A long time ago in 1989, aerospace students were planning to build an aircraft, to celebrate the ninth lustrum of the VSV “Leonardo Da Vinci”. The first plan was to produce a replica of the famous Fokker Spin. Unfortunately a replica was already built in the past and there were plans to make it airworthy again, so the search continued. Finally the students chose to rebuild a fairly unknown aircraft: the Lambach HL II. It is an aerobatic aircraft of which the history traces back to Delft.

**THE ORIGINAL LAMBACH HL II**
The original airplane was designed by Hugo Lambach in 1937. He studied applied physics at the Technische Hoogeschool Delft, later known as the Delft University of Technology. During his studies he designed and built his first aircraft, the Lambach HL I, by request of the Delftsche Studenten Aeroclub. He wanted to work on other aircraft and was employed by Koolhoven Vliegtuigen N.V., a large Dutch aircraft manufacturer at the time. As an engineer he worked on projects like the FK-46 and FK-47.

In the 1930’s, aerobatic competitions were gaining popularity. The first national championship was held during Whitsun in 1936 at the airfield of Eelde. Six pilots participated: four Dutchmen and two Germans. Leaving many in regret it was a German who won and could call himself champion of the Netherlands. The victory was mainly due to the superior Focke Wulf Stieglitz the German victor flew in. The Dutch competitors had ordinary planes at their disposal: a Tiger Moth, a Koolhoven FK-51 and a Pander, which were less capable of making aerobatic maneuvers.

Therefore several wealthy gentlemen asked the young Hugo Lambach to develop an aircraft that could repair this dent in national pride: the Lambach HL II was born. Hugo Lambach devised a biplane consisting of a steel tube airframe covered with linen. The wings were made of wood and measured eight metres spanwise. The plane was powered by the widely used De Havilland Gipsy Major Mk. I, capable of delivering 120hp. The design was finished in a very short period of time in order to participate in next year’s championship. To facilitate the construction of the HL II, Hugo Lambach set up his own factory: Lambach Vliegtuigfabrieken. Production started in January 1937 and was completed just in time. Its maiden flight took place on 2 May 1937, including a small aerobatics program. Only two weeks later pilot Schmidt Crans participated with the HL II in the next Whitsun championship. The Germans had not been idle either and showed up
with a Bück Jungmeister which brought them victory a second time. Nevertheless Schmidt Crans managed to get an honourable third ranking, given the short preparation time. Afterwards the HL II was used in demonstrations throughout the Netherlands and was eventually used as a trainer for the NLS (National Aviation School). Soon World War II started and in May 1940 the German troops invaded the country. The HL II was then stationed at the airfield of Ypenburg which was struck by a bomb raid. The plane did not withstand the violence and went up in flames. The only thing that remained was a set of technical drawings.

BUILDING THE REPLICA
In 1989 aerospace students wanted to rebuild the Lambach HL II for the celebration of the 45th anniversary of the VSV ‘Leonardo Da Vinci’. The Lambach HL II is a unique aircraft with its origin in Delft, which was one of the reasons to choose the HL II. The students managed to get their hands on the original drawings through the aviation museum Aviodrome. To organize the building process the SSVOBB (Foundation for Students in Airplane development, manufacturing and management) was founded in 1990. Later it simply became known as Lambach Aircraft. The goal of the foundation is to introduce the practical aspects of aircraft to aerospace students.

Before work could be started, the original drawings were copied because they were hard to read as a result of aging and of course such antique papers cannot be used in a dirty workshop. To gain experience in manufacturing steel constructions test samples were made out of carbon steel. In September 1989 the preparations were done and the production of the HL II began, decades after the last Lambach left the factory. Hundreds of plate metal parts had to be filed by hand. The hardness of the chrome-molybdenum tempted the patience of the workers. In February 1990 the first parts of the fuselage frame could be welded.

Another challenge was acquiring the required sorts of wood to construct the wings and other parts. Airworthy triplex was easy to find, but spruce was rather rare. After a long search our own faculty turned out to have a supply of spruce. It was used in the production of Koolhoven aircraft. The wooden parts could then be produced. After the right wood was found, also the right glue had to be found. In the old days people used casein glue. It had the unfortunate tendency of dissolving in water and for that reason it had been prohibited for use in aircraft constructions. A suitable replacement was found in Aerodux, a cold-setting two component adhesive.

One more challenge to be tackled was obtaining an engine. Despite the fact that the Gipsy Major was a commonly used engine in those days, they were scarce to find. A working unit could cost tens of thousands (old fashioned) guilders. Fortunately military aviation museum Soesterberg was willing to loan a Gipsy Major they had in storage. Unluckily the engine was affected by corrosion and was not suitable for use. Soesterberg also had a Tiger Moth in the collection which was equipped with a Gipsy Major in seemingly perfect condition. The engines were switched, so the students had a good engine in their hands. The engine was disassembled and all parts were removed, cleaned, numbered and stored. When the cast parts were inspected using the dye-check method a large crack was discovered in the motor section. Repairing this was not possible, so another motor section had to be found. The students searched intensively and at last met a person who had one lying in his attic. It turned out to be in good shape. The roaring heart of the aircraft was coming to completion.

The final phase of production was reached. Originally the fuselage frame was covered with linen. The replica was covered with the modern substitute Celconite. After that the aircraft could be painted. The control system parts were put in place, as well as the struts supporting the wings. The aircraft’s weight and stability were checked. The production of the HL II had cost numerous hours of hard labour, in the end it was finished. On 18 September 1995 the Lambach HL II entered the blue sky for the first time.

CURRENT ACTIVITIES OF LAMBACH AIRCRAFT
In 1997 a crack was discovered in a wing bracket due to fatigue. To continue flying would be irresponsible, since the safety of the pilot could no longer be guaranteed. In the past years the problem has been thoroughly investigated and a new bracket design was made. This design is analyzed using Finite Element programs such as MSC Patran/Nastran. The Lambach Aircraft team is currently at the point of performing a vibration measurement of the HL II with the engine running in order to verify the computer model. If the results are positive the HL II is considerably closer to airworthiness. The entire aircraft will then have to be inspected intensively before it is back in operational state.

Without forgetting the past, Lambach Aircraft is looking to the future with a brand new design: the Impuls. It is a composite sports plane that offers a comfortable way of travelling for two people. The Impuls is being developed fully in-house at the moment with enthusiastic students working on several projects. Parts like the fuselage frame and landing gear have already been produced. At the moment the fuel tank is being certified and the control system is being designed.

References
Lambach Aircraft: www.lambachaircraft.nl