Proceed with caution: outsourcing engineering services abroad

Competition to come in with the winning bid for the job requires a skillful strategy. Larger companies are outsourcing engineering services to cheaper labour and facilities in developing nations–but this trend comes with its own set of concerns, says Nigel Histon, P.Eng., an industrial engineer who works for a U.S. engineering giant.

by Nigel Histon, P.Eng.

We are all familiar with the concern of "too little fee for too much work." Some of us can remember instances where too little fee has led to engineers short-cutting their work, not performing proper in-depth checks or assuming contractors will take responsibility. Then the project suffers a collapse or a similar disaster that leads to nationwide attention.

On the other hand, who among us doesn't like a bargain? Who among us hasn't heard of "overpaid engineers?" It's an old dilemma–how can we fix the fees so that we can win the work, do it properly, keep clients and perhaps shareholders happy, and feel value was gained at a fair price?

Outsourcing abroad

Today there is an alternative to the status quo. However, it is fraught with potential for concern–concern for the public whom we serve (protected until now through the process of licensing for Canadian engineers), concern for our profession, and concern for our ability as a nation to survive independently should we one day wake up and find that there is no more work for engineers in Canada.

This alternative, being pursued relentlessly by larger engineering firms, is to shift the work to another country. The developing nations of China, India, Philippines, Mexico and the old Eastern Bloc countries, such as Poland, all have large reserves of human resources, many knowledgeable and well trained, and all willing and able to work for wage rates of less than one-tenth of those in Canada.

Inexpensive office facilities rivalling any found in North America are available and, in our world of instant communication, setting up a computer network between an office in Alberta and one in New Delhi, for example, is easy to accomplish. Email and telephone communication is cheap and an accepted, effective way of communicating.

Preliminary conceptual design of just enough to define the project can be done in Alberta, or Ontario, and all detailed design can be done in India, the Philippines, China or wherever the "virtual office" is located. Given that in India, English is the common language for the highly educated, it is the country most favoured for "virtual offices," including banking, credit card companies and insurance.

Engineers and designers who interpret and use our codes, standards and specifications perform the work in India and return it to Canada via the non-taxable medium of email/computer information interchange. The completed work lacks only one thing for construction to begin–the required engineer's stamp or seal of approval on the drawings.

Companies pursuing work in this manner expect their Canadian engineers to "review" or "check" the work, then sign/seal it with their professional stamps. Here is where our concerns begin.

The Canadian experience

The largest engineering companies performing work in this manner have been able to open offices and staff them with locally available people of the highest quality. They have been able to impose their systems and organization for work processes. They can get work done quickly, sometimes efficiently.

But they cannot provide the "local experience" that allows Canadian engineers to be confident of their designs, such as an understanding of our summer and winter conditions and how they interact with our designed work, direct access to our code writers and universities to fully interpret code requirements in difficult situations, and an understanding of how and why our codes are written as they are. They cannot provide access to our societies and organizations within which professionals can discuss problems and solutions with their peers.

In short, there are many areas in which foreign engineers may make mistakes or poor decisions because they have no "Canadian experience" or understanding of our environment. Worst of all, they also have no third-party responsibility–only a responsibility to their companies, which, in the heat of the moment, is simply to get the work finished quickly.

Since there is no way for Canadian legal authority to be involved, there is no way for our engineering regulatory organizations to impose our standards of practice and ethics upon a foreign engineer.

Checks and balances

Now, let us review what happens when the work returns to Canada.

First, project managers, clients and contractors are all pushing for the work to be released as quickly as possible, because schedules are now all-important to the financial well-being of projects. The "stamping engineer" is therefore under great pressure to "review the work." In the minds of managers and senior officers of some larger engineering companies, a "review" to ensure that "the work is safe" should be the only obstacle to the professional stamping of the drawings.

In my experience, some managers have even stated: "In-depth checking should not be necessary once a degree of confidence in the work from the foreign office has been achieved." What is entirely forgotten or ignored is that by placing their seals and signatures upon documents, engineers are assuming all responsibility for that work. They are not saying: "This looks reasonable and I think the work may be constructed"; they are now fully responsible to the public (including the company and the client) for the complete integrity of the work.

In the event of a failure or collapse–or even just a complaint about the work–not only is the company liable, but so is the engineer. And an engineer's livelihood would be at stake if the engineer's professional licence were rescinded.

A question of ethics

It is neither uncommon nor unethical for an engineer, under certain circumstances, to sign and seal work that was performed by others. Take, for example, the case of a senior engineer supervising the work of junior engineers in training. In this case, they will likely be working in the same office. Certainly, they will meet and be able to discuss the work. A conscientious senior engineer will review daily what the juniors are doing. The work can truly be said to be accomplished "under the direct control and supervision" of the senior engineer.

However, upon a senior engineer sealing and signing the work, that engineer is taking full responsibility. The engineer would be professionally negligent if the work had not been fully checked. The same rules apply to work prepared "by others," perhaps overseas, given the trend toward outsourcing engineering work abroad.

Feeling the push

As licensed Canadian engineers, we are being pushed by some of the largest engineering companies to treat work done overseas in just the same way as if it were done in our own offices in our own country.

But is the work just the same? Are the processes no different to those used by the engineers around you? Given time zone differences that can be as large as 12 to 14 hours, is a phone conversation at 9:30 p.m., at home with no back-up data, as effective as a 15-minute, face-to-face meeting in the office? Almost certainly not.

Can a stamping engineer truly say of work prepared on another continent: "It was prepared under my direct control and supervision?" Emphatically not. Can the engineer even be sure that in complicated situations involving multi-discipline work, such as high-pressure piping, structural engineering, mechanical, process and electrical engineering, that proper integration of all work has been done? Do deflections of structure match and sympathize with those of pipe systems and vessels? Are system stiffnesses appropriately chosen? Unless the engineer is intimately involved in the complete design, there can be no assurance. All the engineer can do is check the work relating to the engineer's own discipline, which is just not enough. If the engineer then stamps and signs the work, I, for one, would consider the engineer to have acted unethically. But that is the pressure that today's engineers face from their employers.

Mass movement

In my work experience, some 70 percent to 80 per cent of the detailed structural, piping and electrical engineering within some parts of some of our largest petrochemical (oil sands) plants today is being performed by foreign engineers in developing countries. Within a year to 18 months, a similar percentage of mechanical, control systems and perhaps process engineering may follow suit.

Is this what we, as a profession, want? Does this allow us to perform our jobs in an ethical manner, properly designed and checked to be in the best interests and protection of the public?

Our engineering licensing and regulating bodies were legislated into being to ensure that we, as licensed engineers, are qualified for the work we do and that we perform it properly. Should engineers on other continents, who cannot be fully familiar with Canadian practices, winters, codes, culture, contracting abilities and preferences, costs, and so on, be licensed here?

I believe that, in many cases, it is simply not enough to pass a set of exams. Residence in Canada is necessary to experience our conditions, and time working here is needed to cement those experiences. Canadian residency also more easily enables the application of Canadian law to an engineer.

Made in Canada, please

I believe engineering is an essential part of Canadian sovereignty and integral to development of our infrastructure. As such, it must be controlled and properly administered by Canadian engineers, who must be in responsible charge of the work performed under us to the satisfaction of such third parties as our licensing and regulating bodies.

Mass movement of engineering work for the Canadian oil sands, refineries, aluminum smelters, etc. from Canada to elsewhere poses a direct threat and should be resisted with all possible strength. If not, we will wake up one day, very shortly, no longer responsible for any of this work ourselves.

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