COAL CARBONISATION

Head(Co-ordinator) : Dr. D. D. Haldar

Ph: +91-0326-2388310 (O): 2388231, 2381199 (R)

Mob: 09431512936, Email: drddhaldar@yahoo.co.in

HOS: Mr. Abdul Ali

Ph: +91-0326-2388209 (O): 2380665 (R)

Mob: 09836196158, Email: abdul_ali3@yahoo.co.in

Coke making had been one of the major pursuits of CFRI since inception. Fundamental research on coal science and the carbonisation process found its applications in the development and transfer of various technologies on HTC coke, formed coke, briquettes, soft coke at different point of time. Keeping in view the gradual depletion of indigenous good quality coking coal resources , R&D initiatives at CFRI provided the scientific basis and scope of utilising different type inferior grade coals as blend components for metallurgical coke making. Extensive R&D on carbon product from coal tar & pitch has also been done. Application of the knowledgebase backed by validation tests in pilot plants has helped in optimising the blend components for various steel plants utilising both indigenous and imported coals.

Compelling factors like severe environmental regulations on coke making technologies, market competitiveness and demand activated the development of environment friendly improved design for coke making which have already entered the market. CFRI with its built in expertise in the area of carbonisation is in a ready state of preparedness to provide not only specialised services but would remain a key player as a technology provider to the growing coke making industries.

Non-Recovery Coke Oven with Pusher System

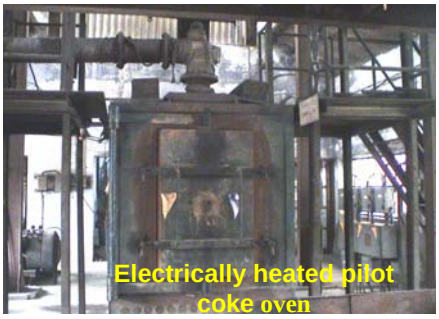
Significant Contribution

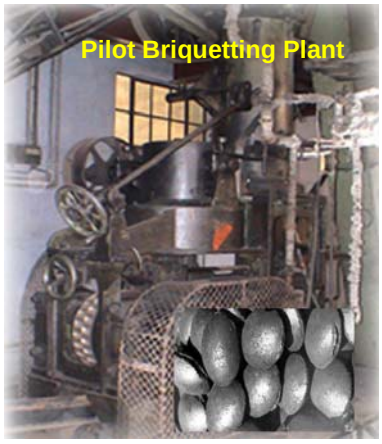
- Assessment of potential for inferior grade coal in coke making
- Development of process of coking by blending inferior coals.
- Optimisation of coal blends for steel plants
- Development of sole heated improved Beehive coke oven (TATA – CFRI type).
- Development of improved non-recovery type coke oven (Kumbraj).
- Development of energy efficient environment friendly coke oven battery by
- dragging /Pushing the product with provision of HR/NR
- Development of Non-recovery type soft coke oven.
- Formed coke/ briquetting technology for domestic as well as industrial fuel.
- Industrial briquetting technology of waste (-6mm) coke breeze.
- Energy efficient curing chamber for curing briquettes.
- Pilot stamp charging facility for by-product coke oven.

Major Analytical & Test Facilities Available

Coke/Briquette Making

- Electrically heated Pilot coke oven.
- Oil fired By-product coke oven.
- Non-Recovery type Battery consisting of three Pilot Coke Ovens

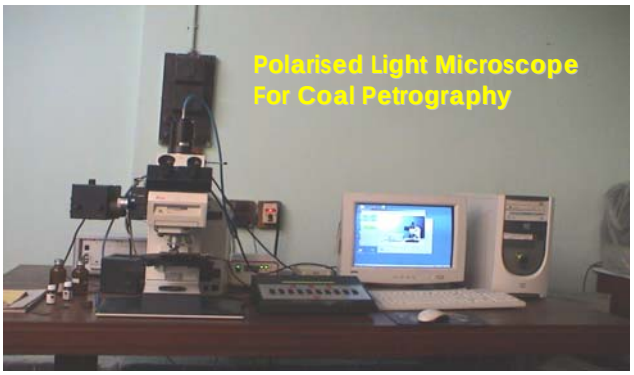

Electrically heated pilot coke oven


Pilot Briquetting Plant

- Pilot Briquetting plant of 1tph capacity
- Pilot scale coal/lignite devolatiliser
- Energy Efficient pilot curing chamber
- Bench scale electrically heated devolatiliser of different capacities
- Laboratory scale stamping machine
- Pilot scale stamping machine for both byproduct as well as non recovery type coke oven
- Electrically heated laboratory furnace for coke making of different capacities

Coal Quality

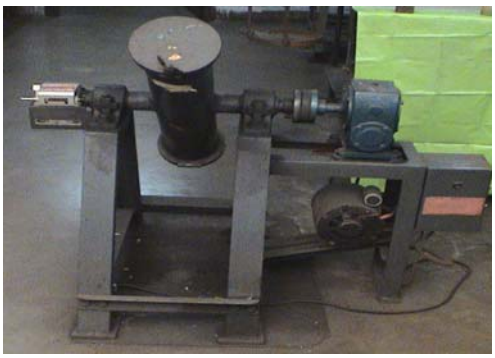
- **Chemical and physical characteristics of coal - proximate, ultimate, Heat value, HGI, Porosity, ash composition**
- **Petrographic analyses - Reflectance, macerals, microlithotypes**
- **Coking propensity - CSN, Roga Index, LTGK, HTGK, Dilatometer**



Coke Quality

- **Micum & half Micum Test**
- **CSR/CRI**
- **Shatter Test**
- **Reactivity of coke/char**
- **Coke texture & morphology**
- **Point crushing strength of briquette**

CRI – CSR apparatus



Client

- **Steel sector**
- **Sponge Iron industries**
- **Private entrepreneur**
- **Foundries**

Specialised Services

Activities	Time Frame	Approximate Cost (Rs.)
Testing of coal blend in electrically heated Pilot coke Oven	One month	1.50 lakh
Blend optimisation studies by petrographic and chemical analyses supported by Pilot coke oven test	Three months	10.0 lakh
Trouble shooting of by product coke oven by Technical audit	One month	5.0 lakh
Trouble shooting/Technical Audit of Non Recovery coke oven	One month	3.0 lakh
Petrographic Analysis of coal	One week/sample	6500.00
CSR & CRI test of coke	-do-	5000.00
Micum test	-do-	3000.00

Deliverables

Activities	Time Frame	Approx. Cost (Rs.)
Detailed Design, Drawing of Non Recovery Coke Oven including Consultancy during Erection & Commissioning	6 months/ battery	20.00 lakhs
Detailed Design, Drawing of Industrial Briquetting plant from coke breeze including Consultancy during Erection & Commissioning	6 months/ plant of 25tpd	10.00 lakhs
Licensing &detailed drawing for Non Recovery type soft coke plant	One month	1.7 lakh/battery

Technical enquiry

Head, Carbonization Division**,**
CIMFR (Digwadih Campus), P.O. FRI,
Dhanbad-828108, Jharkhand

For business enquiry

Director
Central Institute of Mining & Fuel Research , Digwadih Campus, P.O. FRI,
Dhanbad-828108, Jharkhand
Phone-0326-2381111, 2388200, 2388202,
Fax-0326-2381113, 2381385,2381560
Website: www.cfriindia.nic.in

TECHNOLOGY FOR SOFT COKE PRODUCTION (DEVOLATILIZATION OF COAL)

Name of the Technology : **Soft Coke Technology**

Raw Material ; **Sized (+50 mm) Non Coking Coal**

Product : **Coke for Domestic Use**

Product Size : **+ 20 mm**

Water Requirement : **0.50 te/te soft coke**

Power : **1 to 2 kWh/te**

For small plant (40 tpd) manual operation is also possible except quenching when DG set for water supply may be required.

Viable commercial plant : **`50 tpd**

Cost of 50 tpd plant : **Rs. 20 lakh fixed capital**

Yield : **80 - 85 % of coal charged**

Processing cost : **Rs. 70-100/te of soft coke**

Process Description : **The sized (+50 mm) non coking coal is charged in the coke oven through charging holes from oven top. The coal is devolatilized at a specific temperature for a specific period of time after which it is discharged and quenched on the platform. The soft coke is sent to the stock yeard after atmospheric drying**

Major Equipment: : **Screen, Conveyor & Coke Oven**

Pay Back Period : **6 months to 12 months**

Benefit : **Cheap and environment friendly domestic fuel.**

Technical enquiry

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ENERGY EFFICIENT ENVIRONMENT FRIENDLY HEAT - RECOVERY COKE OVEN

Name of the Technology	:	**Energy Efficient Environment Friendly Non-Recovery Coke Oven**
Raw Material	:	**Prime coking and Medium coking Coal**
Feed Size	:	**- 3 mm**
Power Requirement	:	**15 kWh/Te**
Viable commercial Plant	:	**100 tpd plant.**

Yield	:	**70-75% Depending upon the coal quality**
Processing Cost	:	**Rs. 400 - 500 per tonne of coke (inclusive of Depreciation. & Interest)**

Process Description : **The process involves with crushing of coal to -3 mm size followed by charging from the top of the oven by charging trolley or charging car. The coal is carbonised at a specific temperature for a specific period of time after which it is discharged from the oven either by Drag or by pusher car. The coke is quenched in the quenching car or on the platform. After atmospheric drying it is sized and is sent to stock yard.**

Major Equipment	:	**Crusher, conveyor, charging Car/ Charging Trolley, Coke Oven, Pusher Car,**
Pay Back Period	:	**Two Years.**
Benefit:	:	**Industrial Metallurgical grade coke can be manufactured at a lower cost and environment friendly condition.**

Technical enquiry

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Director
Central Institute of Mining & Fuel Research , Digwadih Campus, P.O. FRI,
Dhanbad-828108, Jharkhand
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Website: www.cfriindia.nic.in

BRIQUETTED FUEL FROM COKE BREEZE FOR INDUSTRIAL USE

Name of the Technology : Briquetted fuel from coke breeze for Industrial use.

Raw Material ; Coke Breeze, Char etc.

Product : Industrial Briquette

Product Size : - 3 mm

Binder : organic Binder

Size of Briquette : 35 x 45 x 20 mm
55 x 40 x 20 mm

Shape : Oval

Utility : Water, Steam

Power : 40 to 45 kWh/te

Viable commercial plant : 1 tph

Cost of 1 tph plant : Rs. 50 - 60 lakh

Yield : 1.05 te/te of coke breeze

Processing cost : Rs. 1000/te (inclusive of the cost of binder)

Process Description : The process involves crushing of coke breeze/char to - 3 mm followed by mixing with requisite quantity of binder. The mixed raw material is then subjected to kneading in presence of steam. The kneaded material at a particular temperature is conveyed to briquetting press. The green briquette produced are conveyed to Grizzly for screening the broken briquettes. The green briquettes are then put into trolleys and cured for 3 hours at a specific temperature. The cured briquette is then sent to despatch.

Major Equipment : Double roll crusher, conveyor, Elevator, Twin Paddle Mixer, Kneader, Tank, Kettle, Gear Pump, Briquetting Press, Curing Chamber, Trolley, Winch.

Pay Back Period : 1 year

Benefit : Replacement of costly imported coke.

Technical enquiry

Head, Carbonization Division,
CIMFR (Digwadih Campus), P.O. FRI,
Dhanbad-828108, Jharkhand

For business enquiry

Director
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Digwadih Campus, P.O. FRI, Dhanbad-828108, Jharkhand
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