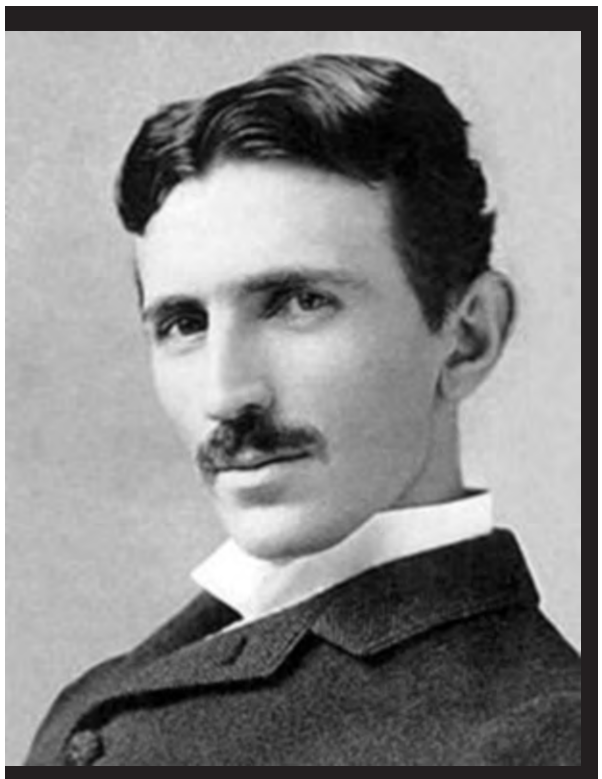
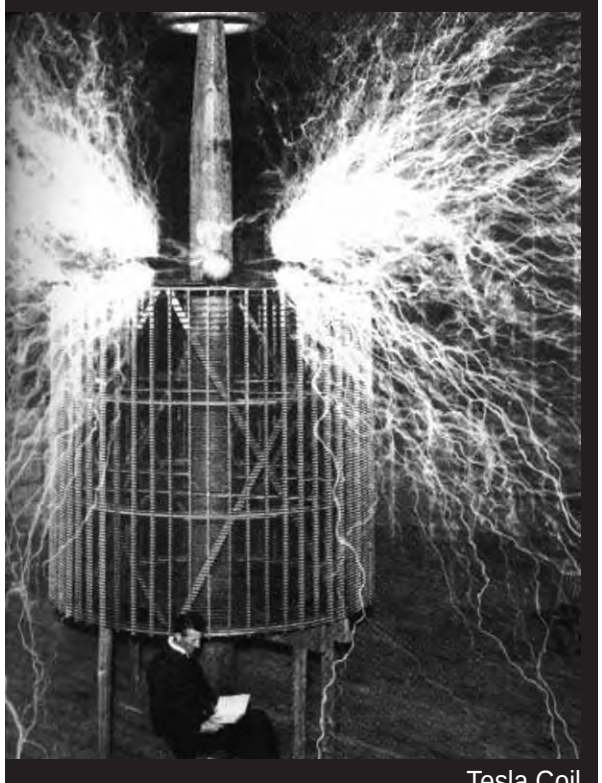


Tesla 1893, at the age of 37

Tesla and King Peter II Karadjordjevic 1942



Tesla Coil

Lightning on Demand

By Milos Rastovic

American engineers are planning to give a great honor to Serbian-American scientist, inventor, engineer, and researcher Nikola Tesla. Greg Leyh, an electrical engineer, plans to build the biggest Tesla coil in the world in California, which will produce 100-meter long electric lightning.[1] To protect the safety of engineers and tourists, they will transport the machine to the Nevada desert. The lightning producing machine will be as high as a 10-floor building. Lightning uses only ten percent of electric power for transmitting electricity and the goal of this scientific project is to discover how lightning can transmit electrical power through air.[2]

Nikola Tesla is one of the greatest scientists and inventors in the history of science. His inventions gave direction to the field of scientific-technological development in the Twentieth Century. Without his inventions, the contemporary world would have a totally different look. His most important inventions are: the rotating magnetic field, the induction motor, the polyphase system of generators, motors, and transformers, the Tesla coil, wireless communication, robotics, electrotherapy, Tesla turbines, X-rays tubes, arc light system, remote control, and the laser beam.

Nikola Tesla was born on July 10, 1856, in the village of Smiljan, in the area of Vojna Krajina (Lika), which was part of the Austria-Hungarian Empire, located today in Croatia. Milutin Tesla, his father, was a Serbian Orthodox priest and a good orator. Djuka Tesla, his mother, was also very intelligent, but she did not work outside the home. She invented many household tools and she knew many traditional Serbian songs. They had two sons: Dane, who died in an accident at the age of 14 and Nikola; and three daughters: Angelina, Milka and Marica. Nikola Tesla finished elementary and high school in Gospic and Karlovac. In 1875, Tesla went to study mechanical and electrical engineering at the Polytechnic Institute in Graz and at the University of Prague. Before going to America, Tesla worked as an electrical engineer for telephone companies in Budapest, Paris, and Strasbourg. While in Paris, Tesla worked for the Continental Edison Company until he decided to go to America to develop his ideas. Charles Batchelor, who worked with Tesla at the Edison Company, wrote a letter of recommendation to Thomas Edison: "I know two great men, one is you and the other is this young man!"

In 1884, Tesla arrived in America at the age of 28 with four cents in his pocket, some mathematical computations, and an idea about alternating current motors. He left the Edison Company in New York after one year of employment due to a disagreement with Edison, who was a proponent of direct current, which could be transported at no more than two-mile intervals. Tesla developed a polyphase alternating current system, which could transport electricity by circle and change direction sixty times per second. In this battle, Tesla beat Edison and the future of electricity was born. In 1886, Tesla founded his own company Tesla Electric Light & Manufacturing, and he began to work with Pittsburgh industrialist George Westinghouse. Westinghouse bought the patents rights to many Tesla inventions including the polyphase system of alternating current motors. As Tesla began to work with Westinghouse's engineers on a practical realization of his inventions, Westinghouse used his polyphase system at the 1893 World's Columbian Exposition in Chicago, which helped build the first power plant in the world in Niagara Falls in 1896.

In 1891, Tesla invented the Tesla coil, which is widely used in radio and television technology even today. He became an American citizen that same year. In a Colorado Springs laboratory in 1899, Tesla experimented with the transmission of wireless power from Pikes Peak to Paris. With this experiment, he proved that the earth can be used as a conductor in transmitting electricity. He also tried to build a wireless broadcasting tower for worldwide communication on Long Island with American financier J. Pierpont Morgan. Unfortunately, the project failed because of financial problems. Many Tesla inventions could not be developed because of lack of money, but the ideas found in his books and notebooks still remain valuable to today's scientists and engineers. Unfortunately, some scientists took Tesla's inventions and claimed them as their own, winning prizes such as Guglielmo Marconi's patent for radio, which won the Nobel Prize in 1909. Tesla fought to claim his radio patent, and finally, in 1943, the Supreme Court of the United States granted Tesla the radio patent.

Tesla lived at the hotel Waldorf-Astoria in New York when he was financially able, but his last ten years were spent at the Hotel New Yorker. He lived a lonely life and often visited a local park where he fed the pigeons. He was a close friend of Mark Twain, who often visited Tesla in his laboratory along with Robert Underwood Johnson and Francis Marion Crawford. In 1917, Tesla won the Edison medal for scientific achievement. He won honorary doctorates from Columbia University and Yale, among many others. He was an honorary member of the National Electric Light Association. In 1919, he published his autobiography, *My Inventions*. In 1935, on Tesla's 75th birthday, he appeared on the front page of *Time Magazine* when he received congratulatory letters from many scientists including Albert Einstein: "I congratulate you on the magnificent success of your life's work." [3]

In 1937, Tesla had a traffic accident: a cab hit him while he crossed the street. In those very lonely and painful years, his only visitor was his nephew, Sava Kosanovic, with one exception: a visit from His Royal Highness, King Petar Karadjordjevic II, who met Tesla in his apartment in June 1942. On January 7, 1943 (Orthodox Christmas) Tesla passed away at the hotel New Yorker at the age of 87. His funeral at the Cathedral of St. John the Divine in Morningside Heights, was attended by about 2000 people, including several Nobel Laureates, world recognized scientists and inventors, and Yugoslav diplomats. Bishop William T. Manning and Serbian Orthodox priest Dusan Sukletovic conducted the funeral service. Telegrams of sympathy were received from First Lady Eleanor Roosevelt and Vice-President Henry A. Wallace, among others. The mayor of New York City, Fiorello La Guardia, in a live radio broadcast read the following tribute:

"He died in poverty, but he was one of the most useful and successful men who ever lived. His achievements were great and they are becoming greater as time goes on. Nikola Tesla could have amassed hundreds of millions of dollars, could become the richest man in the country and in the world, if he wished for riches. He did not.… Nikola Tesla was a great humanitarian, a great scientific genius and poet in science. He did extraordinary and amazing miracle things during his life among us. He did that simply to serve mankind and for his services he did not want anything. Money, he did not care for it, honor, who was anybody to honor anybody else; that was his attitude; gratitude, he did not expect from men. Nikola Tesla did not care to be paid for anything he did for the human race… The real and important part of Tesla lives in his achievements which is great almost beyond calculation and integral part of our civilization, our daily lives, and our current war effort… His life is a triumph…" [4]

1 *Let there be lightning.* 21 June 2006 NewScientist.com news service Hazel Muir
http://www.lod.org/misc/Leyh/Articles/NewScientist6Jun06/Let%20there%20be%20lightning%20-%20%20New%20Scientist.pdf
2 *Kurir.* "Prave Najveci Teslin Kalem." November 25, 2011. http://www.kurir-info.rs/planeta/prave-najveci-teslin-kalem-152948.php
3 Michael Burgan. *Nikola Tesla: Physicist, Inventor, Electrical Engineering.* Signature Lives, Compass Point Books, 2009: 87.
4 Mayor Fiorello LaGuardia's Eulogy on Nikola Tesla. His Eulogy was recorded live on January 10, 1943 broadcasted over New York Radio. http://www.teslasociety.com/eulogy.htm

Tesla's body was cremated in a gold sphere and transferred to the Tesla Museum in Belgrade in 1957. Each year, July 10 is proclaimed as Nikola Tesla Day by the state of New York. Monuments to Tesla were built at Niagara Falls, Ontario, (2006) in front of the University of Belgrade Faculty of Electric Engineering, (1976) and his village, Smiljan (2006).

His work and vision were and will be an inspiration for many generations to come. Many famous and successful people today found inspiration in Tesla's works such as Larry Page, the founder of the internet search engine, Google. His parents bought him a book about Nikola Tesla at age of 12, and he decided that he wanted to be an inventor. Tesla was a genius who never practically realized his ideas because he could not find a fund for his inventions, says Page. First, you have to invent something, and then put it on the market, to make it commercial. Invention and market have to go together, says Page. Larry Page is also an investor in the company Tesla Motors, which produces electric cars. [5]

Some of Tesla's thoughts from his books *My Inventions*, and *Problem of Increasing Human Energy* may inspire the next generation of inventors:

"The present is theirs; the future, for which I really worked, is mine."

"I don't care that they stole my idea … I care that they don't have any of their own."

"I do not think there is any thrill that can go through the human heart like that felt by the inventor as he sees some creation of the brain unfolding to success . . . Such emotions make a man forget food, sleep, friends, love, everything."

"Our virtues and our failings are inseparable, like force and matter. When they separate, man is no more."

"Let the future tell the truth, and evaluate each one according to his work and accomplishments. The present is theirs; the future, for which I have really worked, is mine."

"One must be sane to think clearly, but one can think deeply and be quite insane."

"What we now want is closer contact and better understanding between individuals and communities all over the earth, and the elimination of egoism and pride which is always prone to plunge the world into primeval barbarism and strife... Peace can only come as a natural consequence of universal enlightenment..."

"Fights between individuals, as well as governments and nations, invariably result from misunderstandings in the broadest interpretation of this term. Misunderstandings are always caused by the inability of appreciating one another's point of view. This again is due to the ignorance of those concerned, not so much in their own, as in their mutual fields. The peril of a clash is aggravated by a more or less predominant sense of combativeness, posed by every human being. To resist this inherent fighting tendency the best way is to dispel ignorance of the doings of others by a systematic spread of general knowledge. With this object in view, it is most important to aid exchange of thought and intercourse."

"Everyone should consider his body as a priceless gift from one whom he loves above all, a marvelous work of art, of indescribable beauty, and mystery beyond human conception, and so delicate that a word, a breath, a look, nay, a thought may injure it."

"Invention is the most important product of man's creative brain. The ultimate purpose is the complete mastery of mind over the material world, the harnessing of human nature to human needs."

"All that was great in the past was ridiculed, condemned, combated, and suppressed— only to emerge all the more powerfully, all the more triumphantly from the struggle."

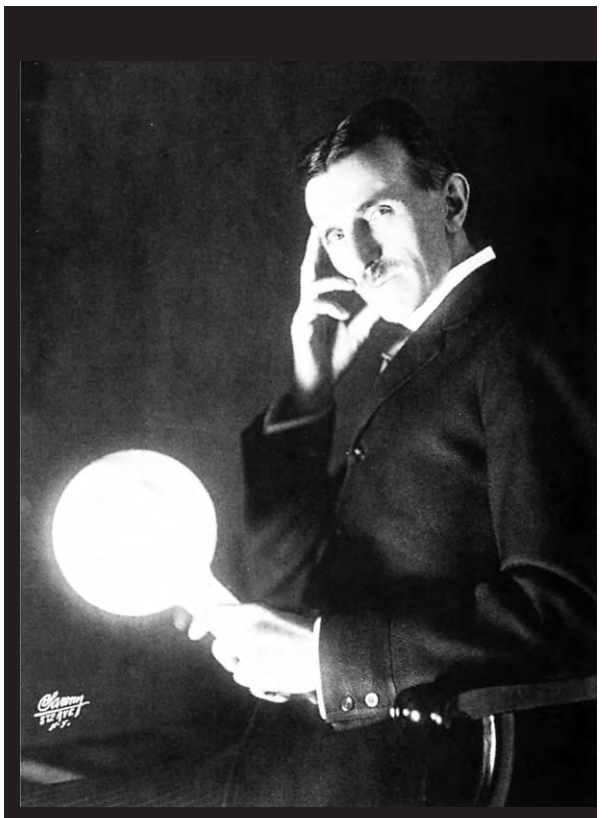
"What we now want most is closer contact and better understanding between individuals and communities all over the earth and the elimination of that fanatic devotion to exalted ideals of national egoism and pride, which is always prone to plunge the world into primeval barbarism and strife."

"So we find that the three possible solutions of the great problem of increasing human energy are answered by the three words: food, peace, work. Many a year I have thought and pondered, lost myself in speculations and theories, considering man as a mass moved by a force, viewing his inexplicable movement in the light of a mechanical one, and applying the simple principles of mechanics to the analysis of the same until I arrived at these solutions, only to realize that they were taught to me in my early childhood. These three words sound the keynotes of the Christian religion. Their scientific meaning and purpose now clear to me: food to increase the mass, peace to diminish the retarding force, and work to increase the force accelerating human movement. These are the only three solutions which are possible of that great problem, and all of them have one object, one end, namely, to increase human energy. When we recognize this, we cannot help wondering how profoundly wise and scientific and how immensely practical the Christian religion is, and in what a marked contrast it stands in this respect to other religions. It is unmistakably the result of practical experiment and scientific observation which have extended through the ages, while other religions seem to be the outcome of merely abstract reasoning. Work, untiring effort, useful and accumulative, with periods of rest and recuperation aiming at higher efficiency, is its chief and ever-recurring command. Thus we are inspired both by Christianity and Science to do our utmost toward increasing the performance of mankind. This most important of human problems I shall now specifically consider."

"From childhood I was compelled to concentrate attention upon myself. This caused me much suffering, but to my present view, it was a blessing in disguise for it has taught me to appreciate the inestimable value of introspection in the preservation of life, as well as a means of achievement. The pressure of occupation and the incessant stream of impressions pouring into our consciousness through all the gateways of knowledge make modern existence hazardous in many ways. Most persons are so absorbed in the contemplation of the outside world that they are wholly oblivious to what is passing on within themselves. The premature death of millions is primarily traceable to this cause. Even among those who exercise care, it is a common mistake to avoid imaginary, and ignore the real dangers. And what is true of an individual also applies, more or less, to a people as a whole."

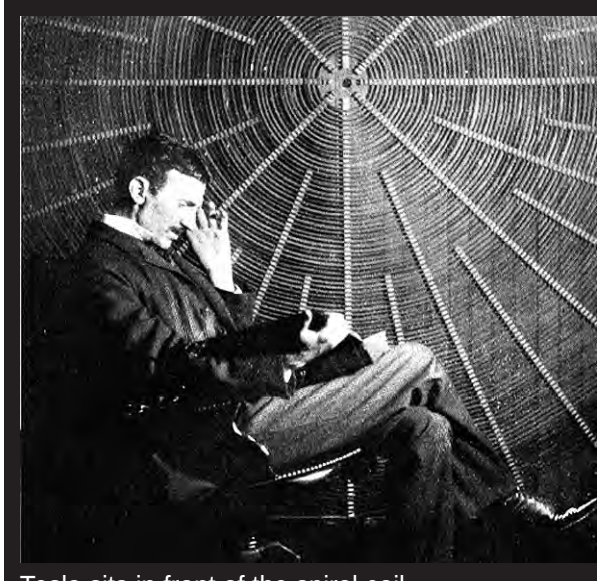
"The individual is ephemeral, races and nations come and pass away, but man remains."

"It is not a dream; it is a simple feat of scientific electrical engineering, only expensive — blind, faint-hearted, doubting world! [...] Humanity is not yet sufficiently advanced to be willingly led by the discoverer's keen searching sense. But who knows? Perhaps it is better in this present world of ours that a revolutionary idea or invention instead of being helped and patted, be hampered and ill-treated in its adolescence — by want of means, by selfish interest, pedantry, stupidity and ignorance; that it be attacked and stifled; that it pass through bitter trials and tribulations, through the strife of commercial existence. So do we get our light? So all that was great in the past was ridiculed, condemned, combated, suppressed — only to emerge all the more powerfully, all the more triumphantly from the struggle." – Nikola Tesla (at the end of his dream for Wardenclyffe)"



Tesla Master of Lightning

Tesla Model S - Tesla Motors-1



Tesla sits in front of the spiral coil with the book of Rudjer Boskovic *Theoria Philosophiae Naturalis*

5 *Kurir.* "Vlasnik Gugla: Nikola Tesla je Moj Idol." September 30, 2011. http://www.kurir-info.rs/vesti/drustvo/vlasnik-gugla-nikola-tesla-je...