Cracking the U.S. Market

Described as a major breakthrough by a Canadian company in the U.S. aviation market, is the $300,000 contract recently secured by Pathex (Canada) Ltd., Toronto, for the supply of a big metal-bonding autoclave unit to the aviation division of the Twin Coach Co., Buffalo, N.Y. This equpiment will be used in the production of major structural sections of such aircraft as the Boeing 707 jetliner, B-52 bomber, KC-135 tanker, etc.

Pathex entered the aeronautical field five years ago with the supply of aircraft tooling under sub-contract to larger concerns. With the overall expansion of aircraft production in Canada, Pathex expanded its facilities to accomodate the design and manufacture of specialized equipment. With the advent of the CF-105 program, Pathex won the contract for the supply to Avro Aircraft of a 15,000-ton hydraulic press for the forming of aluminum skin and airframe sections, and a prime contract to design, build and install a large metal-bonding autoclave unit.

The process of metal-bonding is a development of the jet age. It has now reached the point where all supersonic aircraft, such as the Arrow, are, to a very large extent, bonded together. The materials used for this bonding are extremely strong polymer resins of the phenolic type requiring critical process control.

The bonding autoclave which Pathex built for the Arrow, is essentially a cylindrical oven 8 feet in diameter and 30 feet long. A network of steam-heating coils, supplemented by a 150 kw electric element, provide a working temperature of 500°F. The components to be bonded, after being treated to a degree of surgical cleanliness, are coated with resin and placed on a precision platen at the base of the autoclave. Inside the autoclave the components, which may weigh in excess of a ton, are wrapped in fibreglass cloth and sealed inside a plastic vacuum bag.

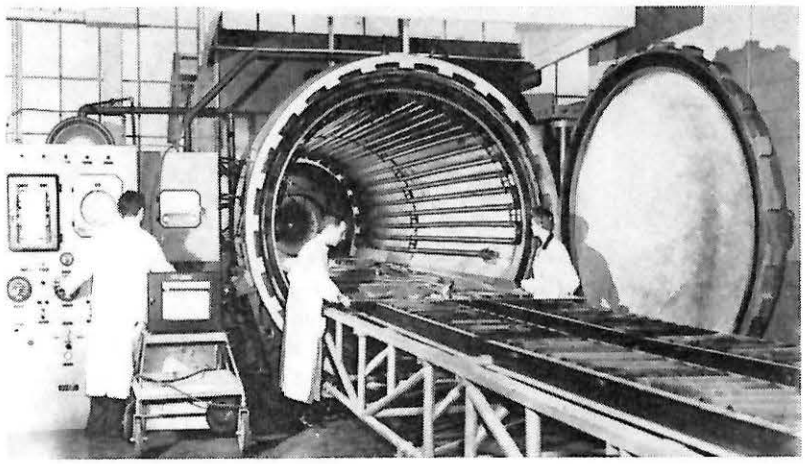
Once the breach-block door has been closed and a button pressed, a miniature chemical plant goes into operation, completely automatic. A compressor pumps air at 200 psi into the autoclave, and is circulated over the heating coils by a high-speed blower. Vacuum is drawn on the plastic bag, squeezing the components together and extracting air and solvent vapors. Throughout the working cycle recorders and other devices chart the process, plotting temperature and pressure.

After the bonding and curing process is completed, the heater coils are emptied of steam and cold water is circulated. When the temperature has dropped to 140°F., the autoclave is opened.

The electronic controls and instruments are mounted on an adjacent panel and indicate all conditions throughout the process. However, once the process pattern has been set and started, the human element retires and electronics takes over. Several different resins require different process patterns, and all the factors of these are fed in at the control panel prior to processing. This is the only point at which an error can be made.

There is even provision for the inevitable occasion when someone gets locked inside the autoclave. A switch is provided inside, which the unfortunate prisoner may turn to ring a bell and to prevent the process from starting until the door has been opened.

John Tieslink, chief engineer of Pathex, believes that the experience gained on the Avro autoclave was the primary reason why Pathex secured the contract for the much larger U.S. unit. The company is now negotiating with U.S. companies for two even larger autoclave installations. These units would have capacities to handle whole airframe sections up to 5 tons weight.



CF-105 wing section being placed in Pathex-made autoclave bonding unit.

three years will centre around completely new approaches to control procedures which may be based upon such things as automatic machine collection and processing and computer analysis to provide the necessary directions for aircraft."

Radio Navaids: In the field of radio, Mr. Hees said, "one of the great problems which continues to confront my Department is the increasing reliance of both shipping and aviation upon radio aids to navigation of all sorts."

"Increasingly complex and expensive equipment is necessary in order to maintain proper safety standards. We anticipate our costs will climb this year by approximately $2,750,000 to almost $14,000,000.

"Our radio aids system of flying is built around the four-course beacons, for many years the standard on our airways; the new VOR aid being established which provides for a greater multiplicity of courses to be followed by the aircraft; instrument landing systems; radar for airway and airport surveillance; and a variety of other installations.

"With the growth of civil and military flying, even newer and more advanced systems must be provided if safety is to be maintained. The solution may involve such equipment as electronic computers and automatic data processing. These and many others, such as the Decca Navigator system, the Doppler systems of navigation and so on, are being studied to keep us abreast of developments.

"In the construction of radio aids we require a total of $11,385,000. The main reasons for the increase are the deliveries taking place this year of the long-range radars intended for airway use. In addition to these we are purchasing and installing a very wide variety of marine and aviation beacons and transmitter and receiver equipment."

More Met Men Needed: Mr. Hees said his Department has long been hampered by a shortage of personnel possessing the required postgraduate training in meteorology. However, prospects for recruiting this year appeared more favorable.

"Among the problems confronting us is the need for better forecasting at high altitudes for today's jet aircraft and the development of automatic de-

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