**SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY, SURAT**

**DEPARTMENT OF CIVIL ENGINEERING**

**GEOTECHNICAL ENGINEERING SECTION**

**GEOENVIRONMENTAL ENGINEERING LABORATORY**

Geoenvironmental Engineering Laboratory was established in the year 2022. The Geoenvironmental Engineering Laboratory at Advanced Research Centre (ARC-309) in Department of Civil Engineering is a facility that serves both research and teaching functions. Specializing in geoenvironmental studies, the laboratory has developed special experience in investigating ways to use waste and recycled materials in civil and environmental engineering applications. The laboratory is also engaged in developing innovative soil and groundwater remediation methods, and designing effective municipal and hazardous waste landfills. The laboratory has special experience in determining soil properties for environmental measurements that determine the source and fate of pollutants at hazardous waste sites.

A technology has been developed to produce angular shaped high strength coarse aggregates from fly ash. A patent has already been granted on this technology by Indian Patent office. The developed fly ash aggregates are durable, eco-friendly and cost effective. All the required equipment to manufacture these fly ash aggregates are also available in this laboratory.

List of equipment available in the laboratory is given below:

|  |  |
| --- | --- |
| **Sr. No.** | **Equipment Name** |
| 1 | Orbital Shaker |
| 2 | Soil Digestion |
| 3 | pH Meter & Electrical Conductivity Meter |
| 4 | Micro Pipette C3 |
| 5 | Magnetic Stirrer 1 MLH |
| 6 | Laboratory Centrifuge |
| 7 | TCLP rotary Agitator |
| 8 | Steam Curing Chamber (Autoclave) |
| 9 | Water bath |
| 10 | Block Making Machine |
| 11 | Impact Crusher |
| 12 | Fly ash – Lime mixer Machine |
| 13 | Muffle Furnace |
| 14 | Distillation unit |
| 15 | Desiccator |
| 16 | Vacuum pump |
| 17 | Hot Air Blower |

**Information Regarding Few Important Set Ups in the Geoenvironmental Engineering Laboratory**

**Orbital Shaker:**

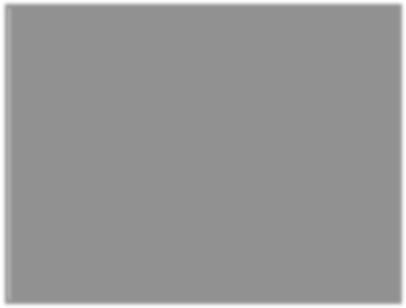
It is used to keep the sample in suspension for a known time. The equipment is used for the sample preparation of pH, electrical conductivity and total dissolved solids chemical oxygen demand and biochemical oxygen demand.



Figure 1 Orbital Shaker

**Soil Digestion Unit:**

Soil digester is used for the sample preparation of contaminated soil/compost and sludge samples. This equipment utilises high temperatures up to 200o C. Which causes the removal of heavy metals from the sample.The samples are digested using strong acids like Nitric acid (HNO3), Hydrochloric acid (HCL) and Sulphuric acid (H2SO4).



**Soil Digestion Unit**

Figure 2 Soil Digestion Unit

**pH Meter and Electrical Conductivity Meter:**

Soil samples pH, electrical conductivity and total dissolved solids are measured using this meter.



Figure 3 pH meter and Electrical conductivity meter

**Micro Pipette:**

The liquids in micro quantities are taken with the help of this micro pipette.

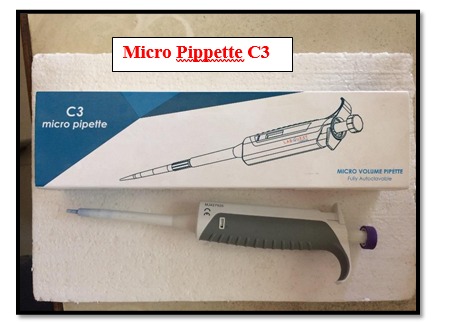


Figure 4 Micro Pipette

**Magnetic Stirrer (1 MLH):**

Magnetic stirrers are used to mix the sample for known time and temperature. Most of the applications in geoenvironmental engineering lab are depended on this particular equipment.



Figure 5 Magnetic Stirrer (1 MLH)

**Laboratory Centrifuge:**

Laboratory centrifuge is used separate the solid and liquid medium from chemicals like contaminated soil samples.



Figure 6 Laboratory Centrifuge

**TCLP Rotary Agitator:**

Toxicity characteristics leaching procedure test is used to determine the major leaching potential of contaminated soil samples. The samples are rotated at 30±2 rpm using glacial acetic acid (CH3COOH) and sodium hydroxide (NaOH).



Figure 7 Bump Integrator

**Steam Curing Chamber (Autoclave): -**

The autoclave has dimension of 500 mm diameter and 1000 mm height with capacity of 12 kg/cm2. It can be used for accelerated curing of fly ash blocks and any other building materials. It is fitted with a heater of 6 kW capacity which enables to obtain maximum pressure of 12 kg/cm2 in 3 hours.



Figure 8 Loading Frame (10T Capacity)

**Water Bath: -**

A water bath is a laboratory equipment made from a container filled with heated water. It is used to incubate specimens in water at a constant temperature over a long period of time. It is also used to enable certain chemical reactions to occur at high temperature. The water bath is fitted with a stirrer and heater of 3 kW capacity. It can be used for accelerated curing of fly ash blocks and any other building materials.

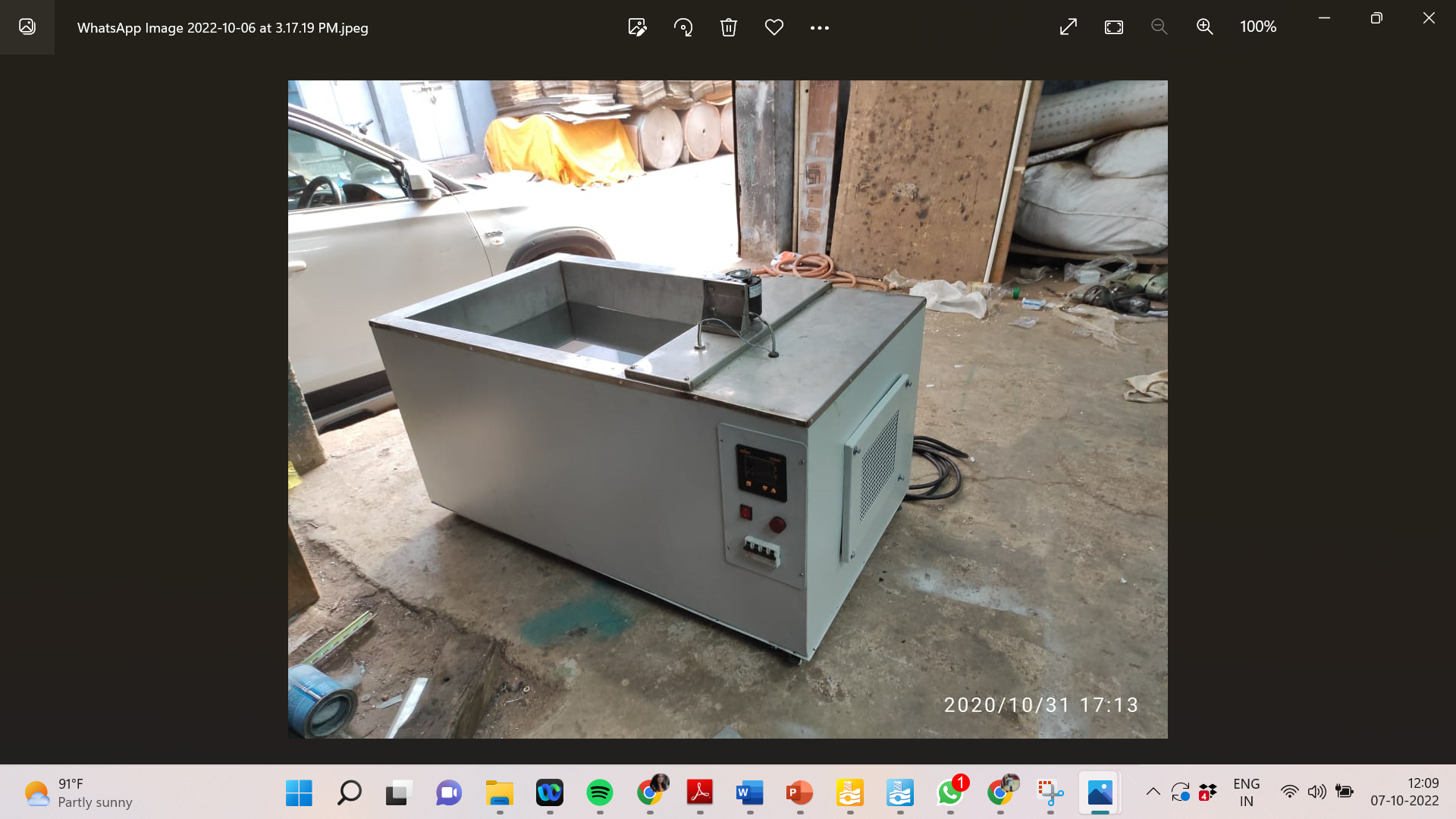


Figure 9 Water Bath

**Block Making Machine: -**

This equipment is designed to produce fly ash blocks with dimensions of 20 cm × 10 cm × 7 cm. The instrument has the pressing capacity of 40 tonnes.



Figure 10 Block making machine

**Impact Crusher: -**

It is a horizontal shaft impact crusher which can produce angular shaped aggregate of size less than 50 mm by crushing cured fly ash blocks or stones of size 100-200 mm. It can be operated at various RPM up to 700 rpm.

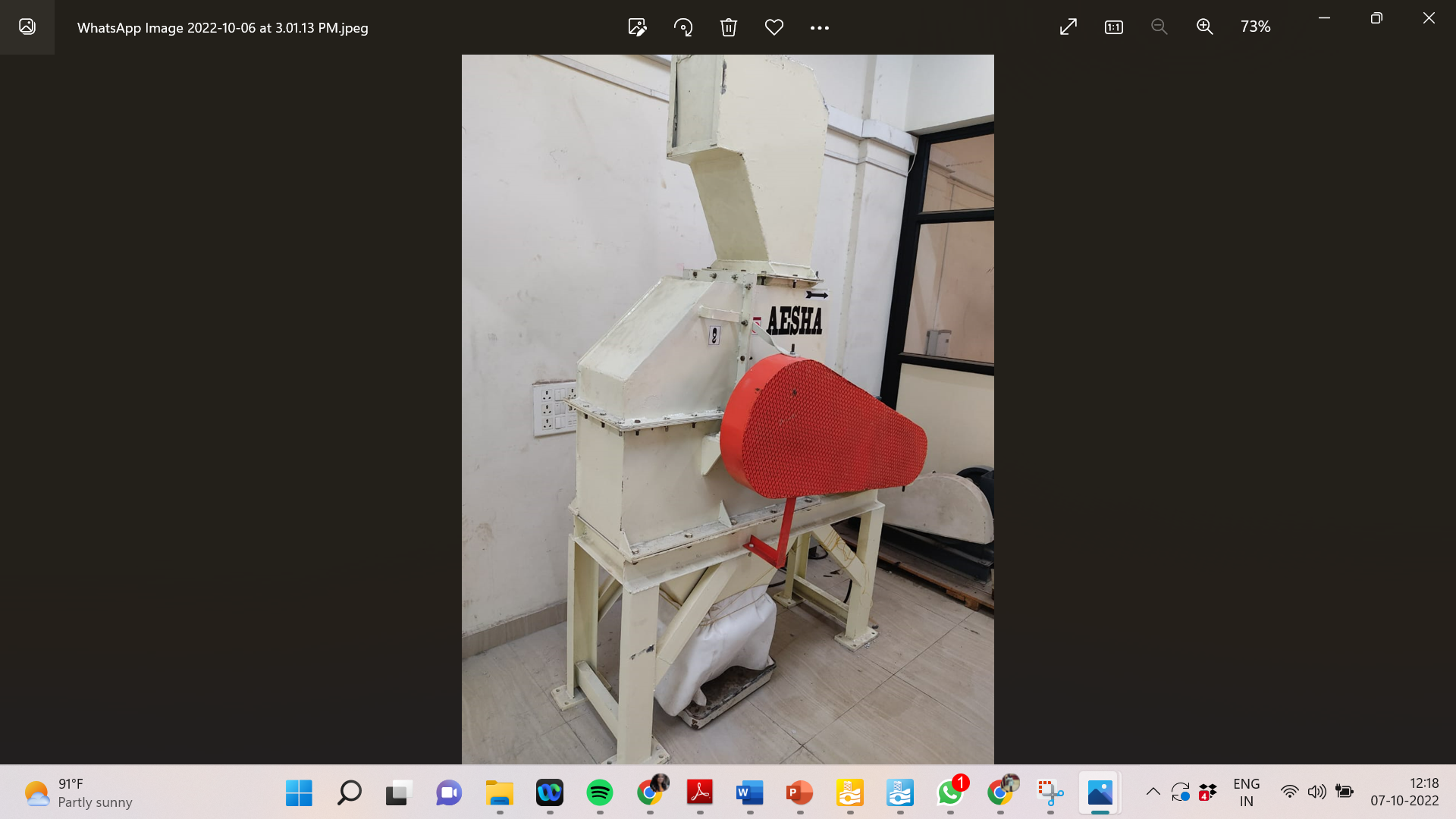


Figure 11 Impact Crusher

Other Instruments:

* Muffle Furnace
* Weighing Balance
* Distillation unit
* Magnetic Stirrer
* Desiccator
* Vacuum pump
* Hot Air Blower
* Fly ash – Lime mixer Machine