AERONAUTICAL ENGINEERING AT THE OHIO STATE UNIVERSITY

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Although courses in aeronautical engineering have but recently been added to the long list of those taught at The Ohio State University, the subject of aeronautics has not been neglected. As is usually the case, years of attention by the staff preceded the announcement of new courses. This may not take the form of definite study, but more the form of personal interest. When the work finally appears to have become definitely established and the demand sufficient to warrant it, courses are arranged, suitable teachers engaged, and the first public announcements made. During the World War, this University gave a great many men their knowledge of flight. Ground school classes were graduated about every week. Aerodynamics, structures, observation, gunnery, and motor repairing were but a few of the many phases covered. Following the war, instruction stopped, but the interest remained. Much of the war-time equipment is still in Robinson Laboratory. Although obsolete in use, the fundamentals are unchanged. New equipment has from time to time been added, the largest being a full-sized airplane. This has been hung above the reach of souvenir hunters, and one side uncovered so that the structure may be seen easily.

At the present time three courses are offered to senior engineering students. The first is taught by Professor Stinson; the others by the writer. Professor Stinson's course is concerned with the airplane engine and is given during the fall quarter. During the winter quarter a course in aerodynamics is given, and during the spring quarter a course in airplane design. It is hoped to add more work in the near future, such as a descriptive course for non-engineers, more advanced work in aerodynamics, a course in applied design, a course in air transportation, and laboratory work. Perhaps it would be of interest at this time to explain briefly what these divisions are.

Aerodynamics may sound involved to the uninitiated, but it is really quite simple. Aero implies air and dynamics motion. If you were to hold an object out the window of a moving automobile a force would be required to overcome the resistance to motion through the air. How this force varies with speed and with size can be measured, and rules laid down. Aerodynamics is but a study of these forces and their variations. If the car were standing still in a gale of the same speed as when the first experiment was made and the object were again held out the window the same force would be observed. Thus it makes no difference whether the object moves through the air or the air past the object. This makes possible a convenient means of measuring air forces. It costs much to build a complete airplane and the risk of injuring the pilot makes it desirable to build a small model, determine the forces, and then scale these forces up to the full sized machine. It would be difficult to rush a model through the air and measure the forces encountered. So we reverse the process, hold the model stationary and blow a stream of air past the model. The equipment used to produce this stream of air is called a windtunnel and consists principally of a tube to direct the air and a fan to move it. It is the hope of this staff to install a small wind tunnel here at Ohio State University soon. The main difficulty in adding such equipment is the loud noise and the large space required. Here at Ohio State we have our class rooms in the same building as our laboratory. This forces us to avoid all noises possible, which is sometimes very inconvenient. However, that is one of the problems which adds to the interest of the work.

Airplane design consists of three major operations. First, the airplane must be proportioned to give the desired performance and flying qualities. Second, it must be light and yet strong enough to withstand all the loads to which it may be subjected, and, third, it must be detailed so that it will be easy and cheap to produce, and yet last a reasonable length of time without wearing badly. The first group requires something very difficult to teach—judgment. We have many designers but the good ones are few and far between, and it is in this first group that the chief difference occurs. The second group—strength—is a problem in forces and mathematics, two things quite exact in themselves and readily taught. Our knowledge of the forces is vast and growing daily. Our methods of analyzing structures has been greatly refined, and although still open to improvement, are quite satisfactory. The third group—production, is very changeable. Men in the factories are constantly working to improve this and each manufacturer has his own methods and ideas.

It is a question whether or not we here at Ohio State University should offer a special degree in aeronautical engineering. It is a highly specialized science and perhaps warrants special recognition. However, it is fundamentally mechanical engineering with a knowledge of bridge design. Automotive engineering is also highly specialized and no degree offered. One hears too often of a graduate mechanical engineer working at civil engineering, or a graduate civil engineer spending his life at mechanical design. So it has been decided that for the present, at least, the work will be given as elective senior engineering work.

In closing, it might be well to look for a minute into the future, a dangerous but pleasant thing to do. No means of faster transportation has ever been projected by the human race. It has been stated that a man lives more in thirty minutes in a modern city than in thirty years in a desert.

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This may be somewhat of an exaggeration, but the idea is there. Our doctors help us live longer in years, but our engineers help us live at a faster rate. I personally have known people who prefer a horse to a motor car. The auto might explode. True, the horse might kick, but they were used to that. So the airplane might crash, but we are used to automobile accidents.

I am free to admit there is danger in flying, but I believe it can be greatly reduced. The human factor, according to government records, is by far the greatest source of trouble. A ship captain would consider himself a fool to take his boat as close as possible to the shore. Yet too many of our pilots fly barely over the tree tops. Occasionally fog may force this necessity, but certainly on clear days it is cheap insurance to stay up. When these facts have become more clearly recognized and when production will warrant lower prices, I feel sure that a more popular use of the airplane by individuals and by groups will follow. The Ohio State University is now stepping into the scene to add its bit.