



RAGHAV RAMMING MASS LIMITED

MORE WITH LESS

ANNUAL REPORT 2016-17

ELIOM

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Raghav Ramming Mass Limited (RRML) is synonymous with MORE with LESS.



RRML has emerged as a productivity enhancement partner for the steel industry, and is moving towards being the same for glass and ceramics industry.

The premium quality quartz powder, including its flagship quartz ramming mass, adds a significant value to its users with distinct and clearly visible enhancement in Return on Investment (ROI) for its customers.

Compared to other players with a “commodity mindset”, RRML provides differentiated solutions with its bespoke products, each customized and tailor-made for specific industry and application need.

RRML is changing its name and is revamping its brand identity to reflect its focus and philosophy that is aligned with this positioning as the preferred and recognized PRODUCTIVITY ENHANCEMENT PARTNER that delivers

**MORE
WITH LESS**

UNDERSTANDING QUARTZ POWDER

Quartz is a silica-based mineral extracted as large stones from mines. These stones are processed into various sizes having different silica purity content. Quartz powder with a **silica purity of 96-98%** is called ramming mass and is widely used in the steel industry as a refractory material in lining of the inner surface of coreless induction furnaces for melting scrap, sponge and pig iron.

Quartz powder with higher silica purity is used in glass and ceramics industries, while quartz powder with highest purity is used in the manufacture of ophthalmic lens and solar industry.



Uses of Quartz Powder : By Industry and Respective Purity

65-98%	90-98%	97-99.9%	>98%	>98%
CEMENT	FOUNDRY	CERAMIC	FERRO-SILICON	RUBBER
80%	96-98%	97-99.5%	>98%	>99%
FERTILIZER	STEEL/REFRACTORY	GLASS	PAINT	ABRASIVES

Global High Purity Quartz Powder (HPQ) Industry (>99.5% Silica Purity)

Type of Application	Sio2 Minimum %	Other Element Maximum %	Other Elements Maximum ppm	Market Size Mtpa	Typical Price US\$/tonne	Market Size (million\$)	Growth Rate
Clear Glass-grade sand	99.5	0.5	5000	>70	\$30	2100	5.80%
Semiconductor Filter, LCD and optical glass	99.8	0.2	2000	2	\$150	300	3-5%
Low Grade HPQ	99.95	0.05	500	0.75	\$300	225	3-5%
High Grade HPQ	99.997	0.003	30	<0.1	>\$5000	500	3-5%

SOURCES: INDUSTRIAL MINERALS REPORT

India is not a producer of high purity quartz, (more than 99.5%), but we will become one of the very few ones to be in the high purity quartz powder market.

UNDERSTANDING QUARTZ POWDER

Ramming Mass

Quartz powder with a silica purity of 96-98% is called ramming mass, then continue with ramming mass is primarily used as a furnace refractory lining by steel industries, which is a mandatory consumable for induction melting furnace and used as an insulating material between liquid metal and furnace body. The quality of ramming mass has direct impact on the heating performance of the furnaces leading to smooth working of furnaces, optimum output and better metallurgical control. It comes in three variants – acidic (made from silica), basic (made from magnesia) and neutral (made from alumina).

Silica ramming mass (also known as acidic ramming mass) is the most commonly used owing to its inherent advantages and application in the induction furnace of steel industry, which accounts for nearly 75% of the total refractories consumption.


Areas of Application

Ramming mass is used in steel, foundry and casting units. However, it is primarily used as a refractory lining material by the iron and steel


industries using induction furnace method of production. Besides, in India, steel production through induction furnace route is one of the major sources accounting for nearly 32% of the total steel production. Based on steel produced through furnace route in FY 2015 and average ramming mass required for 1 MT (metric tonne) of steel production, the demand for ramming mass in India is estimated at nearly 5,65,640 MTPA.





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28  million tonnes
of steel produced in India in 2015 through induction furnace route

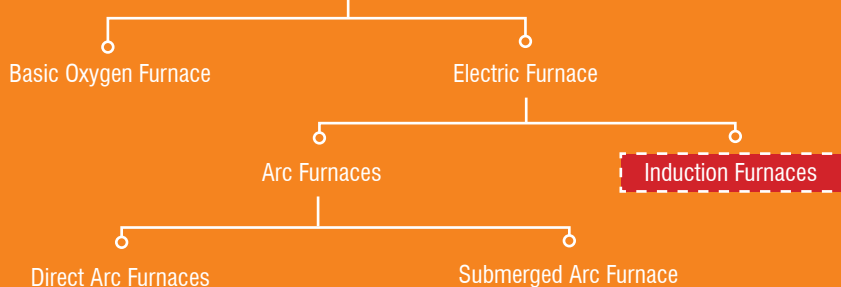
05  million tonnes
of new I-F based steel production capacity to be added during FY 2017-21

70 percent 
Market share of unorganized player in ramming mass production

4.5 billion 
Estimated size of ramming mass industry in India in 2015

5,65,000–8,00,000  MTPA
Estimated demand of ramming mass in India in 2015

Steel-Making Processes



Advantage of Quartz Ramming Mass

Physical properties that make quartz the most ideal solution for iron and steel industry include:



It has the lowest thermal conductivity resulting in low energy loss, low expansion coefficient leading to stable lining, and good resistance to temperature



High silica content (>98.9%) facilitates in oxidizing the impurities present in the input charge by forming slag



Cost is nearly 10-20% to that of alumina or magnesia based ramming mass

Comparison advantage of quartz ramming mass over others

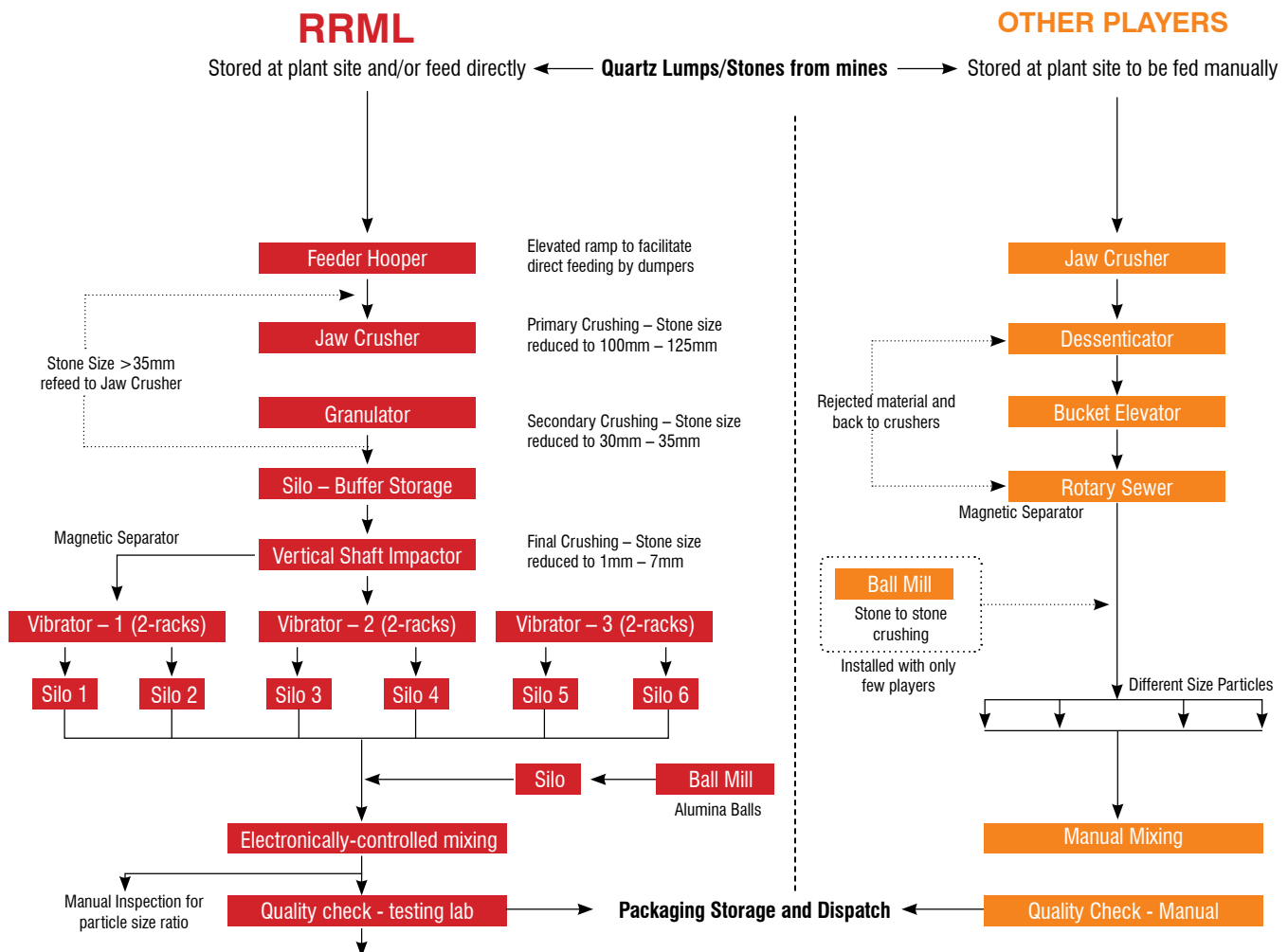
Type of refractory material	Quartz	Alumina	Magnesia
Nature	Acidic	Neutral	Basic
Melting point (°C)	1,723	2,050	2,800
Free energy at 1,450°C (kJ/mol)	-594	-758	-732
Average thermal conductivity between 0°C - 1,200°C (W/mk)	1.7	2.6	4.0
Expansion coefficient between 0°C - 1,200°C (x106)	12.2	8.2	13.8
Cost (relative to silica)	1	5-10 times	5-10 times

SOURCE: CRISIL RESEARCH

UNDERSTANDING QUARTZ POWDER

Ramming Mass Production Process

Ramming mass is produced by crushing and grading of good quality and high purity quartz. The process begins with procuring raw material from mines in Tonk, a region rich in quartz, which is nearly 40 km away. Quartz is directly fed into feeder from where the stones are fed to jaw crusher for primary crushing. Crushed stones are then sent to granulator for secondary crushing. After this, the stones are screened and the ones with sizes greater than 35 mm are sent back for primary or secondary crushing. The remaining stones are cleaned to remove unwanted and waste particles. The cleaned stones are then sent to Vertical Shaft Impactor for further crushing to sizes 1-7 mm. The crushed stones are then passed through magnetic separator machines to remove iron, which is very critical for the proper functioning of induction furnace. The remaining small particles are then sorted as per size and some are sent to ball mill machines where they are reduced to powdered form. Particles of desired sizes and quantity are properly mixed with boric acid powder and sent for packaging.



Key Consumption Areas for Ramming Mass



RRML is a leading **PRODUCTIVITY ENHANCER** for the steel industry, dominating the Ramming Mass space with bespoke offerings customized for each industry and application. Leveraging the latest technology, the Company is moving up the Quartz Powder value chain, displaying formidable thought-leadership. It is all set to expand its presence into newer industries and applications.

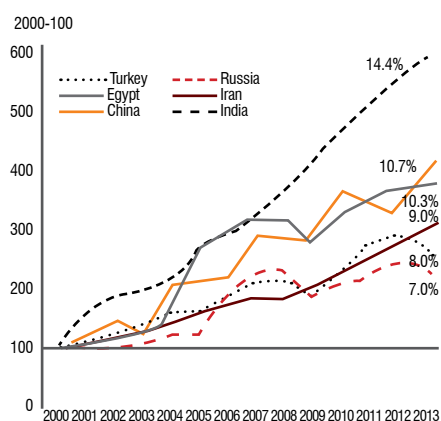
OPPORTUNITY IN THE STEEL INDUSTRY

Induction Furnace in Steel Industry

Manufacturing steel using the Induction Furnace process is a very Indian phenomenon. The Induction Furnace process of steel-making is today widely used across the country with small and medium steel manufacturers. The Induction Furnace process has also been exported to countries in the Middle East and Africa.

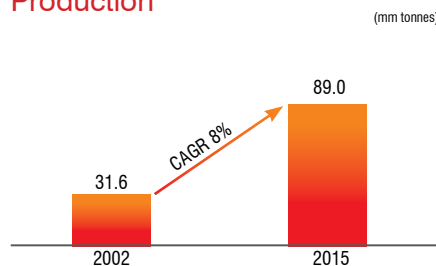
With demand for steel growing, RRML is a strong proxy for growth due to its leadership position as a dominant producer of quartz ramming mass in the country, critical to steel-making through the Induction Furnace process.

Evolution of Crude Steel Production in Electric Furnaces (CAGR)

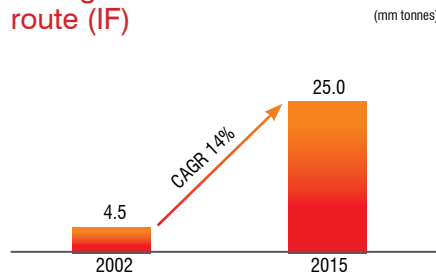


SOURCE: WORLD STEEL ASSOCIATION

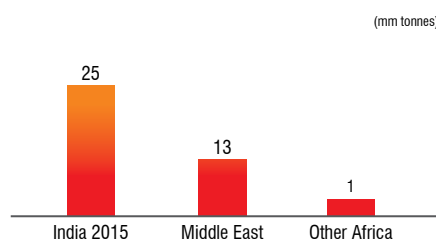
Growth in Indian Steel Production



Indian Steel Production Growth through Induction Furnace route (IF)



Production in Different Geographies through IF route



SOURCE: WORLD STEEL ASSOCIATION

