2A Highlights in the History of Engineering

Among the great engineering achievements of history, we would typically list (along with approximated dates) the following advances:

- The pyramids of Egypt (2400-1700 BC)
- Roman roads and aqueducts (312 BC to 500 AD)
- Water-powered machinery (300 BC to 1900 AD)
- Windmill -650
- Crankshaft design (Al-Jazari) -1206
- Mechanical clocks (1350's)
- Steam engine (James Watt) and steam-driven factories (1757-1890's)
- Industrial Revolution (1760-1850)
- Steamboat (John Fichwas, Robert Fulton) (1807)
- Steam powered locomotive (George Stephenson)-1814
- Mechanical engineering as a separate discipline - 1847
- Transcontinental railroad (1850-1869)
- Telegraph (Samuel Morse)-1837
- Four stroke internal combustion engine (Nikolaus Otto) (1876)
- Electric light bulb and DC electricity (Thomas Edison) (1879)
- Automobile (Karl Benz, Gottlieb Daimler)-1885-1889
- Electrical power generators (Nikola Tesla) (1895)
- Auto factory-assembly line (Henry Ford)-1908
- Airplanes (Wright Brothers) and modern airports (1910's onward)
- Electrical engineering as a separate discipline -1882
- Electrification of American cities -1890-1930
- Digital computer (ENIAC by Eckert and Mauchly) -1946
- Transistor (Bardeen, Brattain, Shockley)-1947
- Interstate highway system-1956-1991
- Space program (NASA) (1960's and beyond)

- Moon landing (1969)
- The Internet (1973 and beyond)

Other than attaching the name of James Watt to the efficient steam engine, Henry Ford to the auto assembly plant, and the Wright brothers to the first successful flight, most people don't know the individual names of most of those who made the earliest or the most recent contributions. Most large-scale engineering projects involve dozens or hundreds of people in a variety of roles. In general, engineers are not in the profession to become famous, although innovators (who are often specialists in a certain area) are often recognized. Robert Lucky writes this.

> *It seems to me that almost all the IEEE major awards go to specialists. IEEE Fellows and members of the National Academy of Engineering get elected because of specialties. Most of the important innovations in our field have been made by specialists. Many of the engineers who have started important tech companies have done so in the field of their specialty. Of course, some of these famous engineers could be real engineers, but their success and fame was initially due to their mastery of a specialty…Yes, we need and respect real engineers, but the pathway to success seems to lead through specialization. Our world is too complex. The most successful among us begin as specialists. Some of the best then become generalists later, showing innate skills in management, interpersonal skills, communications, and business. It's an academic argument, literally. Should the education system focus on producing "real engineers," or has our field become so splintered and complex that early specialization is a necessary step to an employable skill? [1]*

Reference

1. Lucky, R. L., Are Specialist Engineers More Successful?, *IEEE Spectrum*, November 2019.