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Design in Building of an Aeroplane

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During history mankind has invented various instruments for exploring and conquering the Earth, for surmounting distances both for ground and water. However the big step into the third dimension, the occupation of air had to be waited for long. Desire for flying, longing for the freedom of a free soaring bird has always been connected to the history of human being. There are legends, drawings, descriptions connected to flying in the cultural history of nearly all nations. The oldest one comes from Mesopotamia, while the most popular Greek story of Daidalos and Ikaros is the classical saga of flying in European literature.

All these trials can be seen as a kind of ingenuity but also a highly hazardous venture, as the early attempts ended too often tragically. The first really scientific experiment was the one of Leonardo da Vinci, who planned different objects for flying, though the transformation of bird-wings were characteristic not just in his constructions, but centuries later, namely at Lilienthal, as well. Yet the first flying actions were managed not with the help of any wings, but with parachutes and balloons, while the very first human flight happened in 1783, with a hot-air balloon. Although the 19th century was the era of balloons, new trends and ideas have already shaped the directions in invention. Gliding constructions heavier than air, without any human power were examined, but the first engine driven airplanes with fixed wings have only appeared in the 20th century.
From that point on was the development striking – unfortunately mainly because of military use – even **more brilliant invention and ideas has founded the world of aeroplanes together with all the rich varieties of flying instruments**. Some short decades later flying human constructions have left the atmosphere of Earth and started searching new planets – until now without human participation.

Development of technology is the base to understand both changes in design and evolution of aeroplanes. My theme, the development and evolution of fixed-wing airplanes gives good examples for the material determined and on the other hand for **the individual role of designers in form-giving and shaping**. Design and technology in aircraft construction were radically changed by material-testing, aerodynamical researches and experiences in the latest decades in aircraft industry like in the field of my research and master work, general aviation.

In the first times nearly all technical solutions were set up on an intuitive action of a particular designer, as there were no exact basic researches. Later we can see the initials of the design studio or a leader designer on the new aircrafts coming out of the hangars one after the other.
Nowadays a lot of producers and designers participate in the market competition and they need to use the best technical solutions in order to win the consumer whose expectations are as high in the case of airplanes as in any other technical appliances. The marketing focused competition let design give a definitely more important role. **Aircraft manufacturers in general aviation have to accept design if they want market success.** If design is limited by technology, producers will loose market. Through the consume-oriented designing, styling gets a new member into the team: the innovative way of thinking, creativity and ability analyze, ergonomics and others of the designer may build ideas into the planning process.

Computer aided design has brought a improvement in aircraft planning as well. There is nearly no need of modeling in the planning process of the prototype. CAD systems allow variations in virtual space. In aeroplane planning there is a huge data base for ergonomics on human models. **CAD systems are more accurate and effective in testing** and are able to avoid a big part of modeling costs. The virtual data base of human physique can save time and row material while it helps to set up time in the process of design.

Comfort and safety of air vehicles is the most important field of research and development. Until now it was characteristic for the passenger and commercial ground transport, where the main task was how to use time of travel on a useful way (talking, individual activity, relaxing etc.). Designers of 4-6-8 person aircrafts seem to ask the same questions concerning travel comfort.
Examination of traditional and untraditional solutions of cabin arrangements, analyze of costs and benefits can open new perspectives in aircraft design. A possible new design is able to reform traditional pilot-passenger connections and generate further special interactions.