

ENGINEERING

Airplane "Mass Production" Requiring New Methods

Techniques Borrowed From Automobile and Shipbuilding Industries To Speed Production of New U. S. Aircraft

MANUFACTURE of airplanes for military and commercial use is approaching the production of automobiles in methods used if not in the actual quantities produced, it is evident from papers presented by aircraft executives and engineers attending the Fourth Annual Aircraft Production meeting of the Society of Automotive Engineers at Los Angeles.

With unfilled orders estimated at more than \$275,000,000 and the Government placing military contracts larger than ever before, the industry is worrying about problems that did not arise when production was lower and not so speedy.

Because interchangeable parts are extensively used in automobile manufacture, it is taken for granted that the same methods can be used in airplane construction. Courtney J. Hertel, Douglas Aircraft assistant chief designer, explained that while parts subject to replacement are strictly interchangeable, airplane production cannot follow exactly the same system of interchangeable fabrication and assembly used in the automobile industry.

Lofting, a technique of laying out lines on a floor full-scale, borrowed from shipbuilding but greatly refined in accuracy to meet more exacting aircraft requirements, is used in making sure that the precisely molded curves of wings and fuselage are reproduced. Analytical geometry is called upon to overcome the difficulties caused by large size of parts, the prevalence of double curvature surfaces and defections.

Record For Production

A RECORD American production of 103 airplanes in one month of 23 working days was reported for August by H. F. Schwedes, assistant factory superintendent for North American Aviation, Inc. For the past six months an average of approximately 74 airplanes a month has been achieved.

In the inflationary period of 1927-29, airplane producers dreamed of building

and selling airplanes the way automobiles were sold, Mr. Schwedes explained. But airplanes of five to six years ago were not suitable for quantity production. They were costly to tool and in final assembly too many men had to crowd into the small space of the fuselage. Today design aims at high performance with maximum efficiency of production.

Plane an Untried Weapon

BUILDING of airplane production plans upon the foundation established through years of hard work was urged by P. N. Jansen, factory manager of the Curtiss-Aeroplane division of Curtiss-Wright Corporation, Buffalo.

"Much is claimed, and little known, about the airplane as a defensive or offensive weapon in modern warfare between great powers," Mr. Jansen told the engineers. "We do know, however, that a great modern air force in the hands of a power can exercise a tremendous influence on the morale of its potential enemies."

Designers Kept Busy

INTENSELY rapid development and great demand for reliable performance cause many changes in aircraft engine details, Henry C. Hill, project engineer of the Wright Aeronautical Corporation, told the meeting. This rapid and continuously accelerating development does not pause long enough to make real quantity production easy.

The nine-cylinder, single row Cyclone engine in the 11 years since 1928, has increased in horsepower from 525 to 1200 without altering the basic dimensions of the design, reducing the weight per horsepower from 2 lbs. to 1.07 lbs.

Meet New Problem

BECAUSE airplane engines are about to disappear inside the wings in the interest of creating less air resistance, a

major problem in aircraft design is how to construct such submerged engine installations, Wellwood E. Beall and E. G. Emery, Jr., of the Boeing Aircraft Co., told the Society.

The main problems include the design of a satisfactory propeller shaft, the satisfactory and safe disposal of exhaust gases, the cooling of the engine and its parts, and the mounting of the engine. Because of high temperatures created within the wing and the fact that 150 degrees F. is about the safe maximum limit for aluminum alloy structures, it is expected that stainless steel will be used for the structure of the airplane around the power plant installation.

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MEDICINE

Launch New Line of Attack On Cancer

AN ATTACK on cancer, Public Health Enemy Number Two, has been launched along new lines in Pennsylvania. The attack consists of a fact-finding campaign, expected to furnish doctors with strategic information for new and more sure-fire use of the big anti-cancer guns, surgery, X-rays and radium.

Some of the questions about cancer treatment doctors would like to have more definite answers for—answers they hope the new campaign will provide—are, for example: Is it better to operate for cancer of the lip or to use X-rays or radium? Should X-ray or radium treatment be given before operating for breast cancer or after, and if after the operation, how much time should intervene between the operation and the start of radiation treatment?

Who gets cancer, is another question the doctors want answered more exactly. Are the patients young or old, men or women, what chemical or other irritants have they been exposed to during their lives before cancer started, and how many of their ancestors had cancer? Information on the last point may help in determining the part heredity plays in cancer incidence, it is believed. Another important question to be answered is how long did the patient delay getting treatment after the cancer was first noticed?

So the State Department of Health and the Medical Society of the State of Pennsylvania have launched their campaign to get the answers. Doctors are asked to send in a complete record of every patient they treat for any kind of tumor, whether harmless or cancerous.

With the report is to go a microscopic slide with a section cut from the tumor tissue whenever this examination, called a biopsy, has been made. Full details of all treatment given the patient, and of post mortem examinations are also to be sent in. To cover the costs of the extra

slide and filling in the report, for which the State Department of Health distributes special forms, fifty cents will be paid for each complete report plus microscopic slide. Names of patients will of course be kept absolutely confidential.

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CHEMISTRY

Germany's Planes Using Oils Made By Exclusive Method

"Voltolized" Oils Made by Treatment With New Electrical-Discharge Process Go Into Blend

SWEEPING squadrons of German fighting and bombing planes now wheeling in Europe's skies are being lubricated by oils which are made by methods commercially unavailable in the United States, it was disclosed at the meeting in Chicago of the American Oil Chemists' Society in the report of Dr. B. H. Lincoln of the Continental Oil Company.

The German oils are made by treating mineral, vegetable and animal oils with an electrical-discharge process and thus increasing their viscosity greatly. These "voltolized" oils, as they are known, are then blended with ordinary mineral oils to produce a superior airplane lubricant which has many of the valuable properties of castor oil, used during the World War, but without castor oil's handicap of stickiness.

The airplane lubricants are an outgrowth of Germany's World War con-

quest of Belgium, for the German occupation of that country gave them control of the then-young Elektrion Company which was just beginning to produce lubricants by subjecting oils to an electric discharge.

Through an agreement with Netherlands interests the process was made available to Royal Dutch Shell, worldwide Dutch petroleum corporation. Following the war, Royal Dutch Shell did extensive research on the method and perfected it until today the great KLM Dutch airliners, flying to Batavia and the East Indies, use such electrically-treated oils for lubrication. After the war the Elektrion Company in Belgium again picked up production there by this method.

The action of the electrical discharge appears to produce polymerization of the molecules of the oil (make larger molecules out of little ones) and does it with-

out changing the essential properties which make for good lubrication, i.e. slipperiness and strength of film.

Little realized, Dr. Lincoln said in his report with G. D. Byrkit and E. W. Nelson, is the large extent to which the American petroleum industry utilizes fats and fatty acids, obtained primarily from agriculture, in producing better lubricants. Some \$22,204,900 worth of fatty products are used by the petroleum industry yearly, he said.

Better oiliness, greater strength of lubricating film and less corrosion to engine parts result from the blending of small amounts of compounds of these fats from the farm into oils and greases.

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FORESTRY

"Blitzkrieg" Plan Adopted By U. S. Forest Service

"BLITZKRIEG" methods have been adopted by U. S. Forest Service fire-fighters, materially speeding up the tempo and effectiveness of attack against the flaming enemy. The new technique is known in the Service as the "one-lick" method.

Formerly, each man on a fire-fighting line was armed with ax, rake and shovel. He was entirely responsible for his particular sector of the front, and was expected to chop down saplings, rake away debris, and scoop the ground so bare that the fire would find nothing on which to feed as it moved along.

In the "one-lick" method, the fire-fighter, like the modern infantryman, has been made a specialist, a one-weapon man. He is either an axman, a rakeman or a shovelman, just as the doughboy may be a rifleman, grenadier, machine-gunner, etc.

His job is to move forward rapidly, taking one lick at anything combustible he sees but not stopping to clean it up completely. The next man behind him will take another lick, and so on. Only when the leading axman finds himself too far out in front does he stop to take more licks, until the line catches up.

These counter-attacking shock troops move forward in furious action for 40 or 50 minutes at a time, then pause for breath until the end of the hour. The combat is very exhausting, and after three or four hours of it the front-line men are relieved by supports from the rear, while they fall back and perform less arduous duties, such as patrolling the line.

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