

LIGHT METAL AGE

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- Academic Outreach to Advance Extrusion Industry Growth
- Metallurgical Aspects of 6xxx Billet
- The Maintenance and Upgrade of Extrusion Presses, Part II

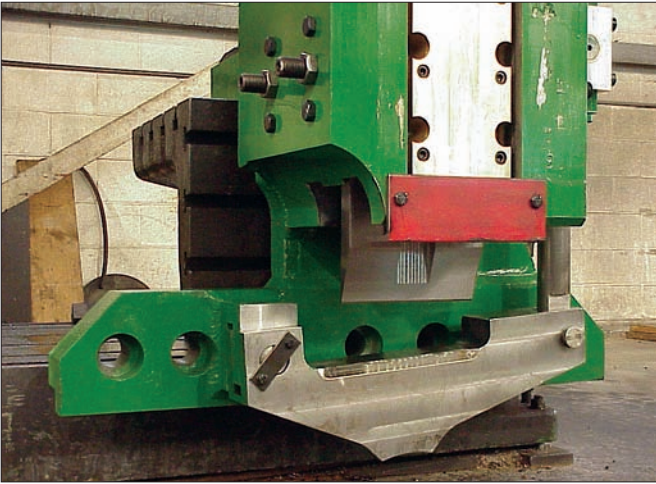


Figure 12. A sectional view of the DieGuard clamping the die ring.

ing each action of the shear. On presses equipped with die slides, the Lake Park DieGuard™ clamps the die ring providing this support (Figures 11-12).

The Key Features of a State-of-the-Art Extrusion Press

UBE Machinery, located in UBE City, Japan, has been building aluminum extrusion presses since 1964. At that time, extruders in Japan produced about 50,000 tons of extrusions annually. By 1972, driven by housing starts in the rapidly growing economy, and just prior to what has become known as the “First Oil Shock,” shipments of extrusions had reached 800,000 tons annually. During the “Bubble Economy” of the late 1980s and early 1990s, shipments exceeded 1.2 million tons annually. UBE was the dominant supplier of extrusion presses in Japan throughout this period of growth.² In the intervening years since UBE began, extrusion presses have become larger with most having a capacity over 2,500 short tons. With the completion of the aluminum extrusion presses currently being manufactured, UBE will have shipped 517 worldwide. The following illustrates the aspects of and operation of a modern UBE extrusion press, which represents the key features of an ideal state-of-the-art extrusion press.

Constructed to withstand the earthquakes that rock some part of Japan every five minutes, the massive steel frame and boxed tie rods ensure alignment is maintained while providing access to critical components (Figure 13).

The traditional self-contained extrusion press, with oil tank and pumps located above the main cylinder, has long been replaced by presses where, to reduce noise and provide ease of access to the main pumps, the oil tank and main pumps are located at floor level. Improved uti-

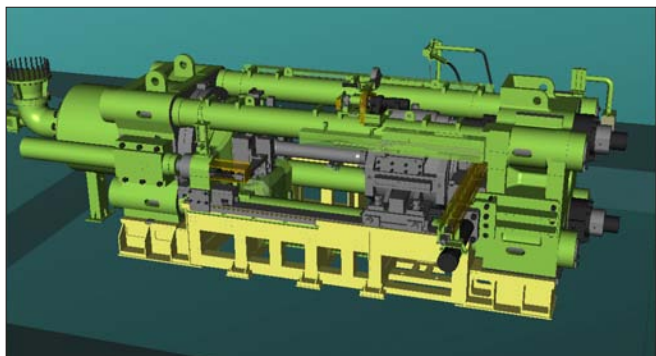


Figure 13. The full machine base of the press ensures proper alignment of the container, cross-head, and stem. Note the easy access to maintain alignment of container and cross-head from outside the extrusion press.

lization of the hydraulic fluid also enables a smaller tank to be used (Figure 14). Few presses operate for years before oil leaks become apparent, requiring the attention of maintenance personnel. Removing the main pumps from the oil tank, and placing them where they are visible and readily accessible ensures that any problems that occur can be attended to immediately (Figure 15).

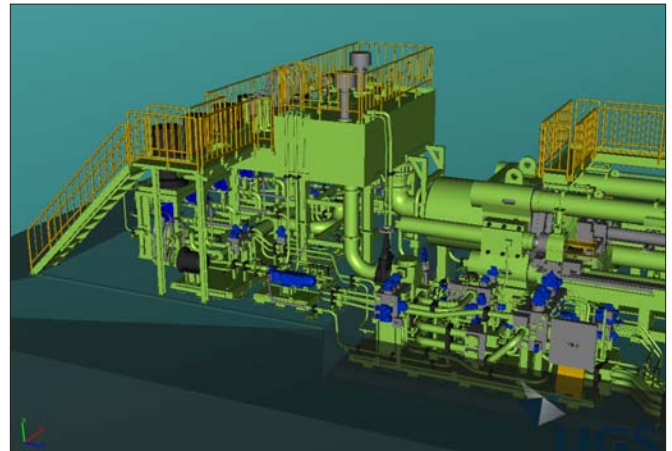


Figure 14. UBE's modern 2,750 UST press is equipped with a smaller than usual oil tank, which holds 1,600 US gallons (6000 litres) of hydraulic oil.

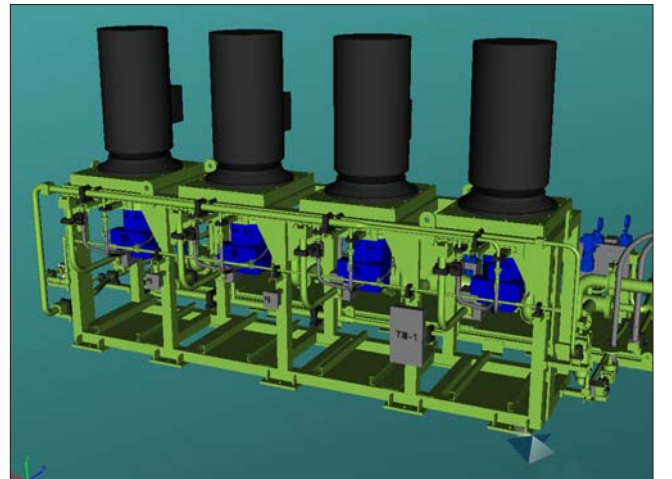


Figure 15. The main pumps are located vertically at the back of the UBE press ensuring alignment and ease of access in case of maintenance.

The massive hydraulic manifold (which along with the pumps has been removed from the hydraulic tank), properly selected pipe sizes, and rigid mounting are essential to ensure that there are no oil leaks.

The rigid pipe brackets reduce vibration, eliminating consequent leaks. The risk of fire, always present when hot aluminum billets and hydraulic lines are in close proximity and has in the past been responsible for the death of press operators and destruction of property, is eliminated by replacing hydraulic cylinders with electric motors. The billet loader is one example of a switch to all electric operation (Figure 16). Safety at the extrusion press is further increased by also replacing the hydraulic systems driving the die shuffle mechanism with electric motors.

Changing the container is not an every-day occurrence in most extrusion operations. However, when the need does arise, the operation can take hours to complete. However, with the proper lifting equipment and layout of

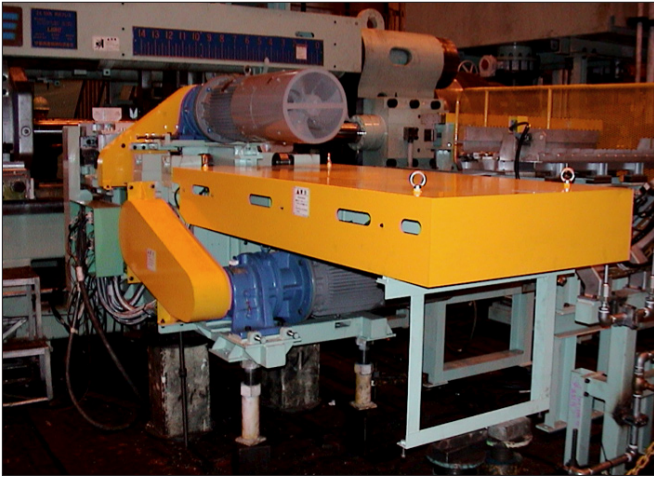


Figure 16. An electrically driven carrier moves the billet to the center-line and inserts it into the container.

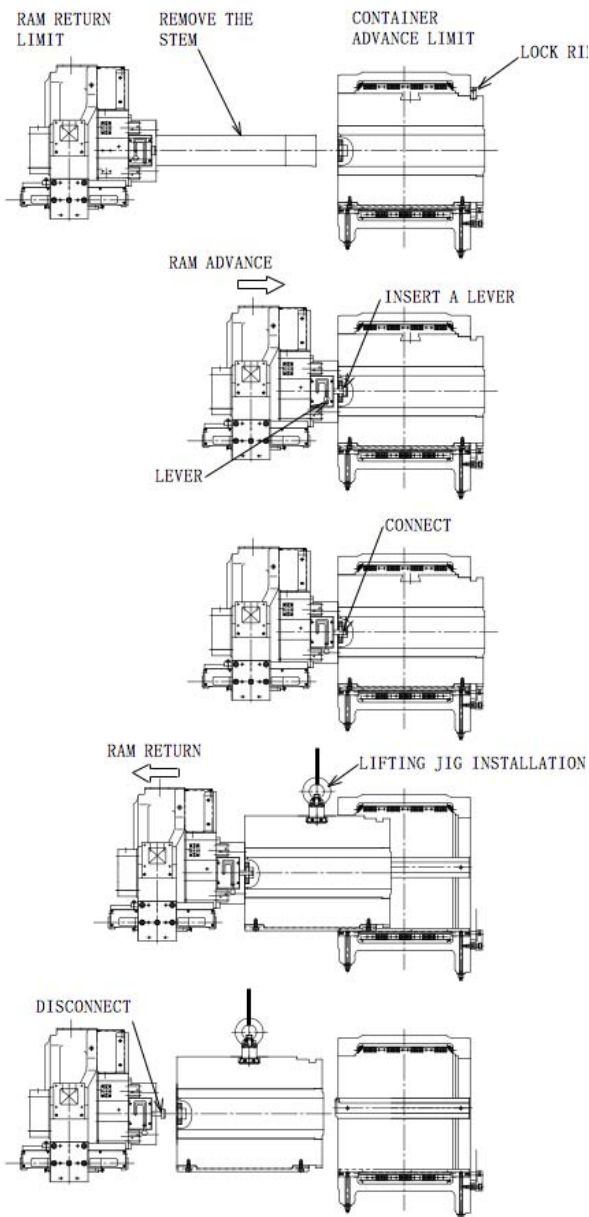


Figure 17. The steps required for a quick change of a container.

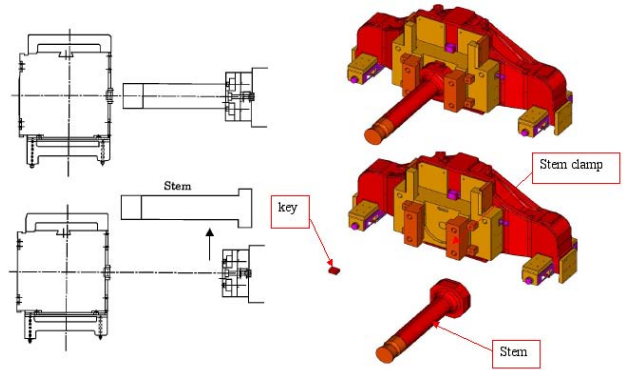


Figure 18. UBE's design has only four bolts that need to be loosened to remove the stem, thus the container and stem can be changed very quickly and down time is minimized. Accurate alignment of stem and container is maintained using electronic sensors.

replacement parts, it has been shown that a trained press crew can change the container and stem in less than ten minutes (Figures 17-18).

The photographs that appear here illustrate many of the mechanical components of an extrusion press system. Problems relating to the condition of the hydraulic oil, the pumps, and control valves; to the control (by obsolete relay logic systems), or out-of date, first generation, programmable logic controllers; and to ancillary equipment, such as billet furnaces, saws/shears, die ovens, and handling systems, etc., will be discussed in a later article.

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2. Takagi, Shigeyoshi, "The Evolution and Current Status of Technology in the Japanese Aluminum Extrusion Industry," *Light Metal Age*, October 2000, pp. 6-20.

Roger A.P. Fielding started his career with a seven-year engineering apprenticeship in 1952. He trained on bench and machine tools, on the installation of new machinery, and in the execution and management of maintenance operations. He subsequently worked as a project engineer and an industrial engineer in the U.K. and Canada. As manager, Extrusion Technology, for Alcan International Limited, he developed a series of five regional maintenance workshops, which ultimately involved the participation of engineering and maintenance personnel from 43 extrusion plants world-wide. Fielding started BENCHMARKS and The Virtual Company Inc., in 1994 and has subsequently worked with extrusion businesses in North and South America, Europe, and the Far East. He can be contacted by email at: par_doe@kingston.net