



MTO adopts performance-based consultant selection system

by Donald C. Ingram, P.Eng.,
and Brian Peltier, P.Eng.

The Ministry of Transportation of Ontario (MTO) is using a new system to select engineering consultants aimed at increasing the importance of past performance in its selection process.

The new system, which became effective January 1, 2001, uses weighted scores for price, technical submission and *past performance*. Projects are assigned to the consultant with the highest total weighted score.

Starting in 1997, to get ready to implement the new selection system, MTO introduced a revised consultant appraisal system and built up a large database of appraisals. "Past performance" is measured by a moving, weighted average of each consultant's appraisals over the previous three years.

Previously, MTO selected most of its engineering consultants by calculating a "price/score ratio" for each consultant submitting a proposal. The revised selection process is intended to emphasize quality and performance on consulting assignments, as measured by the MTO appraisal system.

The new MTO consultant selection model was created in partnership with Consulting Engineers of Ontario (CEO). According to CEO, the changes are expected to reduce the influence of price on the ministry's consultant selection process and increase the influence of past performance.

In creating the new process, MTO and CEO reviewed best practices in other jurisdictions and then developed and analyzed

a number of options. The new model is based on the recognized need to:

- ◆ take past performance into account explicitly;
- ◆ remain sensitive to price to ensure value for taxpayer's money;
- ◆ not regulate the open marketplace; and
- ◆ be simple, objective, defensible and flexible.

MTO expects that the emphasis on quality in the new approach will mean fewer errors and omissions, more comprehensive alternative checking, use of the latest technologies, better risk management and better overall integration of design elements. Higher quality is also expected to result in fewer "extras" and claims during construction, and reduced infrastructure life-cycle and road-user costs. Extras are changes to the scope of work defined in the contract between the owner and the contractor.

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MTO's consultant selection systems

The sample calculation below shows how the transportation ministry's former "price/score ratio" system for selecting consultants worked. The price/score ratio was calculated by dividing each firm's price by the technical score assigned to its proposal submission. The project was awarded to the consultant with the lowest price/score ratio (firm C).

| Firm | Proposal Technical Score (Out of 1000) | Price | Price/Score Ratio |
|------|--|-----------|-------------------|
| A | 640 | \$250,000 | 390 |
| B | 560 | \$200,000 | 357 |
| C | 800 | \$250,000 | 312 (winner) |

The following sample calculation shows how the ministry's new consultant selection system works. Price, technical submission and past performance were scored and weighted for each firm's proposal. The weighted scores were then totalled, and the consultant with the highest total weighted score (firm A) was awarded the project.

| Firm | Proposal Technical Score | Weight (30%) | Weighted Score | Past Performance Score | Weight (50%) | Weighted Score | Price Score | Weight (20%) | Weighted Score | Total Weighted Score (Out of 100) |
|------|--------------------------|--------------|----------------|------------------------|--------------|----------------|-------------|--------------|----------------|-----------------------------------|
| A | 80 | 0.3 | 24 | 100 | 0.5 | 50 | 80 | 0.2 | 16 | 90 (winner) |
| B | 70 | 0.3 | 21 | 60 | 0.5 | 30 | 100 | 0.2 | 20 | 71 |
| C | 100 | 0.3 | 30 | 70 | 0.5 | 35 | 80 | 0.2 | 16 | 81 |

Engineering still a popular career choice, study shows

by Dwight Hamilton

From 1998 to 1999, enrolment in Canadian engineering schools increased at both the undergraduate and postgraduate levels. While more bachelor degrees were awarded in 1999 than the previous year, the number of postgraduate degrees awarded declined. The data is highlighted in *Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded, 1995-1999*, which was recently produced by the Canadian Engineering Resources Board (CERB) of the Canadian Council of Professional Engineers.

For the fifth year in a row, undergraduate enrolments were up, increasing 1.3 per cent from 1998 to 1999. More women are choosing engineering as a profession, showing the largest year-over-year increase in first-year students since 1992-93, and now make up 20.6 per cent of full-time undergraduates. Women are particularly attracted to biosystems engineering, where they comprise 41.7 per cent of the student body, along with chemical engineering (41.5 per cent) and environmental engineering (41.4 per cent). Computer and mechanical engineering are not as popular with women, comprising 11.8 per cent and 14.7 per cent female students, respectively.

Civil engineering continues to wane in popularity. From 1995 to 1999, undergraduate enrolments in the discipline decreased by more than 25 per cent. By contrast, undergraduate enrolments in computer engineering programs jumped 89 per cent from 1995-1999, showing the

highest growth of any engineering disciplines for that period.

In postgraduate engineering programs, the CERB study found an increase in enrolments from 1998 to 1999, bucking the trend of continuing decline shown in several previous years. Including part-time students, there were slightly more master's students (0.3 per cent) and doctoral candidates (3.2 per cent) than the previous year, mainly due to an increase in women enrolling as full-time students.

At the master's level, the largest increases were in electrical (15.2 per cent) and mechanical (10.6 per cent) engineering, while at the doctorate level, the biggest gains were in civil (9.3 per cent) and electrical (8.5 per cent) engineering. The most popular areas on a full-time basis at both levels were electrical, followed by civil and mechanical engineering.

As for trends in degrees awarded, the study found that the number of students graduating from undergraduate engineering programs is on the rise. There were about 2 per cent more undergraduate degrees awarded in 1999 than in 1998, with almost 70 per cent going to Ontario and Quebec graduates.

All disciplines showed growth in the number of undergraduate degrees granted, except for geological, chemical, industrial, manufacturing and civil engineering. Electrical and computer engineering were the top gainers, and civil engineering showed the largest decline. Between 1995 and 1999, the number of civil engineering degrees awarded fell by 28 per cent.

Graduation at the postgraduate level is showing a downward trend, with 13 per cent fewer master's degrees awarded in 1999 than in 1998, and eight per cent fewer doctorates. Since 1995, the number of master's degrees awarded has declined by 22 per cent, and doctorates by about 16 per cent. The study report attributes the decline partly to the drop in the number of visa students pursuing postgraduate engineering studies in Canada.

Report predicts shortage of environmental workers

by Dwight Hamilton

A comprehensive report on the state of the Canadian environmental sector says broad-based skills shortages are expected in the near future. *Human Resources in the Canadian Environmental Sectors: Final Report 2000* combines the results of a 1998 survey of employers of environmental practitioners, as well as focus groups that included representatives from the environmental industry, academe and government. The report was produced by the Canadian Council for Human Resources in the Environment Industry (CCHREI), a not-for-profit organization dedicated to human resources development.

The report states that, in 1998, about 9500 public and private organizations employed approximately 102,000 environmental practitioners in the following sectors:

- ◆ environmental industry—44 per cent;
- ◆ government—24 per cent;
- ◆ other industries (e.g. mining, oil and gas, etc.)—23 per cent;
- ◆ non-governmental organizations—5 per cent;
- ◆ academic institutions—3 per cent.

Of the more than 3000 organizations surveyed by CCHREI, 78 per cent said they were looking for new staff at the time. Most in demand were personnel in engineering, environmental studies and science and engineering technology. The report states: “persistent difficulties are expected to continue” when recruiting computer programmers, technical sales specialists, hydrogeologists, engineering technologists and chemists. The report estimates that current demand will increase the workforce of environmental practitioners by 14 per cent by 2001.

To compound the situation, many environmental workers are close to retirement age. Focus group participants noted that “very large numbers” of practitioners will be retiring in the next five to 10 years, and that many organizations have no succession strategies to deal with the situation. The reason? Most firms in the environmental sector employ fewer than 50 people and half employ fewer than 10, explains Grant Trump, president and chief executive officer of CCHREI. As a result, most are focused on the immediate short-term demands of running their businesses and ensuring they make it to the next quarter. “One of the problems with the consulting engineering side is that the margins are thin. When you start to talk about HR concerns, they roll their eyes back in a big hurry,” he says.

Another issue identified by CCHREI’s research is the need for skills upgrading. About 82 per cent of participants in the 1998 survey said the practitioners they



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currently employ need to upgrade their skills in oral and written communications, business/management and computers. Survey results indicate that poor communications skills are most acute among young employees.

To address human resources issues in the industry, CCHREI has teamed up with a division of the Council of Ontario Universities to form the Environmental Recruitment Retention and Learning Project. It's an effort to get education providers and small- and mid-sized businesses to work together to upgrade the skills of current environmental practitioners, and to recruit new graduates.

What if this shortage in skilled people is not addressed in time? Trump believes that most small businesses in the industry would likely fold, representing lost business opportunities for Canada. "There are lots of companies outside our borders that are willing and able to do what Canadian companies can't," he says.

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They can result from unforeseen site conditions, errors or omissions in the contract documents, modifications to the project requested by the owner or other factors that were not within the contractor's power to control or anticipate.

A comparative analysis of the old and new consultant selection systems indicates MTO's total costs for engineering consultants may increase marginally with the new system. MTO is treating this as a business investment and expects a good return on the investment in terms of higher design quality.

To ensure that value for money is achieved, MTO's Internal Audit Branch is conducting a "before/after" design quality review. This two-part audit includes conducting an assessment of design quality achieved under the old system. After the new system has been in place for one year, a similar assessment will be conducted. It is anticipated that this review will be concluded in the fall of 2002.

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Associations tackle misuse of engineer title in industry

P.Eng.

by Dwight Hamilton

The word "engineer" will no longer appear in any of Sun Microsystems Canada Inc.'s job titles used in Alberta unless the employee is a licensed P.Eng., thus complying with the province's Engineering, Geological and Geophysical Professions Act.

After two years of discussions with the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA), legal action was averted in December 2000 when the company agreed to restrict the job title's usage.

Letters had been exchanged between APEGGA and Sun Microsystems when "something happened within Sun Microsystems. Cooler heads prevailed and, all of a sudden, we got a letter from their lawyers stating that they were going to comply," says Dave Todd, P.Eng., director, compliance for APEGGA.

The association pursued legal action against one of Sun Microsystems' employees after learning that he was misrepresenting himself by using "engineer" in his

job title when he was not a P.Eng. Because the public may be misled to believe a person with such a title is a professional engineer, APEGGA is concerned about the proliferation of job titles like "systems engineer" and educational certificates such as "Microsoft Certified Professional Systems Engineer." Says Todd: "If we feel the public could be misled, we pursue it."

But how tough is it to stop multinational corporations and course providers with very deep pockets? "We've got some [providers] that are using the word 'expert' now instead of the word 'engineer,'" he says. But, explains Todd, the enforcement provisions of Alberta's Engineering, Geological and Geophysical Professions Act enable APEGGA to target only corporations and individuals who misuse the word "engineer," not schools.

So when APEGGA held various information sessions for providers of Microsoft training courses to outline APEGGA's regulatory role, more than one of them complained to Microsoft over what they believed to be unfair interference. "That got their ear," says Todd. Subsequently, the company wrote APEGGA a stern letter requesting that it stop pursuing the matter, which helped initiate talks between Microsoft and Marie Lemay, ing., chief executive officer of the Canadian Council of Professional Engineers; Neil Windsor, P.Eng., executive director and registrar of APEGGA; Claude Lizotte, ing., director of professional affairs, Order of Engineers of Quebec; and Roger Barker, P.Eng., CEO and registrar of PEO.

The group met last October in Seattle, Washington, with four managers from Microsoft's training, certification and skills assessment areas and were "given a full opportunity to express our concerns," says Barker. "They were sympathetic to our position, and promised to give the issue full consideration and get back to us," he says.

At press time, the group had received no response from the company, but at least the issue "is in the arena now where it should be," says Todd. "If we can get Microsoft to change its program, it will be done worldwide."