

ROLE OF INDIAN ORDNANCE FACTORIES IN THE DEVELOPMENT
OF SOME OF THE IMPORTANT CAST AND WROUGHT ALUMINIUM
ALLOYS DURING THE LAST THREE DECADES (*)

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Aluminium is one of the newest of the major industrial metals. More than a century back, in 1854, the first industrial process of reduction by Henri Saint - Claire Deville was established and the 75th anniversary of the discovery by Paul Heroult in France and Charles Hall in America of the electrolytic process of extraction was celebrated in 1961. Its earlier industrial development followed the same traditional pattern of the older metals, but in the first decade of 20th century certain aluminium alloys were found to exhibit age-hardening properties which were until then quite unknown. The discovery by Alfred Wilm of the effect of quenching the solid solution alloy, with its subsequent ability to strengthen by precipitation opened up new and exciting prospects. New families of aluminium alloys have now been developed and brought into successful commercial use. The use of optical and electron microscopes to investigate the structural changes and the adoption of X-ray crystallography, all contributed to the general understanding of the solution-treatment and age-hardening phenomena.

Manufacture of aluminium alloy castings to BSS 3L5, Y-alloy to 2L-24, modified Aluminium-Silicon alloy to L-33 and a few other such aluminium alloys was established in the Indian Ordnance Factories, Metal & Steel Factory, Ishapore, in early thirties for their use in the production of different types of service components. Cold rolling of pure Aluminium as well as of low aluminium alloys was a regular production item in early twenties in the 2-High, 24", 18", 16" and 12", D.C. Electric Motor Driven Cold Rolling Mills which was installed in the Ordnance Factories in 1895 and is still in operation at Metal & Steel Factory, Ishapore. Probably this is the first cold rolling mill of its type, installed and put into operation in India. Satisfactory extrusion of brass rods by the inverted process, as developed by the Research Department of Woolwich Arsenal U.K., led to the design and manufacture of an extrusion press of 900 Tons power at 1-1/2 tons per square inch hydraulic water pressure by Messrs. Henry Berry & Co. of Leeds, which after a few experimental runs, was

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acquired by the Indian Ordnance Factories and installed at Metal & Steel Factory, Ishapore, in 1924 for extrusion of brass and other non-ferrous alloy rods upto 2-1/4" diameter from billets of 6-5/8" dia x 24" long. This is the first Extrusion Press which was installed in India for the commercial production of extruded non-ferrous metals and alloys - primarily from copper-base alloys and a small percentage from aluminium and its alloys. The above 900-Ton Extrusion Press was used for small-scale production of untreated Duralumin Bars (Specification 17S) in late thirties and untreated super-duralumin bars in the beginning of World War II at Metal & Steel Factory, Ishapore by adopting melting, extrusion and treatment technology, as developed by Metal & Steel Factory, themselves. The press is still in regular production at Metal & Steel Factory, Ishapore.

Later on, after independence and with the wider and increased application of both aluminium and magnesium base light wrought alloys in the manufacture of different types of service stores, a separate Aluminium Alloy Extrusion Plant complete with melting, casting, homogenising, extrusion, heat-treatment and other ancillary facilities was installed at Ordnance Factory, Ambarnath near Bombay in June, 1961. This is a 2000/2500-Ton piercing-type Extrusion Press and at present engaged in the production of all types of important wrought aluminium alloys to meet the entire defence requirements as regular production of such alloys has not yet been satisfactorily established by any of the commercial firms in India.

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