

Quality Management of Iron ore and coal by Raw Material Division of Tata Steel

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Raw Material Division

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Tata Steel – A member of Tata Group



The Tata Group

- Founded in 1868 by **Jamsetji Nusserwanji Tata**
- 98 companies
- Sixth amongst the **'World's Most Innovative Companies'** – Business Week (2008)

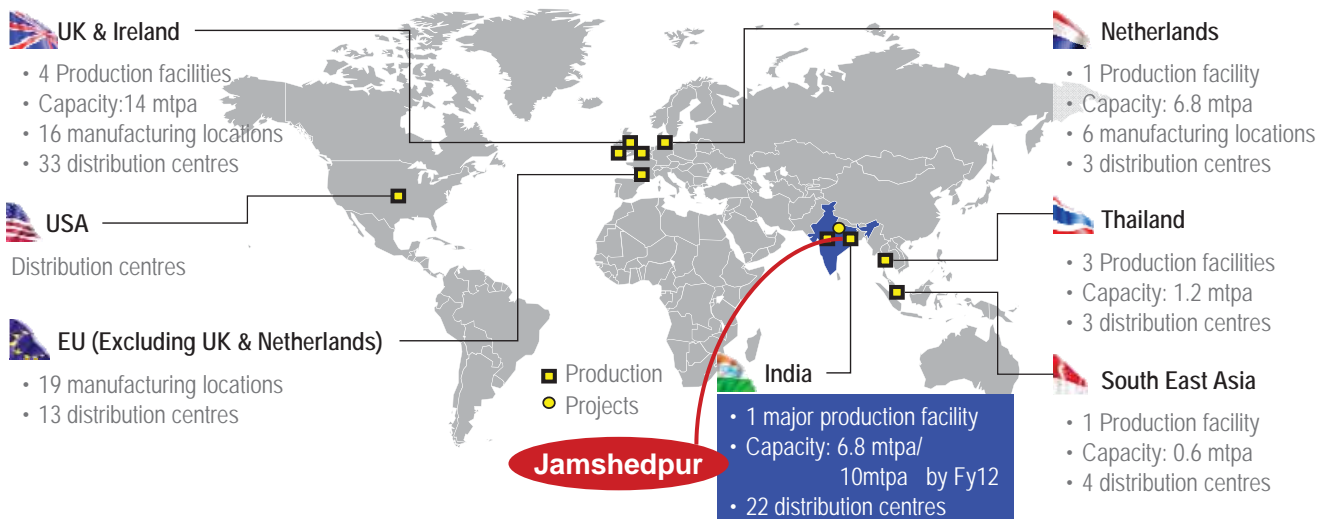
Tata Motors	Largest auto company in India, one of the largest in the world
Tata Steel Group	8th largest steel producer in the world (24.4MT)
Tata Power	Largest power generating supplier (private sector) in India
Tata Chemicals	Worlds largest producer of synthetic soda ash

Tata Tea	2 nd largest branded tea company in the world
Indian Hotels (Taj)	Largest hotel chain in India
Tata Consultancy Services	Asia's leading and India's largest software service provider
Tata Communications	Largest wholesale voice carrier in the world

Tata Steel Group



- **8th largest steel producer in the world**
- **Winner of the prestigious DEMING Application Prize 2008**
- Has presence in **5 continents**





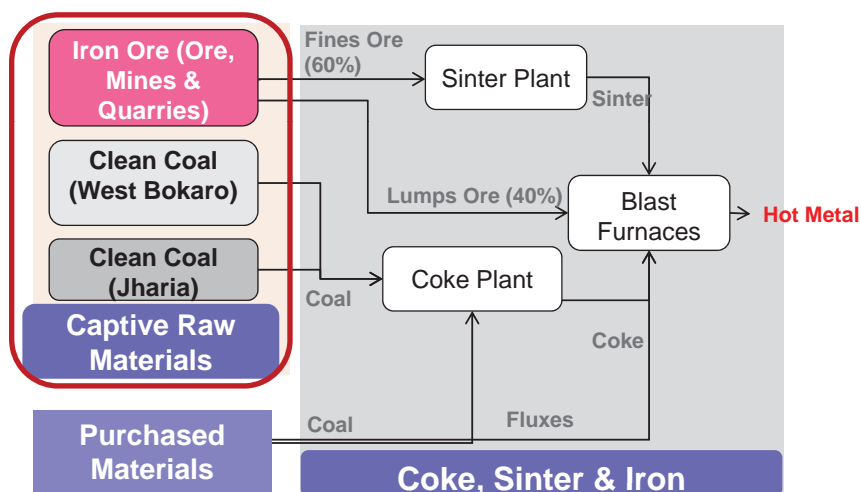
- **100 year old & Asia's first** integrated steel company
- **One of the most profitable companies in the world**
- **Largest supplier** to the Indian automobile industry
- **Spends** equivalent of about **5%** of its **net profit** for **social welfare activities**

Role of RMD in the Value Chain of Steel Making

Demand Flow



Material Flow



- Captive Raw Materials:
 - 100% Iron Ore
 - 50% Coal
- 50% Coal is imported.
- Quality is Decoupled at CSI Stage.

Salient Features of Raw Materials Division

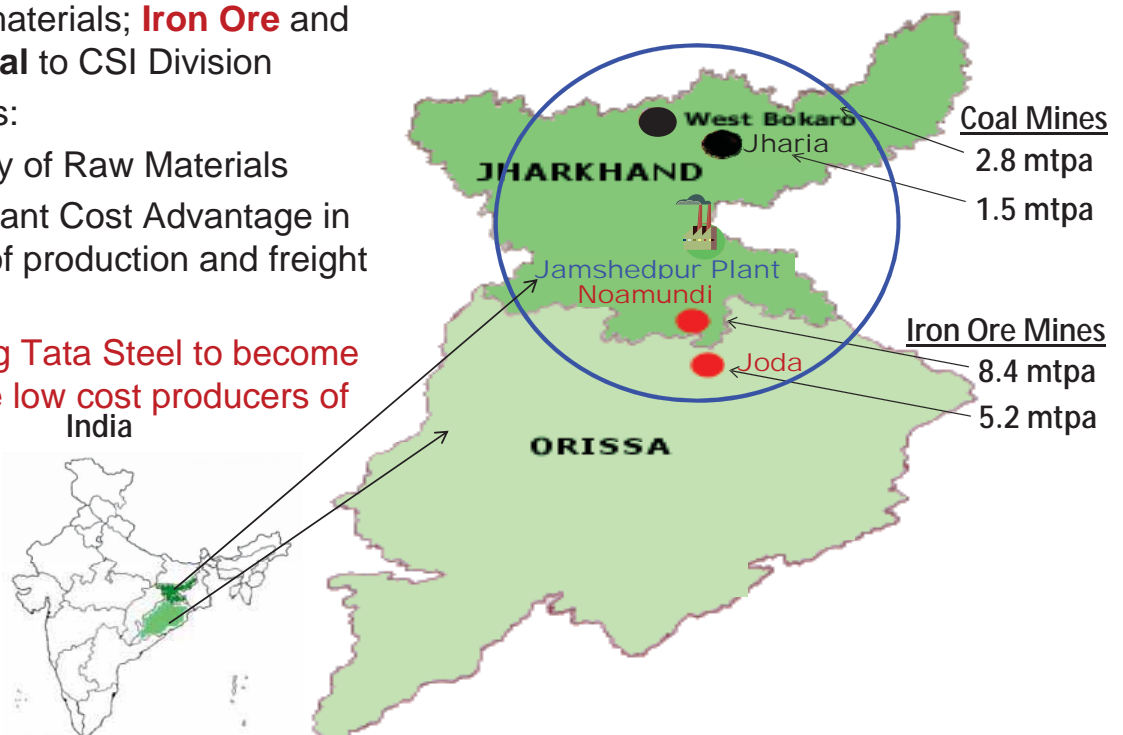


- Indian Coal Mining Industry is 3rd largest in the world and RMD is the national benchmark in Coal Mining and Beneficiation.
- Indian Iron Ore Mining Industry is 4th largest in the world. RMD is the national benchmark in Iron Ore Mining and Beneficiation.
- RMD is pioneer in Indian Mining Industry with close to 100 years' of operations
 - First Coal Beneficiation Plant in India
 - India's deep most (650 meters) underground Coal Mine
 - Having state of the art beneficiation facilities for iron ore

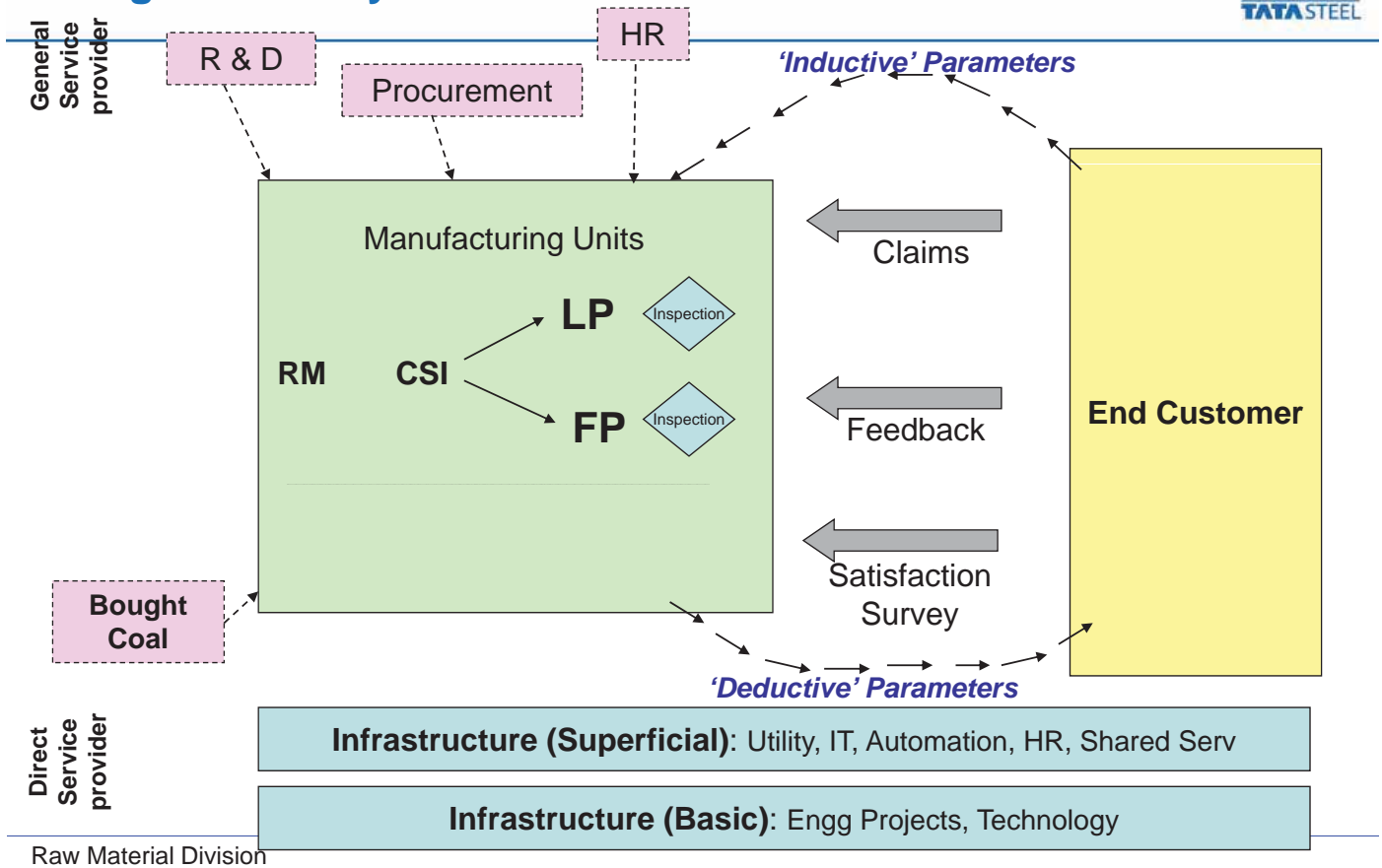
Iron ore and coal mines of Tata Steel



1. RMD's purpose is to supply two key raw materials; **Iron Ore** and **Clean Coal** to CSI Division
2. It provides:
 - Security of Raw Materials
 - Significant Cost Advantage in terms of production and freight cost
 - (enabling Tata Steel to become one of the low cost producers of Steel)



Integrated QA system in Tata steel and RMD's role

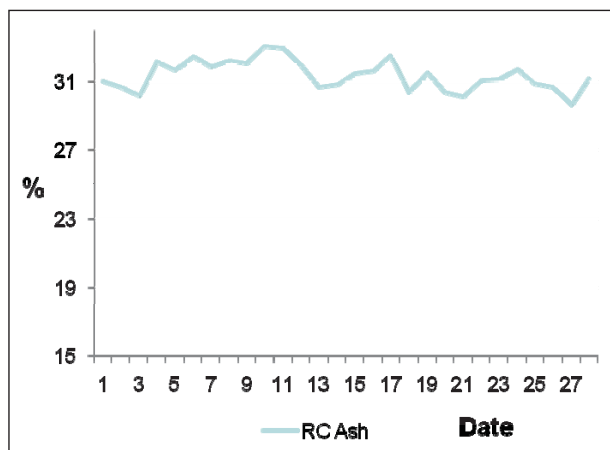


Need for QA in the Division

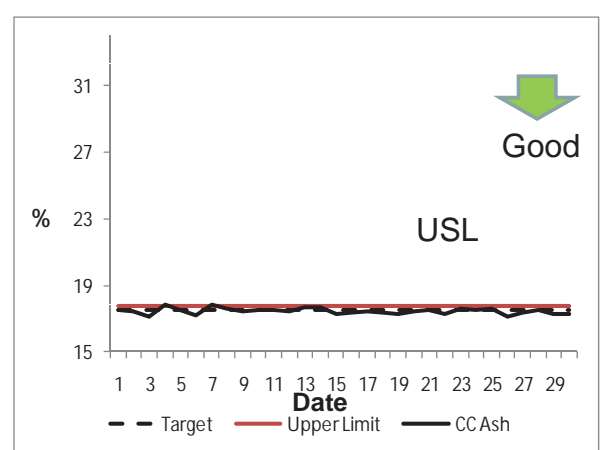
- Captive mines offers significant cost advantage in steel making
- To improve productivity in hot metal stage customer wants not only improvement in mean but also reduction in variation

Challenges remain in converting highly heterogeneous ore types from the mother earth into homogeneous product to meet customers' quality requirement while **IMPROVING MINE LIFE**

Heterogeneous Raw Coal



Homogeneous clean coal



Need for QA in the Division

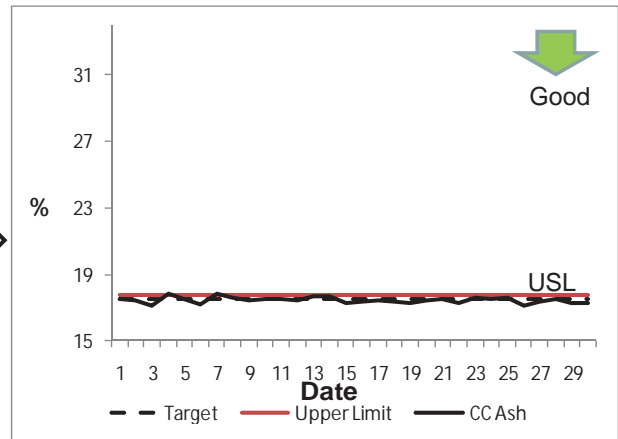
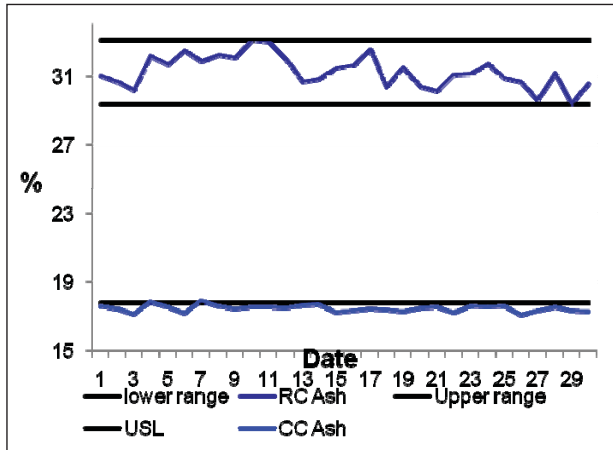


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Homogeneous clean coal



QA functions in RMD



QA Modules in RMD	Pre-Prod QA	QA during Production & Despatch	After delivery relationship
	Exploration, Ore Body Modeling & Mine planning	Mining, processing & Transport	Customer meet, feedback

	Mine Planning & Mining	Processing Plant	Blending & Dispatch
Objective	To know the quality & Quantity of deposits	To conduct in-process check and feedback to operator for control	Pre-despatch control/ checks and feedback to customer
Method	Borehole/blast hole/mine face sample	Stream sampling at fixed intervals	Sampling of despatch materials
Feedback used in	Mining and Processing	Processing and Mining	Processing and CSI

The quality story....

Business Environment and need for improvement in iron ore quality (Fy01 onwards)

- Being a cyclic industry, Steel faced one of the greatest downturns during late 90's
- Tata Steel took a bold initiative to grow, create value and become market leader

- The customer, CSI decided to increase production by:
 - Maximizing BF productivity
 - Expansion of Blast Furnace capacities

- Requirements from Raw Materials Division:
 - Improve quality for higher Blast Furnace productivity
 - Meet increase in demand of Iron Ore from captive source

Improving iron ore quality: **Fy02-05**

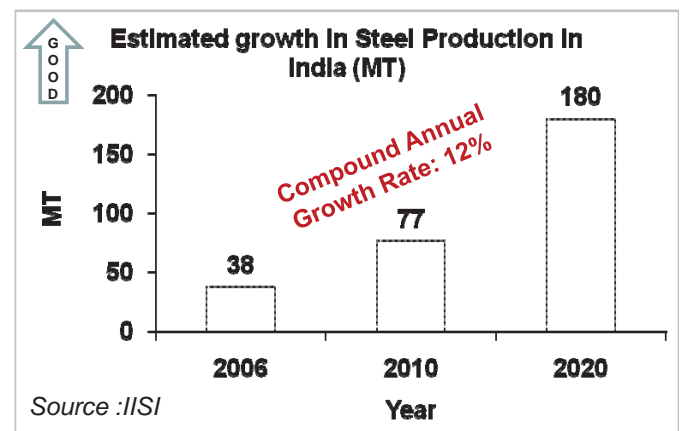


Business Objectives	Strategies
Quality Reduce Alumina in Iron ore fines	Improve Beneficiation Capability
Why Challenging? <ul style="list-style-type: none"> Indian iron ore having higher alumina, mostly interlocked and class for higher order of beneficiation to upgrade Lowering of alumina increases yield loss and reduces mine Limitation in beneficiation process capability 	
TQM Methodology Problem Solving (PS) and Task Achieving (TA)	Trend of Output Alumina

Iron Ore : Business Environment (Fy05)



- Domestic demand for steel was estimated to grow @12%.
 - Estimated capacity of 77 mt in India by FY10
-
- Tata Steel decided to go for brown field expansion:
 - 6.8 mtpa by FY09
 - 10 mtpa by FY12
-
- Requirements from RMD
 - Chart out expansion plans
 - Reduce alumina for higher Blast Furnace productivity
 - Meet increase in demand of Iron Ore from captive source
 - Acquire/Defend mining leases

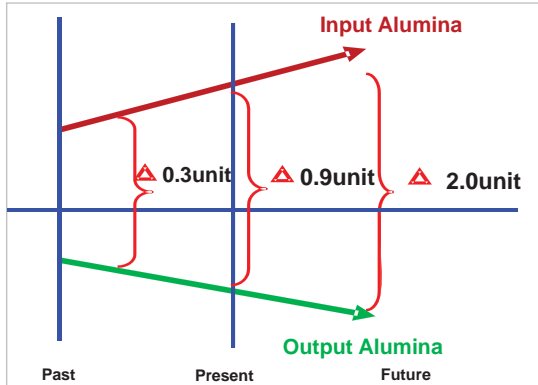


Improving iron ore quality: FY06-till date

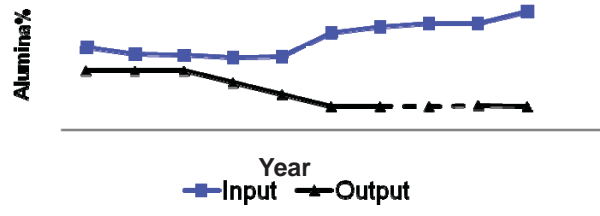


Business Objective

Reduce Fines Alumina further while increasing input alumina



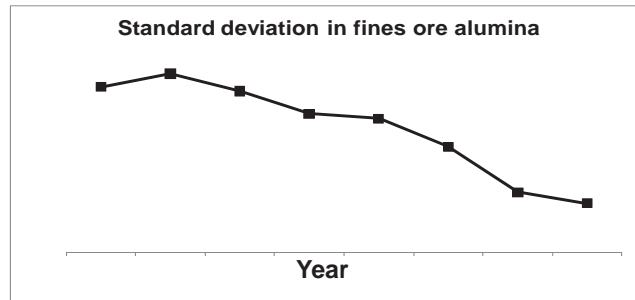
Trend of Feed/Input and product alumina



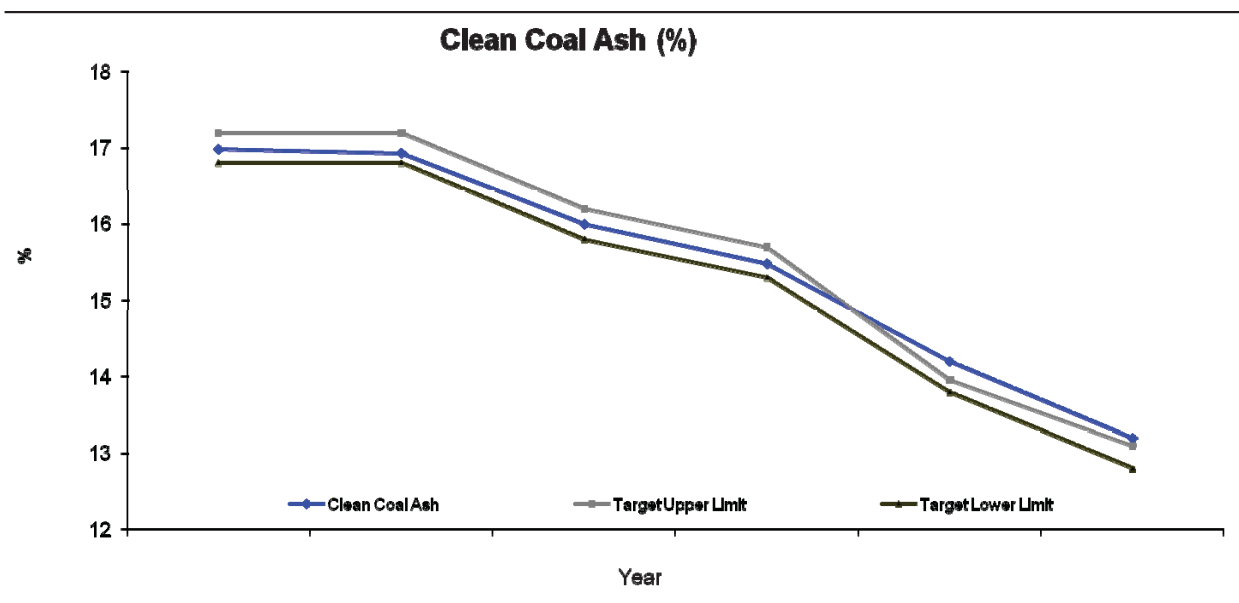
TQM Methodology

- PS/TA, Theory Of Constraint for improving mean and
- DM implementation for reducing variability

Standard deviation in fines ore alumina



Improvement in clean coal ash



And the process....

QA process in RMD : overview

- 1. Understand Customer requirements, stated and unstated**
- 2. Link KPIs which help serve them, directly or indirectly- improve KPI status**
- 3. Develop processes to serve long term and short term needs of customer :Management System Chart for QA**
- 4. Customer complaint handling and customer claims/ feedbacks- CAPA**

Customer requirements: Linkage with departments

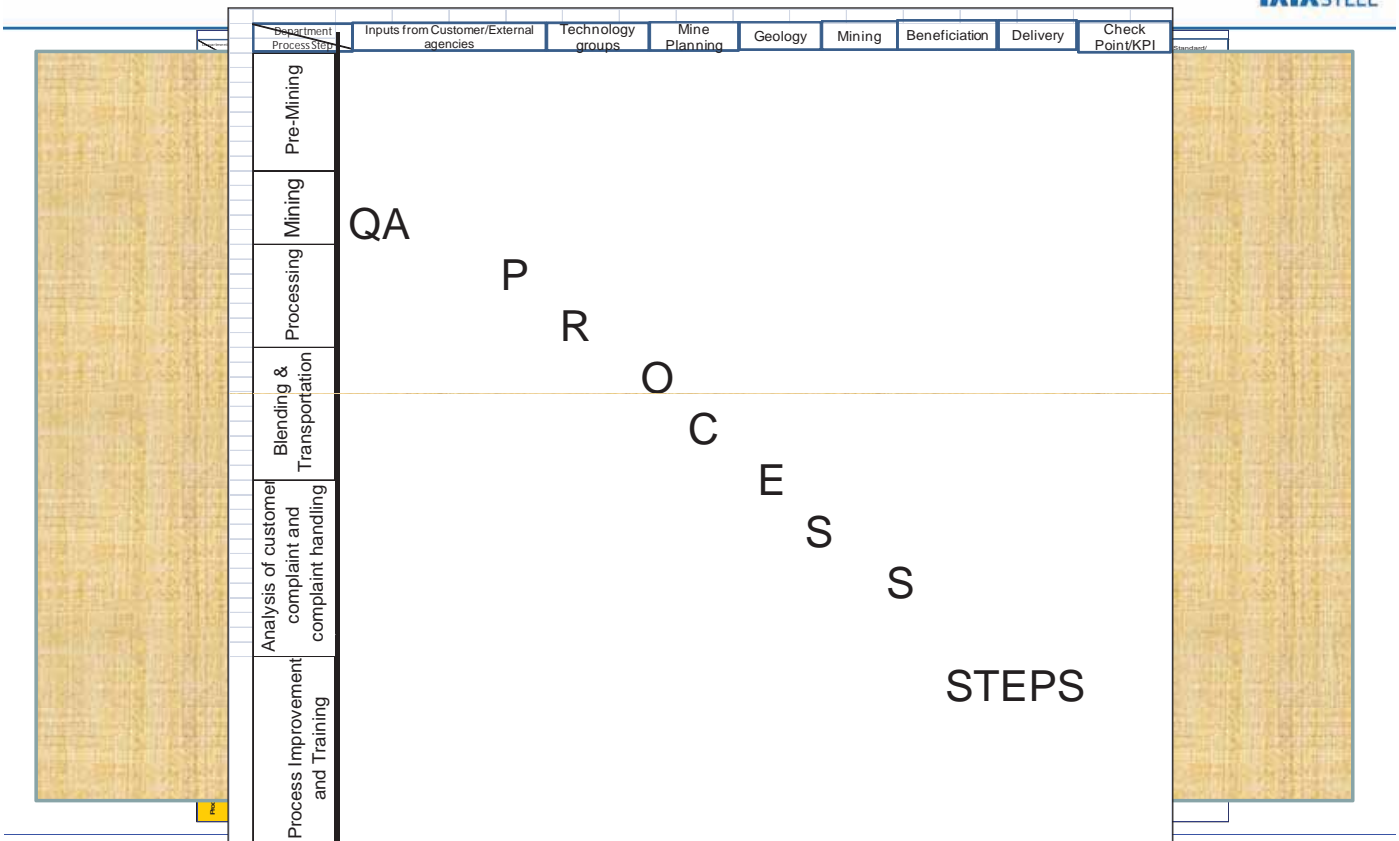


Customer requirements
As captured from Claims, Feedback, MOU, and ABP work shop,

	Planning	NRD	GSE	QACD	Washery2	Washery3	Power systems	RMTG	P & S	Sec. Prod	Logistics
(P) Clean coal Qty	—	○	●	☺	⏏	▽	▣	—	—	—	★
(Q) Clean coal ash within 14.8-15..2%	—	○	●	☺	⏏	▽	—	—	—	—	★
(Q) Clean coal moisture <10.2%	—	—	—	—	⏏	▽	—	—	—	—	★
(Q) Clean coal VM >=24.5	—	○	●	☺	⏏	▽	—	—	—	—	★
(Q) Clean CSN >=4	—	○	●	☺	⏏	▽	—	—	—	—	★
Clean coal fluidity range	—	○	●	☺	—	—	—	☾	—	—	★
(C) Clean coal Cost	—	○	●	☺	⏏	▽	▣	—	—	▣	★
(D) Clean stock at Jsr	—	—	—	—	—	—	—	—	—	—	★
(D) Minimum one rake supply per day	—	—	—	—	—	—	—	—	—	—	★
Clean coal size	—	—	—	—	—	—	—	—	—	—	★

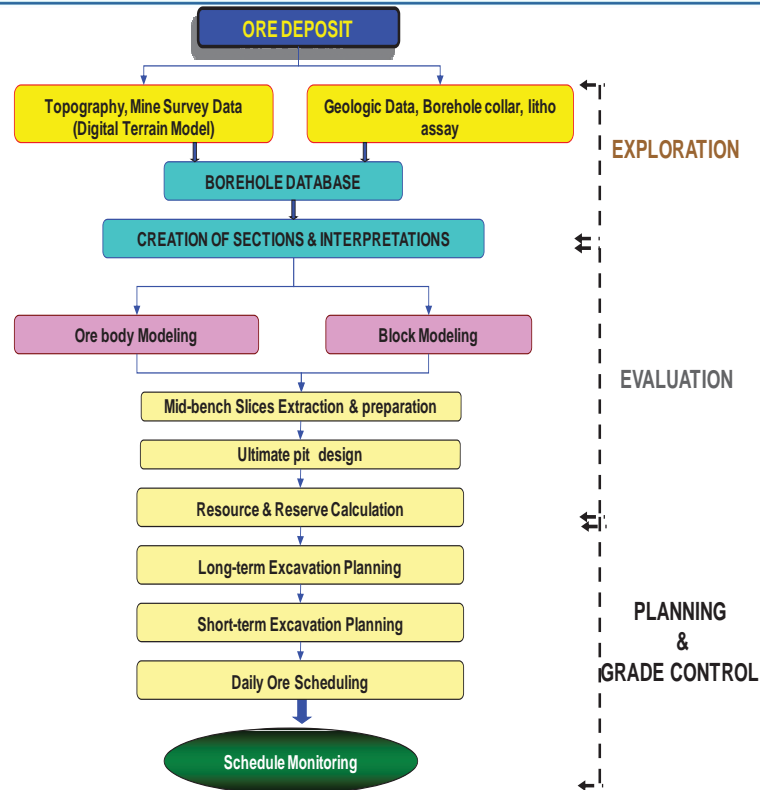
Raw Material Division

Management system chart for QA

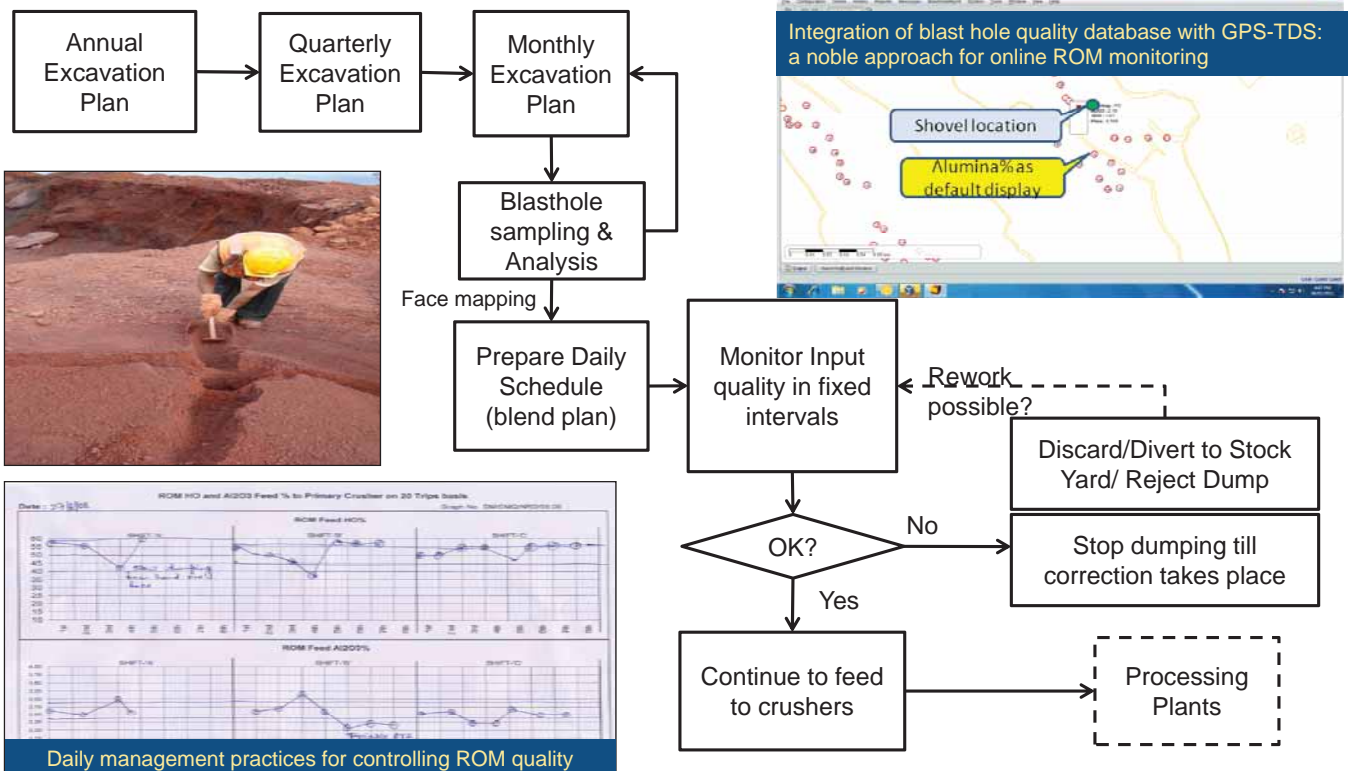


Raw Material Division

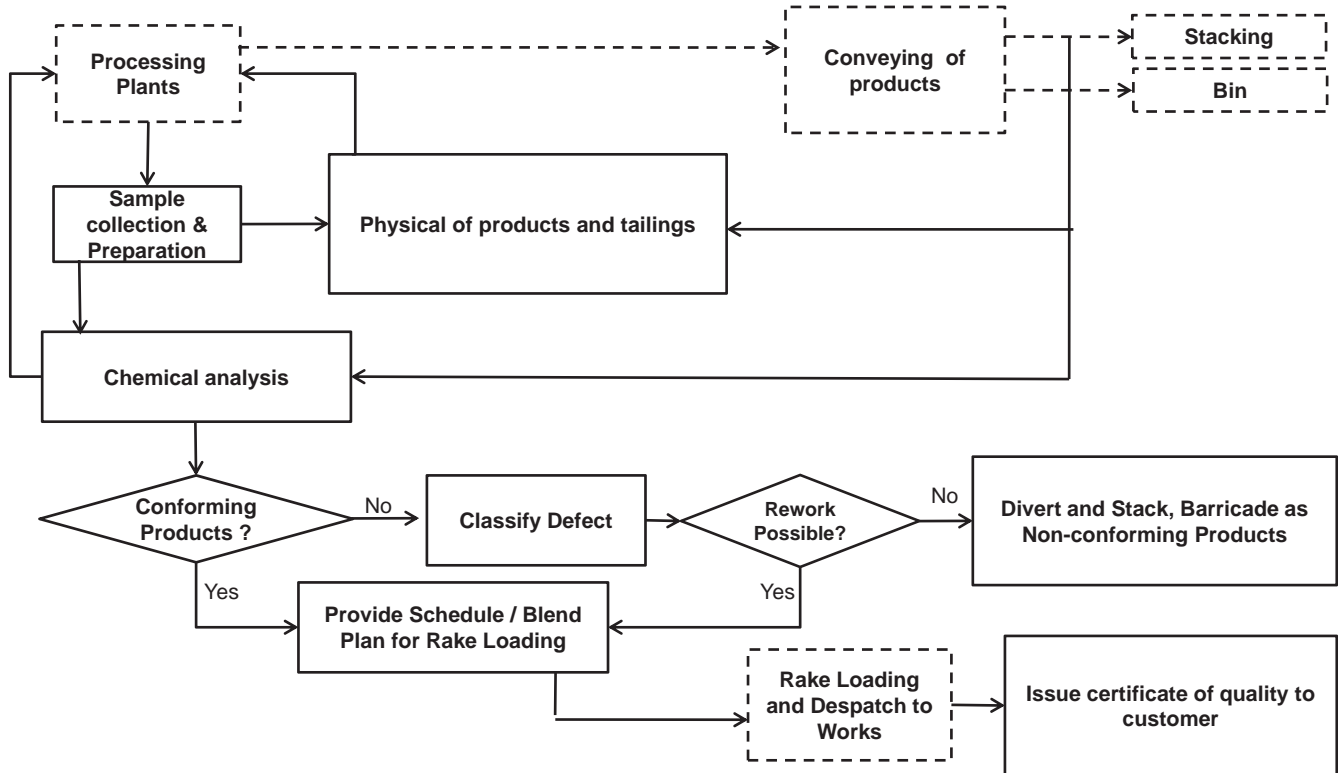
Quality assurance in pre-mining stage



QA process in mine grade control (short term)



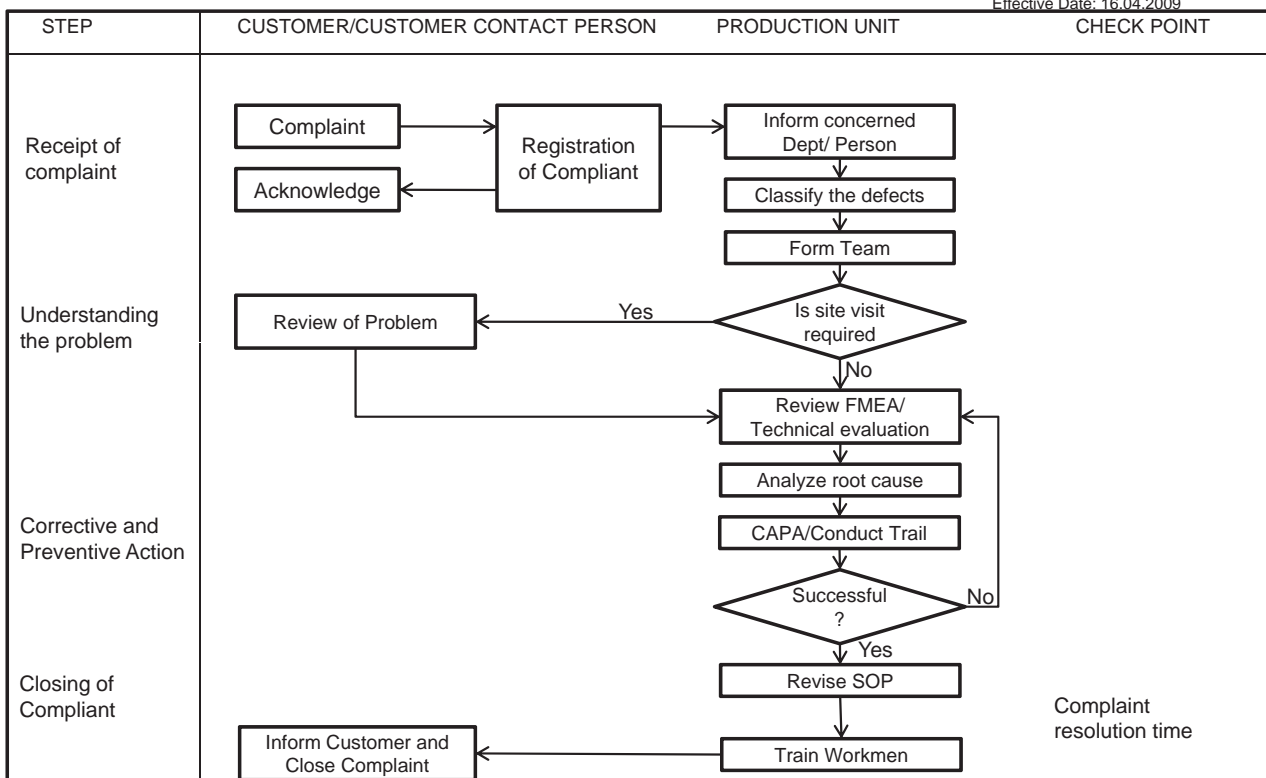
QA processes in beneficiation plants and transportation



Customer Complaint Handling in RMD



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Thank You