

## **A DAY IN THE LIFE**

Structural Engineering is the profession that deals with the frame work or skeleton of buildings, bridges, towers, stadiums, tunnels, roller coasters and monuments – in short, virtually every piece of the world's built environment. Originally engineering was a military activity. As time passed, the benefit of engineering in non-military activities was recognized and engineering subsequently divided into two disciplines: Military Engineering and Civil Engineering. Soon other disciplines—Mechanical Engineering, Electrical Engineering, Structural Engineer, Chemical and Petroleum Engineering, and others—developed from Civil Engineering. Some famous structural engineers in history include Washington Roebling (The Brooklyn Bridge), Gustave Eiffel (The Eiffel Tower), and William Le Baron Jenney (Home Insurance Building in Chicago).

To complete any project, it now takes a team of professionals that includes structural engineers working with other disciplines including mechanical, geotechnical, electrical, and civil engineers, urban planners, and architects. These teams are selected by governments or owners of properties that would like to have something built, such as, the Louisiana Superdome, The Channel Tunnel, the Hoover Dam, the Sunshine Skyway Bridge, and the myriad other buildings (from skyscrapers to houses), bridges (from long span cable-stayed to one-span rural country road bridges), tunnels, monuments, domes, sports arenas, and amusement park rides. Today, in the United States, most structural engineers (SE) are employed by small privately owned firms comprised 1-30 employees, and many structural engineers have ownership positions, as partners in these firms. A number of engineers work for larger firms and some SE's are employed by government agencies that supervise or design public works projects, civil infrastructure, or enforce building construction regulation.

The main duty of the SE is to ensure public safety and to serve the client's interests in meeting the appropriate standards and legal codes. The SE accomplishes this by designing the components of the structure that hold its contents, such as the people or items in a building or the vehicles on a bridge. In buildings, SE's design roof framing (beams, rafters, joists, trusses), floor framing (floor decks, joists, beams, trusses, girders), arches, columns, braces, frames, foundations and walls. In bridges, they design the deck - or riding surface, girders or stringers, and piers. The materials they use include steel, concrete, wood, masonry, and aluminum. Engineers design the structure to resist forces from gravity, earthquakes, high winds, water, soil, collisions, and blast explosions. SE's develop their designs by performing calculations of the framing components often using complex design and analysis computer programs. The results are drawn on a set of plans. The drawings are then used by a contractor to price and build the structure.

The job is both an art and a science. SE's must educate themselves throughout their careers to adapt to new materials, construction methods, code changes, and the tools used for the trade such as structural design and analysis software. The profession can be very demanding, challenging, and stressful, but, is a very rewarding career. "One of the greatest joys is seeing a project under construction and then walking into, or driving on the finished product" one SE wrote. Within structural engineering, there are many specialties for certain types of buildings or bridges depending on the materials or method of construction. It is a good idea for engineers early in their career to become involved in the design and analysis of as many different types of structures as possible, both to gain knowledge and to determine the most enjoyable career path for them. Later in a SE's career, one may tend to specialize in a particular area of structure such as high rise building, long span bridges, electrical towers, power plants or amusement park roller coasters!

## **PAYING YOUR DUES**

SE's must have a college degree in Structural Engineering, Civil Engineering with emphasis on structures, or an Architectural Engineering degree. Many structural engineers today hold a Masters Degree and some obtain PhDs, though this is not required for practice. Usually, just prior to or after completing a bachelors degree, engineering majors take an exam on engineering fundamentals which once passed earns the designation of



engineer-in-training. Early in their careers, SE's are mentored by senior staff members. This is as critical as their college education, which lays the foundation to make the engineer recognize critical components and ask the mentor what options they have to tackle the problem. Professional Licensure is the next step in demonstrating competence in the field and may generally be obtained four years after graduation from college. The highest paid and financially comfortable engineers are those who have a keen understanding of the process of construction, can deliver projects on time, on budget, and can communicate their goals and their clients' goals effectively.

### **ASSOCIATED CAREERS**

Many structural engineers entered the profession because they love the process of construction. Many structural engineers move out of the pure design or analysis aspect of the business to become consultants for builders, material suppliers, municipalities, government agencies, and the legal profession. Engineers may be called into court to explain why things may have gone wrong on a project or to testify that other engineers performed their duty satisfactorily. Analytical training makes them well suited to solving complex problems in many fields.

For more information on the life and practice of the structural engineer, follow the links below:

[www.NCSEA.com](http://www.NCSEA.com)

[www.SEInstitute.org](http://www.SEInstitute.org)