MANA ARMS MAGAZINE

JULY 2024 VOL-31

……Empowering Minds

JULY 2024

EDITORIAL BOARD

CONTENTS

MD.NASEER
20MQ5A0327

ALUMNI ARTICLE

HISTORY OF THE PANAMA CANAL

The idea of the Panama Canal dates back to 1513, when the Spanish conquistador Vasco Núñez de Balboa first crossed the Isthmus of Panama. European powers soon noticed the possibility to dig a water passage between the Atlantic and Pacific Oceans across this narrow land bridge between North and South America. A number of proposals for a ship canal across Central America were made between the sixteenth and nineteenth centuries, with the chief rival to Panama being a canal through Nicaragua.

Miraflores Locks in 2004

By the late nineteenth century, technological advances and commercial pressure allowed construction to begin in earnest. Noted French entrepreneur Ferdinand de Lesseps led the initial attempt (1880–1889) to build a sea-level canal, as he had previously achieved in the building of the Suez Canal (1859–1869). A concession to build the canal was obtained from the Colombian government, at that time the possessor of the Panama Isthmus. The canal was only partly completed, as a result of the severe underestimation of the difficulties in excavating the rugged terrain, heavy personnel losses to tropical diseases, and increasing difficulties in raising finances.

The collapse of the French canal company (1889) was followed by a political scandal surrounding alleged corruption in the French government. Interest in a U.S.-led canal effort developed in the late 1890s, and was considered a priority by President Theodore Roosevelt (1901–1909). Despite a longstanding preference in Congress and amongst the public for the Nicaragua route, Roosevelt was able to swing Congressional support to buy the French canal concession and equipment. After encountering resistance from the Colombian government to what they considered unfair terms, Roosevelt gave his support to a group of Panamanians seeking to secede from Colombia. He then signed a treaty with the new Panamanian government enabling the project.

The terms, which heavily favoured American interests, remained a source of tension between Panama and the United States until the signing of the Torrijos–Carter Treaties in 1977. The Americans' success in constructing the canal hinged on two factors. First was converting the original French sea-level plan to a more realistic lock-controlled canal. The second was controlling the diseases which had decimated workers and management alike under the original French attempt. The Americans' chief engineer John Frank Stevens (the second Chief Engineer of the American-led project) built much of the infrastructure necessary for later construction; slow progress on the canal itself led to his replacement by George Washington Goethals. Goethals oversaw the bulk of the excavation of the canal, including appointing Major David du Bose Gaillard to oversee the most daunting project, the Culebra Cut through the roughest terrain on the route. Almost as important as the engineering advances were the healthcare advances made during the construction, led by William C. Gorgas, an expert in controlling tropical diseases such as yellow fever and malaria. Gorgas was one of the first to recognize the role of mosquitoes in the spread of these diseases and, by focusing on controlling the mosquitoes, greatly improved worker conditions.

On 7 January 1914, the French crane boat Alexandre La Valley became the first to traverse the entire length of the canal, and on 1 April 1914 the construction was officially completed with the hand-over of the project from the construction company to the Panama Canal Zone government. The outbreak of World War I caused the cancellation of any official "grand opening" celebration, but the canal officially opened to commercial traffic on 15 August 1914 with the transit of the SS Ancon.

During World War II, the canal proved vital to American military strategy, allowing ships to transfer easily between the Atlantic and Pacific. Politically, the canal remained a territory of the United States until 1977, when the Torrijos–Carter Treaties began the process of transferring territorial control of the Panama Canal Zone to Panama, a process which was finally completed on 31 December 1999.

The Panama Canal continues to be a viable commercial venture and a vital link in world shipping, and is periodically upgraded. A Panama Canal expansion project started construction in 2007 and began commercial operation on 26 June 2016. The new locks allow the transit of larger PostPanamax and New Panamax ships, which have greater cargo capacity than the original locks could accommodate.

The canal was a technological marvel and an important strategic and economic asset to the US. It changed world shipping patterns, removing the need for ships to navigate the Drake Passage and Cape Horn. The canal saves a total of about 7,800 miles (12,600 km) on a sea trip from New York to San Francisco.

The anticipated military significance of the canal was proven during World War II, when the canal helped restore the devastated United States Pacific Fleet. Some of the largest ships the United States had to send through the canal were aircraft carriers, particularly Essex class; they were so large that although the locks could accommodate them, the lampposts along the canal had to be removed.

The Panama Canal cost the United States about $375 million, including $10 million paid to Panama and $40 million paid to the French company. Although it was the most expensive construction project in US history to that time, it cost about $23 million less than the 1907 estimate despite landslides and an increase in the canal's width. An additional $12 million was spent on fortifications.

A total of over 75,000 people worked on the project; at the peak of construction, there were 40,000 workers. Compared to the French era, fatalities in the American era were markedly low. Total deaths for all nationalities for the period of American involvement have been reported at 5,609-5,855. Of these, the great majority were West Indian laborers, particularly those from Barbados, who had substantially poorer living conditions and mosquito remediation controls than White workers. For example, for the years 1907 to 1913, in which employee fatalities were reported by race, there were 4,668 total fatalities, of which 900 (19%) were classified as "White" and 3,788 (81%) classified as "Colored". Additionally, a substantial number of White workers werenon- Americans. For example, in 1908, of the 185 White employees who died, only 81 were from the United States. In total about 350 White Americans died in the building of the canal.

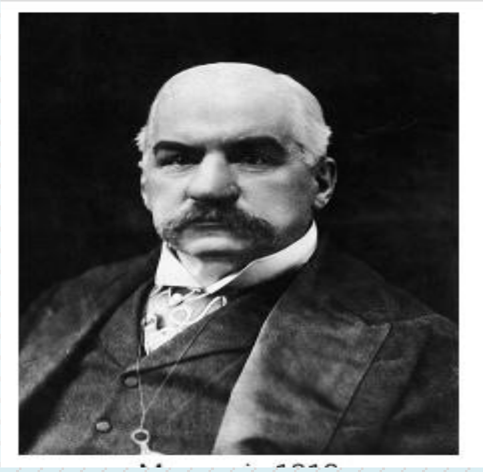
A total of 182,610,550 m3 (238,845,582 cu yd) of material was excavated in the American effort, including the approach channels at the canal ends. Adding the work by the French, the total excavation was about 204,900,000 m^3 (268,000,000 cu yd) (over 25 times the volume excavated in the Channel Tunnel project).

STUDENT ARTICLE

M.BABI
22MQ5A0311

J. P. MORGAN

John Pierpont Morgan Sr. (April 17, 1837 – March 31, 1913) was an American financier and investment banker who dominated corporate finance on Wall Street throughout the Gilded Age and Progressive Era. As the head of the banking firm that ultimately became known as J.P. Morgan and Co., he was a driving force behind the wave of industrial consolidations in the United States at the turn of the twentieth century.



Over the course of his career on Wall Street, Morgan spearheaded the formation of several prominent multinational corporations including U.S. Steel, International Harvester, and General Electric. He and his partners also held controlling interests in numerous other American businesses including Aetna, Western Union, the Pullman Car Company, and 21 railroads.His grandfather Joseph Morgan was one of the co-founders of Aetna. Through his holdings, Morgan exercised enormous influence over capital markets in the United States. During the Panic of 1907, he organized a coalition of financiers that saved the American monetary system from collapse.

As the Progressive Era's leading financier, Morgan's dedication to efficiency and modernization helped transform the shape of the American economy.Adrian Wooldridge characterized Morgan as America's "greatest banker". Morgan died in Rome, Italy, in his sleep in 1913 at the age of 75, leaving his fortune and business to his son, J. P. Morgan Jr. Biographer Ron Chernow estimated his fortune at $80 million (equivalent to $2.5 billion in 2023).

John Pierpont Morgan was born on April 17, 1837, in Hartford, Connecticut to Junius Spencer Morgan (1813–1890) and Juliet Pierpont (1816– 1884), of the influential Morgan family. His father, Junius, was then a partner at Howe Mather & Co., the largest dry goods wholesaler in Hartford. His mother Juliet was the daughter of the poet John Pierpont.

His uncle James Lord Pierpont composed the famous Christmas song Jingle Bells. Morgan preferred to be called "Pierpont", as opposed to "John".In 1847, when Morgan was ten years old, his grandfather Joseph Morgan died and left the family a large fortune. He was educated in public and private schools in New England, where he attended West Middle School and Cheshire Academy. Junius soon becamea senior partner at the rechristened MatherMorgan & Co

In September 1851, he passed the entrance exam for The English High School of Boston, which specialized in mathematics for careers in commerce. In April 1852, he suffered from rheumatic fever, an illness whose symptoms became more severe as his life progressed and ultimately left him in such pain that he could not walk.

Junius sent him to the Azores to recover. He convalesced there for almost a year, then returned to Boston to resume his studies. In 1856, his father sent him to Bellerive, a school in the Swiss village of La Tour-de-Peilz, where he gained fluency in French. His father then sent him to the University of Göttingen to improve his German. He attained passable fluency and a degree in art history within six months, completing his studies in 1857.

After completing his education, Morgan went to London in August 1857 to join his father, now a partner in the merchant banking firm George Peabody & Co. For the next fourteen years, he worked as his father's American representativein a series of affiliated New York City banking houses, learning the trade and lifestyle of a bank partner: Duncan, Sherman & Company (1858– 1861), his own firm J. Pierpont Morgan & Co. (1861–1864), and finally Dabney Morgan (1864– 1872). Dabney, Morgan & Company was cofounded by Charles H. Dabney and Jim Goodwin.

His son, J. P. Morgan Jr., took over the business at his father's death, but he was never as influential. The 1933 Glass–Steagall Act forced the dissolution of the House of Morgan into three entities:

- J.P. Morgan & Co., which later became Morgan Guaranty Trust and ended up merging with Chase Bank
- Morgan Stanley, an investment house formed by his grandson Henry Sturgis Morgan
- Morgan Grenfell in London, an overseas securities house
- The gemstone morganite was named in his honor.

The Cragston Dependencies, associated with his estate, Cragston (at Highlands, New York), was listed on the National Register of Historic Places in 1982.

FACULTY ARTICLE

Dr.MD.ABID ALI

The field of robotics has seen remarkable advancements in recent years, revolutionising various industries and sectors. At the heart of these technological marvels lies mechanical engineering, a discipline that plays a critical role in the design, development, and implementation of robotic systems.

Though robotics and mechanical engineering are two separate entities, they are certainly related. Robotics refers to designing, building and using robots and the science behind doing so. It uses machines that can think on their own and act accordingly when presented with a situation. Mechanical engineering is different in the way that it refers to the physical tasks involved with the machines, and the design and production behind them. They both, however, revolve around using machines to solve problems.

There have been many developments in robotics and mechanical engineering in recent years, especially with technology advancing at an impressive rate. From robotics being used to automate processes in factories, to the manufacturing industry making use of 3D printing. Of course, this doesn't mean that there aren't some challenges that mechanical engineers and robotics need to overcome. In this blog, we will explore the challenges and opportunities that await mechanical engineers in the realm of robotics.

Major Challenges Faced by Mechanical Engineers in Robotics

Miniaturisation and Compact Design:

Robotics often requires systems that are lightweight and compact, to enhance mobility and manoeuvrability. Mechanical engineers face the challenge of designing intricate mechanisms that can fit within limited spaces while maintaining optimal functionality, all while being robust yet lightweight structures. Achieving miniaturisation often involves overcoming constraints related to power supply, heat dissipation, and structural integrity. This isn't an easy balance to find, and it's likely going to take some trial and error.

Motion Control and Kinematics:

Mechanical engineers are responsible for developing robotic systems capable of precise motion control and manipulation. Achieving fluid movements and accurate kinematics requires a deep understanding of mechanical principles, control systems, and dynamics. Overcoming challenges related to friction, backlash, and vibrations is crucial to enhance the performance of robotic systems, especially when creating robotic arms, grippers, and mobile platforms capable of performing complex tasks with accuracy and efficiency.

Material Selection and Durability:

Selecting the appropriate materials for robotic components is a critical challenge for mechanical engineers. Robotics often involves operating in harsh environments, such as extreme temperatures, high humidity, or corrosive conditions. Engineers must consider factors like strength, weight, durability, and resistance to environmental factors when choosing materials for various components to ensure long-term reliability and functionality.

Human-Robot Interaction:

With the rise of collaborative robots (cobots), mechanical engineers must design robots that can work alongside humans safely and efficiently. Ensuring human-robot interaction is seamless and intuitive involves challenges such as designing flexible joints, implementing force and tactile sensing, and developing advanced algorithms for motion planning and collision avoidance.

Opportunities Presented to Mechanical Engineers in Robotics.

Research and Development:

The field of robotics is a hotbed of research and development, presenting countless opportunities for mechanical engineers. From developing novel robotic mechanisms to enhancing control algorithms and exploring emerging technologies like soft robotics and bio-inspired designs, the scope for innovation is vast. Research opportunities can lead to breakthroughs in fields like medical robotics, autonomous vehicles, and space exploration.

Automation in Manufacturing:

Robotics is having a big impact on our day-to-day lives, especially as far as automation is concerned. More and more aspects of life are becoming automated, from self-driving cars gaining popularity to self-service checkout counters becoming completely automated. Mechanical engineers specialising in robotics can play a pivotal role in revolutionising manufacturing industries. Automation and robotic systems are increasingly utilised to streamline production lines, improve efficiency, and enhance product quality. Furthermore, the demand for skilled mechanical engineers who can design and implement robotic systems for manufacturing processes continues to grow, opening doors to exciting career prospects.

Assistive and Medical Robotics:

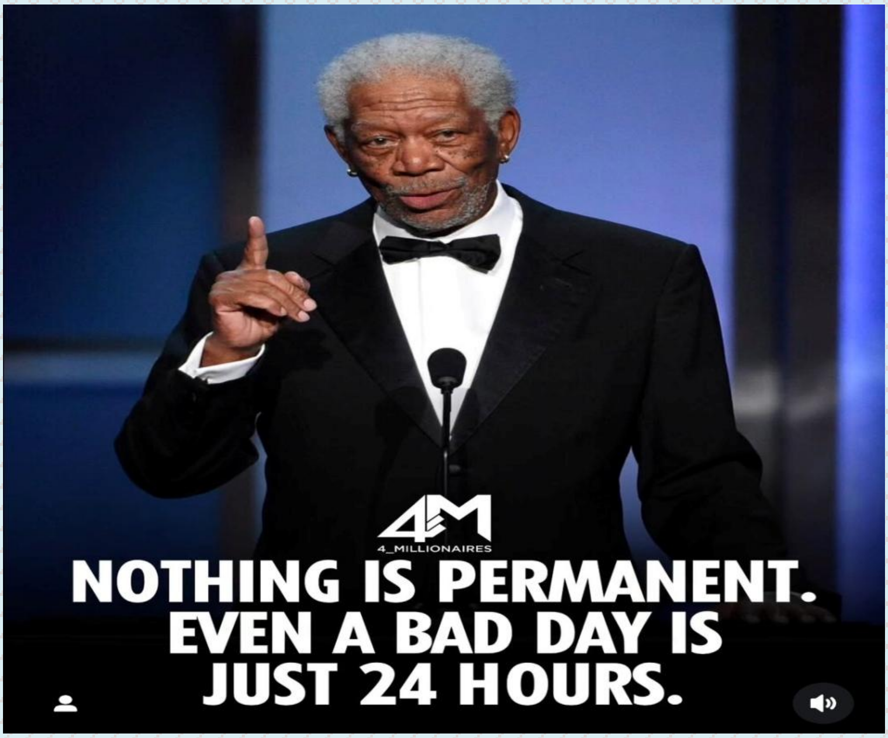
As the global population ages, there is a growing need for assistive and medical robotic devices. Mechanical engineers can contribute to the development of prosthetics, exoskeletons, surgical robots, and rehabilitation devices, among others. These technologies have the potential to enhance the quality of life for individuals with disabilities and significantly impact the healthcare industry. With robotics taking over these tasks, professionals can work on other tasks that robotics haven’t quite mastered yet. With several job opportunities opening up due to mechanical engineering in robotics, brand new careers are now available to mechanical design engineers, which weren’t an option before the prevalence of robotics.

Agricultural and Exploration Robotics:

The agricultural sector is witnessing a transformation through the implementation of robotics. Mechanical engineers can design autonomous vehicles, robotic harvesters, and precision agriculture systems to optimise farming practices, reduce resource consumption, and increase crop yields. Additionally, robotics plays a crucial role in space exploration, with opportunities to contribute to missions involving planetary rovers and advanced robotic systems.

.

MOTIVATIONAL QUOTE



SUCCESS TIP

.....Empowering minds

SRI VASAVI INSTITUTE OF ENGINERRING & TECHNOLOGY(A)

DEPARTMENT OF MECHANICAL ENGINEERING

2024-25 VOL –31