



IJT BOILERS

# Bagasse & Biomass Fired Boilers

*Towards a Green Future*



ENGINEERING FOR EXCELLENCE

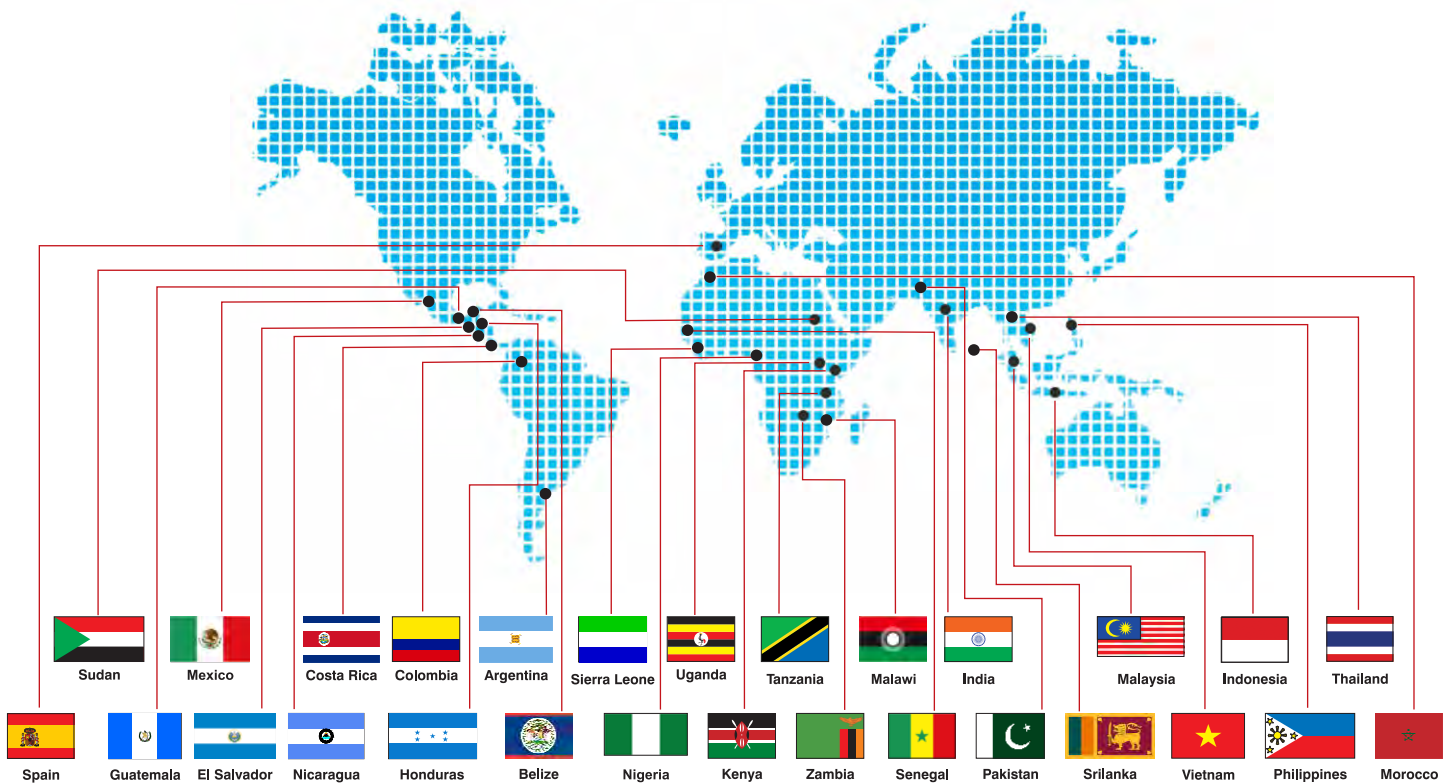


# 400<sup>+</sup>

## Bagasse & Biomass Fired Boilers

# 28

## Across Countries



Isgec Heavy Engineering Ltd. is a diversified heavy engineering company engaged in manufacturing and project businesses with an extensive global presence. In operation for the past 88 years, it provides state-of-the-art, sustainable engineering solutions, with customers & projects spread across 91 countries. Isgec manufactures Process Equipment, Presses, Iron & Steel Castings, and Boiler Pressure Parts. Isgec's EPC portfolio includes turnkey projects for setting up Boilers, Air Pollution Control Equipment, Power Plants, Sugar Plants, Distilleries, Factories, Industrial Water Treatment Facilities, and Bulk Material Handling Facilities. They have also developed strengths in Construction and address the requirements of a wide spectrum of industries such as power, fertilizer, sugar, oil & gas, petrochemicals, steel, cement, chemicals, railways, mines, and ports.

Isgec's technical capabilities are supported by a highly trained and experienced cadre of nearly 900<sup>+</sup> qualified engineers, 500 designers, and as many as 55 teams working on sites around the world at a time. The capabilities cover a gamut of specializations – thermal, metallurgical, mechanical, electrical, instrumentation & civil.

The manufacturing facilities of Isgec, spread over 100 hectares, cover a shop floor area of over 120,000 square meters (143520 square yards) with world-class manufacturing and testing facilities.

The company has various accreditations such as CE Marking, ISO 9001:2008 Quality Management System approved by Lloyds Register of Quality Assurance, ISO 14001:2015 Environment Management System approved by DNV GL Business Assurance, ISO 45001:2018 Occupational Health & Safety Management System, ASME 'S' 'U' 'U-2' & 'U-3' Stamps, ASME 'N' and 'NPT' Stamps, 'R' Symbol and 'NB' Mark approved by National Board, USA, etc.

The company has many joint ventures as well as strategic technology partnerships with leading global firms. Isgec ranks 220 in the Fortune India 500 listing, and 236 in the ET 500 listing.





# Travelling Grate Boilers

We are a leading boiler manufacturer in India with over 40 years of experience and have supplied over 400+ Travelling Grate Boilers both in India and overseas.

Several of these are high pressure (87 to 125 kg / cm<sup>2</sup>g) and high temperature (up to 545 deg. C) boilers. These operate on a wide variety of fuels for cogeneration plants as well as independent power plants. Some of the Biomass Fuels are given below.



Bagasse



King Grass



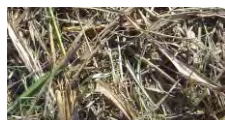
Cotton Stalk



Wheat Stalk



Mustard Husk



Cane Trash



Coffee Husk



Mustard Stalk



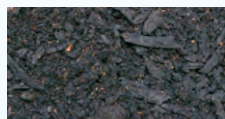
Julie Flora



Rice Husk



Lignite



Coal

• **Supplementary Fuel** : Oil, Natural Gas and Bio-Gas.

**Alkali content range**

**15% - 45 %**

**Chlorine Content**

**0.1% - 2%**

**Calorific value**

**1500 - 6000 Kcal/ Kg**

**Ash**

**1% - 45%**

**Moisture**

**5% - 55%**

Boiler is capable to handle other light Biomass Fuels like Bagasse Pith, Rice Straw, Waste Leaf, Cane Trash

Wide variety of Coal including Indian Coal, Imported Coal, Indonesian Coal, South African Coal, Australian Coal and many more

120 TPH Bagasse and Coal Fired Travelling Grate Boiler with 22 MW cogeneration plant for Triveni, Deoband, India







## Features / Advantages

Water cooled membrane wall construction	<ul style="list-style-type: none"><li>- Low maintenance due to minimum use of refractory in the furnace</li><li>- Eliminates gas leakage</li><li>- Ensures structural rigidity</li></ul>
Air through Tube type APH	<ul style="list-style-type: none"><li>- Ensures online cleaning of air heater tubes thereby eliminating the cleaning difficulty during shutdown</li></ul>
<div>Travelling grate stoker using SG Iron grate bar</div> <div>Chains made of hardened and tempered steel</div> <div>Cross beams and skid bars made of heavy sections and heat resistant material</div>	<ul style="list-style-type: none"><li>- Adds to ruggedness of boiler</li></ul>

### Grate

<b>Variable frequency drive</b>	Travelling Grate is provided with variable frequency drive so that its speed can be varied and the combustion characteristics can be adjusted.
<b>Air cooled view ports</b>	Air cooled view ports are provided for effective monitoring of combustion in the grate.
<b>Self lubricated graphite Bearings</b>	Self-lubricated graphite bearings (Morganite bearings) are provided for the stoker shaft. The Morganite carbon bearing is self-lubricating, chemically inert, dimensionally stable, non-hygroscopic and highly resistant to wear characteristics which makes it ideal for hostile environment.

### Furnace

<b>Water-cooled membrane wall construction with optimum fin width</b>	To have maximum absorption of heat. Lower fin tip to base differential temperature. Structural rigidity.
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### Economiser

<b>Double casing arrangement</b>	Double casing arrangement is provided for economiser tube bends to prevent erosion
<b>Plain tube Economiser</b>	Plain tube Economiser with in line arrangement ensures ease of cleaning and inspection





### Other Features

- ➔ Optimum flue gas velocity levels in pressure parts to minimize erosion due to ash and due to presence of sand in fuel.
- ➔ High circulation ratio at all loads ensuring efficient cooling of water wall tubes and also preventing departure from nucleate boiling.
- ➔ Adequate soot blowers in superheater, boiler bank, economizer and air heater region for efficient on-load cleaning of heating surfaces.
- ➔ Pressure parts tubes made of hot finished seamless steel construction to ensure high tube life and hence higher boiler availability.

- ➔ Provision of adequate access doors / observation doors for inspection and repair.
- ➔ Location and arrangement of heating surfaces ensures good accessibility for inspection and repairs.
- ➔ Adequate Buck stays are provided on the furnace to restrain the implosive and explosive forces resulting from fuel combustion.
- ➔ Flow paths are optimized using CFD techniques to achieve lower power consumption

170 TPH, Travelling Grate Boiler  
at Dhampur Sugars Ltd., Asmoli, Uttar Pradesh



### Reciprocating Grate Boiler

44 TPH,  
Biomass Fired  
Reciprocating Grate Boiler  
with BOP for 9.9 MW Power Plant  
at Precise Smart Life Co.,  
Songkhla Biomass Ltd., Thailand



#### Salient Features:

- Wide fuel flexibility.
- Insensitive to fuel size.
- Simpler fuel preparation.
- Robust construction with minimum maintenance, resulting in longer life and reliable operation.
- High alloy steel air-cooled grate bars.
- Simple and rapid installation.
- Simple control.
- Efficient combustion due to better air distribution.
- Low NOx emission through the use of high pressure secondary / over fire air injection.
- Efficient fuel feed system using hydraulically operated feed piston and divergent hoppers.



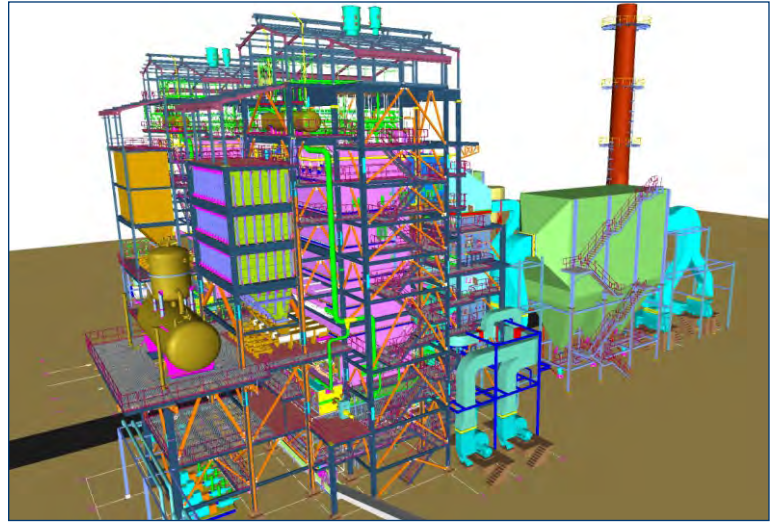


## Design Capabilities

We have a large, state-of-the-art Design Office with a strength of design experts. In our initial years (1960s), we had a technology transfer arrangement with John Thompson, UK. Since then we have developed our own engineering and technological capabilities for Travelling Grate, Dumping Grate, Atmospheric Fluidised Bed Combustion, Reciprocating Grate and field erected Oil & Gas Fired Boilers.

Currently we have a licensing arrangement with **BHI FW Corporation, South Korea** for PC Fired Boilers. Licensing arrangement with **Sumitomo SHI FW Energia Oy, Finland** for CFBC Boilers as well as Package Oil & Gas Fired Boilers.

We also utilise the services of the R&D facilities of European Universities for conducting tests on fuels to improve the availability and efficiency of boilers.



3D Model of Travelling Grate Boiler

## Quality

### Approvals:

- CE Marking
- ASME 'N' & 'NPT' Stamps
- ASME 'S' 'U' 'U-2' & 'U-3' Stamps
- National Board, USA 'R' Symbol
- National Board, USA 'NB' Mark
- Lloyd's Approved Class-I Manufacturer of Fusion Welded Pressure Vessels up to 200 mm (8") thickness
- Lloyd's Approved Foundry from Lloyd's Register of Shipping, London
- Department of Transportation (DOT), USA approval for Liquefiable Gas Containers
- Special Equipment Licensing Organisation, China (SELO)
- Chief Inspector of Boilers (CIB), India
- ISO 9001:2015 Quality Management System - Approved by Lloyds Register of Quality Assurance
- ISO 14001 : 2015
- ISO 45001 : 2018
- OHSAS 18001 : 2007

### External Inspection Agencies:

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| • Lloyd's Register              | • SGS Inspection                    |
| • Bureau Veritas                | • Bax Counsel                       |
| • Det Norske Veritas (DNV)      | • Engineers India                   |
| • TUV                           | • Chief Inspector of Boilers, India |
| • Velosi Certification Services |                                     |





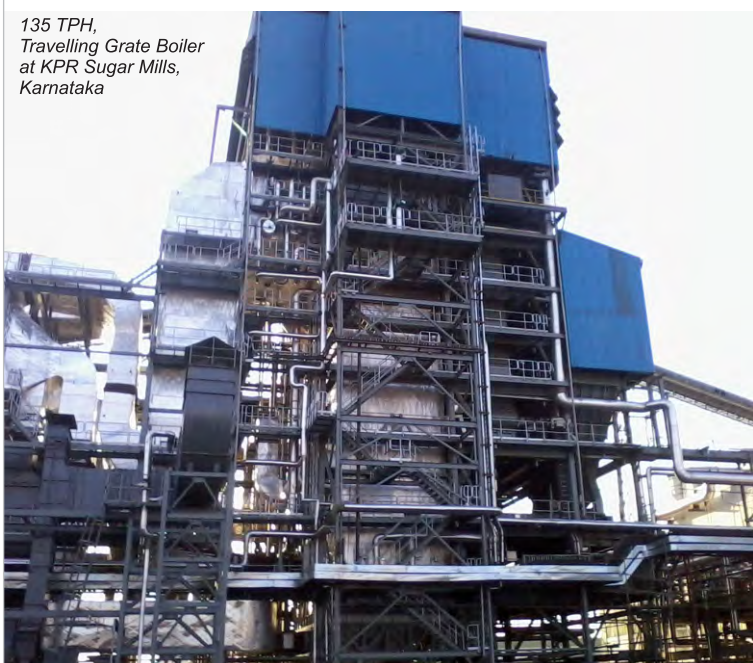
## A Few References

Customer / Site	TPH	kg/sq.cm.g	Deg.C	Fuel
GGC Kits Bioindustrial Co. Ltd., Thailand	2 x 230	105	540	100% Bagasse, 50% Cane Trash
Magdalena Group, Guatemala	3 x 220	109	540	Bagasse, Coal
Ingenio Agricola Industrial Santa Ana, S.A., Guatemala	220	109	540	Bagasse, Coal
El Jiboa, El Salvador	220	110	540	Bagasse
Kinyara, Uganda	220	110	540	Bagasse
KPR Sugars Ltd, Gulbarga, Karnataka, India	210	125	545	Bagasse, Imported Coal
Ingenio Panuco SAPI De CV, Mexico*	200	85	510	Bagasse, Natural Gas
Ingenio La Gloria S.A., Mexico	200	85	540	Bagasse
Indian Sucrose Limited, Mukeria, Punjab, India	200	125	548	100% Bagasse, Rice Husk
Kesar Enterprises Limited Barielly, Uttar Pradesh, India	190	115	542	100 % Bagasse, 80% Imported Coal, 70% Indian Coal
Shree Datta SSK Ltd., Kolhapur, Maharashtra, India	180	110	540	100% Bagasse, 100% Imported Coal
Casur S.A., Nicaragua	170	86	540	Bagasse
San Diego S.A., Guatemala	165	109	540	Bagasse, Coal
Cogeneracion Green Power S.A., Nicaragua	160	85	540	Bagasse, Coal, Natural Gas
Honduras Green Power Corporation, Honduras	160	67	490	King Grass
Twentyone Sugars Ltd., Malwati, Dist. Latur, Maharashtra, India	160	125	545	Bagasse
Ingenio Risaralda S.A., Colombia	159	66.8	510	Bagasse, Coal
Nirani Group, Mudhol, Dist. Bagalkot, Karnataka, India	2 x 150	125	548	100% Bagasse, Imported Coal
DSCL Sugar(DCM Shriram Group), Hariawan, Uttar Pradesh, India	150	110	540	Bagasse
U.P. State Sugar Corporation Ltd., Uttar Pradesh, India	2 x 145	110	540	100% Bagasse
Bannari Amman Sugars Ltd., Kollegal, Karnataka, India	135	110	540	100% Bagasse, 80% Imported Coal
Triveni Sugar, India	120	87	515	100% Bagasse, 30% Biomass
EID Parry India Ltd., Pugalur, Tamilnadu, India	120	87	515	100% Bagasse, 100% Imported Coal, Lignite

\* Pinhole Grate Boiler

Detailed list can be provided on request.

135 TPH,  
Travelling Grate Boiler  
at KPR Sugar Mills,  
Karnataka



130 TPH, Travelling Grate Boiler  
at Coregreen Sugar, Karnataka





### Vashp Kutir (House of Steam)

An integral part of our in-house learning process, this innovative & one-of-a-kind lab helps us study on-ground operational issues so as to add to our knowledge base and help improve our technology and execution on an on-going basis

- Display of a wide variety of fuels that Isgec Boilers are capable of firing
- 3D & 2D Boiler Models representing the wide variety of technologies that Isgec offers
- Wide range of Components and Boiler Parts from different stages of operation
- Various kind of tube failure samples
- Boiler RPMS (Remote Performance Monitoring System)
- Houses 100s of case studies and is a bank of experience for more than 5 decades



### Simulator for Training (Internal & External)

- On Operations ⇨ Improved Knowledge Level
- On O&M ⇨ Improved Availability of Boilers
- Simulation of Control Loops and Interlocks ⇨ Improved Engineering Validation
- Simulation of Emergencies ⇨ Improved Handling of Operations
- Refining Critical Parameters ⇨ Improved efficiency Operations

## Isgec Offerings

#### STEAM GENERATORS

- Pulverised Coal Fired (PC)
- Circulating Fluidised Bed Combustion (CFBC)
- Atmospheric Fluidised Bed Combustion (AFBC)
- Travelling / Pulsating / Pinhole / Dumping Grate
- Oil & Gas Fired
- Heat Recovery Steam Generators
- Waste to Energy
- Waste Heat Recovery
- Slop / Spent Wash / Vinasse Fired

#### AUXILIARY EQUIPMENT \*

- Air Pollution Controller (ESP)
- Deaerator / Fans
- Valves
- Electricals & Instrumentations
- Burner
- Bed Ash Coolers
- DCS
- Feeders
- Pumps

#### STEAM GENERATOR SERVICES

- Site Construction & Commissioning
- Retrofitting and Modernisation
- Replacement / Upgradation of Parts
- Troubleshooting & Services
- Residual Life Assessment (RLA) Studies
- Training
- Spares
- Operation & Maintenance

#### EPC PROJECTS

- Independent Power Plants
- Cogeneration Plants
- Sugar Plants
- Material Handling
- Water Treatment Plants
- Distilleries

\* Only available with the Boiler

**Feed Cycle Equipment (HP Heater, LP Heater & Condenser)**  
**Process Equipment • Presses • Castings • Contract Manufacturing**



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