

## Anton Tedesko:

The Father of Thin-Shell Concrete Construction in America

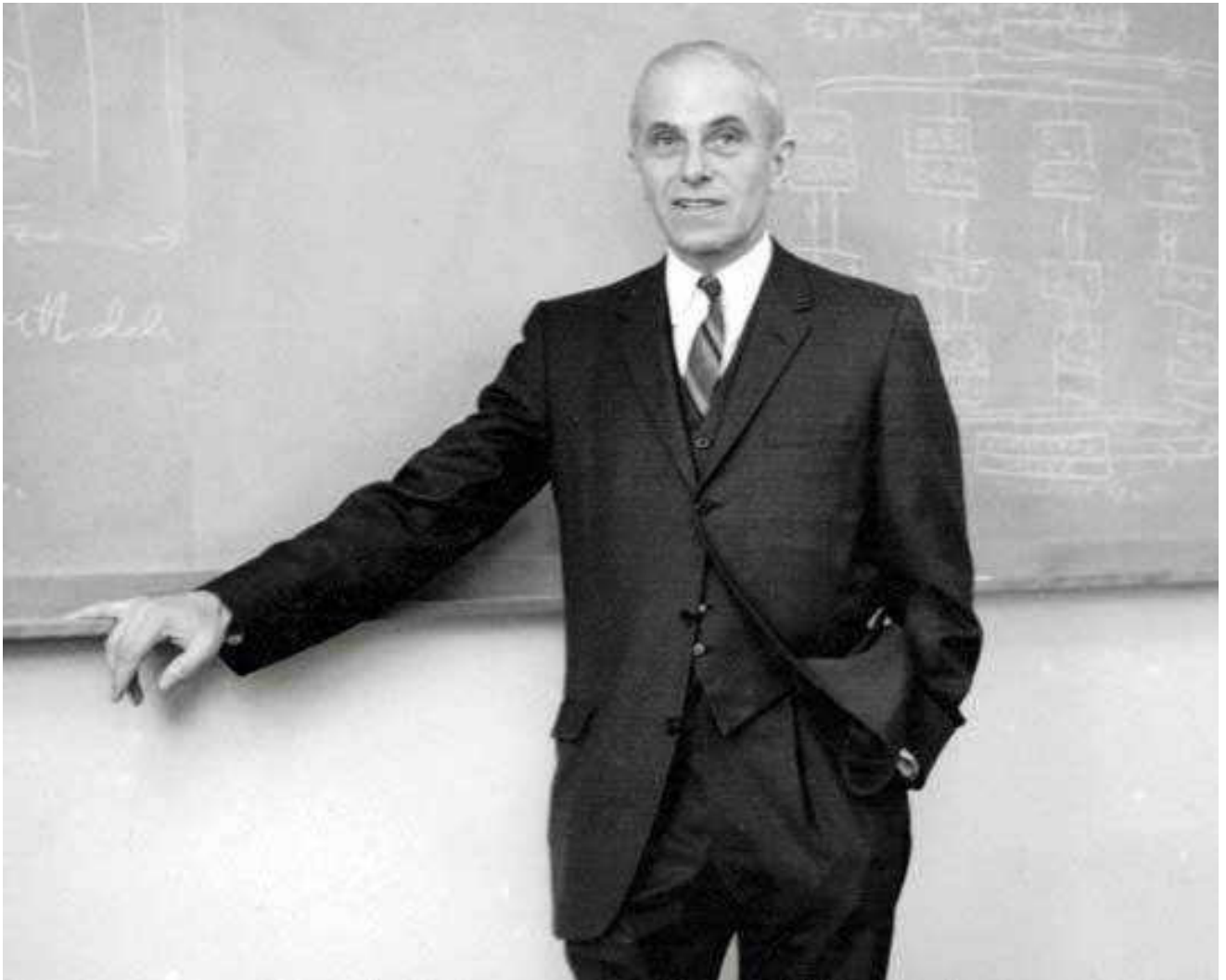


Cover photo credits are provided on page 18.



This booklet was funded and prepared by the Pennsylvania Department of Transportation (PennDOT) in cooperation with the Pennsylvania Historical and Museum Commission (PHMC); PhilaPort; and the Lazaretto, Tinicum Township; in consultation as part of mitigation for demolition of the Mustin Seaplane Hangar.

October 2022



monolithic.org, from Princeton University Library

▲ Anton Tedesko

## Overview: An American Innovator

Anton Tedesko was a German-born structural engineer who became known as “The Father of Thin-Shell Concrete Construction in America.” His contributions to the structural engineering field during the 20th century helped to shape the course of American engineering and construction, particularly for the U.S. military during World War II.

Tedesko, who eventually became a U.S. citizen, implemented and refined a method originally developed in Europe for efficiently constructing

very large buildings with domed or arched roofs and open interiors, such as planetariums, arenas, and aircraft hangars.

Tedesko engineered a number of remarkable buildings, including the Mustin Field Seaplane Hangar in Philadelphia; the Hershey Sports Arena in Hershey, Pennsylvania; the Hayden Planetarium dome in New York City, and NASA’s Vehicle Assembly Building at the Kennedy Space Center in Cape Canaveral, Florida.



Princeton University Library

▲ Interior of a Tedesko-designed hangar, showing the smooth, unobstructed interior of the concrete shell (location unknown).



▲ Stereograph card of the Hofburg Theatre, Vienna, Austria, circa 1903, one of the venues where Anton Tedesko would have attended performances.

## European Roots

### Early Enrichment

Anton Tedesko's story begins in Grunberg, Germany, on May 25, 1903, when he was born to Austrian parents Victor and Alice Tedesko. Victor Tedesko was a chemist at a local textile plant. He had earned an engineering degree from the Federal Institute of Technology in Zurich, Switzerland, and a Ph.D. from the University of Vienna.

Soon after Anton Tedesko's birth the family moved to Vienna, Austria. Tedesko's childhood was enriched by a wide variety of musical, artistic, and educational experiences. He noted in his autobiography that he was heavily influenced by the rich culture of Vienna, as well as by his parents and their peers. His father was a talented cellist and often entertained other musicians at the family home. Anton's grandmother frequently took Anton and his younger brother, Stefan, to performances at the Royal Opera, sparking in Tedesko a lifelong love of music and theater.

### Inclination toward Engineering and Adventure

In 1913, at the age of 10, Tedesko was accepted at the Realgymnasium, a Latin School in Graz, Austria. Tedesko found that he excelled in Latin, German, and math. His French was only fair, and he was "caught unprepared" by history and geography. He noted in his autobiography that he took piano lessons and was poor in competitive sports. Tedesko recalled his daily commute, beginning with a rail journey from Gratwein, where the family had an apartment, to Graz, and continuing by streetcar to the school: "I was proud to unhook the steel rod from the front of the streetcars... as they stopped, and to change the switch, so that the motorman did not have to get out of the car to set it."

On weekends, Tedesko and his friends and family would often take bicycle excursions to Rein, Stubing, Judendorf, or Hitzendorf—towns on the outskirts of Graz. Perhaps piquing

Tedesko's interest in his future work, his father constructed a concrete embankment, tunnel, and bridge on their property for the children's wind-up train.

In 1917, Anton's father became manager of a chemical laboratory in Ortman, Austria. He moved his family to the small town, and for a time they lived in a guest house on the laboratory grounds. When the Tedesko family embarked on the construction of a home of their own, Anton, then a young teenager, worked alongside the architect and consultant. He helped create drawings, aided in the design, and ensured that no errors were made in the construction of the home. Tedesko recalled, "...as arranged by me, there were secret hiding places in the corners of the roof for food, in case there should be searches by soldiers, demonstrators, or communists."

When Anton was 15, he and his brother began attending

Oberrealschule, a high school in Wiener Neustadt south of Vienna. Together they endured a one-and-one-half-hour train ride to the school, a journey that became less reliable as World War I progressed. However, the instability of the war years and the scarcity of many goods spurred Tedesko's ingenuity. In Summer 1918, with no rubber available for bicycle tires, Tedesko mounted spring-wire coils on the wheel rims of his bicycle as makeshift tires. He rigged a wood cart to the bicycle to assist with daily chores and installed a cord that enabled him to operate a brake on the wagon.

### The Young Builder

Tedesko graduated from high school with high honors at the age of 17. As a graduation present his Uncle Hugo took him on a trip to Switzerland. In appreciation, Tedesko constructed a reinforced concrete railway system

for a wind-up train for Hugo's children—a more elaborate version of the one Anton's father had built. He and a local mason spent several weeks constructing the railroad, three stations, a tunnel, retaining walls, and a viaduct behind the family's house. Upon his return to his Uncle Hugo's homestead 50 years later, Tedesko found his reinforced concrete viaduct to be intact.

### University Endeavors

In 1920, Tedesko enrolled at the Federal Institute, today known as the Vienna University of Technology. He graduated in 1926 at age 23 with a Diploma in Structural Engineering. Tedesko noted in his autobiography that he felt most fortunate to be able to participate in numerous cultural, intellectual, and musical endeavors while studying in Vienna. He enjoyed attending performances and would often accompany friends and family

to the cinema, operas, and concerts. He recalled that he and his friends spent many evenings creating math problems and then having in-depth discussions on how to solve them. Throughout his life, Tedesko deeply valued his European education and his "outstanding teachers."

### Hands-On Learning

Tedesko's summer jobs during this period were in the engineering and construction field. One of his first projects was to draw plans to remodel and reconfigure the Ortmann factory buildings. The following two summers Tedesko worked for Baurat Mayer, a general contractor that was involved in construction at the Ortmann factory. Tedesko was tasked with supervising the company's remodeling and renovation work within a five-mile radius of Ortmann and the neighboring village of Pernitz. During that period, he also worked under the direction of famed Austrian architect Josef Frank, who was a distant relation of his father.



▲ Present-day map showing location of Ortmann and Pernitz, Austria, in relation to Vienna and Munich. See also Wiener Neustadt south of Vienna, where Anton attended high school.



Kaufmann & Fabry Co.,  
courtesy of Library of Congress

▲ Chicago, Illinois, circa 1927, when Tedesko arrived in America.

## Career Foundations

### Early Work Experience and the Appeal of America

After his 1926 graduation, Tedesko spent a brief period gaining construction experience in Vienna at the Carl Korn Company. Tedesko expressed interest in visiting the U.S. after he read about and became fascinated by the elevated rail system in Chicago, Illinois. In fact, Tedesko wrote at length in his autobiography about his love of the railroad, stating that he would have considered a career in railroad engineering had he not been influenced by experts in reinforced concrete structures and had the railroad industry provided more job opportunities.

An American friend studying in Vienna helped Tedesko apply for a U.S. visa, and in 1927, Tedesko set off for New York and ultimately Chicago, where he spent two years working as a detailer, draftsman, and steel designer. His most notable job from that period was working as a steel detailer for the Mississippi Valley Structural Steel Company (MVSS) in Chicago. The experience familiarized Tedesko with the American style of engineering and drafting. While with MVSS, he worked on his first outdoor substation, first welded pile-driver, and on several bridges. Tedesko noted, "I could not have gotten such

varied and interesting work in which I influenced the decisions, had I remained in Austria. Having the MVSS experience gave me a substantial advantage over other engineers in my future career."

Throughout his autobiography, Tedesko described the differences he observed between work in the U.S. and Austria. He thought that Americans did not take safety seriously enough, especially in the industrial and transportation sectors. He also noted that Americans felt they had a duty to get work done fast, even though it might not be done to a high standard.

**"I could not have gotten such varied  
and interesting work in which  
I influenced the decisions,  
had I remained in Austria."**

~Anton Tedesko

### Return to Europe

At the conclusion of his work visa period in 1929, Tedesko returned to Austria. For the first six months, he worked as assistant to Professor Ernst Melan at the Vienna Institute (today known as the Institute of Technology in Vienna) where he aided in the study of steel design and construction. He was also chosen to lead a team designing industrial structures and spent a year with a contractor working on a large Vienna housing project.

**The Z-D System made it possible to build domed and arched concrete roofs that were as thin as 3 inches at the top, producing the maximum structural strength using the least amount of material.**

### **Introduction to Thin-Shell Concrete Dome Construction**

In 1930 Tedesko relocated to Wiesbaden, Germany, to join Dyckerhoff & Widmann, one of the leading concrete construction companies in Germany. Tedesko described the following two years as “a most valuable training period under superb engineers (doing bridges, tunnels, shells), resulting in life-long friendships...” During that time Tedesko also earned a further Diploma in Engineering degree from the Technology University of Berlin.

Dyckerhoff & Widmann had been founded in 1865 by German concrete innovator Wilhelm Gustav Dyckerhoff, and was famed for its inventive practices. While employed there, Tedesko worked under German engineers Franz Dischinger and Ulrich Finsterwalder, who were working on the practical theory and construction of thin-shell concrete roofs.

Dischinger was one of the designers of the Zeiss Planetarium cupola that had been constructed in Berlin, Germany, in 1922. The aim was to design a dome that was high quality but could be constructed efficiently. Working with Dischinger on the project was physicist Walther Bauersfeld of the optical company Carl Zeiss, based in Jena, Germany. Their design and construction method became known as the Zeiss-Dywidag (Z-D) System, which was patented in



IL Archives Stuttgart

▲ The Jena Planetarium in Germany, completed in 1934, was an early example of construction using the “Zeiss-Dywidag System.”

January 1924. (“Dywidag” is derived from the company name “Dyckerhoff & Widmann.”)

The Z-D System was a method of designing and constructing a thin monolithic concrete domed or arched roof that could span wide distances without interior bracing. The system used a diamond-shaped grid framework reinforced by prestressed wire mesh. Concrete was then applied using either a dry-spray method (the forerunner to shotcrete) or poured in a traditional manner. The Z-D System made it possible to build domed and arched concrete roofs that were as

thin as 3 inches at the top, producing the maximum structural strength using the least amount of material. On the earliest Z-D buildings, the diamond-shaped grid was embedded into the concrete as permanent reinforcement. Later refinements of the Z-D System employed a grid as reusable formwork that was removed after the concrete cured.

Dyckerhoff & Widmann went on to win a 1938 Edward Longstreth Medal of Merit, presented by the Franklin Institute in Philadelphia, for their part in the thin-shell concrete design and construction system.

► Postcard of the Hayden Planetarium dome in New York City, one of Tedesko's earliest U.S. projects using the Zeiss-Dywidag System.



Boston Public Library

## Thin-Shell Concrete Design and Construction in America

In 1927, unable to turn a profit on the patent in Germany due to fierce competition from the steel roof industry, Dyckerhoff & Widmann began marketing the Z-D system internationally, producing an extensive promotional booklet printed in German, English, French, and Spanish. Dyckerhoff & Widmann also sought foreign licensees to adopt the system. In 1932, Dyckerhoff & Widmann sent Tedesko to its American licensee, the Roberts & Schaefer Company of Chicago, to promote the Z-D System

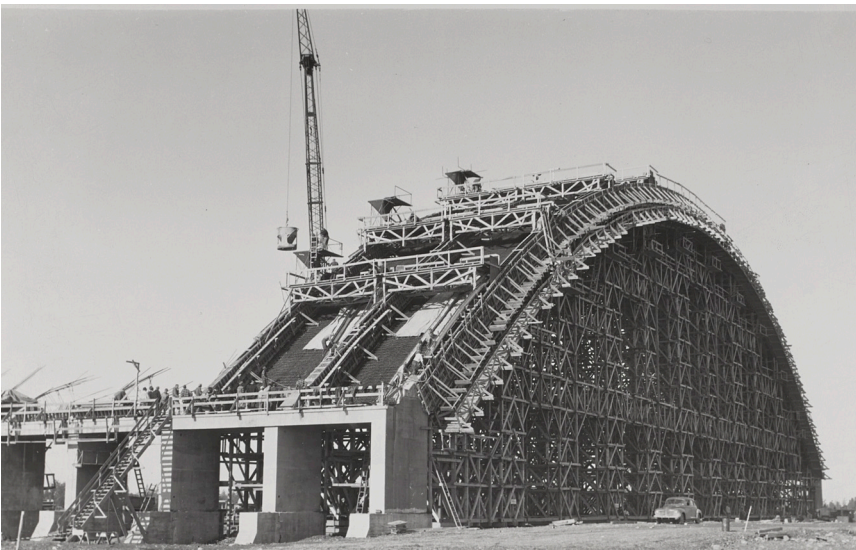
and the use of thin-shell concrete in America. Tedesko was eager to return to America and take the position, which offered considerably more pay, opportunity, and authority than his job in Germany.

Tedesko's importance in popularizing thin-shell concrete design and construction in America cannot be overstated. In the opinion of one engineer and scholar, "Anton Tedesko was singlehandedly responsible for the technology transfer of vaulted roof construction, from Dyckerhoff &

Widmann in Germany to Roberts & Schaefer in Chicago." Tedesko came to be known as "The Father of Thin-Shell Concrete Construction in America."

While in the U.S., Tedesko made important improvements upon the Z-D System. Early Z-D shells were built with smooth exterior and interior surfaces; Tedesko designed his with arch ribs placed either above or below the shell. The arch ribs and the shell formed a series of inverted "tees," keyed together to keep the shell monolithic. The use of arch ribs effectively divided the building into several construction units. Moveable formwork could thus be reused throughout construction, and the building process, like an assembly line, was highly efficient.

▼ A Tedesko-designed hangar under construction using the Z-D System.



Princeton University Library

### 1934 World's Fair

Tedesko's first U.S. contract was for the Brook Hill Farm Dairy Barn at the 1934 Chicago World's Fair. The structure was the earliest concrete barrel shell roof in America. The building was temporary, which meant that after the fair concluded, Tedesko was able to load-test the shell of the barn prior to its demolition. That allowed the Roberts & Schaefer Company to publish the first critical load tests carried out on barrel shells in the U.S.

### Hayden Planetarium

Tedesko's first permanent structure using the Z-D System in the U.S. was the American Museum of Natural History's Hayden Planetarium dome in New York City, completed in 1934. Tedesko drew upon expertise gained by Dyckerhoff & Widmann as well as the Carl Zeiss firm on a planetarium the team designed and built in 1922 in Munich. Tedesko noted in his autobiography that American engineers and architects associated with the project needed convincing that a dome with a diameter of 80 feet, 6 inches, could safely be constructed at a thickness of only 3 inches. The Hayden Planetarium dome was in use until its demolition in 1997.

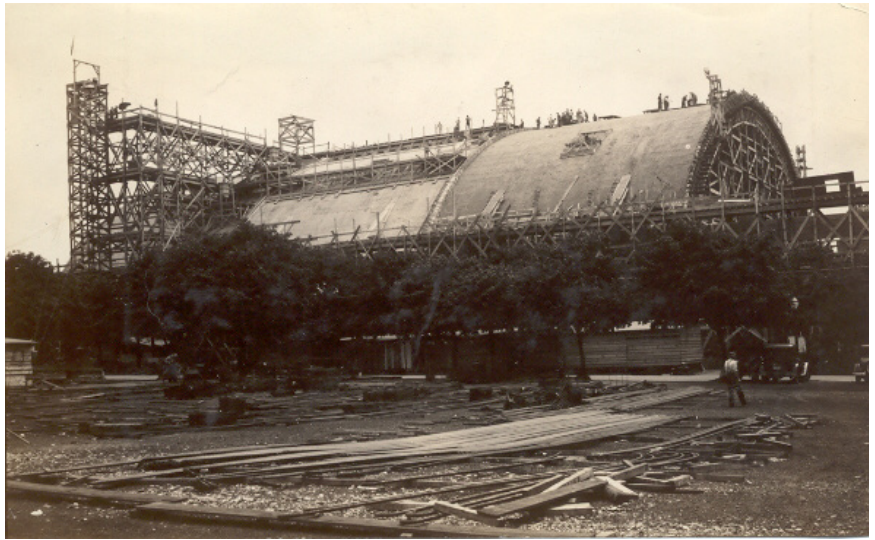
### Hershey Sports Arena

Construction activity greatly slowed during the Great Depression, but a breakthrough came for Tedesko in 1936. Milton S. Hershey commissioned the construction of a sports arena at the chocolatier's hometown and headquarters, Hershey, Pennsylvania. With the help of the Portland Cement Association and Paul Witmer, manager of the Hershey Lumber Company, Tedesko, at age 33, became the designer, decision-maker, and construction supervisor of the Hershey Sports Arena.

Hershey later recalled, "I was somewhat startled when Witmer showed me the plans, for I hadn't figured [on] building such a large structure, and I had to think twice before I let him go ahead with its construction." For his part, Tedesko referred to the project as his "most satisfying challenge of the 1930s."

The arena's 100-foot-high concrete barrel shell roof was a mere 3.5 inches thick at the top. Its 343-foot length was stiffened at 39-foot intervals by massive two-hinge arch ribs that created a 222-foot span. The shell was constructed in five separate units connected by expansion joints.

Tedesko wrote, "This sports arena was unusual because there was no contractor involved, local labor and

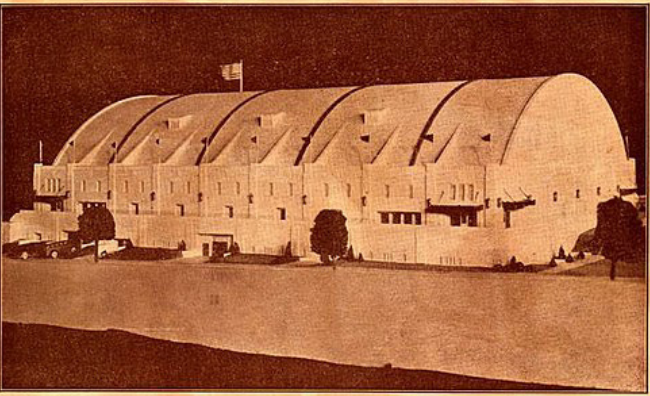


Hershey Community Archives

▲ Construction of the Hershey Sports Arena, completed in 1936.

**PROGRAM and GUIDE**

**H** **ERSHEY**  
**O** **CKEY**  
**C** **CLUB**



**THE HERSHEY SPORTS ARENA**  
THE LARGEST SPAN MONOLITHIC CONCRETE STRUCTURE IN AMERICA  
HOME ICE OF THE HERSHEY BEARS

**Playoffs for the 1936-1937 Championship**  
**Eastern Amateur Hockey League**  
**Hershey Bears vs. Atlantic City Sea Gulls**

SKATING PERMITTED AFTER HOCKEY GAMES WITHOUT ADDITIONAL CHARGE

**No 812** **PRICE 10c**

The Cooper Collection of Hockey History

▲ Hockey program promoting the newly opened Hershey Sports Arena.

**“The engineering and construction decisions were mine. No codes existed that would apply to this work. No rules had to be followed. I shaped and calculated the structure according to my best judgement, influenced by what I had learned in Wiesbaden under Dischinger and good friend Ulrich Finsterwalder... Had I remained in Europe, there never would have been a Hershey-type opportunity for me.”**

~Anton Tedesko



The Cooper Collection of Hockey History

▲ Interior of the Hershey Sports Arena, 1937.

students built the structure, working for the construction arm of the Hershey Chocolate factory. Construction was done slowly and in a very conscientious manner. The roof was protected by [four] layers of roofing felt laid in asphalt. I was unable to find out the actual cost of the structure because the bookkeeping was such that the cost for constructing the arena was lost in the cost of Hershey chocolate bars.”

When the arena opened its doors to the public on December 19, 1936, it was the widest-span concrete thin-shell barrel roof structure in the world. Successful completion of the arena established Tedesko and the Roberts & Schaefer Company as authorities on thin-shell concrete design

and construction. Tedesko stated, “The engineering and construction decisions were mine. No codes existed that would apply to this work. No rules had to be followed. I shaped and calculated the structure according to my best judgement, influenced by what I had learned in Wiesbaden under Dischinger and good friend Ulrich Finsterwalder... Had I remained in Europe, there never would have been a Hershey-type opportunity for me.”

After the success in Hershey, Tedesko went on to design the cupola for Tulane University in New Orleans in 1939. That same year he worked on the elliptical rotational shells for a water treatment plant in Hibbing, Minnesota.

The late 1930s and early 1940s also saw personal milestones for Tedesko. On June 16, 1938, at the age of 35, Tedesko married Sally Murray in Chicago, Illinois. That same year he became a U.S. citizen. Tedesko and his wife lived in a small apartment on the north side of Chicago before eventually moving to Wilmette, Illinois. The couple had two children, Peter in 1943 and Suzanne in 1945.



# Hangars

The Z-D System is adaptable to hangars of small or very long spans. Smooth underside roofs permit the inexpensive re-use of concrete forms which travel on their own wheels. The Z-D system is the first to apply mass production methods to on-the-scene building construction.

▲ An advertisement for the Z-D System showing the Mustin Field Seaplane Hangar in Philadelphia.

## World War II and the Mustin Field Seaplane Hangar

With the start of World War II, Tedesko joined the U.S. Citizens Defense Corps. He was enthusiastic about proving his patriotism and demonstrating that, despite his German birth and Austrian heritage, he was not a follower of Hitler or an Axis spy.

Tedesko's thin-shell concrete domes were a popular construction option during the war because they made efficient use of materials that were scarce, especially structural steel. They were also built using highly efficient industrial production methods. As such, Tedesko engineered and constructed numerous airplane and seaplane hangars for various branches of the U.S. military.

The first hangars to be constructed were the North Island Seaplane Hangars, completed in 1941 in San Diego, California. Tedesko provided a colorful anecdote on the structural stability of one of the buildings, stating, "A curious accident occurred some years ago: a missile was shot by accident from within one of these hangars. It passed through the roof and left as its only evidence a clean-cut round hole in the roof shell of the hangar."



▲ The 1943 Mustin Field Seaplane Hangar adjacent to the Philadelphia Naval Shipyard.

In 1943, Tedesko was transferred to Roberts & Schaefer's Washington, D.C., branch to manage the office. That year saw many projects engineered by Tedesko. In Pennsylvania, the Budd Manufacturing Plant in Philmont and the Mustin Field Seaplane Hangar

adjacent to the Philadelphia Naval Shipyard were constructed.

Roberts & Schaefer designed the Mustin Field Seaplane Hangar using the Z-D System. Robert Zabrowski completed the calculations for the building in March and April 1942.



Princeton University Library

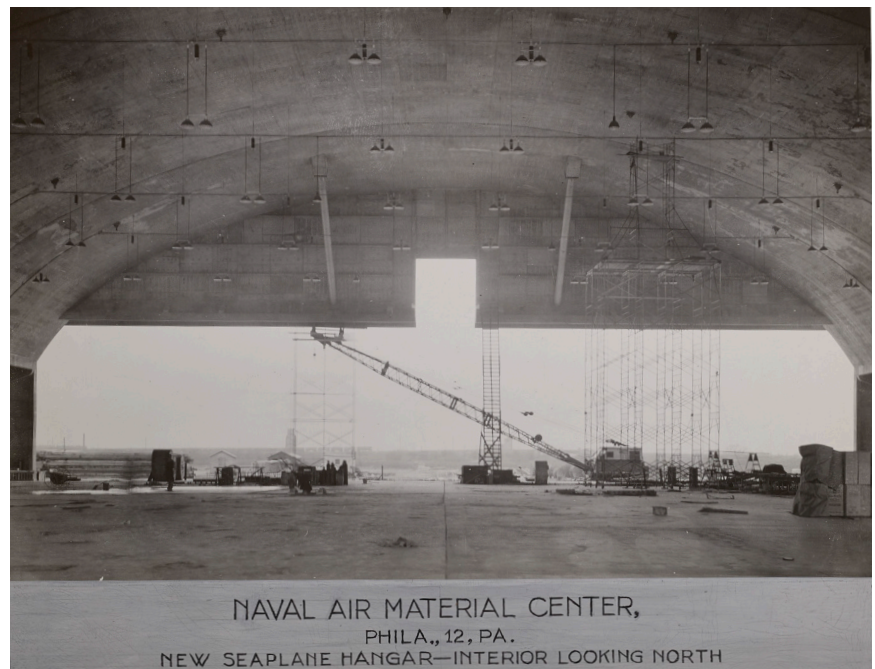
▲ Side view of the Mustin Field Seaplane Hangar, 1943, showing the exterior arch ribs.

► View from inside the cavernous hangar, 1943.

The main hangar area encompassed 64,300 square feet, with a two-story lean-to shop on each side, adding 23,600 square feet. The hangar's arched roof provided a clear span width of 262 feet, 4 inches, and a length of 330 feet. The top of the arch was 70 feet high. The lean-tos were 36 feet, 8 inches wide.

The Navy awarded the \$950,000 construction contract to Golder Construction Company, which used Z-D System methods. The concrete arch sections were formed in increments using rolling sections of wood falsework.

The completed hangar featured one set of manually operated sliding



Princeton University Library

hangar doors at each end of the building and one set of power-operated 15-foot by 14-foot tailgate doors at each end. A 5-ton monorail system was suspended from the ceiling, likely to assist with the production of aircraft. Scores of aircraft could

fit simultaneously in the cavernous hangar as their production was being completed.

The Mustin Field Seaplane Hangar was demolished in 2021 as part of the site's economic redevelopment.



Library of Congress

◀ Other Tedesko military hangars constructed during WWII include the Wright-Patterson Air Force Base Building 6: Signal Corps Special Forces Hangar in Dayton, Ohio (pictured left, in 1991), as well as the base's Building 4, Modification Hangar and Flight Research Laboratory, completed in 1944.

### Anton Tedesko-Designed Buildings in Pennsylvania

- A – Hershey Sports Arena, Hershey (1936)
- B – Philadelphia Skating Club, Ardmore (1938)
- C – Budd Manufacturing Plant, Philmont (1943)
- D – Mustin Field Seaplane Hangar (Building 653), Philadelphia (1943)
- E – Olmsted Air Force Base, Middletown (1958)





Jeffrey Beall/Wikimedia Commons

▲ The 1952 Denver Coliseum in 2009.

**The Denver Coliseum was seen as a refined, updated version of the Hershey Sports Arena.**

### After World War II

In the late 1940s, Roberts & Schaefer's design for the Air Force's "Very Very Heavy Bomber" (VVHB) hangar took shape in Omaha, Nebraska, under contract with the U.S. Army Corps of Engineers. Two additional hangars were completed in 1948: the Ellsworth Air Force Base PRIDE Aircraft Hangar in Rapid City, South Dakota, and the Loring Air Force Base Aircraft Hangar in Limestone, Maine. Both buildings were constructed for the maintenance and housing of B-36 Peacemaker bombers. Tedesko was actively involved in the engineering and construction of these hangars. He noted that he familiarized bidding contractors with the proposed structures using "moving pictures" and cost data from smaller projects. At 340 feet, the PRIDE Aircraft Hangar was the widest span that Tedesko engineered in his career.

Tedesko traveled to Denver, Colorado, in 1948 to present his ideas for a modern sports arena that could also be used for concerts, ice skating, cattle judging, and exhibitions. Tedesko won the contract and served as engineer and construction manager for the Municipal Coliseum. With a 295-foot-span shell that was 3.5 to 5 inches thick, the building was seen as

a refined, updated version of the Hershey Sports Arena. Tedesko called the construction a success, both in terms of its technical achievements and the politics that had to be navigated to bring it to completion.

In the early 1950s, Tedesko prepared several designs for warehouses at military installations. He noted, "I spent long hours, working late at night, helping contractors prepare cost estimates for shell-type structures, permanent construction which proved competitive with basic design."

In 1956, Tedesko left Washington, D.C., to become Vice President of Roberts & Schaefer Company's New York branch, a position he held until 1967. While there, he collaborated with famed architect I.M. Pei on construction of the hyperbolic paraboloid at the Zeckendorf Plaza in Denver, Colorado. Tedesko also collaborated with architect Minoru Yamasaki on a terminal design at what is now St. Louis Lambert International Airport. In Pennsylvania, Tedesko developed an Air Force warehouse in Olmsted, completed in 1958. The building had a 39-foot span and a 3-inch-thick shell.



◀ NASA's Vehicle Assembly Building at Cape Canaveral, Florida (undated photo).

**At the time of its construction in 1966, NASA's Vehicle Assembly Building was, based on volume, the largest building in the world.**

## NASA

Perhaps the most notable building Tedesko engineered in the 1960s was the National Aeronautics and Space Administration (NASA) Vehicle Assembly Building (VAB) at Kennedy Space Center, Cape Canaveral, Florida. At the time of its construction in 1966, it was, based on volume, the largest building in the world. The building was to be used to assemble the Apollo-Saturn V space vehicles. To prepare a bid and gain familiarity with the aerospace engineering field, Tedesko attended Washington, D.C., briefings, presentations, and seminars on sub-orbital flights. He also met astronauts, increased his technical knowledge, and met George Low, an aeronautical engineer and the head of the Apollo Program. Roberts & Schaefer ultimately won the contract due to the company's previous work for the U.S. Army Corps of Engineers on Air Force and NASA missile facilities and Tedesko's reputation and government work history. Furthermore, the

company possessed considerable knowledge of the ground installation needs for space vehicles. To augment its personnel for the VAB project, Roberts & Schaefer assembled a team of architects and engineers from multiple companies.

The building was designed using a steel space truss system with lightweight concrete slabs providing stiffness and transfer of force. The structural engineering was highly complex. Tedesko noted, "The system had 45,000 members, 12,400 of which were dimensioned [to bear the forces of] up to 88 loading combinations."

The project marked the first use of a computer in the design of a space truss building. The U.S. Navy supplied the software, which was run on an IBM computer. Due to the infancy of computers, Tedesko spent many days running the software, only to receive errors within the results that required several days of "de-bugging" to correct.

Tedesko noted in his autobiography, "The VAB was going to be higher than the tower of Vienna's St. Stephen's Cathedral. Each of its four big doors would admit a 45-story Hilton Hotel. The highest point of the VAB was to be three feet shy of the height of the Washington Monument. The New York Times suggested that it would take a dictionary of superlatives to adequately cover the project."

The design was awarded the 1966 Outstanding Civil Engineering Achievement Award by the American Society of Civil Engineers.

In 1967, Tedesco left the Roberts & Schaefer Company to establish his own engineering consulting firm, engaging former colleagues as needed. The new company provided consulting services to governments, architects, and engineers, often troubleshooting designs or advising on construction and renovations.

## Charlotte Skyscraper

The company's first project was the Jefferson Standard First Union National Building in Charlotte, North Carolina. The J.N. Pease Company was selected as the Architect-Engineer for the project, and it engaged Tedesko's firm to provide structural engineering services. The building

was constructed using the “tube” concept, which provided resistance against wind and seismic loads. At 35 stories, it dominated the Charlotte skyline at the time and was Tedesco’s only skyscraper.

In the mid-1970s, Tedesko served as a senior structural consultant for the Chicago Urban Transportation District (CUTD) and was responsible for reviewing the CUTD's long-range public transportation proposals. Tedesko was well-suited for the position, having spent many years commuting via Chicago's public transit system, and having been intrigued by Chicago's elevated trains since his youth. CUTD received a dozen proposals filled with plans, renderings, and descriptions. Tedesko evaluated each one, examining how the proposed improvements would interact with the built landscape, how they would ease commutes for Chicagoans, and which design was best suited for the city. The CUTD ultimately selected the rehabilitation proposal that Tedesko recommended.

Tedesko's consulting assignments included the Quebec City Coliseum expansion and structural rehabilitation of the War College Building at Fort McNair in Washington, D.C. He also served as a forensic engineer on several occasions. Tedesko was the main structures expert on a West Virginia cooling tower collapse analysis and served as chief investigator on the collapse of a concrete dome in Iowa.

- 1967 newspaper article announcing the Charlotte skyscraper project for which Tedesco provided structural engineering services.



**“Structural engineering at its best is an art form,  
parallel to and independent of  
architecture and sculpture.”**

~Anton Tedesko

## Reflections on a Rich and Productive Life

### **Character and Keys to Success**

In his autobiography, Tedesko noted key ingredients of his success: a love of and respect for the work, a wide range of interests, and a blend of theoretical knowledge and practical experience. He also noted that his professional relationships were important. He stated that he made many friends and few enemies and was never envious of others, all while judging people fairly. Tedesko was indeed held in high regard and described as being careful, confident, and reliable. He was also known for rising above the politics that often surround high-profile projects.

Tedesko considered engineering to be much more than the mechanics of building construction. He stated, “Structural engineering at its best is an art form, parallel to and independent of architecture and sculpture.”

### **Adventure, Arts, Athleticism**

Tedesko’s love of travel, music, and theater that characterized so much

of his early life continued well into his later years. He was an avid traveler and traversed the U.S. by rail, priding himself on having visited all 50 states. He and his wife, Sally, fondly recalled their 1976 trip to Asia, where they traveled to Japan, Hong Kong, and Thailand before returning to the U.S. by way of Hawaii.

Tedesko also enjoyed physical pursuits such as skiing and rowing. He was a zealous classical music fan and admired the works of Beethoven, Richard Wagner, Gustav Mahler, and Richard Strauss.

### **Professional Involvement and Recognition**

Tedesko eventually moved to Washington State to be closer to his daughter, but he never fully ceased working. At age 84, he submitted a design for the new Williamsburg Bridge in New York City.

Throughout his life and career, Tedesko was heavily involved in professional organizations. He was

on the Board of Directors of the American Society of Civil Engineers (ASCE) and the American Concrete Institute (ACI). He served on the executive committee of the Reinforced Concrete Research Council. Tedesko also served as the U.S. delegate on the Permanent Committee of the International Association for Bridge and Structural Engineering (IABSE). Lehigh University and the University of Vienna each presented Tedesko with honorary doctoral degrees.

Tedesko received numerous awards, including ACI’s Lindau Award and the Turner Medal Boase Award, which recognized his achievements in the field of shelled structures. In 1998, the IABSE Foundation created the Anton Tedesko Medal in his honor.

Tedesko died in 1994 in Seattle, Washington, at the age of 90. His influence on structural design and construction has endured, with engineers still marveling at his work, achievements, and the legacy of the buildings he left behind.

## Bibliography

American Society of Civil Engineers

- n.d. "Anton Tedesko." Found at American Society of Civil Engineers website: <https://www.asce.org/about-civil-engineering/history-and-heritage/notable-civil-engineers/anton-tedesko>. Accessed March 22, 2021.

Bixler, M.

- 2018 "Abandoned Navy Hangar Prepares For Final Battle." Hidden City, September 14, 2018. Found at <https://hiddencityphila.org/2018/09/abandoned-navy-hangar-prepares-for-final-battle/>. Accessed April 12, 2021.

Casella, R.M.

- 1989 "Radio Test Landplane Concrete Hangar 115, NAS Patuxent River, St. Mary's County, Maryland." National Register of Historic Places Nomination. Prepared by Louis Berger & Associates, East Orange, New Jersey.

Clark, N.S.

- 2009 "The History of Thin-Shells and Monolithic Domes." June 22, 2009. Found at <https://www.monolithic.org/blogs/engineering/the-history-of-thin-shells-and-monolithic-domes>. Accessed March 30, 2021.

Franklin Institute, The

- 1938 "The Franklin Institute Awards, 1938." Found at: [https://web.archive.org/web/20140408000447/http://www.fi.edu/winners/detail.faw?winner\\_id=2713](https://web.archive.org/web/20140408000447/http://www.fi.edu/winners/detail.faw?winner_id=2713). Accessed April 5, 2021.

Hines, E.M.

- 2004 "Anton Tedesko and the Introduction of Thin Shell Concrete Roofs in the United States." *Journal of Structural Engineering*, November 2004, Volume 130. Number 11. American Society of Civil Engineers. Found at <https://engineering.tufts.edu/cee/people/hines/documents/HinesBillington2004.pdf>. Accessed April 12, 2021.

May, R.

- 2015 "Shell Sellers. The International Dissemination of the Zeiss-Dywidag System, 1923–1939." 5th International Congress on Construction History, Construction History Society of America, Chicago. Found at <https://bautechnikgeschichte.files.wordpress.com/2015/07/may.pdf>. Accessed May 17, 2022.

Official Guidebook of the World's Fair

- 1934 *Official Guidebook of the 1934 World's Fair*. Found at <https://libsysdigi.library.uiuc.edu/OCA/Books2009-06/officialguideboo00cent/officialguideboo00cent.pdf>. Accessed April 15, 2021.

Prentiss, L.W.

- 1949 "Thin Concrete Arch Roof Provides 340-Ft. Clear Span for Bomber Hangar." *Civil Engineer*, February 1949, pp. 34-37.

Progressive Management

- 1999 "Cold War Infrastructure for Strategic Air Command: The Bomber Mission." Prepared for Headquarters, Air Combat Command, Langley Air Force Base, Virginia, November 1999.

Saliklis, E.

- 2003 "Hershey Arena: Anton Tedesko's Pioneering Form." *Journal of Structural Engineering*, Vol. 129, Issue 3 (March 2003). Found at: [https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1031&context=aen\\_fac](https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1031&context=aen_fac). Accessed March 30, 2021.

Schlaich, J.

- 2004 "Anton Tedesko (1903-1994)." *Structural Engineering International*, November, 2004. Found at <https://www.tandfonline.com/doi/abs/10.2749/101686604777963540>. Accessed April 1, 2021.

Tedesko, A.

- 1946 "Construction of Wide-Span Concrete Hangars." *Journal of the Western Society of Engineers*, Volume 51, No. 4, pp. 155-166, December 1946.
- 1950 "Construction of Long-Span Concrete Hangars at Limestone Air Force Base." *Journal of the American Concrete Institute*, Part 2, 1950, 416-1 to 412-3.
- 1980 "How Have Concrete Shell Structures Performed?" *Bulletin of the International Association for Shell and Spatial Structures*, No. 73, August 1980, Volume XXI-2. Found at <https://www.concrete.org/publications/internationalconcreteabstractsportal.aspx?m=details&ID=19423>. Accessed May 3, 2021.

- 1982 *Part I – Early Life in Austria. An Autobiography of Anton Tedesko.* The Anton Tedesko Papers, Firestone Library at Princeton University, Princeton, New Jersey.
- 1982 *Part II – The College Years. An Autobiography of Anton Tedesko.* The Anton Tedesko Papers, Firestone Library at Princeton University, Princeton, New Jersey.
- 1984 *Part III – Coming to America. An Autobiography of Anton Tedesko.* The Anton Tedesko Papers, Firestone Library at Princeton University, Princeton, New Jersey.
- 1986 *Part IV – Return to America. An Autobiography of Anton Tedesko.* The Anton Tedesko Papers, Firestone Library at Princeton University, Princeton, New Jersey.
- 1989 *Part V – Looking Back over the Past 50 Years. An Autobiography of Anton Tedesko.* The Anton Tedesko Papers, Firestone Library at Princeton University, Princeton, New Jersey.

Viest, I.M.

- 1996 "Anton Tedesko: 1903-1994." *Memorial Tributes: National Academy of Engineering*, Volume 8. National Academies Press. Found at <https://www.nae.edu/188461/ANTON-TEDESKO-19031994>. Accessed March 30, 2021.

Weingardt, R.G.

- 2007 "Anton Tedesko: Father of Thin-Shell Concrete Construction in America." *Structure Magazine*, April 2007. Found at <https://www.structuremag.org/wp-content/uploads/2014/09/D-GreatAchievements-Weingardt-Apr07-online-version.pdf>. Accessed March 30, 2021.

## Photo Credits

- Cover and page 1, Anton Tedesko portrait: Anton Tedesko Papers, Special Collections, Princeton University Library. Found at <https://www.monolithic.org/blogs/engineering/the-history-of-thin-shells-and-monolithic-domes>.
- Cover and page 8, Hershey Sports Arena interior: The Cooper Collection of Hockey History.
- Cover and page 9, Mustin Field Seaplane Hangar, front view: "Roberts and Schaefer Projects Photographs ca. 1940s-1960s." Box 14, Folder 18. Anton Tedesko Papers, Special Collections, Princeton University Library.
- Cover and page 10, Mustin Field Seaplane Hangar, side view: "Roberts and Schaefer Projects Photographs ca. 1940s-1960s." Box 14, Folder 18. Anton Tedesko Papers, Special Collections, Princeton University Library.
- Cover and page 6, Hayden Planetarium postcard: Boston Public Library
- Cover and page 12, Denver Coliseum: Jeffrey Beall/Wikimedia Commons. Found at <https://commons.wikimedia.org/wiki/File:DenverColiseum.JPG>. Reprinted under [Creative Commons Attribution 3.0 Unported License](#).
- Cover and page 13, NASA Vehicle Assembly Building: NASA, Kennedy Space Center. Found at [https://commons.wikimedia.org/wiki/File:Vehicle\\_Assembly\\_Building.jpg](https://commons.wikimedia.org/wiki/File:Vehicle_Assembly_Building.jpg).
- Page 1, Hangar interior: "Roberts and Schaefer Projects Photographs ca. 1940s-1960s." Box 14, Folder 18. Anton Tedesko Papers, Special Collections, Princeton University Library.
- Page 2, Stereograph of the Hofburg Theatre: H.C. White Co., North Bennington, VT. Found at the Library of Congress website, <https://www.loc.gov/item/99471971/>.
- Page 3, Map of Austria: U.S. Geological Survey.
- Page 4, Chicago: "Chicago Skyline," Kaufmann & Fabry Co., Chicago, Illinois. Found at the Library of Congress website, <https://www.loc.gov/item/2007660836/>.
- Page 5, Jena Planetarium: IL Archives Stuttgart.
- Page 6, Hangar under construction: "Roberts and Schaefer Projects Photographs ca. 1940s-1960s." Box 1, Folder 1. Anton Tedesko Papers, Special Collections, Princeton University Library.
- Page 7, Hershey Sports Arena construction: Hershey Community Archives.
- Page 7, Hershey Hockey Club program: The Cooper Collection of Hockey History
- Page 9, Hangar advertisement: Anton Tedesko Papers, Special Collections, Princeton University Library.
- Page 10, Mustin Field Seaplane Hangar interior: "Roberts and Schaefer Projects Photographs ca. 1940s-1960s." Box 14, Folder 18. Anton Tedesko Papers, Special Collections, Princeton University Library.
- Page 11, Wright-Patterson Air Force Base: Library of Congress, Historic American Engineering Record, Survey HAER OH-79-M. Found at: <https://www.loc.gov/resource/hhh.oh1662.photos/?sp=1>.
- Page 14, Newspaper front page: "30-Story, \$8 million Tower is Planned." *The Charlotte Observer*, Charlotte, North Carolina. May 25, 1967. Found at: <http://Newspapers.com>.

intentionally blank

