



Risk Aversion ...

The public generally takes the safety of their structures for granted, and for good reason. A landmark study by R. E. Melchers in 1987 compared the annual risk of death due to a variety of activities. He found that smoking is a high-risk activity, with 1,000 deaths/million smokers/year. Automobile travel is a moderate-risk activity, with 210 deaths/million riders/year. Structural failures, however, cause only 0.12 deaths/million users/year. Structural engineers can claim most of the credit for this.

During their years in college, structural engineering students are taught that failure is never an acceptable option. They learn that the consequences of a structural engineering mistake can often be severe. A building or bridge collapse can injure or kill hundreds of people and the economic loss can be enormous.

As structural engineers enter the profession, the importance of avoiding mistakes is repeatedly stressed by their employers and professional liability insurers. They learn the financial realities of their profession. Based on revenues, structural engineers have the highest claims of all engineering disciplines. Their average individual claims are higher ... about three times higher!

With these concerns firmly established, the structural engineering profession has become very averse to risk. This approach has certainly served the public very well, but risk aversion is now threatening the prosperity of the profession.

A century ago, many structural engineers worked as master builders. They took responsibility for most aspects of their projects, including planning, design, financing, construction, and maintenance. Eventually, due to liability concerns, they began to limit their

responsibilities. Today, structural engineers typically limit their services to analysis, design, and construction observation.

In addition, structural engineers have generally accepted an environment driven by increasingly prescriptive codes and standards. To avoid risk, few venture beyond a strict interpretation of the many requirements stated in these documents. Consequently, they are sometimes viewed by the public, not as professionals, but as technicians who meticulously follow "recipes" to produce adequate designs. In this environment, they have mostly abandoned their ability to exercise professional engineering judgment, which is the very essence of their professional engineering licensure.

Continuing on the current path will lock structural engineers into a supporting role in a shrinking profession bound by prescriptive design requirements. It will be a profession with diminished stature, one that will be less rewarding to practitioners and less appealing to bright students. With the added pressures of automation and globalization, the profession might eventually face obsolescence.



To avoid this, structural engineers must find a new path outside their current comfort zone. They must learn to actively manage technical and business risk on all of their projects. To become more creative and innovative, and thereby offer more value to their clients, they must be willing

to accept reasonable risk. Most importantly, they must make professional engineering judgment the primary reason why structural engineers are valuable and why creative people aspire to be structural engineers. One accepted method of doing this today is performance-based design. This offers an opportunity to step beyond the requirements of current codes and standards.