**Sergei Korolev**

From Wikipedia, the free encyclopedia

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| **Sergei Korolev** | |
| Sergey Korolyov in Red Army uniform (1938). | |
| **Born** | Sergey Pavlovich Korolev Сергей Павлович Королёв Сергій Павлович Корольов 12 January [O.S. 30 December 1906] 1907 Zhytomyr, Volhynian Governorate, Russian Empire |
| **Died** | 14 January 1966(1966-01-14) (aged 59) Moscow, USSR |
| **Cause of death** | Cancer, Tumor |
| **Nationality** | Soviet |
| **Ethnicity** | Russian and Ukrainian |
| **Occupation** | Soviet rocket engineer and designer Colonel (Red Army) |
| **Spouse(s)** | Xenia Vincentini Nina Ivanovna Kotenkova |
| **Children** | Natasha |

**Sergei Pavlovich Korolev** (Russian: Серге́й Па́влович Королёв, Ukrainian: Сергі́й Па́влович Корольо́в, *Serhiy Pavlovych Korolov*, also transliterated as **Sergey Pavlovich Korolyov**; 12 January [O.S. 30 December 1906] 1907 in Zhytomyr, Russian Empire – 14 January 1966 in Moscow, USSR) was the lead Soviet rocket engineer and spacecraft designer in the Space Race between the United States and the Soviet Union during the 1950s and 1960s. He is considered by many as the father of practical astronautics.

Although Korolev was trained as an aircraft designer, his greatest strengths proved to be in design integration, organization and strategic planning. Arrested for alleged mismanagement of funds (he spent the money on unsuccessful experiments with rocket devices), he was imprisoned in 1938 for almost six years, including some months in a Kolyma labor camp. Following his release, he became a recognized rocket designer and a key figure in the development of the Soviet ICBM program. He was then appointed to lead the Soviet space program, made Member of Soviet Academy of Sciences, overseeing the early successes of the Sputnik and Vostok projects. By the time he died unexpectedly in 1966, his plans to compete with the United States to be the first nation to land a man on the Moon had begun to be implemented.

Before his death he was often referred to only as "Chief Designer", because his name and his pivotal role in the Soviet space program had been held to be a state secret by the Politburo. Only many years later was he publicly acknowledged as the lead man behind Soviet success in space.

**Early life**

Korolev was born in Zhytomyr, a small provincial center in the Volhynian Governorate of the Russian Empire (now Ukraine). His father, Pavel Yakovlevich Korolev, was a Russian from Mogilev and his mother, Maria Mykolayivna Koroleva (Moskalenko), was Ukrainian from Nizhyn. His father had originally moved to Zhytomyr to be a teacher of Russian language. Three years after his birth the couple separated due to financial difficulties. At the time, Korolev was informed by his mother that his father had died, and only later learned that Pavel had lived until 1929. The two never met after the family break-up, although Pavel later wrote to Maria requesting a meeting with his son.

Korolev grew up in Nizhyn (*Nezhin*), under the care of his maternal grandparents Mykola Yakovych Moskalenko who was a trader of the Second Guild and Maria Matviivna Moskalenko (Fursa), a daughter of a local Cossack. Korolev's mother also had a sister Hanna and two brothers Yuri and Vasyl. Maria Koroleva had wanted the higher education, and so she was frequently away attending Women's higher education courses in Kiev. Sergei grew up a lonely child with few friends, this was largely due to the fact of his smaller stature and favoritism with teachers. The subject of jealously of his peers, Korolev proved to be quite the student excelling in math and other subjects. As stated in an interview, the torment of other kids bullying and teasing him later fueled him as he continued with his work as he proved a good student, especially in mathematics. In 1915 his mother got divorce and in 1916 married Grigory Mikhailovich Balanin, an electrical engineer with German education, attending the Kiev Polytechnic university because of the non-recognition of German engineering diplomas in Russia. Grigory proved a good influence on the child. Grigory moved the family to Odessa in 1917, after getting a job with the regional railway.

The year 1918 was tumultuous in Russia, with the close of World War I and the ongoing Russian Revolution. The internecine struggles continued until the Bolsheviks assumed unchallenged power in 1920. During this period the local schools were closed and young Korolev had to continue his studies at home. In 1919 there were severe food shortages, and Korolev suffered from a bout of typhus. Even after this the family suffered through hard times, as did much of the remainder of the nation.

**Education**

Korolev continued his schooling at the Odessa Building Trades School (Stroyprofshkola No. 1) where he received vocational training in carpentry and in various academics. However his primary interest was in aeronautical engineering, perhaps due to the influence of an air show he had enjoyed back in 1913. He made an independent study of flight theory, and also worked in the local glider club. A detachment of military seaplanes had been stationed in Odessa, and Korolev took a keen interest in their operations.

In 1923 he joined the Society of Aviation and Aerial Navigation of Ukraine and the Crimea (OAVUK). By joining the Odessa hydroplane squadron he had his first flying lesson, and also had many opportunities to fly as a passenger. In 1924 he personally designed a glider called the K-5, which was accepted by the OAVUK as a construction project. At about the same time he also trained to become accomplished as a gymnast, but his academic work began to suffer from his distractions with these other interests. To pursue his interests, he decided in 1924 to attend the Kiev Polytechnic Institute as they had an aviation branch. In Kiev he lived with his uncle Yuri, and he earned money to pay for his courses by performing odd jobs. His curriculum was technically oriented, and included various engineering, physics and mathematics classes.

In 1925 he was accepted into a limited class on glider construction. He was allowed to fly the training glider on which he worked, but ended up with two broken ribs. He continued with his courses, completing his second year in 1926. In July of that year he was accepted into the Bauman Moscow State Technical University (MVTU, BMSTU).

Until 1929, Korolev studied specialized topics in aviation at the school. He lived with his family, who had moved to Moscow, in what were typical but crowded conditions. In addition to his studies, Korolev had more opportunities to fly gliders and powered aircraft, and he reveled in the experience. He also designed a glider in 1928, and flew it in a competition the next year. During 1929 the Communist Party had decreed that the education of engineers be accelerated to meet the country's urgent need for their skills. Korolev could obtain a diploma by producing a practical aircraft design, and had the design completed and approved by the end of the year. His advisor was none other than Andrei Tupolev.

**Early career**



Korolev sitting in cockpit of glider "Koktebel."

Having graduated, Korolev began work at an aircraft design bureau designated OPO-4, or 4th Experimental Section. It was headed by a Frenchman named Paul Aimé Richard(fr) who emigrated to USSR in the 1920s and included a number of the Soviet Union's best designers. He did not stand out in this group, but while so employed he also worked privately on a pair of personal design projects. One of these was a glider design that was capable of performing aerobatics. By 1930 he became a lead engineer on the Tupolev TB-3 heavy bomber.

In 1930, Korolev finally earned his pilot's license. The next year, on 6 August, he was wed to Xenia Vincentini, a woman he had been courting since 1924. He had proposed marriage to her back then, but she declined as she wanted a higher education. It was during 1930 that Korolev became interested in the possibilities of liquid-fueled rocket engines. As his interest was primarily in aircraft, he saw the potential for use of these engines to propel airplanes. It was one day, while he was flying around, that he looked up and wondered about what was beyond the point of where he could take his plane and how he could get there. Many believe this was the start of his interest in space. In 1931, together with Friedrich Zander, a space travel enthusiast, he participated in the creation of the Group for the Study of Reactive Motion (GIRD), one of the earliest state-sponsored centers for rocket development in the USSR. In May 1932 Korolev was appointed chief of the group.

During the following years, GIRD developed three different propulsion systems, each more successful than the last. In 1932, the military became interested in the efforts of this group, and began providing some funding. In 1933, the group accomplished their first launch of a liquid-fueled rocket, which was called GIRD-X (not GIRD-09 as often cited; hybrid GIRD-09 used solid gasoline and liquid oxygen). This was just seventeen years after colonel Ivan Platonovich Grave's first launch in 1916 (patent in 1924). In 1934, Korolev published the work "Rocket Flight in Stratosphere".

With growing military interest in this new technology, it was decided by the government in 1933 to merge GIRD with the Gas Dynamics Laboratory (GDL) in Leningrad. The merger created the Jet Propulsion Research Institute (RNII), headed up by the military engineer Ivan Kleimenov and containing a number of enthusiastic proponents of space travel, including Valentin Glushko. Korolev became the Deputy Chief of the institute. He led the development of cruise missiles and a manned rocket-powered glider.

On 10 April 1935, Korolev's wife gave birth to their daughter, Natasha. In 1936 they were able to move out of his parents' home and into their own apartment. Both Korolev and his wife had careers, and Sergey always spent long hours at his design office. By now he was chief engineer at RNII. The RNII team continued their development work on rocketry, with particular focus on the area of stability and control. They developed automated gyroscope stabilization systems that allowed stable flight along a programmed trajectory. Korolev was a charismatic leader who served primarily as an engineering project manager. He was a demanding, hard-working man, with a disciplinary style of management. Korolev personally monitored all key stages of the programs and paid meticulous attention to detail.

**Imprisonment**

On 22 June 1938, during the Great Purge, Korolev was arrested by the NKVD after being denounced by Ivan Kleymenov, Georgy Langemak, and Valentin Glushko. He was accused of deliberately slowing the work of the research institute, and following torture in the Lubyanka prison to extract a confession, was tried and sentenced to ten years in a *Gulag*. Korolev later learned that he had been denounced by Glushko, and this may have been the cause of the lifelong animosity between the two men. Glushko and Korolev had reportedly been denounced by Andrei Kostikov, who became the head of RNII after its leadership was arrested (Kostikov was ousted a few years later over accusations of budget irregularities).

Believing that his arrest was a mistake, Korolev wrote many appeals to the authorities, including Stalin himself. Following the fall of the NKVD head, Nikolai Yezhov, the new chief Lavrenti Beria chose to retry Korolev on reduced charges in 1939, but by that time Korolev was on his way from prison to a gulag camp in the far east of Siberia, where he spent several months in a gold mine in the Kolyma area before word reached him of his retrial. Towards the end of 1939 he was sent back to Moscow, but he had already sustained injuries and had lost most of his teeth due to the labor camp's brutal conditions. When he reached Moscow, Korolev's sentence was reduced to eight years, which he did not have to serve in a labor camp.

Other members of the RNII had also been arrested. Kleymenov and Langemak were executed, leaving Korolev very fortunate to have even survived. The rocket program was set back for years and fell far behind the rapid progress taking place in Germany.

Korolev was assigned to a "sharashka", a penitentiary for intellectuals and the educated. These were effectively slave-labor camps where scientists and engineers worked on projects assigned by the Communist party leadership. The *Central Design Bureau 29* (CKB-29, ЦКБ-29) of the NKVD, served as Tupolev's engineering facility, and Korolev was brought here to work for his old mentor. During World War II, this sharashka designed both the Tupolev Tu-2 bomber and the Petlyakov Pe-2 dive bomber. The group was moved several times during the war, the first time to avoid capture by advancing German forces.

In 1942 Korolev managed to be moved to another "sharashka" under Valentin Glushko, which designed rocket-assisted take off boosters for aircraft. Korolev was kept in the sharashka and isolated from his family until 1944. He lived under constant fear of being executed for the military secrets he possessed, and was deeply affected by his time in the gulag, becoming reserved and cautious. On 27 June 1944, Korolev – along with Tupolev, Glushko and others – was finally discharged by special government decree, although the charges against him were not dropped until 1957. The design bureau was handed over from NKVD control to the government's aviation industry commission. Korolev continued working with the bureau for another year, serving as deputy designer under Glushko and studying various rocket designs. In 1944, Korolev and Glushko designed the RD-1 kHz auxiliary rocket motor tested in an unsuccessful fast-climb Lavochkin La-7R.

**Ballistic missiles**

In 1945, Korolev was awarded the Badge of Honor, his first decoration, for his work on the development of rocket motors for military aircraft. The same year he was commissioned into the Red Army, with a rank of colonel. Along with other experts, he flew to Germany to recover the technology of the German V-2 rocket. The Soviets placed a priority on reproducing lost documentation on the V-2, and studying the various parts and captured manufacturing facilities. That work continued in East Germany until late 1946, when the Soviet experts and some 150 German scientists and engineers were sent to Russia. Most of the German experts, with the exception of Helmut Gröttrup, were those involved in wartime mass-production of V-2, and they had never worked directly with Wernher von Braun. The leading German rocket scientists, including Dr. von Braun himself, surrendered to Americans and were transported to the United States as part of Operation Paperclip.

Stalin had decided to make rocket & missile development a national priority, and a new institute was created for the purpose, the NII-88 in the suburbs of Moscow. For the German engineers, Branch 1 of NII-88 was set up on Gorodomlya Island in the Lake Seliger some 200 kilometers (120 mi) from Moscow. The facility was surrounded by barbed wire and armed guards, although Boris Hertko, chief designer of guidance and control systems, notes in his book *Rockets and People*,

All structures on Goodly island were renovated and living conditions were quite decent for those times. At least married specialists received separate two- or three-room apartments. Visiting the island, I could only envy them, because I and my family lived in Moscow in a shared four-room apartment, where we had two rooms of 24 square meters (260 sq ft) combined. Many of our specialists and workers lived in barracks without most elementary necessities. [...] This is why life on the island behind barbed wire could not compare at all to prisoner of war conditions.

Development of ballistic missiles was put under the military control of Dmitriy Ustinov, with Korolev serving as a chief designer of long-range missiles at the Special Design Bureau 1 (OKB-1) of NII-88. Korolev demonstrated his organizational abilities in this new facility, keeping a dysfunctional and highly compartmentalized organization operating.

With the blueprints reproduced, thanks in part to disassembled V-2 rockets, the team now began producing a working replica of the rocket. This was designated the R-1, and was first tested in October 1947. A total of eleven were launched, five hitting the target. This was comparable to the German hit ratio, and demonstrated the unreliability of the rocket. The Soviets continued to utilize the expertise of the Germans on V-2 technology for some time; however, in the regime of secrecy surrounding the ballistic missile program, Gröttrup and his team had no access to classified work of their Russian colleagues on new rocket technology as well as adequate production and testing facilities. This made any meaningful development impossible and negatively affected the morale of the German team. In 1950, the Ministry of Defense made an official decision to dissolve the German team and repatriate the German engineers and their families. The first group was sent to Germany in December 1951, and the last in November 1953.

In 1947, Korolev's group began working on more advanced designs, with improvements in range and throw weight. The R-2 doubled the range of the V-2, and was the first design to utilize a separate warhead. This was followed by the R-3, which had a range of 3,000 kilometers (1,900 mi), and thus could target England. However, Glushko couldn't get the engines to develop the required thrust, and the project was canceled in 1952.

Later in the same year work began on the R-5, which had a more modest 1,200 kilometers (750 mi) range. It completed a first successful flight by 1953. The first true intercontinental ballistic missile (ICBM), not only in USSR but in the whole world, was the R-7 Semyorka. This was a two-stage rocket with a maximum payload of 5.4 tons, sufficient to carry the Soviet's bulky nuclear bomb on an impressive distance of 7,000 kilometers (4,300 mi). After several test failures, the R-7 successfully launched on August 1957, sending a dummy payload to Kamchatka Peninsula.



"The Chief Designer" Sergei Korolev (left) and "the Chief Theoretician" Mstislav Keldysh (right). In the center: Igor Kurchatov, 1956

It was in 1952 that Korolev joined the Soviet Communist Party, a tactical necessity if he was to request money from the government for his future projects. It was only 19 April 1957, however, when he would be fully "rehabilitated", as the government acknowledged that his sentence was unjust.

**Space program**



Monument to S. Korolev in Baikonur, Kazakhstan.

In spite of the Soviet progress on ICBM technology, Korolev was preoccupied with the use of rockets for space travel. In 1953 he first proposed the use of the R-7 design for launching a satellite into orbit. He pushed his ideas with the Academy of Sciences of the USSR, including a concept for sending a dog into space. He also had to overcome resistance in the military and among party members.

In 1957, during the International Geophysical Year, the concept of launching a satellite began to appear in the American press. The US government was not well disposed toward the idea of spending millions of dollars on this concept, and so it was effectively frozen for a period. However, Korolev's group followed the Western press, and they thought it was possible to beat the US to the punch. He was finally able to win over support because of competition with the United States by suggesting that the USSR should try to be the first country to launch a satellite.

The actual development of Sputnik was performed in less than a month. This was a very simple design, consisting of little more than a polished metal sphere, a transmitter, thermal measuring instruments, and batteries. Korolev personally managed the assembly, and the work was very hectic. Finally on 4 October 1957, launched on a rocket that had only successfully launched once, the satellite was placed in orbit.

The effect of this launch was electric, and produced many political ramifications for the future. Nikita Khrushchev was pleased with this success, and decided that it should be followed up by a new achievement in time for the 40th anniversary of the October Revolution. This was less than a month away, on 3 November. The result was Sputnik 2.

This new spacecraft would have six times the mass of the Sputnik 1, and would include as a payload the dog Laika. The entire vehicle was designed from scratch within four weeks, with no time for testing or quality checks. It was successfully launched on 3 November and the dog was placed in orbit. There was no mechanism designed in this vehicle to bring the dog back to earth and so she died after roughly 6 hours in space succumbing to heat exhaustion.

This string of successes ran out with the launch of Sputnik 3. This instrument-laden spacecraft was sent into orbit on 15 May the following year. However, the tape recorder that was to store the data failed after launch. As a result, the discovery and mapping of the Van Allen radiation belts were left to the United States' Explorer 4 in July. What Sputnik 3 did do, however, was to leave little doubt with the American government about the Soviets' pending ICBM capability.

**The Moon**

Korolev now turned his attention to reaching the Moon. A modified version of the R-7 launch vehicle would be used, with a new upper stage. The engine for this final stage was the first designed to be fired in outer space. The first three probes sent to the Moon in 1958 failed, because of lack of consistent funds from the Soviet government due to political turmoil. He and his colleagues often cited the lack of consistency from the Soviets that lead to many of their problems, especially financially. The Luna 1 mission in 1959 was intended to impact the surface, but missed by about 6,000 kilometers (3,700 mi). Another probe failed, and then the Luna 2 successfully impacted the surface, giving the Soviets another first. This was followed by an even greater success with Luna 3. It was launched only two years after Sputnik 1, and was the first spacecraft to photograph the far side of the Moon.

Korolev's group was also working on ambitious programs for missions to Mars and Venus, putting a man in orbit, launching communication, spy and weather satellites, and making a soft-landing on the Moon. A radio communication center needed to be built in the Crimea, near Simferopol and near Evpatoria to control the spacecraft.

**Human spaceflight**



Monument to S. Korolev in Korolyov city, Moscow Oblast, Russia.

Korolev's planning for the piloted mission had begun back in 1958, when design studies were made on the future Vostok spacecraft. It was to hold a single passenger in a space suit, and be fully automated. The capsule had an escape mechanism for problems prior to launch, and a soft-landing and ejection system during the recovery.

On 15 May 1960 an unpiloted prototype performed 64 orbits of the Earth, but failed to return. Four tests were then sent into orbit carrying dogs, of which the last two were fully successful. After gaining approval from the government, a modified version of the R-7 was used to launch Yuri Alexeevich Gagarin into orbit on 12 April 1961, the first human in Earth orbit. He returned to Earth via a parachute after ejecting at an altitude of 7 kilometers (4.3 mi).

This was followed up by additional Vostok flights, culminating with 81 orbits completed with Vostok 5 and the launch of the first woman cosmonaut, Valentina Tereshkova, on Vostok 6.

Following Vostok, Korolev planned to move forward with Soyuz craft that would be able to dock with other craft in orbit and exchange crews. However, he was directed by Khrushchev to cheaply produce more 'firsts' for the piloted program. Korolev was reported to have resisted the idea, since he currently lacked a rocket of sufficient capability to lift a three-person capsule into space. However, Khrushchev was not interested in technical excuses and let it be known that if Korolev could not do it, he would give the work to his rival, Vladimir Chelomei.

Cosmonaut Alexey Leonov describes the authority Korolev commanded at this time.

Long before we met him, one man dominated much of our conversation in the early days of our training; Sergei Pavlovich Korolev, the mastermind behind the Soviet space program. He was only ever referred to by the initials of his first two names, SP, or by the mysterious title of "Chief Designer", or simply "Chief". For those on the space program there was no authority higher. Korolev had the reputation of being a man of the highest integrity, but also of being extremely demanding. Everyone around him was on tenterhooks, afraid of making a wrong move and invoking his wrath. He was treated like a god.

Leonov recalls the first meeting between Korolev and the cosmonauts.

I was looking out of the window when he arrived, stepping out of a black Zis 110 limousine. He was taller than average; I could not see his face, but he had a short neck and large head. He wore the collar of his dark-blue overcoat turned up and the brim of his hat pulled down.

"Sit down, my little eagles," he said as he strode into the room where we were waiting. He glanced down a list of our names and called on us in alphabetical order to introduce ourselves briefly and talk about our flying careers.

Main article: Voskhod program

To complete this task his group designed the Voskhod, an incremental improvement on the Vostok. One of the difficulties in the design of the Voskhod was the need to land it via parachute. The three-person crew could not bail out and land by parachute, since the altitude would not be survivable. So the craft would need much larger parachutes in order to land safely. However, some tests with the craft resulted in failures, causing the death of some test animals. This gave Korolev pause, but the problem was solved through the use of new parachute material.

The resulting Voskhod was a stripped-down vehicle from which any excess weight had been removed. Another modification was the addition of a backup retrofire engine, since the more powerful Voskhod rocket used to launch the craft would send it to a higher orbit than the Vostok, thus eliminating the possibility of a natural decay of the orbit and reentry in case of primary retrorocket failure. This spacecraft made one unmanned test flight, then on 12 October 1964 a crew of three cosmonauts, Komarov, Yegorov and Feoktistov, was launched into space and made sixteen orbits. This craft was designed to perform a soft landing, thus eliminating a need for the ejection system. The crew was also sent into orbit without space suits, another risky move.

With the Americans planning a spacewalk with their Gemini program, the Soviets decided to trump them again by performing a spacewalk on the second Voskhod launch. After rapidly adding an airlock, the Voskhod 2 was launched on March 18, 1965, and Alexei Leonov performed the world's first spacewalk. The flight very nearly ended in disaster and plans for further Voskhod missions were shelved. In the meantime the change of Soviet leadership with the fall of Khrushchev meant that Korolev was back in favor and given charge of beating the US to landing a man on the Moon.

For the Moon race, Korolev's staff started to design the immense N1 rocket in 1961, using the highly efficient NK-33 liquid fuel rocket engine. He also had in work the design for the Soyuz manned spacecraft (which many years later went on to carry the first space tourists), as well as the Luna vehicles that would soft-land on the Moon and make unmanned missions to Mars and Venus. But, unexpectedly, he was to die before he could see his various plans brought to fruition.

**Death**



Korolev's tomb (left) in the Kremlin Wall Necropolis.

On 3 December 1960, Korolev suffered his first heart attack. During his convalescence, it was also discovered that he was suffering from a kidney disorder, a condition brought on by his detention in the Soviet prison camps. He was warned by the doctors that if he continued to work as intensely as he had, he would not live long. However Korolev reasoned that once the Soviets lost their leadership in space, the capricious Khrushchev would likely cut off the funding for his programs. So he continued to work - now even more intensely than before.

By 1962 Sergei Korolev's health problems were beginning to accumulate and he was suffering from numerous ailments. He had a bout of intestinal bleeding that led to him being taken to the hospital in an ambulance. In 1964 doctors diagnosed him with cardiac arrhythmia. In February he spent ten days in the hospital after a heart problem. Shortly after he was suffering from inflammation of his gallbladder. The mounting pressure of his workload was also taking a heavy toll, and he was suffering from a lot of fatigue. Korolev was also growing deaf, perhaps due to much exposure to noise from rocket engine tests.

The actual circumstances of Korolev's death remain somewhat uncertain. In December 1965, he was supposedly diagnosed with a bleeding polyp in his large intestine. He entered the hospital on 5 January 1966 for somewhat routine surgery. He died nine days later. It was stated by the government that he had what turned out to be a large, cancerous tumor in his abdomen. But Glushko later reported that he actually died due to a poorly performed operation for hemorrhoids. Another version states that the operation was going well and no one was predicting any complications. However, suddenly during the operation, Korolev started to bleed. Doctors tried to provide intubation for him to allow him to breathe freely, but his jaws (injured during his time in a gulag) did not heal properly and impeded the installation of the breathing tube. Korolev died without coming back to consciousness. According to Harford, Korolev's family confirmed the cancer story. His weak heart contributed to his death during surgery.

Under a policy initiated by Stalin and continued by his successors, the identity of Korolev was never revealed until after his death. The purported reason was to protect him from foreign agents from the United States. As a result, the Soviet people didn't become aware of his accomplishments until after his death. His obituary was published in the *Pravda* newspaper on 16 January 1966, showing a photograph of Korolev with all his medals. Korolev's ashes were interred with state honors in the Kremlin Wall.

Korolev is often compared to Wernher von Braun as the leading architect of the Space Race. Unlike von Braun, Korolev had to compete continually with rivals, such as Vladimir Chelomei, who had their own plans for flights to the Moon. He also had to work with technology that in many aspects was less advanced than what was available in the United States, particularly in electronics and computers.

Korolev's successor in the Soviet space program was Vasily Mishin. Mishin was a quite competent engineer who had served as Korolev's deputy and right-hand man. After Korolev died, Mishin became the Chief Designer, and he inherited what turned out to be a flawed N1 rocket program. In 1972, Mishin was fired and then replaced by a rival, Valentin Glushko, after all four N-1 test launches failed. By that time, the rival Americans had already made it to the Moon, and so the program was canceled by CPSU General Secretary Leonid Brezhnev.

**Personal life**

The Soviet émigré Leonid Vladimirov related the following description of Korolev by Glushko at about this time:

"Short of stature, heavily built, with head sitting awkwardly on his body, with brown eyes glistening with intelligence, he was a skeptic, a cynic and a pessimist who took the gloomiest view of the future. 'We are all going to be whacked and there will be no obituary' (*Khlopnut bez nekrologa*, Хлопнут без некролога - i.e. "we will all vanish without a trace") was his favorite expression."

Korolev was rarely known to drink vodka or other alcoholic beverages, and chose to live a fairly austere lifestyle. He remained a handsome and solidly built man, and he was as fond of women as they were of him.

About 1946, the marriage of Korolev and Vincentini began to break up. Vincentini was heavily occupied with her own career, and at about this time Korolev had an affair with a younger woman named Nina Ivanovna Kotenkova. Vincentini, who still loved Korolev and was angry over the infidelity, divorced him in 1948. Korolev and Kotenkova next were married in 1949, but he is known to have had affairs even after his marriage to Kotenkova.

**Awards and honors**



Monument to Sergei Korolyov on Cosmonauts Alley, Moscow. Ostankino Tower is on the background.

Among his awards, Korolev was twice bestowed the Hero of Socialist Labor in 1956 and 1961. He was also a Lenin Prize winner in 1971, and was awarded the Order of Lenin three times, the Order of the Badge of Honor and the Medal "For Labor Velour".

In 1958 he was elected to the Academy of Sciences of the USSR. In 1969 and 1986, the USSR issued 10 kopek postage stamps honoring Korolev. In addition he was made an Honorary Citizen of Korolyov and received the Medal "In Commemoration of the 800th Anniversary of Moscow".

The Nobel Prize committee attempted to award Korolev but the award was turned down by Khrushchev in order to maintain harmony within the Council of Chief Designers.

**Namesakes**

A street in Moscow was named after Korolev in 1966 and is now called *Ulitsa Akademika Korolyova* (Academician Korolyov Street). *The memorial home-museum of akademician S.P.Korolyov* was established in 1975 in the house where Korolev lived from 1959 till 1966 (Moscow, 6th Ostankinsky Lane,2/28). In 1976 he was inducted into the *International Space Hall of Fame*.

The town of Kaliningrad (formerly *Podlipki*, Moscow region) is the home of RSC Energia, the largest space company in Russia. In 1996, Boris Yeltsin renamed the town to Korolyov. There is now an oversized statue of S.P. Korolev located in the town square. RSC Energia was also renamed to S.P. Korolev Rocket and Space Corporation Energia.

Astronomical features named after Korolev include the crater Korolev on the far side of the Moon, a crater on Mars, and the asteroid 1855 Korolyov.

Quite big number of streets exists with his name in Russia as well as in Ukraine. In Zhytomyr on the other side of the street (vulytsia Dmytrivska) from the house where Sergei Korolev was born is the Museum of Cosmonautics.

**Portrayals in fiction**

The first portrayal of Korolev in Soviet cinema was made in the 1972 film *Taming of the Fire*, in which Korolev was played by renowned Russian actor Kirill Lavrov. He was played by Steve Nicolson in the 2005 BBC co-produced docu-drama *Space Race*. In 2011 the British writer Rona Munro produced the play *Little Eagles* on Korolev's life – its premiere was from 16 April to 7 May 2011, in an RSC production at the Hampstead Theatre, with Korolev played by Darrel D'Silva and Yuri Gagarin by Dyfan Dwyfor.

Korolev appeared briefly in a film-within-a-film in the ***The Right Stuff*** during the administration of Dwight D. Eisenhower, inside one of the President's conference rooms.

The science fiction novel by Paolo Aresi titled *Korolev* was published in the Italian magazine series *Urania* in April 2011.

The story The Chief Designer by Andy Duncan is a fictionalized account of Korolev's career.



Sergey Korolev on a Soviet Union 1969 Stamp (10 kopeks)

* [Taming of the Fire](http://en.wikipedia.org/wiki/Taming_of_the_Fire)
* [Maxime Faget](http://en.wikipedia.org/wiki/Maxime_Faget)
* [Hermann Oberth](http://en.wikipedia.org/wiki/Hermann_Oberth)
* [Vladimir Chelomei](http://en.wikipedia.org/wiki/Vladimir_Chelomei)
* [Valentin Glushko](http://en.wikipedia.org/wiki/Valentin_Glushko)
* [Kerim Kerimov](http://en.wikipedia.org/wiki/Kerim_Kerimov)
* [Mstislav Keldysh](http://en.wikipedia.org/wiki/Mstislav_Keldysh)
* [Robert Bartini](http://en.wikipedia.org/wiki/Robert_Bartini)
* [Wernher Von Braun](http://en.wikipedia.org/wiki/Wernher_Von_Braun)
* [Soviet Moonshot](http://en.wikipedia.org/wiki/Soviet_Moonshot)
* [Space Race](http://en.wikipedia.org/wiki/Space_Race)
* [Sputnik program](http://en.wikipedia.org/wiki/Sputnik_program)
* [Vostok](http://en.wikipedia.org/wiki/Vostok_programme)
* [Voskhod](http://en.wikipedia.org/wiki/Voskhod_programme)
* [Soyuz](http://en.wikipedia.org/wiki/Soyuz_spacecraft)
* [Soviet space program](http://en.wikipedia.org/wiki/Soviet_space_program)
* [State Space Agency of Ukraine](http://en.wikipedia.org/wiki/State_Space_Agency_of_Ukraine)

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