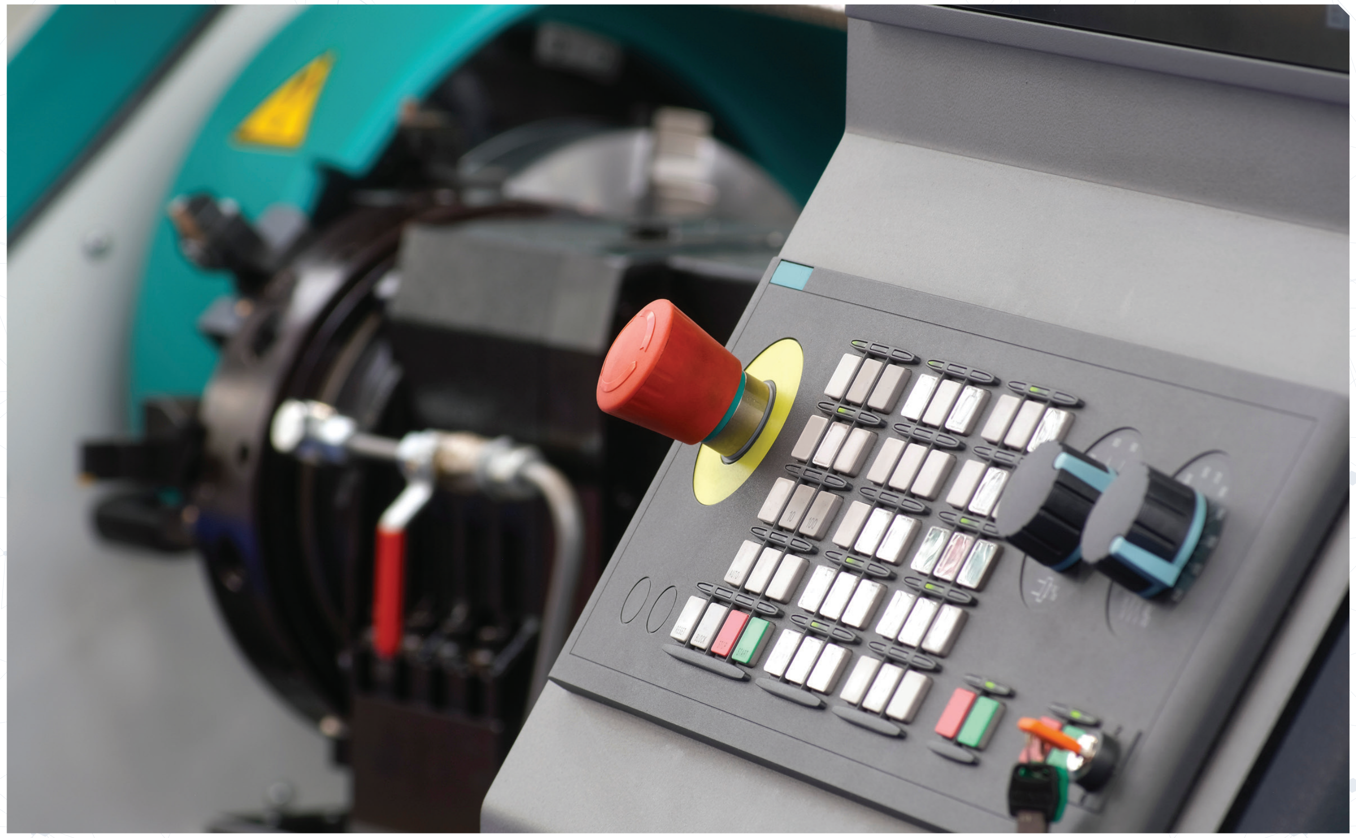
REMEMBERING JOHN T PARSONS

MMI pays tribute to John T Parsons, the inventor of CNC Technology who is considered by many to be the father of the second industrial revolution.



Source: Magic Wand Media

Every day hundreds of thousands of CNC machines churn out millions of products. Virtually, almost every product we use in our daily lives has been touched by CNC technology somewhere in the process.

Numerical Control marked the beginning of the second industrial revolution and the advent of an age in which the control of machines and industrial processes would pass from an imprecise craft to exact science. The impact of this invention is little understood, yet its applications range from Computer Chips to Medical, Aerospace, Machine Tools, Marine, Surface Transportation, Oil and Gas, Defence, Electronics, Clothing, Mobile phones, etc

The man behind CNC

Even though CNC has become a household name, not many people are aware of John T Parsons, the inventor of CNC Technology and considered by many to be the father of the second industrial revolution.

Computerized Numerical Control, or CNC as we all know it, came about shortly after WWII as a result of the Aircraft industry's desire to produce more accurate and complex parts.

The story of numerical control starts with John Parsons becoming aware of the use of accounting machines for solving engineering problems and employing this technique to check helicopter rotor blade airfoil patterns.

These developments were done in collaboration with his Chief Engineer and Vice President of Engineering, Frank L Stulen, whom Parsons hired when he was head of the Rotary Wing Branch of the Propeller Lab at Wright-Patterson Air Force Base, USA in April 1946.

Together, they were the first to use computer methods to solve machining problems, in particular, the accurate interpolation of the curves describing helicopter rotor blades.

In the 1940s, a 'computer' meant a punch card-operated calculation machine. At the time John Parsons's company Parsons Corporation had made only made one prototype of a helicopter propeller, but Parsons convinced Sikorsky Helicopter that they could

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A BRIEF TIMELINE OF JOHN PARSONS'S CONTRIBUTION TO THE ENGINEERING INDUSTRY

1944
Devised a manufacturing system for producing 22 in. Sikorsky R-5 rotor blades. The quality of the product was so good and the costs so low, that the US Army refused to approve Sikorsky's request for a second source, even when the requirement increased to 405 blades per month.

1945
Conceived and installed the world's first production facility for metal-to-metal adhesive bonding of primary aircraft structures for the R-5 Sikorsky rotor blade spars. Redesigned the spar from spot-weld to adhesively bonded construction.

1947
Devised and implemented a system for producing airfoil templates on a manual milling machine, using machine tool table settings calculated and tabulated on IBM accounting machines.

1948
Conceived a machine for producing aircraft structural shapes automatically from punched-card/tape input.

1949
Negotiated and executed a contract with the US Air Force to build the first numerical control milling machine. Coordinated its development with Parsons' staff and its principal subcontractors - IBM, Snyder Corporation, and Massachusetts Institute of Technology. Monitored the design and completion of the machine between 1950-1952.

1950
Designed, manufactured, and installed a modular tooling system for aircraft plants, resulting in a great reduction in tooling costs and floor space requirements.

1951
Designed the layout of a new rotor blade manufacturing plant, including materials laboratories for ferrous and nonferrous metals, resins, and reinforced plastics, and test laboratories for structural, dynamic, and flight tests.

1954
Devised and installed an Operations Control System at Parsons Corporation using a single source document to control total engineering, manufacturing, quality, and service functions.

1955
Granted exclusive license of Parsons N/C patent to Bendix, and was signatory to its sublicenses to General Electric, TRW, Sundstrand, Milacron, Allen-Bradley, IBM, Fujitsu, Bosch, etc.

1956
Conceived and installed a hydraulic adhesive bonding press with a 2 in. x 22 in. platen with an automated load/unload system. Developed and installed programmable salt bath furnaces for heat-treating 25 in.-long alloy steel tubes.

1958
Parsons received a patent for his Motor Controlled Apparatus for Positioning Machine Tools (patent number 2,820,187, filed on May 5, 1952)

1964
Conceived and directed the installation of a special 4-axis N/C machine tool for helicopter rotor blades.

1965
Participated in the blade design and designed and developed the manufacturing process and tooling for the world's first tapered metal helicopter rotor blade (Lockheed AH-56 helicopter). Not even one blade was said to have been scrapped during the entire program.

1967
Conceived a programmable surface preparation system for adhesive bonding stainless, titanium, aluminum, and alloy steel aircraft structures up to 35 in. long in random sequence.

1969
Devised NC techniques and tooling for producing polystyrene foam patterns for aluminum, bronze, iron, and steel castings marketed under the 'ComputerBilt' trademark.

1971
Designed and developed an NC system for the automatic inspection of turbine blades.

1973
Developed rotor blade designs for large wind energy turbines.

1977
Designed NC ball-screw presses to replace crank, eccentric, and hydraulic presses for many uses.

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produce extremely precise templates for propeller assembly and manufacturing.

He ended up inventing a punch card computer method to calculate points on a helicopter rotor blade. Parsons and Stulen generated two-axis coordinate tables of the contours for checking the airfoil patterns, utilizing early model punched card tabulating equipment.

Once they were able to define the pattern numerically, Parsons then had the idea to use the same data to direct the machine and thus define the part numerically.

An ordinary milling machine was extensively modified – the table, cross-slide, head drives, and controls were removed, and three variable-speed hydraulic transmissions were installed and connected to lead-screws. Each transmission would produce, through gearing and leadscrew, a 0.0005-in. motion of the table, head, or cross-slide for each electrical pulse received from the director. A feedback system was provided to make sure the machine was doing what it was told. A synchronous motor geared to each motion generated a voltage response to movement, which was sent back to the director and compared with the original command voltage

By 1951, the system had been assembled, and application studies were begun and in a couple of years, enough data had been assembled to indicate practical possibilities that could be developed.

Patent received

MIT was also at the same time developing a similar protype that employed a Flexowriter and its eight-column paper tape, a tape reader, and a vacuum-tube electronic control system.

Parsons's patent application arrived three months before MIT's and on January 14, 1958, he received a patent for a Motor Controlled Apparatus for Positioning Machine Tool (patent number 2,820,187, filed on May 5, 1952)

Initially, the NC concept was slow to catch on as the people selling the concept were computer engineers and not machine tool engineers. By the early 1970s, however, the US Army itself popularized the use of NC computers by building and leasing them to numerous manufacturers. The CNC controller evolved in parallel with the computer, driving more and more productivity and automation into the manufacturing processes, especially machining.

John Parsons's genius spawned many other inventions that benefitted a wide range of industries. He pioneered adhesive bonding in metal aircraft structure and then built the first all-composite airplane. He produced the gigantic fuel lines for the Saturn booster that propelled US astronauts towards the moon, and he brought computer technology to aircraft design, manufacturing, and real-time management reporting. Parsons also developed NC produced evaporative patterns to replace weldments and streamlined castings, which revolutionized the production of automobile body dies.

Winning accolades

In 1968, John Parsons became the first recipient of the Numerical Control Society's 'Joseph Marie Jacquard Memorial Award'. The Society of Manufacturing Engineers awarded him a plaque in 1975, naming him 'The Father of the Second Industrial Revolution' and in 1985, Parsons and Stulen received the National Medal of Technology from President Ronald Reagan.

Parsons, who didn't have a college degree, was also awarded an honorary Doctor of Engineering degree from the University of Michigan in 1988. He was inducted into the National Inventors Hall Of Fame in 1993 for inventing numerical control systems, joining a long list of luminaries like Alexander Graham Bell, Thomas Edison, Henry Ford, Steve Jobs, etc.

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Tech Talks is a column by industry veteran and journalist Reji Varghese that talks about the latest advancements in Machine Tools, provides snippets from history, interesting facts, etc. about the Machine Tool industry.