



**Following the Dinosaurs ...**

Structural engineers have always been attracted to mathematics and often spend most of their workdays solving equations. It should be no surprise to learn that they take to computers like fish take to water. Computers have been central to their work for decades.

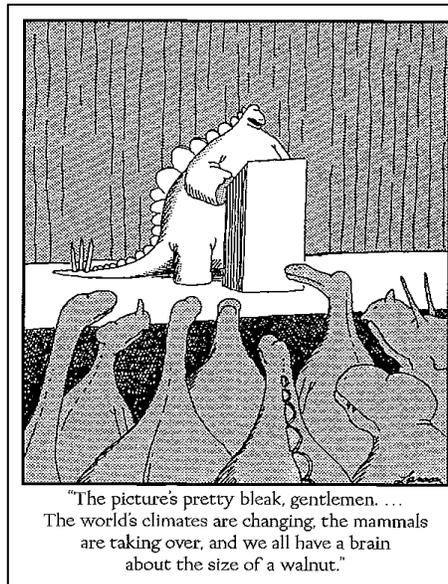
In the 1970s, structural engineers were the first to use computers for stress analysis. In the 1980s, they were the first to use computers for steel and concrete design. In the 1990s, they were among the first to transition to computer-aided-drafting (CAD). In the 2000s, they emerged as leaders in building information modeling (BIM). Now, they are actively experimenting with paperless projects, where all design and construction documents are electronic.

Structural engineers have greatly benefitted from the use of computers. It has freed them from the drudgery of manual calculations, allowed them to study multiple alternatives, and enabled them to quickly make changes with relatively little effort. However, rapidly advancing computer technology now threatens their future livelihood.

Fully automated structural engineering services loom on the horizon. When existing 3D analysis and design software is fully integrated with current 4D and 5D BIM software, probably sometime within the next five years, the heavy lifting will have been completed. All that will remain is the relatively easy task of adding a front-end user interface with cloud-based databases for site-specific code requirements, environmental loading conditions, and real-time cost and schedule data.

At that point, a “designer” can start the software; enter the project location, basic geotechnical parameters, project geometry, and any constraints or preferences; and push the Easy Button. The software will then retrieve local code, environmental, cost, and schedule data;

prepare multiple designs in alternative materials; and present the results within a matter of minutes. The “designer” will choose a preferred design, and the software will then produce a complete package of electronic construction documents. The “designer” might not always be a structural engineer. The Easy Button could be pushed by a civil engineer, or an architect, or a technician, or someone on the other side of the world. This is not a farfetched prediction. Many believe that it is inevitable within twenty years.



Today, most structural engineers spend their time designing beams, columns, frames, and the like. They do not lead their project teams, their firms, their profession, or society. Preferring to avoid risk, they seldom innovate. Instead, they believe that good, code-compliant design work is their highest calling, and they derive great satisfaction watching their designs become reality. Within twenty years, many will be just as obsolete as bank tellers, encyclopedia salesmen, travel agents, and telephone operators. Most of their traditional structural

engineering work will have been replaced by automation. Without substantial change, it has been estimated that the structural engineering profession might shrink by as much 80%.

Like the dinosaurs of 65 million years ago, structural engineers must adapt or they will face a very bleak future. They must learn to “swim upstream” and create value to replace their existing work, which will be going away. Their profession must ultimately be reinvented. The Structural Engineering Institute (SEI) completed a comprehensive study on the future of the profession last year. They concluded that future structural engineers must emerge as leaders and innovators. Unfortunately, most structural engineers are neither today. Bridging the gap will take time, and the process must start immediately. Recognizing this, SEI has recently embarked on eight new future-oriented initiatives ranging from education reform to international outreach. Stay tuned ... change is coming.