Theodor von Kármán

Dr. Theodor von Kármán holds an important position among the contributors to aerodynamic theory, particularly in the area of supersonic flight. Known as “the father of supersonic flight,” he made major contributions to aviation and space technology, theoretical aerodynamics, and the application of theory to improve aircraft performance. He also helped develop the use of rocketry for creating weapons of defense.

As a young child in Hungary, von Kármán seemed destined for science. His father was a professor and his mother a descendant of well-known scholars. Born in 1881, Theodor’s intelligence was first noticed at age 6 when he solved his older brother’s complicated multiplication problems in his head before his brother could complete them on paper.

At age 9 he enrolled in an open education laboratory founded by his father that was referred to as “a nursery for the elite.” By the age of 22, von Kármán had graduated from Royal Joseph University in Hungary with a mechanical engineering degree and highest honors. He enrolled in the advanced study of mechanical engineering after serving his mandatory military service and received his doctorate under the tutelage of the famous aerodynamicist, Ludwig Prandtl.

Von Kármán spent the next four years working under Prandtl and helped advance boundary-layer theory and airfoil and wing theory. In 1913 he left Prandtl’s supervision to become a professor in aeronautics and mechanics at the Technical University at Aachen, Germany. He was soon appointed the director of the Aachen Aerodynamics Institute.

While at Aachen, he met Hugo Junkers and collaborated with him in the aerodynamic design of the Junkers J-1 transport airplane. Created in 1915, the J-1 airplane was the first cantilevered wing all metal airplane.

Von Kármán moved to the United States in 1930 to accept the role of director of the Guggenheim Aeronautical Laboratory at the California Institute of Technology (GALCIT). He brought with him a new approach to theoretical aerodynamics and its use in practical airplane design. He soon made GALCIT the intellectual center of aerodynamics and a leader in rocket research in the United States. Aerojet Engineering Corporation, which later became the major rocket company Aerojet-General, was spun off from GALCIT in 1942, and the Jet Propulsion Laboratory, a leader in rocket research, was formed from GALCIT in 1944.

In 1932, von Kármán made a notable contribution to the study of supersonics. Von Karman reduced the current equations for supersonic flow into a single equation. He then proposed its solution by studying the airflow at various points along the object. This became known as the Karman-Moore theory and marked the beginning of a new approach to studying supersonics that is still used today.

In 1939, the commanding general of the U.S Army Air Force, General Henry “Hap” Arnold, asked von Kármán to design a 20-foot (six-meter), 40,000-horsepower (29,828-kilowatt) wind tunnel for the Air Force at Wright Field in Ohio. This was the first facility of its kind and was used by the Air Force to make
During World War II, General Arnold chose von Kármán as his scientific advisor, marking the beginning of a long period of cooperation between researchers, the Air Force, and industry that still exists. This relationship gave von Kármán a strong influence over much of the aeronautical research and development that occurred during the war. He created the Air Force Scientific Advisory Board, a group of academic, government, and industry engineers and scientists who were a major force in determining U.S. Air Force research and development policy.

After the war, von Kármán sent a team of scientists to Germany to study their facilities and learn how they had made such rapid progress in aeronautics and aviation during the war. He used this information to develop a blueprint for an Air Force research and development facility for jet propulsion, supersonic aircraft, and ballistic missiles. This facility was created in Tennessee and was called the Arnold Engineering Development Center.

Also after the war Von Kármán was responsible for creating the Advisory Group for Aeronautical Research and Development (AGARD), part of the North Atlantic Treaty Organization (NATO). AGARD has played a major role in the aeronautical advancements of NATO countries since the war. One of the educational and research institutes of AGARD became the Von Karman Institute for Fluid Dynamics, a leading aerodynamics laboratory known worldwide.

Von Kármán continued his policymaking relationship with the U.S. Air Force and also traveled throughout the world giving lectures. He eventually moved to Paris and left the operation of GALCIT to his former students and colleagues. He died on May 6, 1963, in a hospital in Aachen, and was buried in Pasadena, California, home of the Jet Propulsion Laboratory. At his funeral, a statement paying tribute to him from President John F. Kennedy was read. The President had also earlier that year awarded von Karman the first National Medal of Science. Dr. von Kármán was inducted into the National Aviation Hall of Fame in 1983.

—Dan Johnston

References and Further Reading:


Von Karman, Theodor. *Aerodynamics, Selected Topics in the Light of Their


<table>
<thead>
<tr>
<th>Educational Organization</th>
<th>Standard Designation (where applicable)</th>
<th>Content of Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Technology Education Association</td>
<td>Standard 6</td>
<td>Students will develop an understanding of the role of society in the development and use of technology.</td>
</tr>
<tr>
<td>International Technology Education Association</td>
<td>Standard 10</td>
<td>Students will develop an understanding of the role of experimentation and research and development in problem solving.</td>
</tr>
<tr>
<td>National Council of Teachers of Mathematics</td>
<td>N/A</td>
<td>Understand meaning of mathematical operations</td>
</tr>
</tbody>
</table>