CETC

CANMET Energy Technology Centre

Our Power is Innovation

Metallurgical Fuels

Canada annually exports about 30 million tonnes of coking coal and uses a further 6 million tonnes domestically. This metallurgical coal is used to manufacture coke, which is subsequently used in blast furnaces to produce iron for steelmaking purposes. At the CANMET Energy Technology Centre, we are increasing the efficiency of the iron and steel making process.

Pushing Coke from Slot Type Coke Oven

The Energy for High Temperature Processes Group studies and develops technologies to:

- improve the coking behaviour of coals to produce high quality coke while ensuring safe and efficient industrial operation;
- enhance coal properties for carbonization;
- use coke and alternative fuels in blast furnaces and other metallurgical processes; and
- demonstrate the advantages of Canadian coals to world markets.

Research Activities

Major areas of research are:

- the unique coking characteristics of western Canadian coals;
- new technologies to enhance coking properties and expand Canada's metallurgical coal resources;
- the coking process in slot-type ovens;
- the behaviour of coke in blast furnaces; and
- injection of coal and alternative fuels in blast furnaces.

R&D Facilities

CETC's metallurgical fuel facilities include pilot-scale coal handling facilities, coke ovens and coke testing facilities, and laboratory coal and coke evaluation equipment.

Coking Ovens

- two 460 mm width/325 kg capacity;
- one 310 mm width/250 kg capacity;
- one 150 mm width/15 kg capacity;
- three sole-heated ovens; and
- modelling capability.

Pulverized Coal Injection into a Blast Furnace Environment

- 12 kg/h injection rate with oxygen enrichment and preheated combustion air to 900°C;
- fuel substitution; and
- blast furnace modelling capability.

Energy Technologies for High Temperature Processes

Coal Preparation

- complete pilot plant blending, crushing, pulverization and sampling; and
- briquetting and agglomeration.

Coal Evaluation

- petrographic analysis;
- hot stage microscopy;
- thermal rheological analysis;
- particle size distribution and grindability determination;
- proximate, ultimate and ash analyses;
- standard ASTM, ISO and JIS coal analytical techniques;
- advanced analytical facilities (including coal oxidation)surface area and coal porosity determination;
- differential thermal gravimetric and gas analysis; and
- spectroscopic analysis and interpretation.

Coke Evaluation

- size distribution determination;
- standard ASTM, ISO and JIS coke strength evaluations;
- hot coke strength (coke strength after reaction-CSR) evaluation;
- coke microscopy (texture) analysis;
- coke reactivity determination;
- surface area determination;
- porosity and density determination; and
- proximate and sulphur analyses.

Microscopic Analysis

Technology Development

CETC works closely with the Canadian Carbonization Research Association (CCRA), the membership of which comprises the following steelmakers and coal producers:

- Dofasco Inc.;
- Algoma Steel Corporation Ltd.;
- Line Creek Ltd.;
- Smoky River Coal Ltd.;
- Fording Coal Ltd.; and
- Quintette Operating Corp.

Other Clients for CETC's services have included

- QIT - fer et Titane Inc.;
- Petro-Canada;
- Stelco Inc.;
- Iron Ore Company of Canada Inc.;
- SGS Supervision Ltd.;
- Quebec Carter Mining Corp.;
- Gulf Canada Ltd.;
- Ruetgers - VFt Inc. (formerly Carbochem);
- Elkview Coal Ltd.;
- ACME Steel Inc.; and
- ISPAT - Inland Steel.

CETC's coal evaluation, preparation, agglomeration and carbonization facilities are unique in Canada. They are available to industry on a "fee for service" basis:

- to aid in mine planning, marketing and economic investigations;
- to ensure safety during coking; and
- to evaluate the quality of coke, carbon, coal and other fuels for metallurgical purposes.

Closing Remarks

Ironmaking will change over the forthcoming decade. The practice of injecting coal directly into blast furnaces will increase at the expense of the use of metallurgical coke, the production of which will diminish. Together with the introduction of new reduction/smelting technologies, this change will alter fuel requirements for ironmaking. It will also affect the markets for Canadian coal.

The efficiency with which iron and steel is made can also be increased through the use of new and improved coking technologies. Better technologies are also needed to meet the environmental challenges facing the industry: emissions reduction, waste reduction and the wise use of energy.

A program of technology development addressing the needs of Canadian industry will help to achieve these benefits.

For further information, please contact:

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