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## TORFTECH PILOT PLANT FACILITIES

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While Torfttech is not an R&D company, it undertakes development and piloting of new processes in order to understand the application of its technologies to new applications. The most extensive TORBED pilot facility is located at **Process Research ORTECH in Mississauga, Ontario, Canada** and provides a world class capability for the development of novel products and processes at a range of temperatures up to over 1,500°C.



The facilities include:

- 🌀 Two new reactors – the complete line up now includes a TORBED Compact Bed Reactor ('CBR'), a TORBED Expanded Bed Reactor ('EBR') and a Transport Bed Reactor ('TBR').
- 🌀 The original CBR is still used for a wide variety of applications including catalyst, fine chemical, mineral and metallurgical applications
- 🌀 The new EBR has been developed to handle ashes, combust biomass, roast and calcine materials, scrub gases and classify
- 🌀 The new TBR is providing flash processing of ultra-fine (down to submicron) materials at high temperature and in controlled and modified atmospheres
- 🌀 Gas injection on the CBR to facilitate processing of materials at up to 1,600°C
- 🌀 Venturi blower recycle to allow direct recycle of the process gas stream at elevated temperatures (enhancing the capability of the reactors to operate in modified atmospheres for gasification, reduction, hydrogenation and devolatilisation)
- 🌀 Computerized data logging of relevant parameters
- 🌀 Addition of new feeders and other relevant ancillary equipment



There are two refractory lined natural gas fired hot gas generators onto which the TORBED reactors are placed. Each is equipped with inlet points where steam, nitrogen, oxygen or any other gases to be introduced to modify the atmosphere within the reactor. An oxygen analyser is available and can be connected to either reactor to measure oxygen concentration in either the hot gas generator or a reactor. More detailed online gas monitoring equipment is available from Canadian Environmental ORTECH for monitoring services. The pilot facility includes a Hosokawa circular vibrating table feeder, a low and high capacity screw feeder, a large screw feeder and several vibrating pan feeders.

The exhaust gas handling system includes a cyclone where the bulk of product samples are collected. A quench tower/scrubber combination can be incorporated into the exhaust train for projects where large amounts of acid gases such as SO<sub>2</sub> are generated. A small baghouse can be incorporated into the exhaust gas line on a slip stream for sampling only (the full flow creates too high a pressure drop. A general purpose baghouse ensures that exhaust gases are cleaned prior to exit from the building.



On site equipment includes various crushers, mills, screens and drying ovens for feed preparation. Laboratory facilities are available to allow simple analytical tests to be undertaken such as screen size analysis, moisture content, loss on ignition (LOI) and particle density and bulk density. Other analyses are contracted out to Bodycote ORTECH that is located in adjoining facilities or samples can be returned to clients for their own in-house analysis.



Current processes under development include novel combustion, mineral calcination, catalyst, waste and chemical reaction processes.

The addition of a **400mm electric food processor** has also expanded the capability of the pilot facilities to allow the precise thermal processing of food products including fat free snacks, breakfast cereals, spices and beans.

In **Europe, the facilities include a transportable** low and high temperature 400mm diameter ceramic CBR complete with a post combustion chamber, heat exchanger and venturi scrubber. There are numerous ports for monitoring process parameters and the process data can be automatically logged. This plant can be transported to sites throughout Europe for long term trials.

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