

THE PRACTITIONER

A monthly newsletter of the Energy Facility Contractors Group's
Project Delivery Working Group



EFCOG

Issue 48

July 2023

Summer is busy — have fun and stay safe!

Greetings Project Delivery Working Group (PDWG) Team Members! Spring has come and gone, and we are in the early weeks of summer. Busy time for work and home with everyone going in many directions. Kids are out of school for the summer, with some heading off to high school or college in the fall. Some have graduated from college and will be starting their chosen careers. What ever the case may be, safety and security in both the workplace and at home are key. Best wishes for all for a healthy, happy summertime of fun! With that, let's jump into this month's *Practitioner*!

Annual Meeting of the Energy Facility Contractors Group

The annual meeting of the Energy Facility Contractors Group, or EFCOG, took place in Washington, DC, on June 21-22. EFCOG promotes excellence in all aspects of the operation, management, and integration of DOE facilities in a safe, environmentally sound, efficient, and cost-effective manner through the ongoing exchange of information on lessons learned. EFCOG has over 100 member companies, with projects representing over two-thirds of DOE's overall budget.

The content of the meeting's presentations came in three primary forms:

- 1) Out-briefs from the Working Groups which comprise EFCOG;
- 2) Presentations from DOE leadership regarding the status of their organizations, and;
- 3) Two different panel discussions.

The contractor working groups are:

- Communications
- Cybersecurity
- Operations
- Project Delivery
- Safeguards & Security/Safety
- Supply Chain Task Team
- Sustainability & Environment
- Training
- Waste Management

The Project Delivery Working Group, which has the charter to “to seek out, promote, and share the best practices and processes for successful project delivery at DOE facilities”, is structured as shown on the next page.

This year marked the largest group in the history of annual EFCOG gatherings, and next year's meeting will likely move to a new venue that can accommodate a larger audience.

Amy Basche is the Chair of the Project Delivery Working Group; in her presentation she covered several topics. First was a transition of leadership positions, with Lisa Cazalet of

Concludes on next page

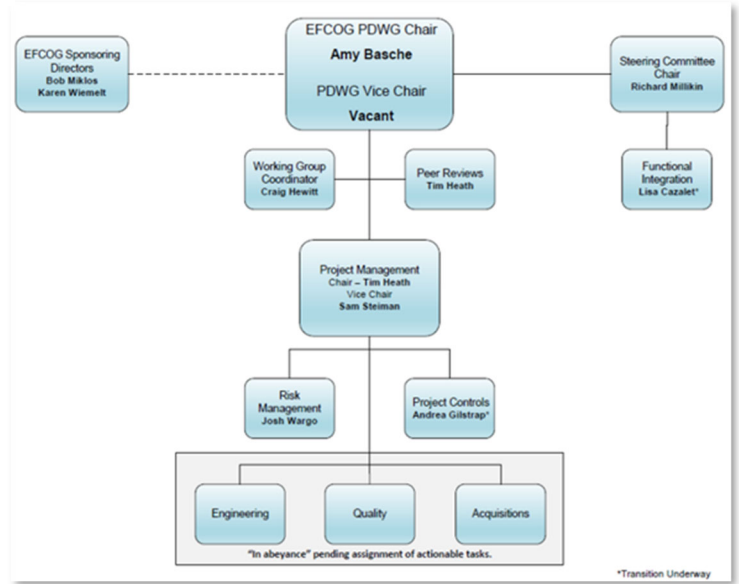
EFCOG Annual Meeting

Concluded from previous page

Consolidated Nuclear Security moving from Project Controls to Functional Integration, and Andrea Gilstrap of Idaho National Laboratory taking over that team.

PDWG key achievements in 2023:

- Facilitated implementation of the PM Maturity and Environment Total Risk Rating (METRR) tool – Complete and now a Best Practice
- Project- Subproject path forward/ Understand the PARS driver - Draft Complete
- Created a standard form for a Corrective Action Plan – Complete and now a Best Practice



Structure of the EFCOG Project Delivery Working Group

- Publish a Monthly Newsletter – Ongoing

PDWG key focus areas planned for 2024:

- Support DOE efforts in the development of DOE guides and revisions. Upgrade to 413.1B planned in FY24.
- Continue to provide Project Peer review candidates based on DOE request.
- Coordinate a joint Project Management Risk approach.
- Understand DOE project path forward for Net Zero-Carbon free project execution.
- Provide collaborative earned value compliance support to the Office of Project Management Oversight and Assessments (PM)/(PM-30) and EM-5.22 as requested.
- Improve integration aspects of Project Controls, Estimating, and Risk through survey and lessons learned.

Links to the EFCOG Annual Meeting Presentations can be found here: [Library – EFCOG.org](https://www.efcog.org/library); then “Meeting Proceedings” and “2023 Annual Meeting.”

THE PRACTITIONER

Published monthly for the EFCOG’s Project Delivery Working Group by:

Craig Hewitt

(writer/editor)

(509) 308-2277

Craig_T_Hewitt@rl.gov

Adam Russell

(writer/publisher)

(509) 376-5742

Adam_Russell@rl.gov

Tony Spillman

(managing editor)

(509) 372-9986

Anthony_W_Spillman@rl.gov

For questions, comments, story ideas or other correspondence, call or e-mail Craig Hewitt at the contact information above.



Ch-ch-ch-changes for DOE O 413.3B are Final and Approved

Yep...”LTD” changes have been made and are summarized below. You can access the revised document [here](#).

Chg. 7 change Summary:

1. In Section 6 of Appendix A, Baseline Management, they beefed-up the language requiring a Corrective Action Plan when a BCP is processed which impacts the Performance Baseline. Note, this is not contractor change management, but the DOE Program Office’s obligation when program thresholds are breached.
2. Section 14 of Appendix C, is on the “Lessons Learned Process”. Change 7 incorporates the requirements of DOE Order 210.2, DOE Corporate Operating Experience Program, into the language. Lessons Learned, in this context, is the sharing of information from reviews, and other areas of project management, through the CD gates. The new language also places the requirement of capturing lessons learned on the individuals leading the reviews; this responsibility assignment was missing in Chg. 6.
3. Appendix C added a section on “Climate Adaptation, Resilience and Sustainability” (C-4). This highlights the emphasis on putting climate resilient practices into the early stages of building design.

It Is Not One World 10 Incredible Feats in Construction History

Human history has seen a multitude of incredible feats. From Leonardo da Vinci to Nikola Tesla to Steve Jobs, creation and invention are core to the human experience. It sets us apart from the animals and gives life flavor and meaning.

What are some of humanity’s most important achievements in construction? There is certainly a long list to choose from, but we’ve narrowed it down to 10 of the greatest.

Each one of these projects required massive coordination and cooperation, in addition to vast quantities of resources and labor. All of these factors came together to produce the magnificent wonders of the world that stand as humanity’s crowning accomplishments.

*“We shape our buildings;
thereafter they shape us.”*

— Winston Churchill

1. Stonehenge: 3100 BC

One of the world’s oldest and most recognizable prehistoric monuments, Stonehenge has been revised and reconstructed throughout its history. The original design, however, was constructed around 5,000 years ago in present-day Amesbury, England.

Continues on next page

10 Incredible Feats in Construction History

Continued from previous page

The project began with a circular ditch about 100 meters in diameter with an inner and outer bank. The ditch was then filled with 56 “Aubrey Holes,” intended to hold either timber posts or large stones. Around 100 cremations were also buried throughout the ditch, making Stonehenge the largest Neolithic cemetery in the British Isles.



Stonehenge was changed through the years by war, weather, and workers. The massive stones that we see today replaced timber around 2200 BC. Known as “sarsens,” these stones weigh up to 25 tons and stand 30 feet tall. The smaller stones, or “bluestones,” weigh up to 4 tons. The sarsens were arranged in a large outer circle and inner horseshoe, while the bluestones formed a double arc between them.

How these colossal stones were lifted and put into place remains a mystery. Considering the significant lack of any kind of building technology at the time, Stonehenge stands as one of the most legendary feats of architecture in the world.

2. Pyramids of Giza: 2550 BC-2490 BC

The Pyramids of Giza are, without a doubt, some of the most impressive feats of construction in history. In ancient Egypt, pyramids functioned as tombs for the Pharaohs and were filled with everything that the Pharaoh would need for a successful trip through the afterlife. The pyramids weren't just filled with riches, though. They were also inscribed with hieroglyphics and stunning illustrations and paintings on the inner walls that depicted the life of ancient Egyptians.



The first pyramid was constructed during the reign of Pharaoh Khufu around 2550 BC. Standing at 481 feet, it was the tallest structure in the world for around 3,800 years. Pharaoh Khufu's great pyramid is estimated to have been built with an astonishing 2.3 million limestone blocks, each weighing between 2.5 to 15 tons.

Even more impressive, though, is the fact that these stones were crafted and transported by hand from over 500 miles away. Khufu's son, Pharaoh Khafre, built the second pyramid which was smaller than his predecessor's, but equally impressive. The third, built by Pharaoh Menkaure, was significantly smaller but featured a more complex inner mortuary temple.

Continues on next page

10 Incredible Feats in Construction History

Continued from previous page

3. Great Wall of China: 770 BC-1644 AD

Spanning across mountains, deserts, and grasslands, the Great Wall of China was constructed over a period of almost a thousand years, from 770 BC to 1644 AD, making it history's longest-lasting construction project. However, when you start to grasp the sheer size of the structure, it makes sense.

The wall was initially built by soldiers, POWs, criminals, and common people (we can assume most unfortunately weren't paid, but had they been, they could have benefited from Raken's time card management tools). The Chinese were very resourceful when it came to building materials as much of the Great Wall was constructed with rammed earth consisting of rich native soil, which actually proved to be strong enough to last through the ages. The workers used a technique called *hangtu* to build the wall, which involved pouring gravel and earth into wooden molds, compacting, and adding until it was at the desired height and density:

In the 14th century during the Ming Dynasty, building techniques and materials were seeing a rapid advancement. The Chinese began using large bricks, granite blocks, and massive rocks from surrounding areas which allowed them to build walls 25 feet high and 15-30 feet wide at the base.

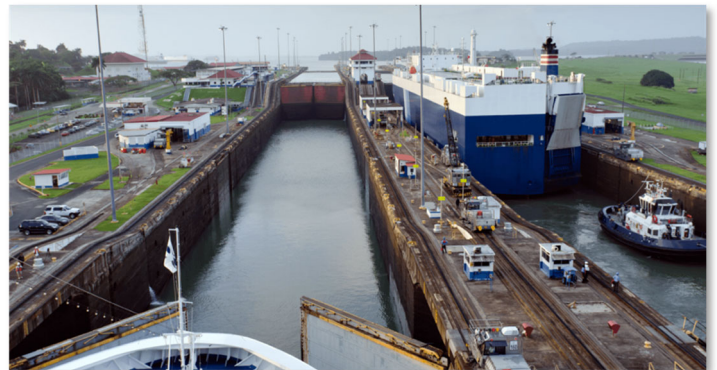
The walls were reinforced with mortar made from lime, clay, and rice flour to ensure durability and strength. The Great Wall of China has stood the test of time, having been built over the span of 6 dynasties and stretching 13,170 miles long. It stands as one of humanity's greatest engineering feats.



4. Panama Canal: 1903-1914

Jumping forward in history, the Panama Canal, built in the early 20th century from 1903-1914 stands as another astonishing feat of construction. Intended as a passageway for ships sailing from the Atlantic Ocean to the Pacific Ocean, the canal would make trade routes much faster and more efficient.

The project would require the excavation of 50 miles of land, damming 4 rivers, and the creation of the largest man-made lake in the world by flooding a 123 square mile area. However, the area planned for construction was wild and unforgiving, with its thick jungle terrains, steep mountains prone to dangerous landslides, lakes, tidal shifts, and easily contractible deadly diseases like malaria and yellow fever. The excavation



Continues on next page

10 Incredible Feats in Construction History

Continued from previous page

required over 60 million pounds of dynamite to remove over 240 million cubic yards of rock and dirt.

To overcome the difference in water levels across the Panama Canal, massive locks (essentially ship elevators) were installed at each end of the canal. Ships would pull into the lock and water would then fill the lock, raising the ship up to about 28 feet. This process is repeated two more times, until the ship is raised to 85 feet, up to the level of Gatun Lake.

Each lock is around 100 feet wide, 1000 feet long, and is made out of solid concrete. In fact, each lock required over 1 million cubic meters of concrete to be built. Check out this video that illustrates how the locks work:

Employing over 75,000 people and costing over \$350 million, the Panama Canal goes down in history as one of the largest and most impressive construction projects ever undertaken. The project was completed on August 15th, 1914, and ships still use the canal to this day.

5. Empire State Building: 1930-1931

The United States during the 1930's saw many unique and impressive construction projects, beginning with the Empire State Building in Midtown Manhattan, New York City. Conceptualized by General Motors executive John J. Raskob, the Empire State Building was planned as an office building to compete with rival Walter Chrysler who, at the time, was



building an impressive 1,046-foot skyscraper in East Manhattan known as the Chrysler Building.

Raskob hired up-and-coming architectural firm Shreve, Lamb & Harmon, who in 1929 designed an impressive art deco skyscraper in Winston-Salem, North Carolina, known as the Reynolds Building. The firm used this building as inspiration for the Empire State Building, adapting its design to fit Raskob's demand for a tower that would stand almost 1,000 feet higher than the Reynolds building and several hundred feet higher than the Chrysler building.

In addition to these lofty goals, Raskob also expected construction to be finished in just 18 months. Had it been available, it's reasonable to assume that Raskob would have wanted real-time digital daily reports on the progress of his project.

Excavation for the project began in January of 1930, and the builders took an innovative approach to building: fast-track construction. This method sees construction begin on the project before designs are even complete to avoid delays and inflated costs. To accomplish this, hundreds of men worked nonstop, day and night.

Because of this large, well-organized workforce and tactical logistics, the building rose incredibly fast. By focusing on the steel skeleton of the building first, the crew was able to progress at least one story per day, making it the fastest construction project for its size in history.

Continues on next page

10 Incredible Feats in Construction History

Continued from previous page

Specialty subcontractors such as electricians and plumbers worked on the inside of the building while other crews worked on the outside, which was a relatively new method at the time.

Because of the project's efficient planning, the building was completed in 15 months, three months earlier than its original deadline. Over the course of construction, the project employed 3,500 men and accumulated seven million labor hours in just 15 months. It was also finished under budget, having only spent \$24.7 million of the estimated \$43 million that would be required. Between the project's speed, logistics, and efficiency, the Empire State Building isn't just one of history's most impressive construction projects, but also one of its most influential.

6. Hoover Dam: 1931-1935

The early 20th century was also a period of rapid development for the southwestern region of the United States. In these remote desert areas, demand for water and hydroelectric power was high. At the same time, the Colorado River caused a series of devastating floods to nearby communities.

This led to the development of the Hoover Dam, which was to be constructed in the Black Canyon on the Nevada-Arizona border. However, before beginning construction on the dam, water had to be diverted.

This was accomplished by blasting the canyon walls and creating 4 diversion tunnels that would channel the water away from the construction site. Working conditions were harsh, with crews working in nearly 140-degree tunnels filled with toxic chemicals and dust. After the tunnels were established, the river was diverted.

Next, crews had to clear and smooth the walls of the dam so that it could fit. For this, they used 40+ pound jackhammers at heights of over 800 feet, while ground crews dug 40 feet further into the ground to access bedrock for a solid foundation. In the end, the workers on the ground excavated over half a million cubic yards of mud and dirt using power shovels and began to pour concrete for the foundation in 1933.

Finally, in 1935, the dam was completed. Gordon Kaufmann, the project architect, made sure that the dam's design was smooth and appealing, and that its interior paid homage to the Native American cultures whose land it was built upon. The dam stands 726 feet tall (the tallest in its day) and required 6.6 million tons of concrete, enough to pave a 16-foot-wide highway all the way from San Francisco to New York! All of the effort and materials required to complete this project make it a truly impressive feat of early modern engineering.



7. Golden Gate Bridge: 1933-1937

Around the same time that the Hoover Dam and Empire State Building were being

Continues on next page

10 Incredible Feats in Construction History

Continued from previous page

constructed, big things were also happening on the central coast of California in San Francisco. The Golden Gate Strait is the body of water that separates Marin County from the city of San Francisco and leads out into the Pacific Ocean. It was an important route destination for travel and cargo. At the time, the only way to get across the strait was via ferry boat, which was time-consuming and inconvenient.



Chief project engineer, Joseph B. Strauss, had an idea for a bridge in the early 1920's, but hit several roadblocks in the form of ferry businesses, who stood to profit from the lack of a bridge, concerned environmentalists, a skeptical engineering community, and budgeting difficulties stemming from the great depression. The area's geography, which made for violent winds and rocky terrain also posed a challenge. After settling these disputes, though, Strauss raised enough funding to begin construction on January 5, 1933.

To begin, Strauss had to construct two towers that would support the entire weight of the bridge, beginning with the north tower on the banks of Marin County. After this was completed with relative ease, construction crews began work on the more challenging second tower, which had to be constructed 1,100 feet offshore. They used a temporary pier that spanned this distance to make work easier, but it was destroyed twice during the project's duration.

Workers also had to establish the foundation for the second tower underwater, which posed unique challenges and dangers. Additionally, because each tower weighs 22,000 tons and stands 746 feet above sea level, placement and precision factored significantly in the project.

After the towers were constructed, work began on the cables that would hold up the bridge. These cables were made of thousands of individual wires bound together to create two separate "mega cables." 27,572 wires were used in total, amounting to around 80,000 miles, which is enough to circle the planet three times! With all of that material, the construction crew could have benefited from Raken's production tracking features.

A ship would then drag the cables from one side of the strait to the other, and cranes would be used to lift them into "cradles" on the top of the towers that would hold them in position. After the workers finished constructing these mega cables, smaller cables were lowered down from them throughout the bridge to suspend the framing of the road.

Once the whole frame was suspended, the framing mold was filled with concrete and the bridge was close to completion. The workers covered the bridge with a heavy, weather-sealed paint with a brass-orange color known as 'international orange' for optimum visibility through San Francisco's infamously thick fog. The bridge was opened on May 27, 1937, and certainly goes down as one of the greatest construction and engineering feats of all time.

Continues on next page

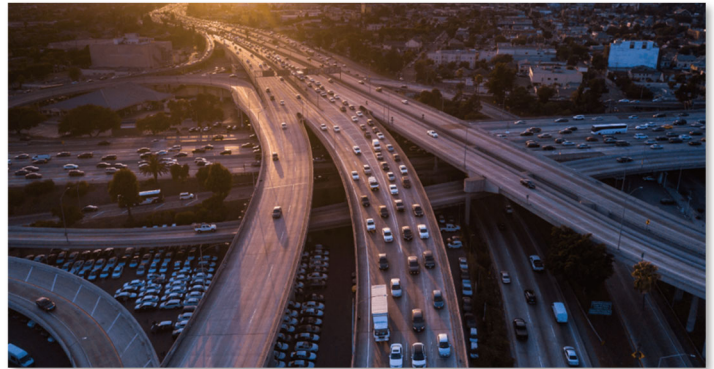
10 Incredible Feats in Construction History

Continued from previous page

8. United States Interstate Highway System: 1956-1992

Following World War II, President Dwight D. Eisenhower proposed the Federal-Aid Highway Act of 1956 which he conceptualized based on the network of highways he saw in Germany during the war. The plan was to create a network of interstate highways across America that would create routes for economic stimulation, transportation, infantry mobilization, and disaster evacuation.

Today, drivers across the United States use these highways to make long-distance travel quicker and more convenient. It's almost hard to imagine an America without them, which bears testimony to the project's importance.



9. Burj Khalifa: 2004-2010

Hands-down one of the most impressive feats of construction and engineering in history is the recently constructed Burj Khalifa in Downtown Dubai, United Arab Emirates. Seeking new forms of revenue outside of oil, the government of Dubai wanted to create something truly spectacular to draw tourists to the city. To do this, they would build the tallest building in the world.

Used for offices, residences, hotels, restaurants, observation decks and communication, the Burj Khalifa was inspired by the Empire State Building when Dubai's ruler visited New York City during the 1960s.

The tower was designed by Adrian Smith, a world-renowned architect from Chicago, and construction began in 2004. The building was designed with a shamrock-shaped base for maximum support and ultimate viewing potential from inside. Samsung Construction was contracted for the job and, after the foundational construction was done, the building began rising in 2005.

It grew at an exponential rate, reaching 30 floors in under a year. Construction picked up speed, and by September 2007, the incomplete structure was already taller than the CN tower, making it the world's largest freestanding building. It was completed in late 2009, and now stands at a mind-blowing 2,719 feet tall. Construction cost \$1.5 billion total, and given the scope of the entire project, it comes as no surprise.



Concludes on next page

10 Incredible Feats in Construction History

Concluded from previous page

10. International Space Station: 1998-Present

So far, all of these construction projects, even with their lofty goals, have been firmly grounded on planet earth. But in the mid-1980s, humans began looking to space as the new frontier. This took the form of a \$150 billion, 460 ton orbiting space station the size of a football field 240 miles above earth's surface: The International Space Station (ISS).

Five teams representing 15 countries have

since come together to use this massive research vessel in outer space. The International Space Station's purpose is for government initiatives, space research, and exploration of other worlds in mankind's efforts to expand beyond our planet.

In his State of the Union address in 1984, President Reagan directed NASA to begin construction on the ISS. The size of the station would make it impossible to construct on earth—there simply wasn't a rocket big enough to propel the entire structure into space—so it had to be launched piece by piece.

In November 1988, Russia launched the first proton rocket, named Zarya, followed closely by the US in December of the same year. The construction process was extremely risky and complex. NASA station program manager Mike Suffredini said, "It's like building a ship in the middle of the ocean from the keel up. You've got to float and you've got to sail. All this has to occur while you're actually building the ship, and that's what the station is like."

Over the past 20 years, astronauts and cosmonauts from around the world have been living on the ISS building, developing, and preparing the station for research and exploration. Many additions to the ISS have been launched from Earth and added on to the structure to make it the massive structure it is today, and more additions are to come in the future.

More to come...

These are only a few of the world's most impressive feats of construction and engineering—a more comprehensive list would take up several volumes of books. It's truly amazing to see the progress that humans have made in the methods used and tools employed in construction, and one can only imagine how future generations will continue to innovate!

— From the [Raken blog](#)



Check out the latest DOE Project Management newsletter!

(Click on the banner below)



Or have it delivered directly to your inbox every month!

1. Click [HERE](#) and a new email will open.
2. Just press SEND – Do not edit anything.
3. Click the provided link in the confirmation email you receive.

(An unsubscribe link is provided in each newsletter email.)

Just for Fun: June's Notable Events and Famous Birthdays

1 — Postage stamps went on sale for the first time (1847), the Battle of Gettysburg began (1863), paycheck tax withholdings began (1943), actor Dan Aykroyd (1952) and Olympic track champion Carl Lewis (1961) were born, ZIP codes went into use (1963), actress Pamela Anderson was born (1967), the first Sony Walkman went on sale (1979), the PG-13 film rating was introduced (1984), and Hong Kong reverted back to Chinese rule after 156 years under the British (1997).

2 — President James A. Garfield was shot and died 80 days later (1881), Supreme Court Justice Thurgood Marshall (1908) and racing legend Richard Petty (1937) were born, aviation pioneer Amelia Earhart disappeared (1937), and the Civil Rights Act was signed in to law (1964).

3 — Idaho became the 43rd state (1890), and TV personality Montel Williams (1956) and actor Tom Cruise (1962) were born.

4 — The United States of America declared its independence from Great Britain (1776), President Calvin Coolidge was born (1872), France presented the Statue of Liberty to the U.S. in Paris (1884), and football executive Al Davis (1929), former N.Y. Yankees' owner George Steinbrenner (1930) and TV personality Geraldo Rivera (1943) were born.

5 — Circus founder P.T. Barnum was born (1810), the Salvation Army was founded (1865), the bikini made its debut (1946), the U.S. suffered its first death in the Korean War (1950), singer Huey Lewis was born (1951), and Arthur Ashe became the first Black man to win Wimbledon (1975).

6 — The first MLB All-Star game was played (1933), the Dalai Lama (1935), President George W. Bush and actor Sylvester Stallone were born (1946), **Althea Gibson became the first African-American to win Wimbledon** (1957), and Forrest Gump opened in theaters (1994).



7 — Hawaii was annexed into the U.S. (1898), construction began on Hoover Dam (1930), Beatles drummer Ringo Starr (1940) and figure skating champion Michelle Kwan (1980) were born, and the U.S. women's soccer team won its record fourth World Cup (2019).

8 — The first passport was issued in the U.S. (1796), actor Kevin Bacon was born (1958), the first Americans were killed in South Vietnam (1959), and country music star Toby Keith was born (1961).

9 — Sewing machine inventor Elias Howe was born (1819), President Zachary Taylor died (1850), the first Wimbledon tennis tournament began (1877), the first female army officer was appointed and football star O.J. Simpson was born (1947), and actor Tom Hanks (1956) and singer Courtney Love (1964) were born.

10 — Brewer Adolphus Busch was born (1839), Millard Fillmore was sworn in as the 13th U.S. president (1850), the Battle of Britain began (1940), tennis champ Arthur Ashe was born (1943), the three-point seat belt was patented (1962), singer/actress Jessica Simpson was born (1980), and Classic Coke was re-introduced after New Coke flopped (1985).

11 — President John Quincy Adams was born (1767), the Old Farmer's Almanac was first published (1792), former VP Aaron Burr killed Secretary of the Treasury Alexander Hamilton in a duel (1804), baseball legend Babe Ruth made his major league debut (1914), actor Yul Brynner (1915) and boxer Leon Spinks (1953) were born, and the Skylab space station fell to earth (1979).

12 — The Medal of Honor was created (1865), Comedians Milton Berle (1908) and Bill Cosby (1937), fitness guru Richard Simmons (1948) and actress Cheryl Ladd (1951) were born, **the Etch-A-Sketch went on sale** (1960), Olympic figure skating champ Kristi Yamaguchi was born (1971), and Geraldine Ferraro became the first woman nominated for vice president (1984).

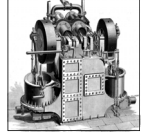


13 — Guglielmo Marconi patented the radio (1898), the first World Cup soccer tournament began (1930), actor Harrison Ford was born (1942), and the Live Aid concert for African famine relief was held (1985).

14 — The French Revolution began with Bastille Day (1789), dynamite was first demonstrated (1867), and President Gerald R. Ford was born (1913).

15 — Artist Rembrandt was born (1606), vulcanized rubber (1844) and margarine (1869) were patented, singer Linda Ronstadt (1946), wrestler/politician Jesse Ventura (1951) and actor Forest Whitaker (1961) were born, the not-a-Christmas-movie Die Hard opened (1988), and the social network Twitter was launched (2006).

16 — Washington, D.C. was declared the new nation's capital (1790), football coach Jimmy Johnson was born (1943), the first successful atomic bomb test was conducted (1945), actor Will Ferrell was born (1967), Apollo 11 blasted off from Cape Canaveral (1969), and Amazon opened for business (1995).



17 — The first dental school in the U.S. opened at Harvard (1867), actor James Cagney was born (1899), **the air conditioner was invented** (1902), actor Donald Sutherland was born (1934), Joe DiMaggio's record 56-game hitting streak ended (1941), actor David Hasselhoff was born (1952), Disneyland opened (1955), and American and Soviet spacecrafts rendezvoused in orbit (1975).

18 — South African President Nelson Mandela (1918) and astronaut/politician John Glenn (1921) were born, the Spanish Civil War began (1936), and golfer Nick Faldo was born (1957).

19 — The Rosetta Stone was found (1799), and the revolver was invented (1814).

20 — Guitarist Carlos Santa was born (1947), Apollo 11 landed on the moon (1969), and actor/martial-arts legend Bruce Lee died (1973).

21 — The Civil War's First Battle of Bull Run began (1861), author Ernest Hemingway (1899), actor Don Knotts (1924), former Attorney General Janet Reno (1938) and actor Robin Williams (1952) were born, and NASA's final space shuttle mission ended (2011).

22 — Wiley Post became the first person to fly solo around the world (1933), "Public Enemy No. 1" John Dillinger was killed (1934), and musician Don Henley and actors Danny Glover (1947), Willem Defoe (1955) and David Spade (1965) were born.

23 — Civil War General and U.S. President Ulysses Grand died (1885), the ice cream cone was invented (1904), actor Woody Harrelson (1961), infamous intern Monica Lewinsky (1973) and actor Daniel Radcliffe (1989) were born, and the U.S. women's gymnastics team won their first-ever gold medal (1996).

24 — Aviator Amelia Earhart was born (1897), the Incan city of Machu Picchu was discovered (1911), basketball star Karl Malone (1963), baseball star Barry Bonds (1964) and singer/actress Jennifer Lopez (1970) were born, and Saving Private Ryan opened in theaters (1998).

25 — The U.S. invaded Puerto Rico (1898), football star Walter Payton (1954) and Louise Joy Brown, the first test-tube baby (1978), were born, and the **Concorde supersonic jet crashed, killing all 109 people onboard** (2000).



26 — The U.S. postal system was established (1775), the FBI was founded (1908), singer Mick Jagger was born (1943), military discrimination ended (1948), actor Kevin Spacey (1959) and actress Sandra Bullock (1964) were born, and the Americans with Disabilities Act became law (1990).

27 — Insulin was first isolated (1921), Bugs Bunny made his debut (1940), the first commercial jet test flight was conducted (1949), the Korean War ended (1953), impeachment proceedings for President Nixon began (1974), baseball star Alex Rodriguez was born (1975), and a bomb blew up in Centennial Park during the Summer Olympics in Atlanta (1996).

28 — **World War 1 began when Austria declared war on Serbia** (1914), a military plane crashed into the Empire State Building and cartoonist Jim Davis was born (1945), and Animal House opened in theaters (1978)



29 — Walt Disney's "Steamboat Willie," featuring Mickey Mouse, premiered (1928), and NASA was created (1958).

30 — Auto maker Henry Ford (1863) and "The Governor" Arnold Schwarzenegger (1947) were born, and Medicare was signed into law (1965).

31 — Actor Wesley Snipes (1963) and author J.K. Rowling (1965) were born.