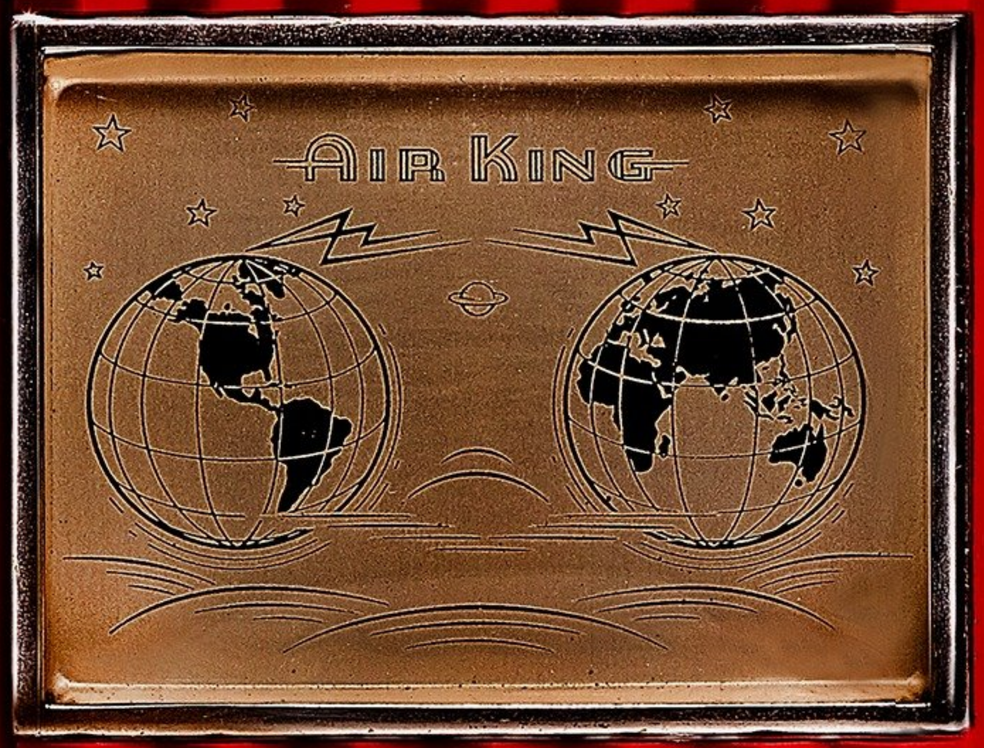
INDUSTRIAL DESIGN IN THE MODERN AGE



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TRANSPORTATION DESIGN IN THE TWENTIETH CENTURY

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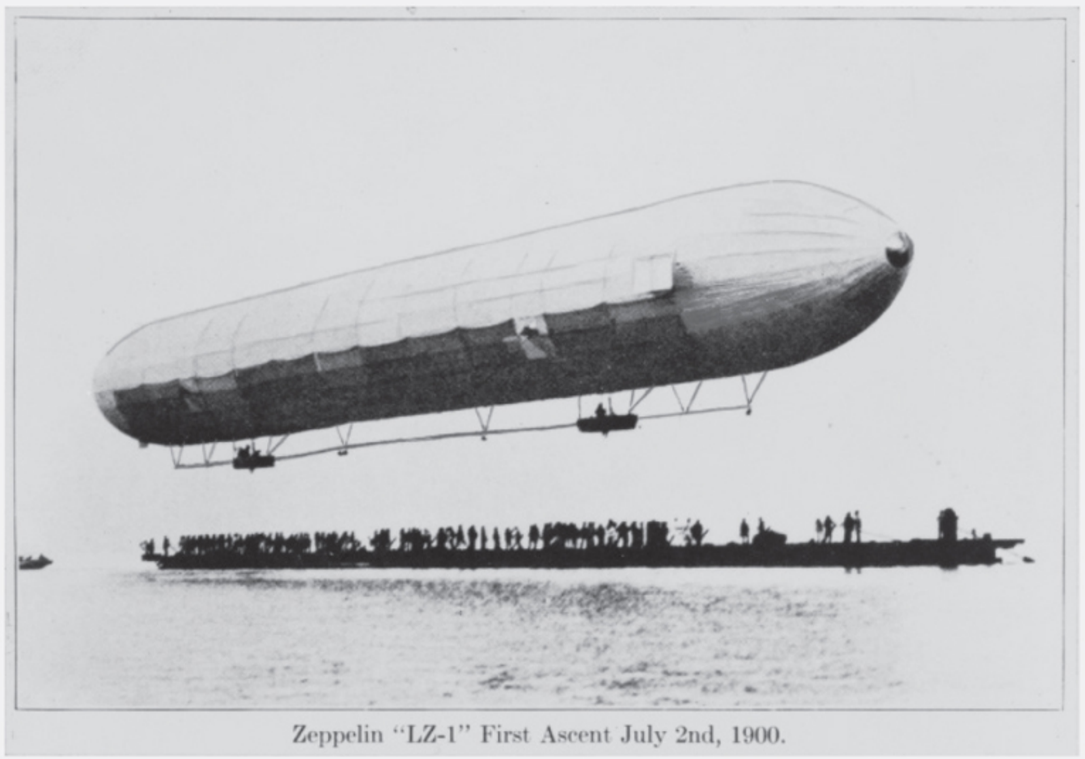
FIG 1
View of the west crossover of the London Underground's Central London Railway extension at Liverpool Street Station, 100 yards from the station, 1912.

FOR INDUSTRIALIZED NATIONS AROUND THE WORLD, THE ADVENT OF THE TWENTIETH CENTURY ushered in a new age of speedy and versatile transportation options that imparted, arguably more than any other design field, a symbiotic and quick-paced fluidity to human life that came to define the modern era. Mass transportation systems such as railroads, trolleys, and subways—which were first developed in the nineteenth century—connected and redefined urban areas as they expanded their reach through improved technology and increased demand. The underground rail system in London, also known as the Underground, or the Tube (fig. 1), was improved in 1905 through the use of electric traction, which helped facilitate the development of "Metroland" suburban housing centers around stations along the train lines, thus greatly expanding the city's metropolitan footprint.

Developing aviation technologies in these early years of the century revealed that man's centuries-long dream of flight was near at hand. Count Ferdinand von Zeppelin witnessed Germany's first successful flight of his LZ 1 airship of 1900 (fig. 2), and Alberto Santos-Dumont flew his airship around the Eiffel Tower in Paris in 1901. Both offered great promise for lighter-than-air travel, but ultimately the most important early aviation event was Orville and Wilbur Wright's first controlled flight of a heavier-than-air craft at Kitty Hawk, North Carolina, in 1903.

Advancements in personal transportation, too, offered new promises of mobility in the first decade of the twentieth century. The liberating effect of improved technologies such as pneumatic tires and paved roads, which resulted from the safety bicycle craze of the 1880s, literally paved the way for the burgeoning automobile market. In 1899, Camille Jenatzy traveled at 105.88 kilometers per hour (65.79 miles per hour) in his torpedo-shaped *La Jamais Contente* electric-motored race car in France (fig. 3). Henry Ford's implementation of the moving assembly line, which launched in 1913, offered cheap prices for his Model T car, allowing consumers of modest means to have access to reliable and swift mechanical transportation, forever changing the way people commute to work and live in their communities.

Around the same time as all of these developments, visions of future societies in which transportation was integral to architecture were birthed. One fantastical, popular example was *King's Dream of New York*, an illustration in a book published by Moses King in 1908 that



Zeppelin "LZ-1" First Ascent July 2nd, 1900.

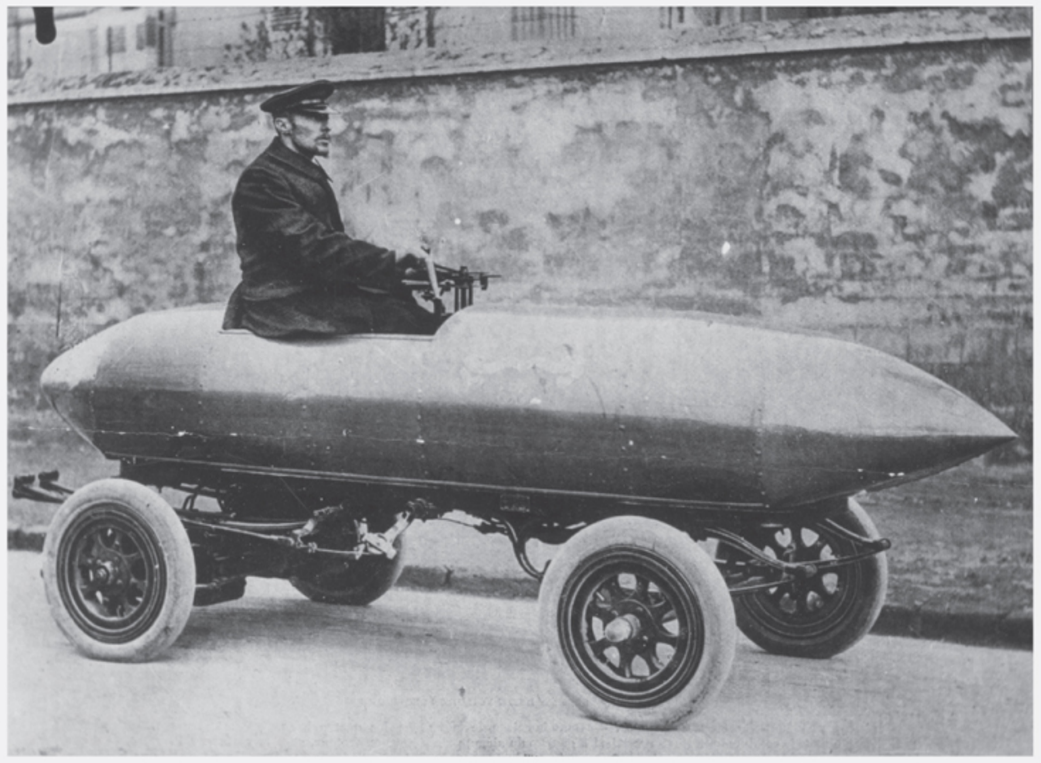


FIG 2
above left First ascent of Count von Zeppelin's *LZ-1,* Friedrichshafen, Germany, 1900.

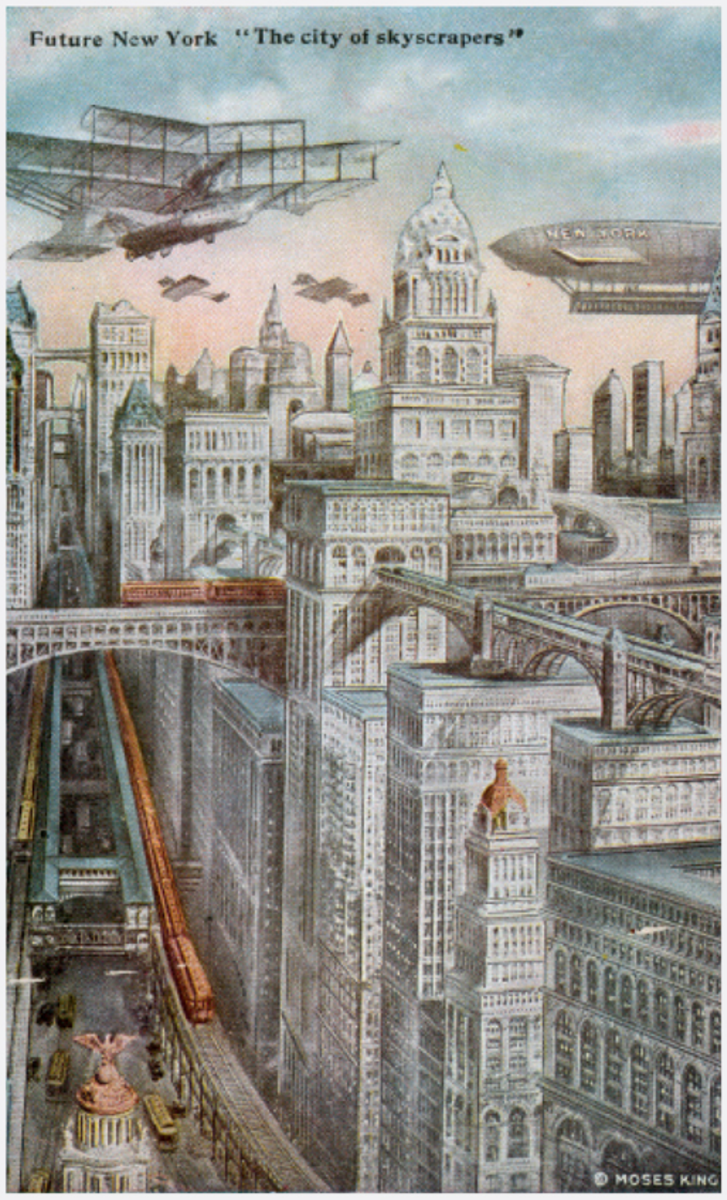
FIG 3
above right Camille Jenatzy at the wheel of his electric car, *La Jamais Contente* ("Never Satisfied"), c. 1899.

imagined stories-high train lines, flying machines, and airships in constant movement amid a crowded metropolis of skyscrapers piercing the sky (fig. 4).

By the end of the first three decades, transportation's concern with increased speed and distance, improved reliability, standardized parts, ease of manufacturability, and other engineering attributes culminated in a number of notable feats. Charles Lindbergh's crossing of the Atlantic in his *Spirit of St. Louis* in 1927 set a new bar for airplane and pilot endurance. A year after Lindberg's historic adventure, the LZ 127 (the *Graf Zeppelin*) airship was making speedy trans-Atlantic voyages from Germany to North America, and in 1930 completed an around-the-world trip. In 1931, the German Dornier DO-X, the world's largest passenger airplane (and flying boat) up to that time, traveled the length of Africa and South America before being welcomed to New York City Harbor by thousands of admirers lining Manhattan's shore. Both forms of air travel would become symbolic in the following decade (although Zeppelin's approach was marginalized by the Hindenburg tragedy at Lakehurst, New Jersey, in 1937).

The financial crash of 1929 and the ensuing Depression, however, found many businesses shifting focus from scientific and technological advancements to the fanciful aesthetic ballyhoo of a nascent design field in an effort to attract customers. In an October 1940 retrospective of the 1930s, the magazine *Architectural Forum* designated America's previous ten years as the "design decade." Perhaps a more apt name would have been the *re*-design decade: due to the limited funds at hand, as well as the solid technological investments of the several preceding decades, many designs of the era amounted to little more than a sprucing up of the exterior of existing units without any change occurring in the underlying mechanisms.[1]

Much of this type of work entailed merely placing a new shroud over the old apparatus, as seen with Henry Dreyfuss's steam locomotive *Mercury,* made for the New York Central Railroad in 1936. Side-by-side comparisons of the *Mercury,* with a smoothly rounded bathtub carapace, and its predecessor reveal little more than a traditional steam locomotive that has received a new steel suit (fig. 5). Although such treatments (often termed "styling" rather than "design") were commercially successful, some designers and critics found these types of design approaches somewhat artificial in nature. But such eye-catching transformations



were more than a dolling up, through their signaling of "progress," a heavily promoted term both in America and Europe that decried the doldrums of the Depression by speaking of an unceasing societal forward momentum. Claims of progress also encouraged the idea that the overall quality of life, even during the Depression, was nevertheless better than it had appeared only a few decades earlier.[2]

The "streamline" craze of the 1930s—or the application of aerodynamic shapes to products through scientific (or more commonly, artistic) determination—is commonly credited to the popularity of airplanes during the era, although in many ways airships were just influential muses to designers, as witnessed in automobiles. In 1922, Zeppelin Company chief engineer Paul Jaray patented and built running prototypes of his design for a double-teardrop, dirigible-based automobile body that greatly reduced aerodynamic drag, even at speeds as low as thirty-five miles per hour. His modified Zeppelin form did not catch on initially, but with more powerful engines, smoother roads, aerodynamic body testing, and improved stamping technology in the early 1930s, automobile designers realized that this aerodynamically-efficient form was necessary for the increased speeds of the future. Even so, only a handful of production or serially-produced automobile designs, such as Hans Ledwinka's 1934 Tatra 77 limousine and the Chrysler Corporation's 1934 Airflow, featured coachwork that was closely related to Jaray's ideal; the rest of the industry interpreted the double teardrop as it saw fit.[3]

A much-publicized bright spot during the Depression came in the field of railroading, with the Pennsylvania Railroad (PRR) implementing massive electrification of the northeast

FIG 4
opposite left Postcard illustration of a futuristic city inspired by *King's Dream of New York*, published by Moses King, 1908.

FIG 5
opposite right *J-1c Hudson* locomotive (left) and Henry Dreyfuss's *Mercury* locomotive, New York Central Railroad, 1936.

FIG 6
right *SS Normandie,* New York Harbor, c. 1937.

corridor of the United States, which remains in use today. Complementing this impressive feat was industrial designer Donald R. Dohner's custom designed and iconic double-ended GG-1 Class locomotive featuring a smooth body with integrated hood and centrally located cabin providing better protection for the engineer. Not only was Dohner's work with the PRR's engineering department a rare instance during the Depression where a designer collaborated during (as opposed to after) engineering development, the unit (which industrial designer Raymond Loewy was later hired to create a paint scheme for, resulting in five stylish stripes) also happens to be one of the earliest known examples of the then-emerging trend of developing a 3D form sculpturally rather than orthographically—a process that has defined the appearance of nearly all product forms from the mid- to late-1930s onward.[4]

Since 1900, the great transatlantic ocean liners have been dominated by a French aesthetic that promoted luxurious and, for rich Americans living under Prohibition, alcohol-fueled lifestyles while treating the ship's interiors as floating galleries for decorative art. Designed under the direction of Roger-Henri Expert, the French-built *SS Normandie*—which at its core was an engineering tour de force that set a speed record for transatlantic crossing during its maiden voyage in 1935 (fig. 6)—featured a multitude of decorative works, including a colossal glass lighting installation by René Lalique and murals by Jean Dupas that were also made in glass but totally different in style. The teardrop shape of the three streamline smoke stacks rising above the main deck inspired silversmith-turned-designer Peter Müller-Munk's pointed *Normandie* pitcher, which utilized the sharp tapered edge to aid in pouring its contents (page 190).

FIG 7
Jeeps on parade at Fort Myer, Virginia, 1942.

The World War II years, beginning in 1939, and the resulting manufacture of paraphernalia for use in war produced a number of significant designs that appealed to a modernist mindset. This outlook promoted the idea that design without consideration of function should not be considered design, and that beauty, or at least a typeform, would emerge only by treating utility first. Representative of this way of thinking is Museum of Modern Art (MoMA) curator Arthur Drexler's critique of the World War II Jeep (fig. 7), which was hailed by MoMA in its 1951 *8 Automobiles* exhibition as "one of the few genuine expressions of machine art." Arguing for this philosophy, Drexler stated in the exhibition's accompanying catalogue, "The admirable Jeep seems to have the combined appeal of an intelligent dog and a perfect gadget." And this appeal was "so vast that this wonderful tool for transportation has won approval for much more than its practicality, though the engineers who perfected it worked without the concern for style with which other automobiles are designed."[5]

Various forms of escapism became popular during the war; designers were unable to produce for industry due to rationing and severe restrictions in place on the manufacture of many civilian "luxury" items (as defined by the War Office) ranging from toasters to automobiles. To help lift people's spirits, magazines regularly published futuristic visions of a victorious postwar world offering a cornucopia of consumer delights. Particularly popular among these scenes were fantastical automobile concepts (heavily associated with the war illustrations of industrial designer George W. Walker) sporting airplane-like "bubble top" canopies and cutting-edge plastic composite bodies. Immediately following the war, Allied victory spurred a technological utopianism in America that envisioned a society full of flying cars that could easily skip over gridlocked urban arteries. Translating these so-called Blue Sky designs (reputedly named after the endless blue horizons featured in the backgrounds of the illustrations) into successful commercial products proved tougher than anticipated,

however. The prototypes of these few dual-purpose units that reached functionality, such as Robert Fulton's 1946 Airphibian or Moulton Taylor's 1949 Aerocar, were found to be neither good cars nor good airplanes.

The same ethos for technological marvel that produced flying cars transformed the hope-filled progress of the 1930s into prideful prowess after the war, in the 1940s and 1950s, again finding automobile designs sporting motifs taken from unrelated forms of transportation—especially jet technology. Perhaps the most representative of these is the 1951 Le Sabre "dream car" by legendary General Motors design chief Harley Earl, with its "NACA" air intakes, exhaust tube body shape, and taillights, fins, and other aeronautically inspired styling cues that in no way reflected the car's many actual engineering feats. It did, however, mirror the idea of "designing for mass acceptance" that was promoted by Dohner (who has since been deemed the father of American industrial design education by the Industrial Designers Society of America). This philosophy rejected Immanuel Kant's mantra of "art for art's sake," and upheld, by contrast, that a designer's primary role is to avoid personal taste biases and instead consider consumer psychology, appealing forms and colors, user convenience, and more, all in an effort to find those special qualities that will attract the broadest section of the general population.[6]

New materials and construction methods, often introduced as a result of wartime shortages, can be found in many postwar transportation designs. The original 1953 Chevrolet Corvette, also designed under Earl, did not feature the bubble top popularly imagined in the 1940s, although it did have a plastic body made out of fiberglass, each one individually crafted. Benjamin Bowden's organic, futuristic streamline prototype bicycle of 1946, called the Classic, originally featured an innovative and stylish pressed aluminum monocoque frame consisting of two large halves sandwiched together—as opposed to the typical multipiece welded tubular frame. It was shown that year in the *Britain Can Make It* exhibition, which was organized by the Design Council (then the Council of Industrial Design), but production of Bowden's machine would not come until the late 1950s and after a move to the United States, when the aluminum was changed to fiberglass and the bicycle was renamed the "Spacelander," after the space race that was raging at the time.

Aviation in the postwar years saw a dramatic change from propeller to jet propulsion. The Lockheed Constellation, with its flowing and porpoise-like shape, took aerodynamic, propeller-driven airplanes to their zenith in the early 1950s. The more efficient but far less elegant Boeing 707 was the first successful commercial jet and featured an impressive interior designed under the leadership of Frank Del Giudice for Walter Dorwin Teague. First manufactured in 1958, the 707 would easily overtake the Constellation and other propeller-driven competitors and ultimately became the prototype on which all planes that followed were based, as air travel transitioned from a rare event for the privileged few to an everyday occurrence for the masses.[7]

The democratization and expansion of air travel that began with the Constellation and solidified with the 707 took a heavy toll on travel by ocean liner. With passenger numbers dwindling, vessels were often converted to "cruise" ships that became floating hotels for vacationers traveling to exotic ports, rather than a means of transportation. The 1965 *SS Oceanic,* arguably the first of these new aquatic vacationlands, featured a "magrodome" sliding glass roof over a swimming pool on the Lido deck. It offered a pleasant swimming

FIG 8
above left TGV high-speed train, France, c. 1980s.

FIG 9
above right Concorde in flight, British Airways, c. 1990s.

FIG 10
opposite Promotional photograph of the Volkswagen *Beetle*, 1998.

environment, regardless of weather conditions (as first envisioned by Bel Geddes in his own ocean liner proposal of 1932).[8]

While the growing preference for air travel in the 1960s caused many countries around the globe to neglect or abandon their railroads, some chose to invest heavily in rail projects with great success. Japan's renowned high-speed and long-distance "bullet" lines, with development traced as far back as the 1930s, entered service in 1964. France's likewise-speedy intercity *Train à Grande Vitesse*, or TGV, debuted in 1981 (fig. 8), and through continued development reached a world speed record of 574.8 kilometers per hour (357.2 miles per hour) in 2007. The success of both systems has made them symbols of national pride, yet they remain at the heart of a reemerging interest in passenger rail travel, which began in the late twentieth century and continues into the twenty-first.

The dominance of air travel in the 1970s saw the 1976 debut of one of the most impressive airplanes before or since: the British-French designed Concorde Supersonic Transport passenger plane (fig. 9). It was Chuck Yeager who paved the way for this most impressive of airplanes, when he broke the sound barrier in the Bell X-1 in 1947. Including prototypes, only twenty Concordes were built, but they offered luxurious Mach II travel across the Atlantic (Air France's version was replete with flatware designed by Raymond Loewy) at more than twice the speed of their competitors. Travel by Concorde was an unqualified success until its nearly flawless record was shattered by a disastrous runway mishap in July 2000 that resulted in the removal of all Concordes from service.

After human space flight reached an apex in 1969 with the first moon landing, NASA began work on the Space Shuttle program. Unlike other types of manned space flights, the shuttles were designed to land on a runway like a commercial aircraft after reentry into the earth's atmosphere. Successfully launched in 1981, the space shuttles

NOTES

1 Howard Myers, ed., "The Design Decade," *Architectural Forum* 73, no. 4 (October 1940).

2 In 1976, architectural historian Richard Pommer termed the placing of shrouds over preexisting mechanisms as "the skin game." See Richard Pommer, "Loewy and the Industrial Skin Game," *Art in America* 64 (March–April 1976), 46–47.

3 For Jaray's United States patent, see no. 1,631,269 (filed Aug. 19, 1922; granted June 7, 1927).

4 Donald Dohner's contribution to the GG1 locomotive, which was solely credit to Raymond Loewy for decades, was first revealed in 2009 (see Hampton C. Wayt, "Donald Dohner: The Man Who Designed Rivets," *Classic Trains* (Summer 2009), 30–35). Wayt's more recent, unpublished research also disproves nearly all of Loewy's claims surrounding his improvements to the GG1's design, including the use of welding instead of riveting for the shell.

5 Arthur Drexler, *8 Automobiles* (New York: Museum of Modern Art, 1951).

6 In 1998, the Industrial Designers Society of America (IDSA) awarded Donald Dohner a Personal Recognition Award designating him the "father" of American industrial design education, after Dohner's contributions in the field were revealed by designer-turned-historian Jim Lesko. See Lesko, "Industrial Design at Carnegie Institute of Technology, 1934–1967," *Journal of Design History* 10, no. 3 (1997), 269–92. For Dohner's philosophy on designing for mass acceptance, see Donald R. Dohner, "Designing for Mass Acceptance," *Industrial Arts* (UK) 1, no. 4 (Winter 1936), 253–56.

7 Frank Del Giudice, Burien, Washington, detailed his work on the 707 in a letter to Russell Flinchum, July 25, 1993.

8 Norman Bel Geddes, *Horizons* (New York: Little Brown, 1932), 36–43.

teased humankind with the possibility of space travel, yet only reached low earth orbit. The shuttle program has been retired, but private companies such as Richard Branson's Virgin Galactic and Elon Musk's SpaceX continue to develop and test the potential for space travel for commercial purposes.

Throughout the 1960s, the waning of the technological utopianism that was embraced so emphatically by the public in the previous decade brought with it a rise in automobile designs that denoted certain lifestyles. Muscle cars of the mid- to late-1960s, named for their power and overtly muscle-like body designs (such as the ornithologically inspired 1969 Pontiac Firebird), were overpowered and under-braked automobiles with throaty exhaust that advertised raw power, youth, and speed. By contrast, Ferdinand Porsche's Volkswagen *Beetle*, a simple, durable, anachronistic holdover of early 1930s automobile design, launched counterculture into the mainstream with the company's "Think Small" and "Lemon" ad campaigns of 1959 and 1960.

The design by J Mays and Freeman Thomas for the reintroduced Volkswagen Beetle in 1998 (fig. 10) was more about nostalgia than lifestyle or technology, but it gave new life to one of the most enduring and endearingly iconic forms of transportation of the twentieth century. Moving into the next millennium, however, the pendulum continues to swing between technology and style with the increased integration of gadgetry and design in our lives, as seen with products such as the smartphone. Perhaps the embodiment of both aspects, at Tesla Motors (now Tesla, Inc.) the use of stylish forms to connote the advanced electrical drive of its twenty-first century automobiles speaks to the cutting-edge nature of science and mobility in an age when the driverless automobile seems just around the corner.