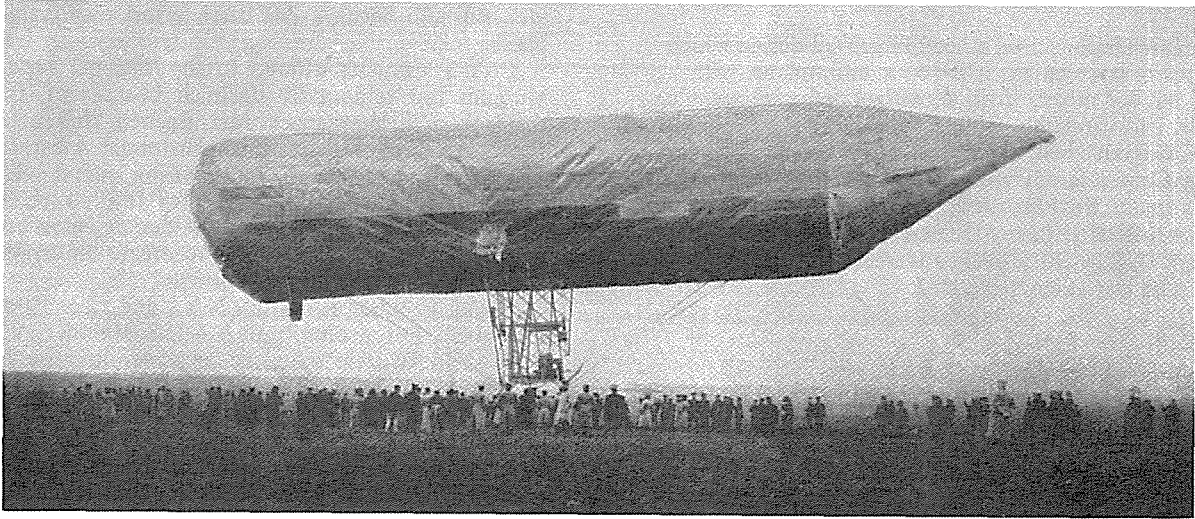


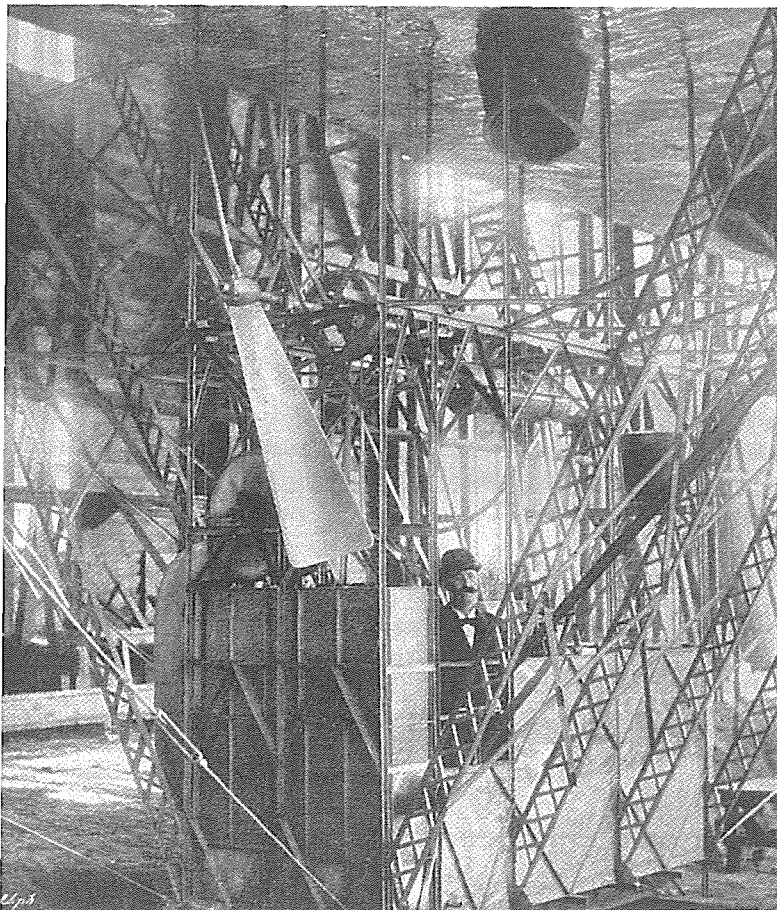
THE SCHWARTZ ALL-METAL AIRSHIP SYSTEM

1893 to 1897

By GEORGE E. WRIGHT, JR.



The ground handling crew for the first ascent of the Schwartz aluminum airship were troops provided by the Russian Airship Detachment, 3 November 1897. (Photo—Courtesy of author)



There is a place in the dusty histories of lighter-than-air flight reserved for the freaks, the has-beens and the never were's. Such a design was the rigid all-aluminum hulled dirigible of an Austrian lumberman turned inventor, Herr David Schwartz. His glistening monster was constructed almost completely of aluminum with the exception of leather driving belts and brass bearings. A strange plan, but sound in conception and, when brought before a commission of scientists and experts of the Prussian Airship Detachment appointed by Wilhelm II in 1894 to examine new proposals for dirigibles, it won out over a competing design submitted by a former Wurttemberg cavalry general, Graf Ferdinand von Zeppelin.¹

Herr Schwartz had previously constructed another aluminum rigid airship at St. Petersburg in 1893, but had met with failure when its interior stay wires had broken during inflation.² Schwartz moved his concern from the Russian capitol to Berlin, and during a period extending from late 1895 to autumn 1897, constructed his second airship. Commonly described as silo-shaped with a rounded stern, the Schwartz airship was not truly cylindrical, but elliptical. The dimensions of the aluminum rigid are disputed, but the best figures generally agree that it was nearly 156 feet in length, 46 feet high and 39 feet wide. The framework of the airship consisted of 12 main transverses, 16 main longitudinal lattice-girders and a number of intermediate transverses and longitudinals, all of tubular aluminum. An outer skin of aluminum, approximately 8/1000th inch thickness, covered the framework, enclosing a single gas compartment of 130,600 cubic feet.

The rudderless airship was intended to be steered by this propeller, swinging on a vertical axis. (Photo — Courtesy of author)

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Motive power for the craft came from a small car rigidly attached to the hull by lattice-girders and braced by wires extending to the extremities of the hull. The Daimler motor housed there developed 12 hp at 480 rpm and drove three airscrews; two mounted by brackets to the hull and the third swinging free on a vertical axis in place of the usual rudder. Each of the propellers was driven by a leather belt. Tampering with their attachment design played a large part in the subsequent loss of the airship.³

Schwartz's negotiations with representatives of the War Ministry and the Airship Detachment secured the use of the shed and landing field at Templehoff. Before the final completion of his airship, Schwartz died, and his wife and partners resolved to carry on with the construction of the dirigible. Inflation of the Schwartz airship took place on November 1 & 2, 1897. Hauptman von Sigsfeld, a member of the Airship Detachment supervised the inflation and prevented an internal collapse similar to that which befell the 1893 dirigible, by making use of the expendable air ballonnet method. In essence, the gas compartment was evacuated of air by inflating cloth bags previously introduced into the hull, then the bags were ripped and removed through an access hatch in the bottom of the compartment.⁴

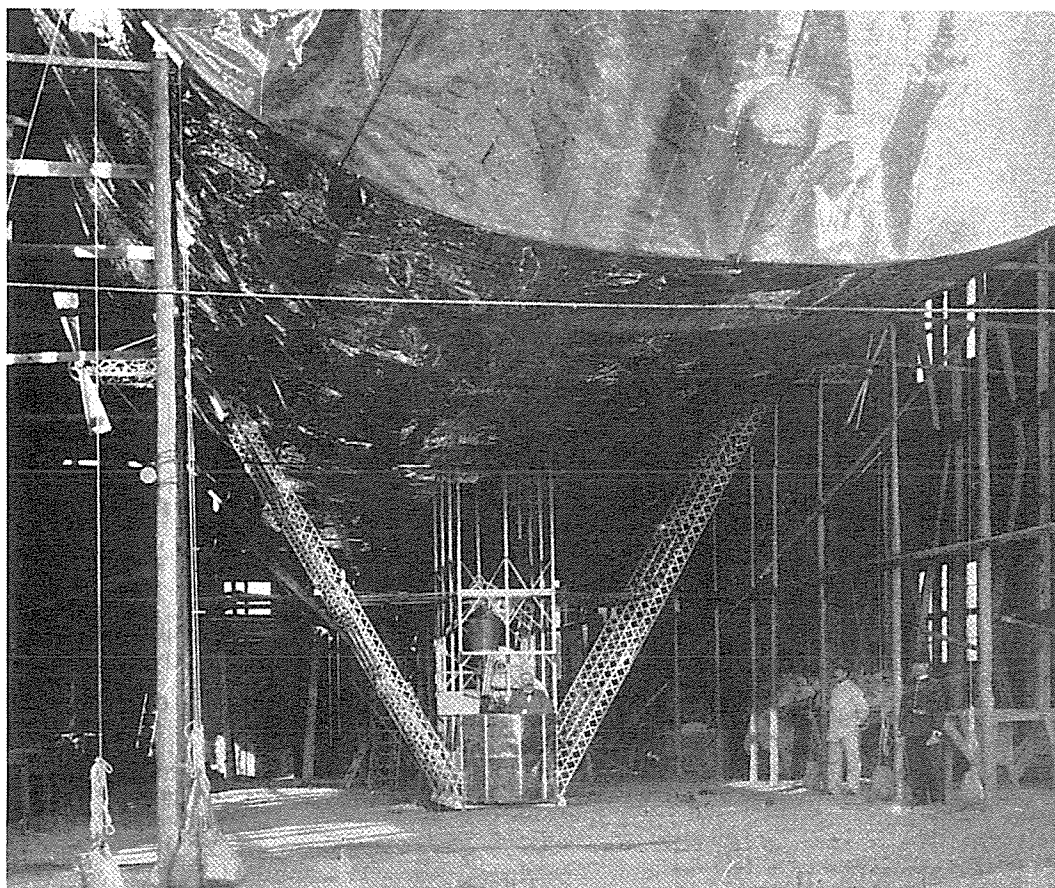
The inflation was a success, and on the morning of November 3, the aluminum rigid was test flown as a captive balloon to reassure the gathered experts that the dirigible was capable of lifting itself. It was. In fact, it seemed overly buoyant — the result, no doubt, of an ill-advised lightening program pressed by members of the Airship Detachment who felt that the ship would be too heavy to fly. Unfortunately, these officers, "... did away with everything that seemed to them superfluous." Included in this category were the arrangements planned by Herr Schwartz to secure the driving belts for the bracket-mounted propellers, a device intended to regulate the descent of the airship, and a device for lengthening the four legs of the car during

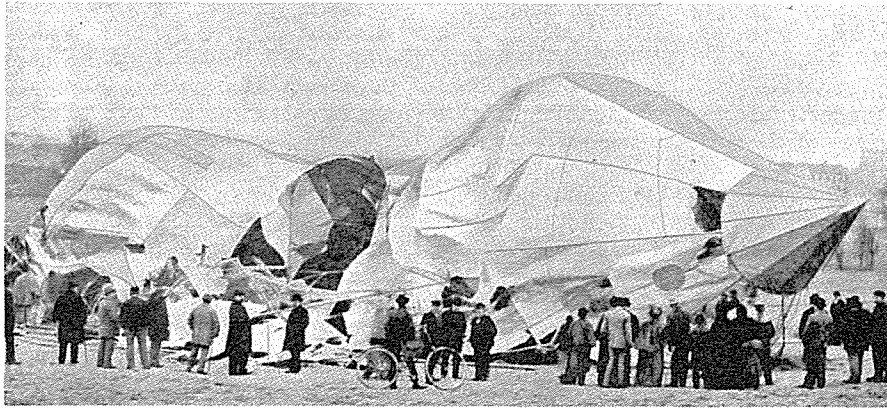
rough landings.⁵

Just who actually acted as pilot of the craft is also a source of dispute. The distinction, however, can be laid at the feet of one of three men; Herr Jaegels (Schwartz's Chief Engineer), a young mechanic named Platz, or an unnamed private of the Airship Detachment. None of these men was in any way experienced enough to be considered a competent pilot and the decision of the War Ministry to permit the trial flight to proceed in the face of this development and a 15 mph wind is questionable. Such adverse weather conditions and the very complexity of the aluminum rigid airship raises the question as to whether even under Schwartz's guidance the test flight would not have been a failure. The Airship Detachment's arbitrary stripping of a number of vital devices intended by Schwartz to deal with such conditions sealed the fate of the dirigible and nearly took the life of its pilot.⁶

In early afternoon the ground troop provided by the Airship Detachment let go their mooring lines and, contrary to expert predictions, the Schwartz airship rose quickly to an altitude of about 100 feet and began to drift with the freshening wind. The pilot made vigorous if unselective efforts to bring the ship under control. Moments later the leather driving belts, stripped of the devices intended to insure the transfer of power to the bracket-mounted propellers, slipped off and the airship was completely at the mercy of the wind. There is a bare possibility that had Hauptman von Sigsfeld or another free balloon pilot of his caliber been aboard, a relatively easy landing might have been achieved. As it was, the terrified pilot of the dirigible completely lost his head and threw open the gas valve. Properly done, such a move should have brought the ship down safely (if somewhat roughly). The valve, however, was left open and the aluminum hull collapsed under the impact of striking the ground, while the pilot, in a well-timed leap, abandoned the car of the dirigible and rolled

Final assembly of the Schwartz Airship was in the Templehof Balloon House. Twin propellers were mounted on brackets at the sides of the aluminum hull, driven by leather belts running from the car. (Photo—Courtesy of author)





Retouched photograph of airship after descent clearly exhibits the violence of its landing. Questionable piloting and adverse weather conditions obscure the facts that the Schwartz design was both ingenious and sound in conception. (Photo — Courtesy of author)

away, receiving only a few cuts and bruises for his trouble.⁷

Schwartz's three years of work and an expenditure of nearly \$50,000 was a total loss, but a number of individuals remained interested in the all-metal design.

"On December 8, 1897, Count Zeppelin acquired control of the Schwartz Airship System, including designs, patents, inventions, technical data, information and experience. Under the purchase agreement, the Schwartz heirs were to receive a cash payment of 15,000 marks and 10,000 marks for each of the first 30 airships constructed and sold by Count Zeppelin."⁸

Later, in 1901, when Zeppelin took personal possession of IZ-1, its hangar and accessories, (only to sell the airship and hangar as junk) he retained the Schwartz patents — though the impact of them on his own design is difficult to ascertain. Only one other metal-hulled design appeared in Europe before World War I — this a steel craft of similar volume proposed by a Hungarian firm. Rumor of this successor to Schwartz's aluminum rigid appeared off and on from 1904 to 1914.⁹ In truth, it never went past the discussion stage, and it remained for the 1920's to field two American all-metal designs as the Navy's ZMC-2¹⁰ and Slate's CITY OF GLENDALE. The concept has popped up again at least once in the 1960's as the Slate SMD-100 project.¹¹

TABLE I
THE SCHWARTZ METAL AIRSHIPS

NAME	NO. 1	NO. 2
Length (ft)		156
Diameter (ft)		39
Vol. x 1 (ft)	160,500	130,600
Gr. Lift (H)		
Net Lift (H)		
Engine Type	Daimler	Daimler
No. of Engines	1	1
Total H.P.	12	12
Speed (approx.)		10.8

REFERENCES

¹ Hardesty, Fred. *The Key to the Development of the Modern Rigid Airship. Luftschiffbau Schutte-Lanz 1909-1930*. Privately printed. 1931. On page 124, Hardesty maintains that Zeppelin tried without success to merge with Schwartz after the Austrian's all-metal design won the 1894 Aeronautical Commission's support and his own was rejected.

² There are a number of books and articles that refer to Schwartz and his efforts. Some of the best are: Stahl, Friedrich, "Rigid Airships," *Technical Memorandums — National Advisory Committee for Aeronautics*, No. 237, November, 1923; Rolt, L.T.C. *The Aeronauts*. Adelt, Leonhard. "Zeppelin — der Mann und die Idee." Berlin: 1938. pg 12-15; On the St. Petersburg ship, see, NACA TM 237, pg 32.

³ On the move to Berlin by Schwartz, see Stahl, NACA TM 237, pg 32. The specifications of the aluminum rigid are found in Stahl, pg 32-33; Rolt, pg 221-222. Also Hildebrandt, August. *Airships Past and Present*. London: 1906, pg 58. And D'Orcy, Ladislaus. *Airship Manual*. New York: 1917, pg 123.

⁴ Negotiations with the authorities are discussed in Tschudi, Georg. *Aus 34 Jahren Luftfahrt*. Berlin: 1914. pg 31-32; *Scientific American*, Vol. 89, No. 51 December 25, 1897. pg 406. Hildebrandt, pg 58; Von Sigsfeld's inflation of the rigid is found in Hildebrandt, pg 59-60. Stahl, NACA TM 237, pg 33. Rolt, pg 222 and Tschudi, pg 35.

⁵ On the test flight as a captive balloon, see Rolt, pg 222. The quotation given here is from *Scientific American*, December 25, 1897. Details of what was stripped from the dirigible can be found in the same article.

⁶ The adverse weather conditions were found in Tschudi, pg 35-37. Rolt is reluctant to offer an opinion as to who flew the ship. (Rolt, pg 222.) Hildebrandt asserts that the Airship Detachment private was aboard. (Hildebrandt, pg 59.)

⁷ For the disastrous particulars of the flight, see Tschudi, pg 35-37. Also *Scientific American*, December 25, 1897; Hildebrandt, pg 60; and Rolt, pg 222-223. Further, Moedebeck, Nermann. *Pocket-Book of Aeronautics*. London: 1906, and Hearne, R.P. *Airships in Peace and War*. London: 1902., subscribe to the story that the Schwartz rigid suffered only minor damage in the landing and was then demolished by disappointed spectators. The most authoritative proof of the violence of the landing is a picture found in Hildebrandt, pg 59. Rolt also noticed this discrepancy on pg 223.

⁸ The purchase of the Schwartz patents is noted in D'Orcy, pg 123. The quotation used here is from Hardesty, pg 124.

⁹ The figure of \$50,000 is adjusted from the sum of 10,000 pounds Sterling, mentioned in Rolt, pg 222. Brief mention of the Hungarian steel design is found in Stahl, NACA TM 237, pg 33. The *Scientific American* places a good portion of the blame for the disaster on the officers of the Airship Detachment and their changes in the dirigible's machinery.

¹⁰ The ZMC-2 is described in Smith, R. K. "Ralph H. Upson." *JOURNAL of the AAHS*, Vol. 13, No. 4 (Winter 1968) pg 282,283. The Slate CITY OF GLENDALE is described by Anderson, R.M., "Slate All-Metal Dirigible Heralded As The First Practical All-Metal Airship." *Aeronautical World*, Vol. 1, (September, 1928) pg 18-19.

¹¹ The high point to date of the SMD-100 project was reached in 1963 when its construction was nearly authorized by the Department of Defense. See McGuire, F.G., "Airship Studied as Booster Carrier." *Missiles and Rockets*. Vol. 12, No. 16, (March 4, 1963).

ABOUT THE AUTHOR

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