

The civil engineering profession has the ability to greatly impact society through design, production, and construction; therefore, advances in our industry are critical to the advancement of the surrounding world. There have been many advances throughout the civil engineering field that have allowed for positive impacts on people and the surrounding environment. For example, the historic development of mass-produced steel beams has changed the way our cities look and reduced the amount of land needed in urban areas. These advancements have been critical to the continuous field of civil engineering, and innovations continue to advance the civil engineering field every day. In the near future, I believe augmented reality (AR) will further advance and become a critical turning point for civil engineering. Thus, from the invention of mass-production steel in 1855 to the upcoming advancements in AR technology, the field of civil engineering continues advancing to meet the needs of the changing world.

The mass production of steel beams has been termed the Bessemer process after Henry Bessemer. He invented the first process to mass-produce steel inexpensively, allowing for taller and taller buildings to be designed and constructed (Bellis). The Bessemer process was first used to create the 10 story Chicago Home Insurance Building in 1885. Quickly, this steel manufacturing process led to the development of skyscrapers, with the 10 story building being replaced by the 45 story Field Building in 1931 (Bellis). This advancement led to the addition of skyscrapers to the skyline of cities all over the world. It allowed for an important turn throughout urban construction and development. Cities were able to gain more office space and apartments without continuous horizontal development. With the increase in skyscrapers, less natural land had to be developed for buildings. This created a more consolidated urbanization, helping not only increase the number of people working in the city, but also helping more of the natural environment remain intact. The Bessemer process for manufacturing steel continues to be used today as skylines are filled with skyscrapers, creating a constant reminder of the tremendous work in the civil engineering field.

While mass-produced steel and skyscrapers continue to be an important aspect in the civil engineering profession, ongoing advancements in augmented reality are going to make a big impact in the civil engineering field in the upcoming years. Augmented reality is defined as “a live, copied view of a physical, real-world environment whose elements are supplemented by computer-generated sensory input” (Yoders). This technology is being more integrated into the field and being used throughout design and construction practices. AR systems will soon be used to identify existing underground utility systems, reducing the time needed for underground mapping. A device using smartphone and GPS technology will be able to visually display the systems underground. Augmented reality will also be used largely to give stakeholders and designers a realistic experience of what finished designs will look like in the proposed natural environments. This will allow owners and stakeholders to better understand the appearance of their finished products (Yoders). Additionally, AR systems will be able to increase the workforce by using visual systems to assist crafts in the field. Step-by-step assembly directions will appear on the screen, so workers spend less time learning the skills and put them to use faster. Inspections and quality control will become faster through AR by comparing the BIM model to the existing conditions in the field. These technological advancements will allow for higher owner satisfaction rates, increased productivity, and superior quality products.

In order to keep up with the constantly advancing world, the civil engineering profession continuously develops to meet the needs of people and the environment. From the advancement of mass-produced steel in skyscrapers to the upcoming use of augmented reality, civil engineering will continue to make a lasting impact. It is our responsibility to realize this impact, use the constant developments to our advantage, and positively contribute to society and the environment.

Bellis, Mary. “The First Skyscrapers.” *ThoughtCo*, ThoughtCo, 16 Dec. 2018, www.thoughtco.com/how-skyscrapers-became-possible-1991649.

Yoders, Jeff. “What Is Augmented Reality, and How Can It Help Architects and Contractors?” *Redshift*, Autodesk, 12 June 2018, www.autodesk.com/redshift/what-is-augmented-reality/.