of services or a supplier can be disruptive, expensive and threaten the availability and delivery of key assets and services. Organizations can mitigate these risks by drafting sound contracts, conducting a diligent pre-qualification process and requiring adequate financial guarantees. Each of these are within the control of the employer engaging the delivery of goods and services. However, the delivery of the organization’s key assets and services is just as much at risk from the default or failure to perform of lower-tier subcontractors and suppliers. For this reason, it is important for the project owner-manager to understand the pre-qualification, selection and administration processes of the main contractor.

Subcontracting can be the largest risk for main contractors and presents the greatest threat to the successful completion of any project. Thus, a robust pre-qualification process prior to the awarding of subcontracts and diligent administration during the construction of the project is essential. These requirements are even more important during the economic conditions that the construction industry is currently experiencing. For example, your main contractor may have a subcontractor working on your project that is performing well. However, if that subcontractor is also working on other projects not being managed by your main contractor, and is not being paid by other contractors or project owners on a timely basis, the result may be cash flow problems that could ultimately lead the subcontractor to insolvency and default on your project.
With these challenges in mind, subcontractor pre-qualification is a very important and necessary process that should be implemented by main contractors to evaluate their subcontractors’ abilities to complete a specific scope of work according to the project design and specification, within the project schedule and budget. To ensure successful delivery by subcontractors, the following pre-construction activities are typically performed by best-in-class main contractors prior to awarding the subcontracts:

1. Utilize a comprehensive subcontractor pre-qualification form with annual updates that addresses:
   a. Capital – Subcontractor financial strength
   b. Capacity – Subcontractor management, experience and organization
   c. Character – Subcontractor references including litigation history

2. Conduct thorough pre-award meeting with selected bidders to address:
   a. Detailed pricing
   b. Clear scope of work
   c. Accurate schedules to complete work
   d. Adequate manpower, equipment and material procurement

3. Subcontract award:
   a. Engage best-qualified bid – subcontractor with the capacity and experience to complete the work
   b. Establish risk mitigation plans for higher-risk subcontractors
   c. Execute agreements prior to commencement of work
Once a contract is awarded, a diligent subcontractor administration process will implement best-in-class checks and balances to verify that subcontracted work is done according to the project design and specification during every step of the construction process. It requires estimators, project managers, quantity surveyors, onsite engineers, and anyone who touches the construction process to ensure the subcontractor’s work is compliant. Subcontractor administration processes including the following can ensure the project is completed on time, under budget and to the satisfaction of the project owner’s design team:

- Confirm that schedules of values reflect the actual work installed.
- Ensure work is installed according to the project design and specification prior to payment.
- Verify that the subcontractors’ own subcontractors and suppliers are paid with random spot checks.
- Obtain proof of inventories and bills of sale for materials stored offsite in adequately insured locations.
- Conduct weekly coordination meetings with all subcontractors; document and distribute minutes to all parties.
- Enforce the terms and conditions stipulated in the subcontract and supplier agreements.
- Verify that materials conform to approved submittals.
- Use mock-ups of assemblies prior to full production and third-party inspections wherever required to ensure work is compliant.
- Track and document deficiencies.

The main contractor may opt for the retention of a percentage of the subcontractor’s payment request as a key control that helps to mitigate loss in the event of a subcontractor failure. Similarly, a bond or other performance securities can offer some compensation for the loss suffered if a subcontractor fails to complete its contractual obligations. However, such forms of security, which are intended to benefit the main contractor, can create stress on a subcontractor’s balance sheet, which in turn can place solvency and performance at risk. Another option would be for the main contractor to seek insurance that protects its balance sheet against catastrophic losses resulting from a subcontractor default.

Ideally, the value of a well-managed subcontractor and supplier selection process, coupled with a robust subcontractor administration process, is the best avenue toward the mitigation of risk, particularly in an economic environment in which all parties must act with vigilance to achieve success for the project owners who are depending on them.

Daniel Faltermeier
Zurich Construction Specialty Product Manager
Subguard/OPPI

With over 25 years of experience, Daniel has spent his career working to identify and implement solutions to reduce cost of project risks, improve quality and performance. Daniel also monitors, evaluates and recommends innovative control methods for all types of construction projects.
A holistic healthcheck

All organizations share the need to ensure that major construction projects are delivered on time, on budget and with the appropriate level of quality and safety. However, the prudent oversight of construction projects is one dimension of risk management. The need for strong, 360 degree enterprise risk management (ERM) across the organization’s entire operational matrix reaches far beyond the requirements of time-limited construction projects.

In an effort to remain competitive and profitable, many companies are now undertaking projects and partnerships they have not experienced in the past. Some businesses are changing strategy as they explore joint ventures, or move from private to public projects which demand compliance with a different political and regulatory environment. There is also a shift occurring today in the staffing talent mix.

The construction industry is now building a different risk landscape. These new activities present potential growth opportunities, but they also force companies to operate in unfamiliar business territory. Given the challenges in the current economic environment, organizations have a greater imperative to find new tools to manage risks more holistically across the enterprise.

In considering the relevance and value delivery of an enterprise risk management to your organization, there are a number of questions that your management team should be asking. To that end, we offer some of them here:

1) Does your organization presently have an Enterprise Risk Management (ERM) policy that clearly articulates your company’s culture and that is supported by your senior management team?

2) Are ERM roles and responsibilities clearly defined for a Chief Risk Officer, audit committee, and other major stakeholders?

3) Has your organization determined a risk tolerance level to compare the impact of possible risk exposures against your company’s business objectives?

4) Is there a repeatable process in place that identifies potential events, both internal and external, that could have either positive or negative results?

5) Do you have a consistent methodology to identify the triggers or causes of the events identified, or to determine the frequency and severity of the event consequences?

6) Is there a method to evaluate the interaction or aggregation of multiple events?

7) Are risk solutions identified and action plans assigned to a ‘risk owner’ responsible for risk improvements?

8) Is there a plan to train, communicate and consult with stakeholders and decision makers at all stages of your risk management and business process?

9) Are policies and procedures established to allow for effective monitoring and controls including regular tracking and reporting, so the business always has a current view of the risk landscape of the business?

10) Are audit control points and compliance verifications incorporated in your ERM framework?
The answers that an organization gives to these questions will indicate whether it has a culture that embraces a 360 degree view of its various dimensions of risk. In an increasingly challenging business environment, successful organizations must use an enterprise-wide risk management approach to gain and retain market share, ensure the integrity and continuity of ongoing operations and achieve profitable growth. ERM can provide holistic risk information which can be applied to project management, capital expenditures or strategic direction, so your company can make profitable decisions with eyes wide open.
How to contact us

For more information, please speak to your local Zurich contact or broker.

www.zurich.com
Whilst all reasonable care has been taken to ensure the information contained within these articles is accurate Zurich does not guarantee its accuracy or completeness. Zurich is not responsible for any errors or omissions or for the results obtained from the use of such information. Zurich assumes no liability in connection with this publication including any risk management methods contained herein. The subject matter of these articles is not tied to any specific insurance product nor will adopting these methods ensure coverage under any insurance policy.

Zurich is a trading name for companies within the Zurich Financial Services Group. Zurich is a provider of insurance and related services through subsidiaries within the Zurich Financial Services Group including:

In the United States: Zurich American Insurance Company, 1400 American Lane, Schaumburg, Illinois 60196
In Canada: Zurich Insurance Company Ltd, 400 University Avenue, Toronto, Ontario M5G 1S9
Outside the US and Canada: (i) Zurich Insurance Plc, Ballsbridge Park, Dublin 4, Ireland; (ii) Zurich Insurance Company, Mythenquai 2, 8002 Zürich, Switzerland; (iii) Zurich Australian Insurance Limited, 5 Blue Street, North Sydney, NSW 2060, Australia; and (iv) further legal entities, as may be required by local jurisdiction. The insurance policy is the contract that specifically and fully describes the insurance coverage provided.