Commercial Spaceflight – Public-Private Partnership
The Pioneers: Rudolf Nebel, Klaus Riedel

With the Commercial Crew Development round 2 (CCDev-2) being completed in April 2011 and Virgin Galactic getting ready to fly its first paying customers in the 2011/2012 timeframe it is worthwhile to note two facts: since the beginning of spaceflight money was always an issue and on the other hand engineers always where very inventive in turning up financial resources.

As the following example shows the approach of what we today call "public private partnership" (PPP) was successfully tried as early as 1930!

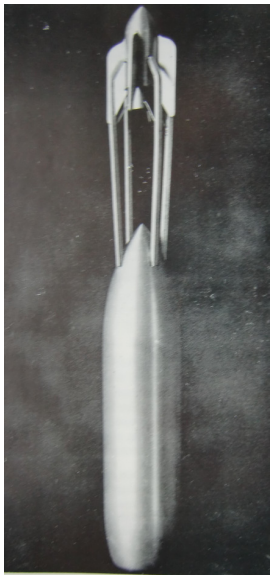
The following article is dedicated to Klaus Riedel, holding the first German patent (together with Rudolf Nebel) for a liquid fuelled jet propulsion motor (RP Nr. 633667).

With increasing public interest in the fledgling rocket experiments, the UfA film studios at Berlin decided in 1928 to produce a space-movie, the now legendary "Frau im Mond" ("Woman in the Moon") by the legendary Fritz Lang.

The UfA studios even were prepared to fund a real rocket. After having read Prof. Oberth's famous publication "Die Rakete zu den Planetenräumen" ("By the rocket to planetary space") Fritz Lang decided that Oberth was the right man to built the UfA-moon-rocket for the movie. Oberth agreed and started the construction of a 16 liter liquid fuelled rocket. This rocket was planned to be launched for promotional purposes for the movie premiere on 15. Oct. 1929. Oberth hired Rudolf Nebel (well-known co-founder of the first German "Spaceflight Society"- VfR) as his assistant who in turn convinced Klaus Riedel to join the project for the practical construction and implementation. The rocket was funded by Ufa, construction commenced and was completed in 1929, however not in time for the premiere of the movie which became a full success without the promotional launch.

A disgruntled Hermann Oberth travelled back home to Mediasch (now Romania) and returned in 1930 when Nebel informed him that the "Chemisch Technische Reichsanstalt" (chemical technical government agency) would provide offices and a test area to critically evaluate the test burns conducted at various other places in the meantime by Oberth, Nebel and Klaus Riedel.

After the successful evaluation of their Oberth/Ufa motor by the "Chemisch Technische Reichsanstalt" which certified a constant thrust of 7 kg over a time period of 50.8 sec on 23 July 1930, and more tests with smaller engines the trio returned to Berlin in search for a rocket test area. They finally established the first very primitive "Rocket Airport Tegel" in September 1930 at Berlin-Reinickendorf (R. Nebel became the first director of the airport), and one of the first engineers joining the team was young Wernher von Braun: "We had no money but our self-esteem was boundless".



The Magdeburg "Piloted" Rocket (1933)

Wernher von Braun later wrote about Riedel and Nebel:

"There are many people in Germany nowadays claiming the success we have achieved in the past. It is time to point out the men which have achieved the real big breakthroughs for our (rocket-) case"

(Letter to Irmgard Riedel, the surviving wife of Klaus Riedel in September 1951 - see ref.1).

"I am always aware of your decisive contributions to the development of liquid fuelled rockets, laying the foundation for today's successes in space-flight explorations."

(Letter to Rudolf Nebel after the return of the Apollo 11 crew in 1969 – see ref. 3)

Always cash-strapped and in search for financial sources R. Nebel could acquire a contract with the city of Magdeburg: Nebel offered to launch the first "manned" rocket from the Magdeburg airport on a chosen Sunday in spring 1933 for public entertainment.
It was a contract between the Deutsche Reichsbank, the city of Magdeburg, industry and the chamber of commerce and other private companies and institutions which wanted to participate in the construction of the "Magdeburg piloted rocket".
The rocket was specified as a 100 kg, approx. 8m long vehicle with a thrust of 750 kg being able to reach a peak altitude of 1000 m. It would consist of two bullet shaped units, the passenger part containing the motor and landing parachute while the lower part contained the liquid fuel tanks (see picture).
Kurt Heinisch, also part of the rocket airport team at Tegel volunteered as pilot. His task would have been to "fly" the rocket and get out at the apex of the flight for a safe return by parachute (similar to the concept Gagarin used some 30 years later after his first orbital flight).
Despite some objections by military representatives the contract was finally signed by Ernst Reuter, the mayor of Magdeburg (he became the first mayor of Berlin after the war) on 27. Jan. 1933, a few days before the third Reich was established.
Because of political reasons Reuter was taken in custody by the new regime however the contract was honored by the city of Magdeburg and the work could continue.
Unfortunately tests showed that the rocket would not fly because of various malfunctions and lack of thrust. During the final (unpiloted) test flight the rocket reached a thrust of approx. 185 kg, got deflected by the launch gantry and reached only an altitude of 30 m before it veered of course horizontally and crashed into the ground.
Due to the following rapid political changes neither party insisted on the fulfillment of the contract and the PPP pioneers returned to Berlin. The rocket test area "Berlin-Tegel" was closed forever by the new regime in June 1934.

Lessons learned: Enthusiastic and dedicated engineers believing in their mission are always able to sell extraordinary "space-related" ideas to the public and to appropriate sponsors - however it is not easy to control all technical and political challenges intertwined with new ideas. The example shows that even "non-deliveries" could advance progress.

It is always worth a try!

Magdeburg Rocket in Flight
Magdeburg Rocket in Flight

Klaus Riedel (1907-1944):

After his completion of his training as mechanical engineer, Riedel became a rocket-designer by vocation. In 1930 he organized and conducted over 100 test burns with liquid fuelled rocket motors. In 1931 Riedel's first successful liquid rocket launch was conducted based on Riedel's own propulsion engine design. It later turned out that Riedel was beaten by Johannes Winkler who launched his first "liquid" rocket 2 months earlier at Dessau and of course by Goddard in 1926. But at time the three did not know about each other's success.
After closure of the "Berlin-Tegel" test area Klaus Riedel moved to Peenemuende with Wernher von Braun working on the V1, V2 motor design efforts. He died in January 1944 in a dubious car accident.

Riedel's and Nebel's patent DRP Nr. 633 667 describes a jet-propulsion engine using liquid fuels (e.g., Gasoline and LOX), which would be fed through different (multiple) valves into a spherical combustion chamber compressed and ignited to exit through a conical shaped nozzle. The combustion chamber and the part of the nozzle is cooled by a pressurized cooling liquid flowing through an outer chamber encapsulating the combustion chamber and part of the nozzle.

Acknowledgements/References

1) The above information was extracted from the book
"Die fliegenden Fluessigkeitsraketen, Raketenpionier Klaus Riedel"
Huepke & Sohn, Weserland-Verlag KG, Holzminden, Germany 1988
New issue: Elbe-Dnjepr-Verlag (26. April 2005), ISBN-10: 3933395720
and translated by J. Kehr with the enthusiastic approval of 97 years old Karl Werner Guenzel author and eye witness of the test runs conducted by Oberth, Nebel and Riedel at Bernstadt/Upper Lausitz in 1930 as a boy.
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2) Additional biographical Data were taken from „Raumfahrt Wirtschaft" (ISSN-0179-5627) Astro Verlag, Postfach 501320, 50973 Cologne, Germany (Publisher: Wolfgang Engelhardt).

3) „Die Narren von Tegel" (The enthusiasts of Tegel) by Rudolf Nebel, 1972 Droste Verlag GmbH, Düsseldorf, ISBN 3 7700 0314 4.

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