

Case Study - Carbon Engineering – Design, Construction and commissioning of a Pilot Fluidized Calciner



Carbon Engineering, a company based in Calgary Alberta, developed a novel process for the capture of carbon dioxide from the environment. The process which was first proved at a bench scale, works by absorbing carbon dioxide from air and concentrating it to almost pure carbon dioxide before it leaves the system as a potential feed stream to other carbon conversion processes or carbon dioxide users. After completing successful bench-scale trials, the process moved into the pilot stage in Squamish, British Columbia.

A key part of the process includes a high temperature fluidized calciner, which was designed by members of the ITC group, under the management of BC Research Inc. (BCRI), and built by Axton Inc., a sister company of BCRI.

Calciner Details

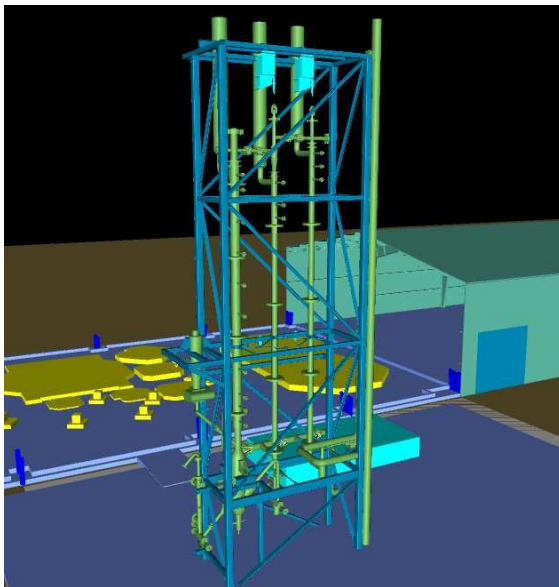
The small pilot plant calciner has a design solids feed rate of 272 kg/h. It operates at temperatures of over 950 °C. Its small size made heat conservation a design challenge which led to the construction of an all metal column. In order to minimize heat

losses, combustion gasses are blown through an external jacket rather than relying on the use of insulation alone. The extreme operating temperature and all steel construction presented a significant mechanical design challenge, not covered by conventional design codes and standards. A steel alloy was carefully selected to provide the required design life with due consideration given to high temperature creep resistance and corrosion. A sophisticated spring support system was designed to accommodate over 150 mm of thermal expansion while maintaining stress below extremely low allowable

limits. This feat was accomplished by combining a variety of commercial Finite Element Analysis (FEA) software packages, first principle mechanical design calculations and sound engineering judgement based on established design codes and standards.

Process Key Equipment:

- Solids feed system
- Jacketed calciner
- Primary cyclone
- Fluoseal
- Secondary cyclone



The ITC Group provides R&D and design expertise on fixed and fluidized bed systems involving reaction kinetics and thermodynamics, mass transfer and heat transfer phenomena. The group's research and piloting facility are located in Vancouver, British Columbia, Canada.

Contact us at www.itc-group.ca

ITC|GROUP