

EXPERIMENTAL PILOT PLANTS

The Laboratory has four Experimental Pilot Plants as under :

1. Pilot & Demonstration Plant in Hydrostatic Extrusion & Material Synthesis ;
2. Glass Technology Development and Production Unit ;
3. Development-cum-Production of Electronic Components Unit ; and
4. Carbon Pilot Plant.

1. PILOT & DEMONSTRATION PLANT IN HYDROSTATIC EXTRUSION & MATERIAL SYNTHESIS

Scope and Objectives

Scientific and Technical

(a) *Short term :*

- (i) Development of composite materials like copper-clad aluminium and alloy aluminium clad aluminium ;
- (ii) Extrusion of hard-to-extrude materials like alloy aluminium and alloy steels ; and
- (iii) Extrusion of complex shapes like gear profiles and twist drills.

(b) *Long term :*

- (i) To undertake development of indigenous production equipment in hydrostatic extrusion ; and
- (ii) To investigate the possibility of putting up similar units in hydro-forming and hydroforming.

Socio-Economic

- (i) To reduce dependence on imported materials like copper, by development of composite materials ;
- (ii) To make more efficient use of indigenous materials like hard aluminium alloys ; and
- (iii) To cut manufacturing costs in the production of complex shapes such as gear profiles and twist drills.

Considerable work is being done the world-over in high pressure technology which holds promise of cutting down manufacturing costs, giving products with improved mechanical properties, lowering scrap, and introducing new materials which substitute expensive and scarce raw materials by cheaper ones.

Of immediate interest to the country, where this development will be of great help, is the development of (i) industrial diamonds which are presently being wholly imported at an estimated cost of Rs. 60 lakhs per year, (ii) composite materials like copper-clad-aluminium wires to effect a substantial saving in the use of copper and (iii) extruded tubes, shapes and sections in alloy steels and other hard-to-extrude materials e.g. titanium, zirconium etc.

NPL is establishing a pilot and demonstration plant in hydrostatic extrusion and material synthesis to meet these objectives. This phase of the work is receiving UNDP assistance.

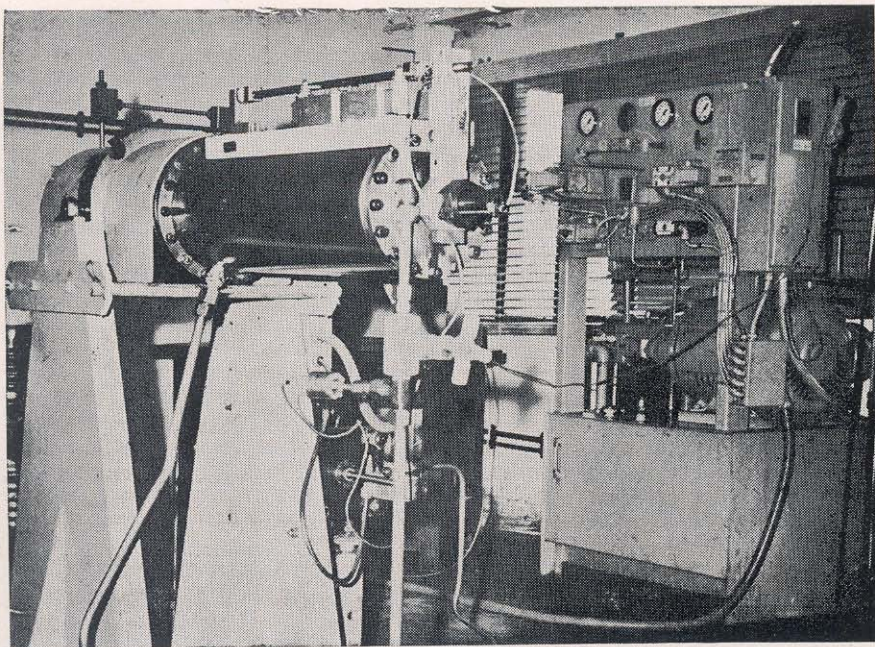


Fig 18 The laboratory hydrostatic machine installed and commissioned at the Laboratory. The machine is a completely self-contained research and development unit for studying cold extrusion on a wide range of shapes, from numerous materials including ferrous, non-ferrous and exotic high-tensile strength alloys.

Progress

Laboratory Extruder Plant : A laboratory plant for hydrostatic extrusion (Laboratory extruder model 0310) was installed and commissioned in March, 1976 with financial and technical assistance under the United Nations Development Programme (UNDP). (Fig 18). The facility was established for developing process parameters for cold extrusion of different materials such as copper-nickel alloys, stainless and alloy steels, titanium and zirconium, and other composite materials, in various shapes and sections required by the Indian industry.

This was the first phase of the project, which, when completed, would involve UNDP inputs in the form of sophisticated equipment including a pilot extruder, shear spinner and ring roller, and a draw bench ; experts ; consultants ; and fellowships to Indian scientists for training abroad in this sophisticated technology.

Material Synthesis : Work on the synthesis of single crystal diamonds was continued on the 200 ton cubic press installed in 1975. Different catalyst-solvent materials were tried to study their effect on the quality and quantity of the diamonds produced. Techniques for chemical separation and characterization of diamonds were also developed. The diamonds produced were subjected to X-ray examination and preliminary consumer trials. The reports indicated that the diamonds synthesised at the NPL were of acceptable quality, comparable to the imported diamonds.

GLASS TECHNOLOGY DEVELOPMENT AND PRODUCTION UNIT

This Unit undertakes fabrication and reconditioning of sophisticated scientific glass and silica equipment for use in the Laboratory as well as for outside organisations. It was started primarily to meet the Laboratory's own requirements of glass apparatus, but now it is working on semi-commercial basis.

The activities of the Unit can broadly be divided into 3 categories :

1. Fabrication and reconditioning of standard glass items ;
2. Fabrication and reconditioning of specialised glass items ; and
3. Reconditioning of mercury arc rectifier bulbs.

Under categories 1 and 2, some of the representative items fabricated during 1976 included : high vacuum stop cocks ; teflon stop cocks ; high vacuum standard ground-glass joints ; high vacuum standard ball & socket joints ; glass-to-metal seals ; discharge tubes including gas laser tubes ; gas and blood analysers ; solid, liquid and gas extractors ; mercury & oil diffusion pumps ; McLeod gauges & manometers etc.

Regarding the reconditioning of mercury are rectifiers, NPL is the only institution in India which undertakes such jobs.

Earnings of the unit including jobs undertaken for the Laboratory during 1976-77 amounted to about Rs 4.20 lakhs.

3. DEVELOPMENT-CUM-PRODUCTION OF ELECTRONIC COMPONENTS UNIT

This unit acts as a laboratory for trying out the fruits of research and development in the area of electronic materials, undertaken by the Division of Materials on an experimental pilot plant production level, for establishing the repeatability and the commercial viability of the various processes developed by the Division. The main objective of this Unit is to pilot-produce (i) various types of piezo-electric transducers & high voltage ceramic capacitors; (ii) high frequency insulator components; (iii) professional grade Ni-Zn ferrite components, pulse transformers and mini inductors & oriented ceramic magnets using celestite ore; and (iv) silver paints, resistor paints and capacitor paints.

The plant undertook pilot production of a variety of items developed within the Laboratory, viz. E and C cores; cup and drum cores; TV deflection yoke cores; high frequency oscillator cores; magnetic tapes; professional ferrites; conducting silver cement; low-loss ceramic insulators; high voltage ceramic capacitors; and piezoelectric materials and devices.

The sales during the year 1976-77 were as under :

<i>Item</i>	<i>Quantity</i>	<i>Amount (in Rs.)</i>
Piezoelectric and dielectric materials and divices	4,542 pieces	26,708.00
Soft ferrites	1,37,236 pieces	53,921.19
Hard ferrites	4,746 pieces	3,107.14
Silver cement	24,710 kg	40,922.25
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		Total 1,24,658.58

4. CARBON PILOT PLANT

The work of the Carbon Pilot Plant is intimately associated with the research and development work on carbon products undertaken by the Divisison of Materials.

During the year 1976-77, this experimental pilot plant undertook small scale production of the items detailed below for supply to the user industry for trials, and for getting feedback information for further R & D work on them, and recorded the sales as mentioned against each:

<i>Item</i>	<i>Quantity</i>	<i>Amount (in Rs.)</i>
Microphonic carbon granules	1 kg	1,000.00
Process carbons	600 pieces	1,260.00
Carbon graphite rings	1,660 pieces	996.00
Carbon blocks and brushes	20 Nos	140.00
	Total	3,396.00