



Providing Reliable Analytical Support Since 1993

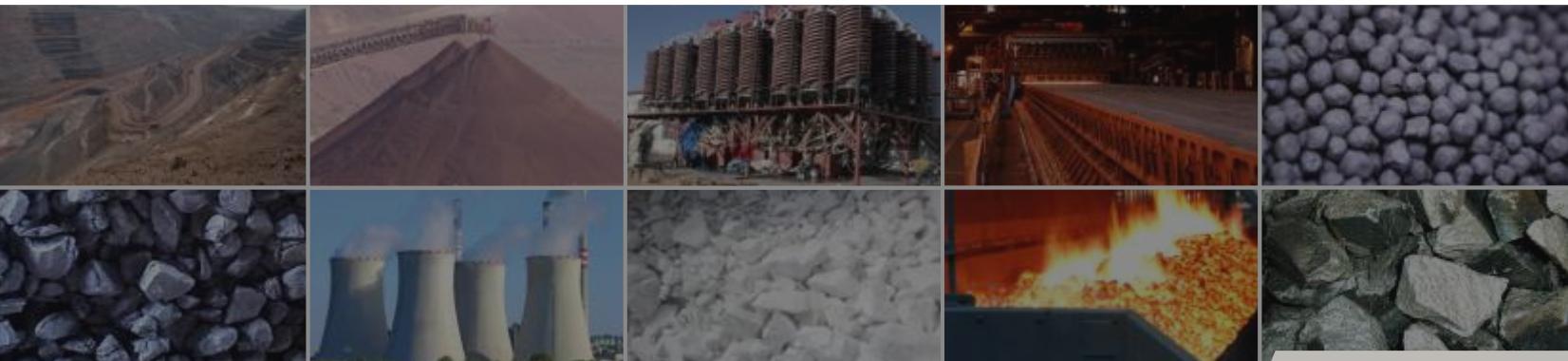


★ of growthful association with ★
★ Indian Iron, Steel, Ferro Alloys Industry, ★
R & D and Scientific Services

An ISO 9001:2015 certified company



Most Comprehensive Quality Control Solution for **IRON, STEEL & FERRO ALLOYS**



ABOUT US

Insmart Systems is 26 years old organization dedicated to manufacturing of sample collection, sample preparation, pilot plants and process analysis equipment.

It develops and produces equipment to assess the quality of all kinds of mined materials except Uranium.

The most popular product categories include systems and equipment for Automatic Sample Collection, Pneumatic Sample Transportation and Sample Preparation Systems & High temperature testing in metallurgical processes.

Insmart equipment are widely used for research, development and quality control in nationwide and overseas locations. The company operates from one of the first industrial hubs of Hyderabad and its market leadership lies in following product segments:

- Lumpy material sampling with Automatic cross belt samplers, Automatic clinker samplers, Belt end samplers, Auger samplers etc.
- Process material sampling systems with Screw samplers, Powdered coal samplers, Air Slide samplers.
- Multi layered fully automatic sample transportation systems.
- Fully automated sample collection, transportation and robotic sample preparation laboratories for manufacturing plants (indigenous).
- Software integration solutions for the entire sampling cycle from auto collection till analysed sample data analysis.
- Sample crushing & its division, Sample Grinding & its Compaction systems.
- Sample size fractioning with single - multi deck screens & fines sieving systems.
- Turnkey Lab setups for physical, wet chemical & automatic sample preparation labs.
- Customized, automated solutions for old plants.

Insmart's other areas of speciality are: Sample Preparation for powder metallurgy applications involving powder blending (pulverization), die compaction and sample preparation for surface characterization.

The focus of Insmart is high precision machine manufacturing and interdependence with quality control and scientific community for offering quality in Insmart equipment. Continuous investments in R & D ensures that Insmart products stand by their excellent reputation.

Corporate office & works:
5-234/1/1, H.P.Road, Moosapet,
Hyderabad - 500018, India.
Prime contact: +91-78932 96891
Email: info@Insmart systems.in



Global Presence

Insmart has consistently maintained its leadership in the supply of sample preparation equipment and today it holds 85% market share in India.

Insmart equipment are also exported to the following countries:

- Austria
- Bahrain
- Bangladesh
- Bhutan
- England
- Kenya
- Malaysia
- Mali
- Mexico
- Nepal
- Norway
- Oman
- Peru
- Philippines
- Saudi Arabia
- South Korea
- Sri Lanka
- Switzerland
- Thailand
- U.A.E.
- U.S.A.
- West Africa
- Zambia

Awards received by Insmart for Innovative Product Designs & Good Service Backup



Insmart ADVANTAGE

Quick ROI from Invested Capital



1

Eliminates Variability

Insmart Automatic Samplers, its Pneumatic Sample Transportation Systems and Robotic Labs are controlled by advanced systems. These systems operate in desired formats each and every time they operate.

Thus, after taking human variability out of sampling equation, the resulting samples are much more representative of the process.

2

Lower Rejections

Insmart automated sample preparation systems provide high throughput in process material assay.

This results in early stage process corrections, help produce desired quality, improve internal customer satisfaction at appropriate stages of Steel making and minimize open market rejections.

3

Low Investment

Iron & Steel industry is going through digitization and automation phase. There is no lab in Iron & Steel industry in India which has **Auto Sample Collection, Sample Preparation and Robotics** use in analysis.

High cost of automation offered by the foreign suppliers has been holding the industry from adopting to such advancements.

Insmart offers Sampling Automation & High Quality Robotic Labs. However, at just **1/3rd cost of the imported systems**. You are welcome to choose from our indigenous systems and stay ahead of competition.

4

Reduced cost of Quality Assessment

Insmart Automatic Sampling Systems offer:

- Samples that are more representative of incoming raw materials, in process raw materials & products at various stages of Iron & Steel making.
- Reduced variability in consecutive samples.
- High sampler uptime.
- Improved sampling frequency and negligible labour costs.

5

Achieve Higher Brand Value

Integrated Sampling & Sample Preparation Systems enable frequent updation of analysis data and allow better process supervision.

Insmart automated process relinquishes technical staff from operational tasks. Thus, they utilize the additional time for process monitoring and process control.

This analytical approach for process control ensures consistent Metal quality.

6

Customisable for Existing Plants

Insmart automatic samplers are much more compact than conventional sampling systems and occupy very little space.

These systems can be easily retro-fitted on vertical / inclined Chutes, Conveyors of any width, Vibratory Screens, Hopper / Silo Discharge areas, or any other kind of process material flow system without any major alterations or modifications.

7

Reduction in QC Lab Operating Cost

Insmart Robotic Sample Preparation System implementations mimic human activities of carrying out the same steps that people do, but at a much higher speed and with high precision.

Resultant effect is saving on manpower & achieve precision in sample processing and obtain repeat accuracies.

8

26+ years of Reliable Service

Insmart has cohabited with the Indian cement industry for last 26 years.

We invite the customers to take bold steps and adopt automated quality control systems needed to achieve the market leadership.

Insmart Systems promises to lend its support by supplying its wide range of Indigenously developed, sample collection and sample preparation systems.



Smart Labs for integrated Steel Plants

Smart Coke Lab	11
Smart Sinter Lab	12
Smart Sponge Iron (DRI) Lab	13
Smart Pellet Lab	14
Smart Base Mix Robotic Lab	15
Smart Blast Furnace Lab	16
Smart Lime - Dolo Lab	17
Smart Refractory Lab	18
Smart SMS Robotic Lab	19
Smart CPP Lab	20
Smart Beneficiation Lab	21
Smart R & D Lab	22
Smart Containerised Lab (for Steel, Aluminium & Other Metals)	23
Insmart Centralized Turn Key Lab	24



Automatic Sample Collection Systems

Automatic Samplers for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Sampler	28
Ferro Alloy Sample Collection & Preparation System	29



Pneumatic Sample Transportation Systems 30

Automatic Sending Stations
Seamless Pipes, Bends & Joints
Fully Automatic 3:1 & 2:1 Diverters
Twin Cap Sample Bottles



Robotic Sample Preparation Labs 31

Auto Sample Receiving Stations
Auto Sample Dozing Stations
Auto Combo for Auto Grinding and Pallet making
Integrated XRF / OES/ XRD / PSA



Sample Preparation Systems 32

Crushing Systems

Jaw Crushers (3 variants)	33
Jaw Crushers with in-built Sample Dividers (3 variants)	36
Roll Crushers (2 variants)	38
Hammer Crusher	39



Grinding Systems

Vibratory Cup Mills	40
Planetary Micro Milling Systems (PBMs)	44
Disc Mill	46
Hammer Mill	47
Pot Mill	49
Ball Mill	50
Rod Mill	51



Compaction Systems

Hydraulic Pallet Presses (2 variants)	52
---------------------------------------	----



Homogenising & Sampling

Turbo Mixer	54
Falling Stream Sample Divider	55
Riffle Sample Splitter	56
Rotary Sample Divider	57



Automatic Grinding & Palletizing Units 58

Auto-Combo A (Standalone)	60
Auto-Combo B (Compatible with Robotic Sample Preparation Labs)	61
Auto-Combo C (with Turret based feeding integrated with XRF / XRD)	62

Screening Equipment

Gyratory Screen	63
Ro-Tap Sieve Shaker	64
Electromagnetic Sieve Shaker	65
R.O.M. Sieve Shaker	66
Wet Sieve Analysis Unit	67
Single, Double & Multi Deck Vibratory Screens	68



Characterisation Equipment

Bond's Work Index Rod Mill	69
Bond's Work Index Ball Mill	70
Core Splitter	71
Core Cutter	72
Hard Grove Grindability Index Tester	73
Coal Free Swelling Index	74



Cold Material Strength Analysis Systems

Tumbler Drum	75
Micum Drum	76
Shatter Test Apparatus	77
Pellet CCS Testing Machine	78



Ovens & Furnaces

Surface Moisture Analyzer	79
Hot Air Oven	80
Muffle Furnace	81
Insmart Proximate Analyzer	82
Fume Chamber / Hot Plate	83



Metallurgical Testing Apparatus

Softening & Melting Test Apparatus	84
Coke CSR / CRI Testing Apparatus	85
RI / RDI Testing Apparatus	86
Pellet Free Swelling Index Test Apparatus	87



Metal Sample Preparation

Milling - (Lollipop Sample) Polishing Machine	Double/Single Spindle	88
Pin Cutting Machine		89
Button Punching Machine		90



Mineral Beneficiation Equipment

Gravity Separation Equipment

Mineral Jig	91
Mineral Separator	92
Concentrating Table	93
Density Separator	94
Hydro Cyclone Test Rig	95
Spiral Test Rig	96

Magnetic Separation Equipment

Davis Tube Tester - Electro magnetic	97
Low intensity Dry Drum Permanent Magnetic Separator (LIDDMMS)	98
Drum Type Wet Electromagnetic Separator	99
Perm Roll Separator	100
Wet High Intensity Magnetic Separator (WHIMS)	101
Disc Dry Electromagnetic Separator	102

Physico & Chemical Process Testing

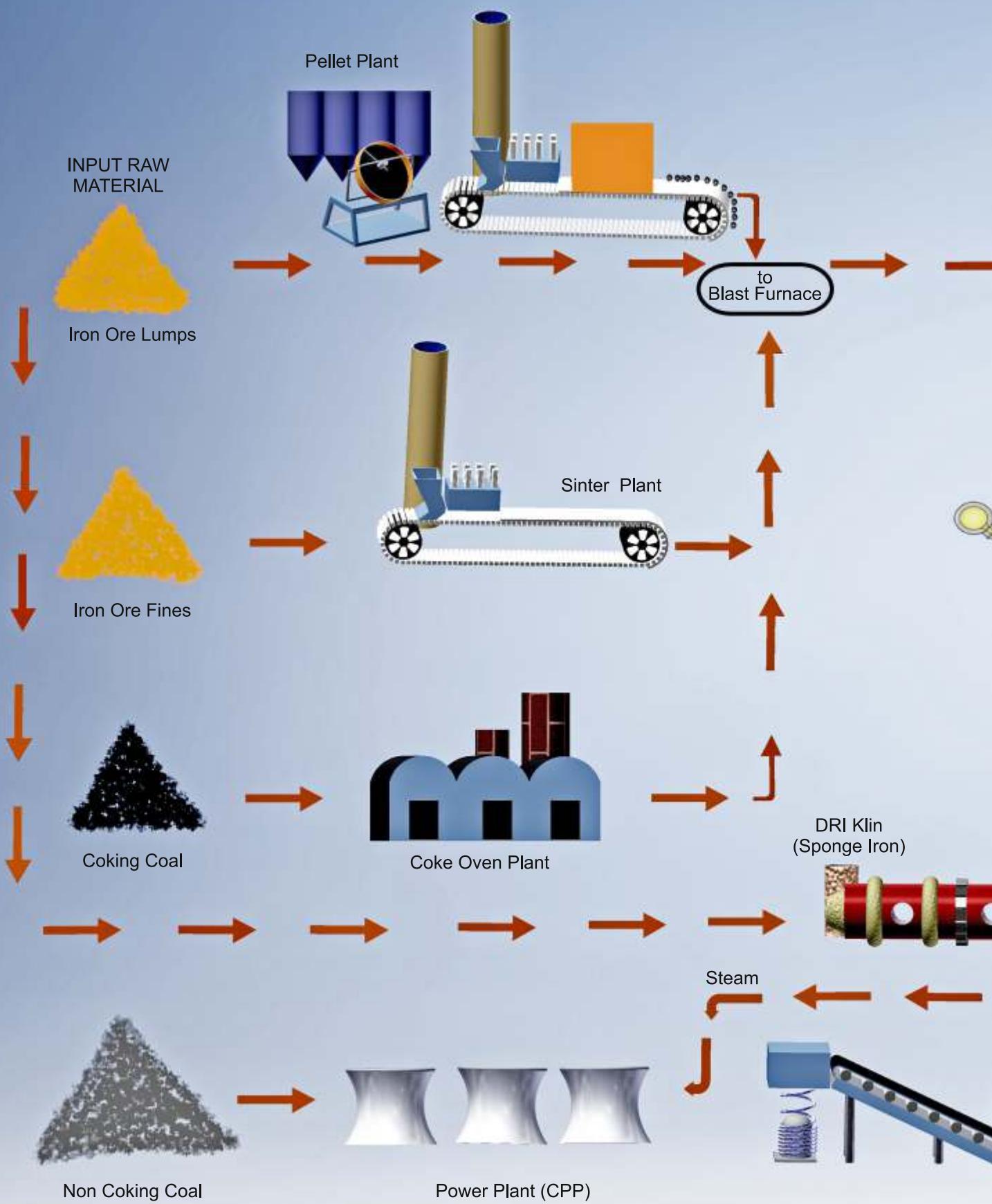
Flotation Cells	103
-----------------	-----

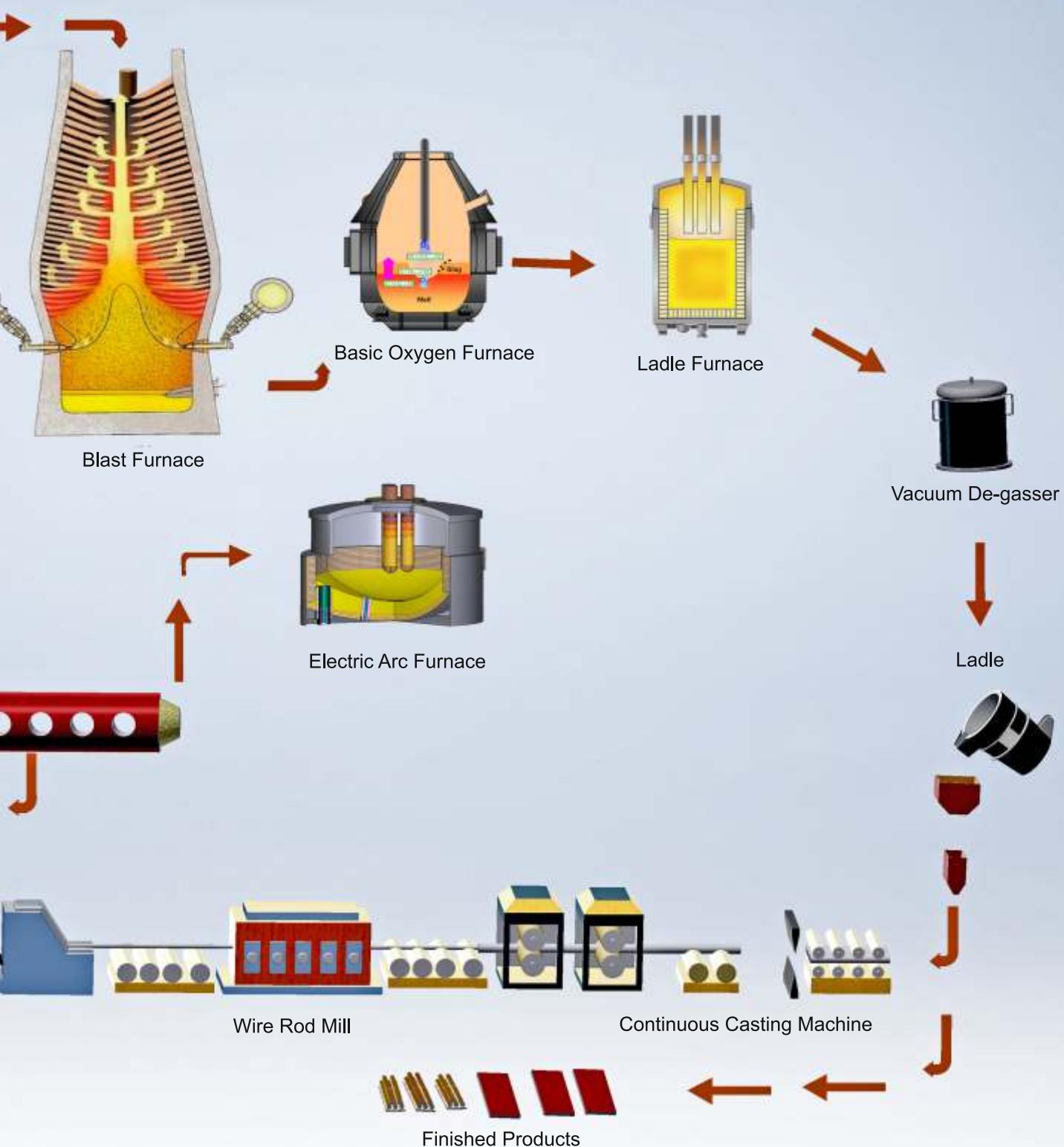


Auxiliary Units

Vacuum Filtration Units	112
Infrared Driers	113
Specific Gravity Pulp Density Meters	114
Ultrasonic Sieve Cleaners	115

Typical Integrated Steel Plant Process





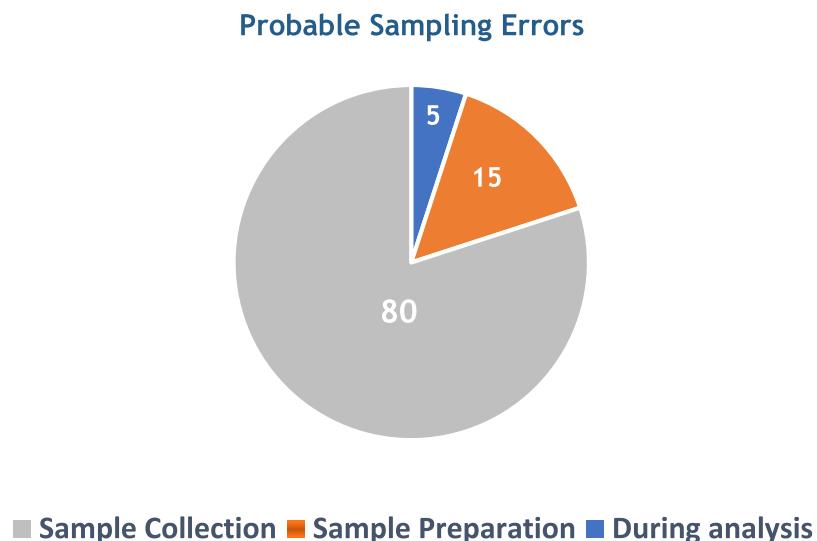
Typical Integrated Steel Plant Process

Raw materials:

Steel is an alloy of Iron and Carbon, wherein, the carbon content is below 2.0%. Iron Ore is mined from the mother earth. Depending on the physical, chemical and metallurgical properties, the mined ore is converted into suitable charge for BLAST FURNACE route of iron making or alternate route of iron making i.e., SPONGE IRON making. For reduction of iron ore, coking coal or non-coking coals are further treated and converted to reductants for sponge iron or blast furnace iron making routes. Iron ores contains large quantities of impurities, they are to be removed with addition of flux material, i.e., limestone, dolomite, pyroxenite, quartzite and / or Ore beneficiation.

Objective:

Environment, Quality, Productivity, Cost effectiveness of steel plant depends on quality of raw material being used for making of steel. Depending on quality and availability of raw materials, manufacturing processes are selected. So, at every stage assessment of quality of raw materials becomes essential before they are put in manufacturing process. The accuracy of analysis depends on the sample collection methods, sample preparation methods and testing procedures followed. Major studies done on the same reveal that errors in the sample collection and preparation are causes in wrong analysis results.



Major studies on methods of sample collection and sample preparation have revealed that majority of probable sampling errors occur during sampling, which in turn results in wrong analysis results.

We at Insmart Systems, Hyderabad have specialized in sample collection, preparation and laboratory mineral beneficiation equipment manufacturing and supply. The equipment are designed and developed based on the standards followed in various industries for manufacturing. Samples are collected from different locations and laboratories being set up at convenient places. In order to minimize sample handling time and optimize manpower involvement, automatic sample transportation is developed by Insmart Systems.

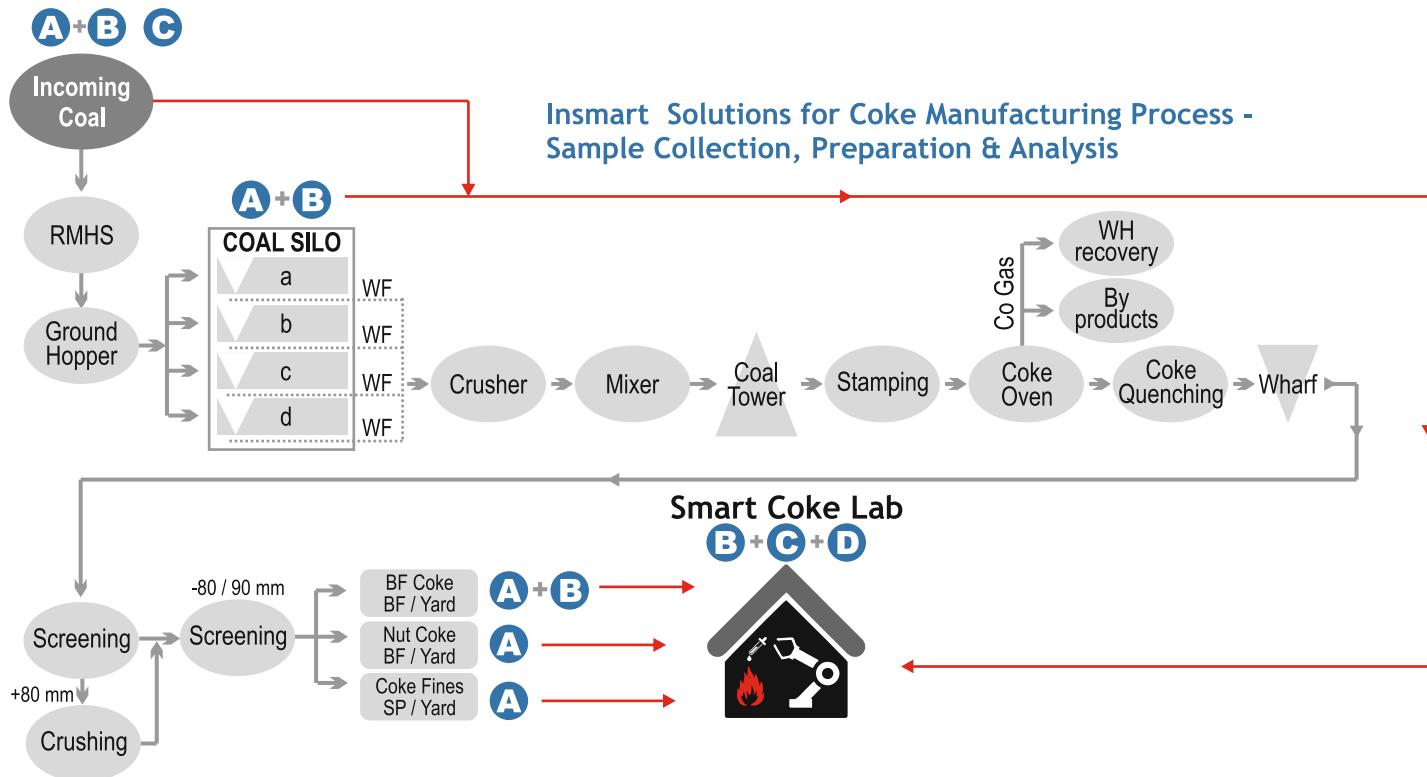
Major processes involved in steel manufacturing are listed below. As explained above, one or the more of the processes are selected in a steel plant. Accordingly, Insmart systems is offering following SMART LABS in an integrated steel plant.

Smart Coke Lab

Smart Lab

These benefits derived from Insmart labs would result in long term Customer satisfaction, Branding, Reputation and Financial gains.

- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Reduced Fatigue.
- Improved Working environment
- Optimization in Coke manufacturing process and Minimizing waste generation
- Reduce & Control Quality Deviations.



A Insmart Sample collection Systems	Page No.
Cross Belt Samplers	26
Truck / Wagon Samplers	28

C Insmart Sample Analysis Systems	Page No.
Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

B Insmart Sample Preparation Systems	
Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	
Insmart Sample Division Equipment	
Rotary Sample Divider	55
Riffle Splitter	56
Insmart Homogenising Equipment	
Turbo Mixer	54
Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems	Page No.
Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80
Insmart Proximate Analysis Equipment	
Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82
Insmart Sieving Equipment	
Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68
Insmart Special Equipment	
Hard Grove Grindability Index	73
Free Swelling Index Apparatus	74
Micum Drum	76
CSR / CRI Apparatus	85
Insmart Auxiliary Equipment	
Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

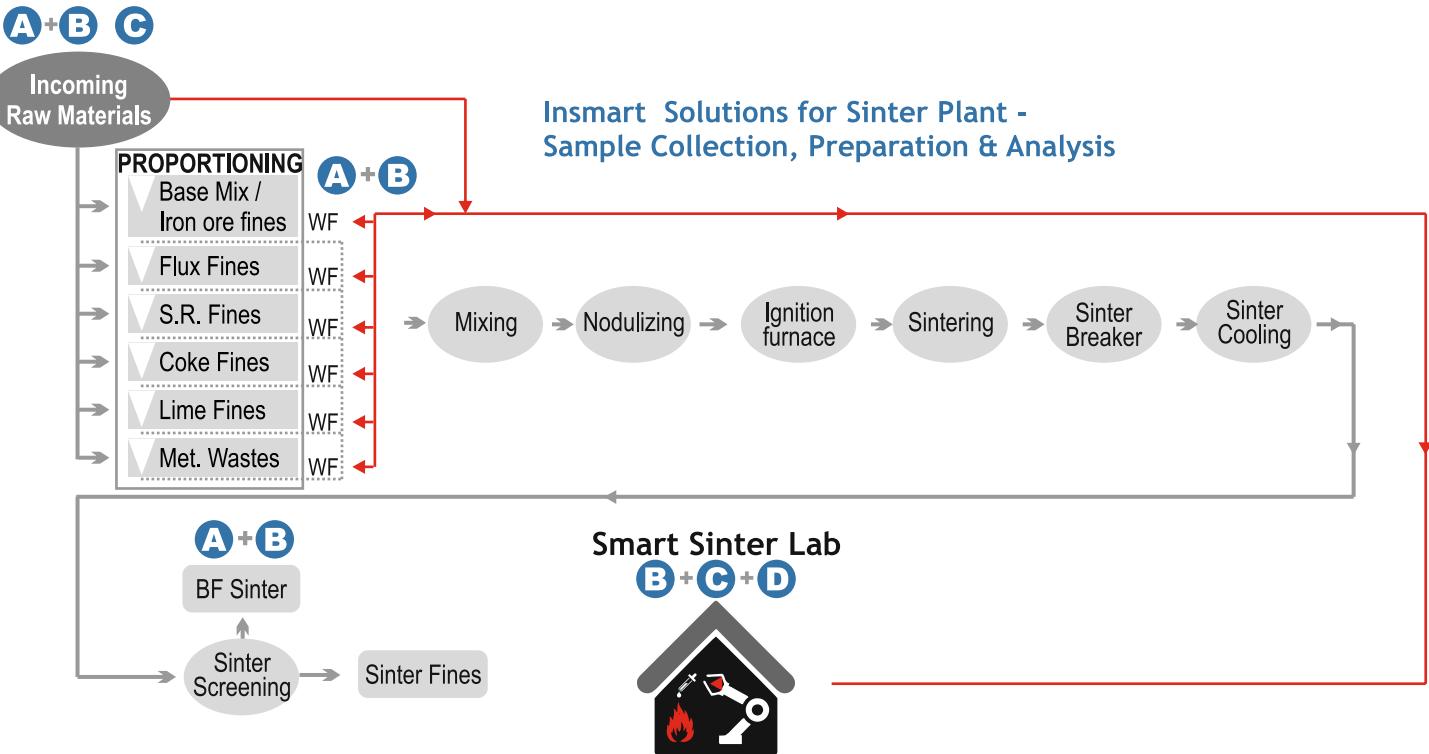
D Insmart Turn Key Smart Coke Lab

Smart Sinter Lab

Smart Lab

These benefits derived from Insmart labs would result in long term Customer satisfaction, Reputation and Financial gains.

- Timely Analysis for continual stable quality sinter
- Optimize operating control parameters
- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Improved Working environment
- Reduce & Control Quality Deviations.



A Insmart Sample collection Systems

Sampler for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Samplers	28

Page No.

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment	
Rotary Sample Divider	55
Riffle Splitter	56

Insmart Homogenising Equipment	
Turbo Mixer	54

Insmart Pulverising Equipment	
Hammer Mill	47
Vibratory Cup Mill	40
Disc Mill	46

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

Page No.

Insmart Proximate Analysis Equipment

Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
Tumbler Drum	75
Shatter Test Apparatus	77
Softening Melting Test Apparatus	84
RI / RDI Test Apparatus	86

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

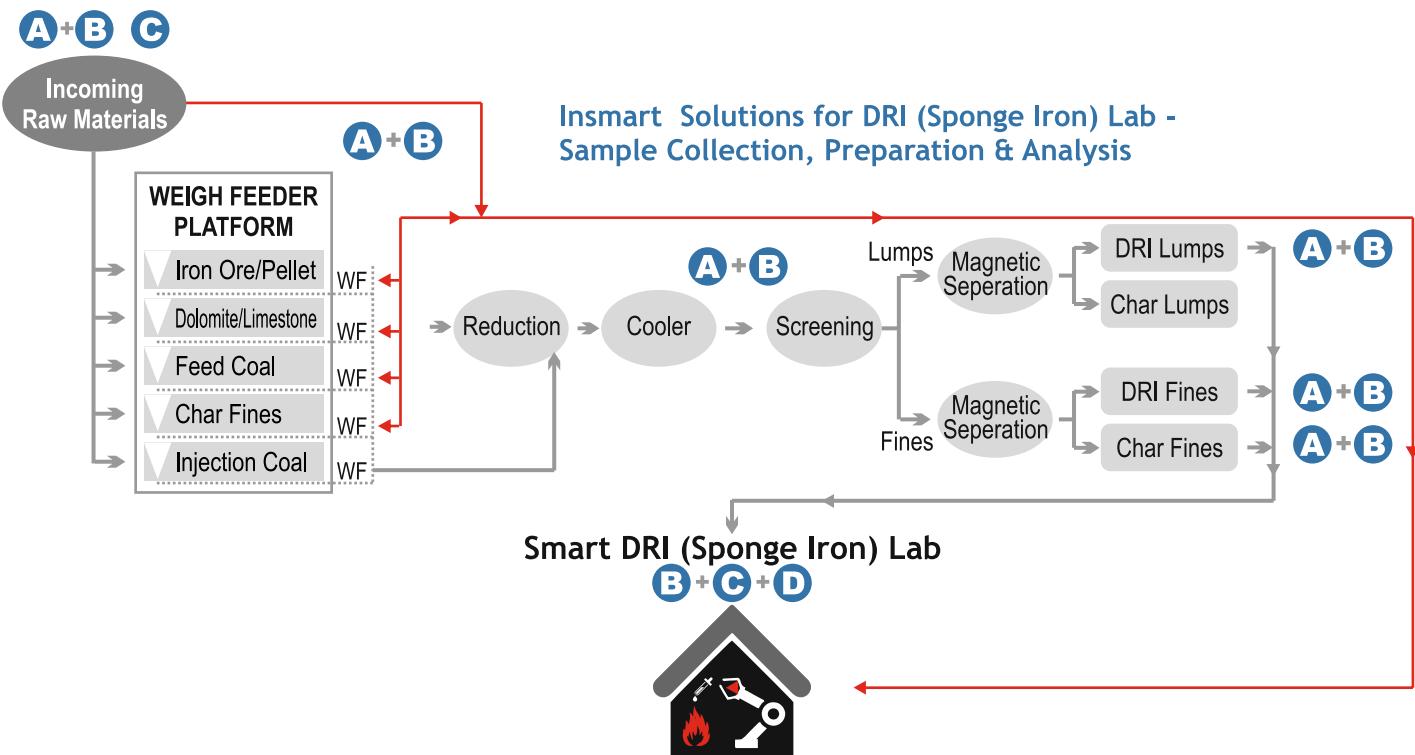
D Insmart Turn Key Smart Sinter Lab

Smart DRI (Sponge Iron) Lab

Smart Lab

These benefits derived from Insmart labs would result in long term Customer satisfaction, Reputation and Financial gains.

- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Minimum human interference in analysis
- Regulate plant control parameters to minimize quality deviations
- Consistency in DRI Quality can be achieved by standard quality plan.



A Insmart Sample collection Systems

Cross Belt Samplers	26
Truck / Wagon Samplers	28

Page No.

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment

Rotary Sample Divider	55
Riffle Splitter	56

Insmart Pulverising Equipment

Hammer Mill	47
Vibratory Cup Mill	40
Disc Mill	46

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

Page No.

Insmart Proximate Analysis Equipment

Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
Coal HGI (Hard Groove Grindability Index) Tester	73
Tumbler Drum	75
Shatter Test Apparatus	77
Pellet CCS (Cold Compressive Strength)	78
Pellet Free Swelling Index Apparatus	87
Disc Dry Electromagnetic Separator	102

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

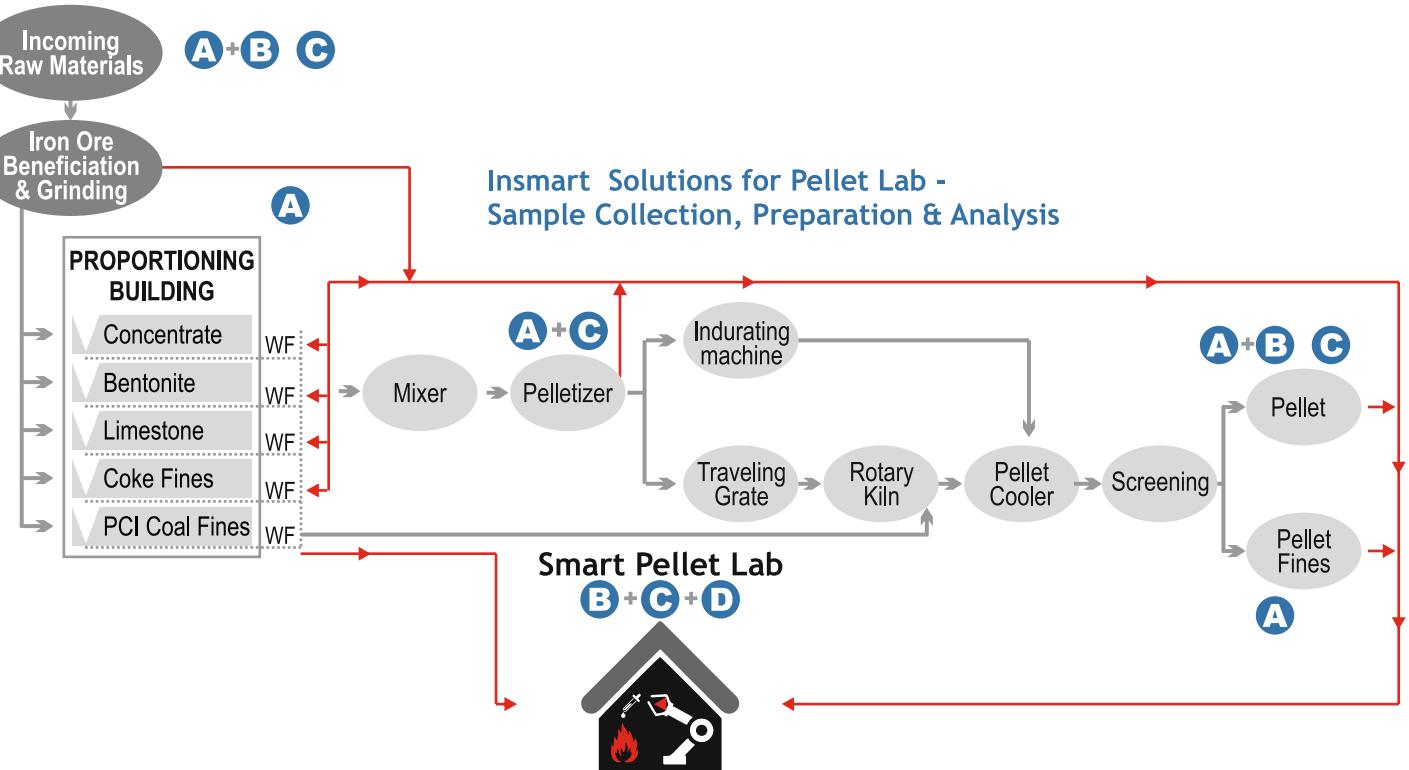
D Insmart Turn Key Smart DRI Lab

Smart Pellet Lab

Smart Lab

These benefits derived from Insmart labs would result in long term Customer satisfaction, Branding, Reputation and Financial gains.

- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Achieve consistency in product quality
- Minimum human interference in analysis
- Regulate plant control parameters to minimize quality deviations.



A Insmart Sample collection Systems

Sampler for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Samplers	28

Page No.

Page No.

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	
Insmart Sample Division Equipment	
Rotary Sample Divider	55
Riffle Splitter	56
Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems

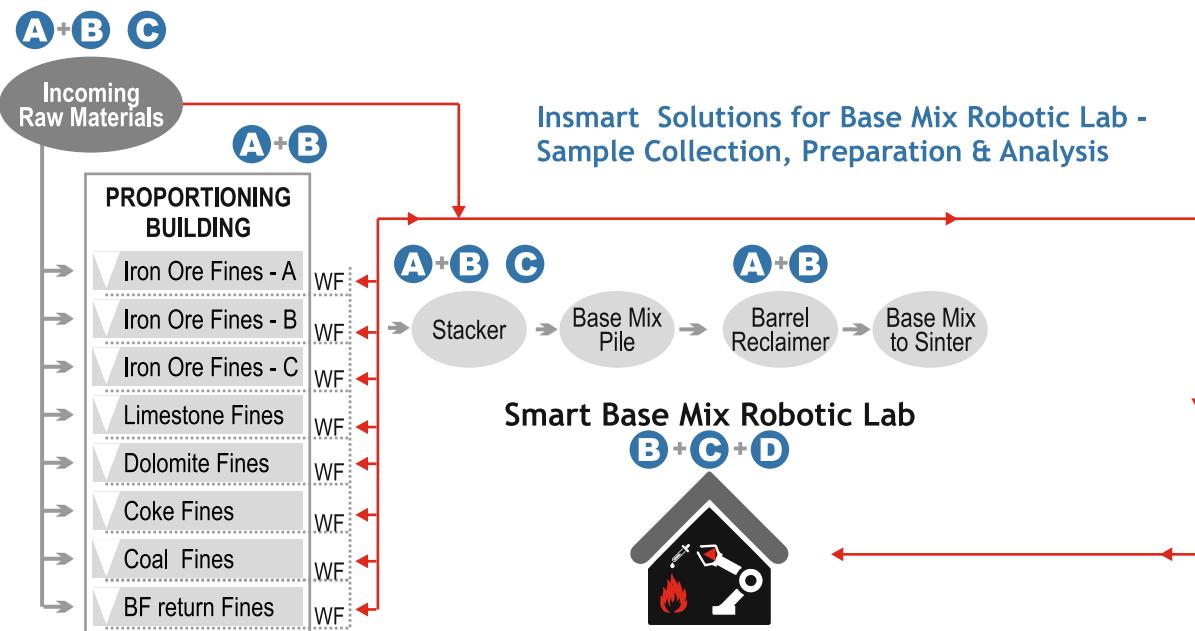
Insmart Moisture Determination Equipment	
Hot Air Oven	80
Insmart Proximate Analysis Equipment	
Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82
Insmart Sieving Equipment	
Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68
Insmart Special Equipment	
Hydraulic Pallet Press	52
Coal HGI (Hard Groove Grindability Index) Tester	73
Tumbler Drum	75
Shatter Test Apparatus	77
Pellet CCS (Cold Compressive Strength)	78
Softening Melting Test Apparatus	84
RI / RDI Test Apparatus	86
Pellet Free Swelling Index Apparatus	87
Insmart Auxiliary Equipment	
Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

D Insmart Turn Key Smart Pellet Lab

Smart Base Mix Robotic Lab

Smart Lab

Base mix preparation involves blending and bedding of various raw materials used in sinter making. Once base mix is prepared there is hardly anything left to sinter plant operator for any major corrections. The raw materials received from various suppliers within the plant and from outside. Thus, base mix preparation must have well established quality control plan along with stringent incoming raw material testing laboratory facilities. Insmart's expertise and knowledge has been put in for custom designed base mix robotic lab to ensure desired quality base mix is prepared and delivered to sinter plant.



A Insmart Sample collection Systems	Page No.
Cross Belt Samplers	26
Truck / Wagon Samplers	28

C Insmart Sample Analysis Systems	Page No.
--	----------

Insmart Moisture Determination Equipment	
Hot Air Oven	80

Insmart Proximate Analysis Equipment

Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
------------------------	----

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Insmart Sample Division Equipment	
Rotary Sample Divider	55
Riffle Splitter	56
Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

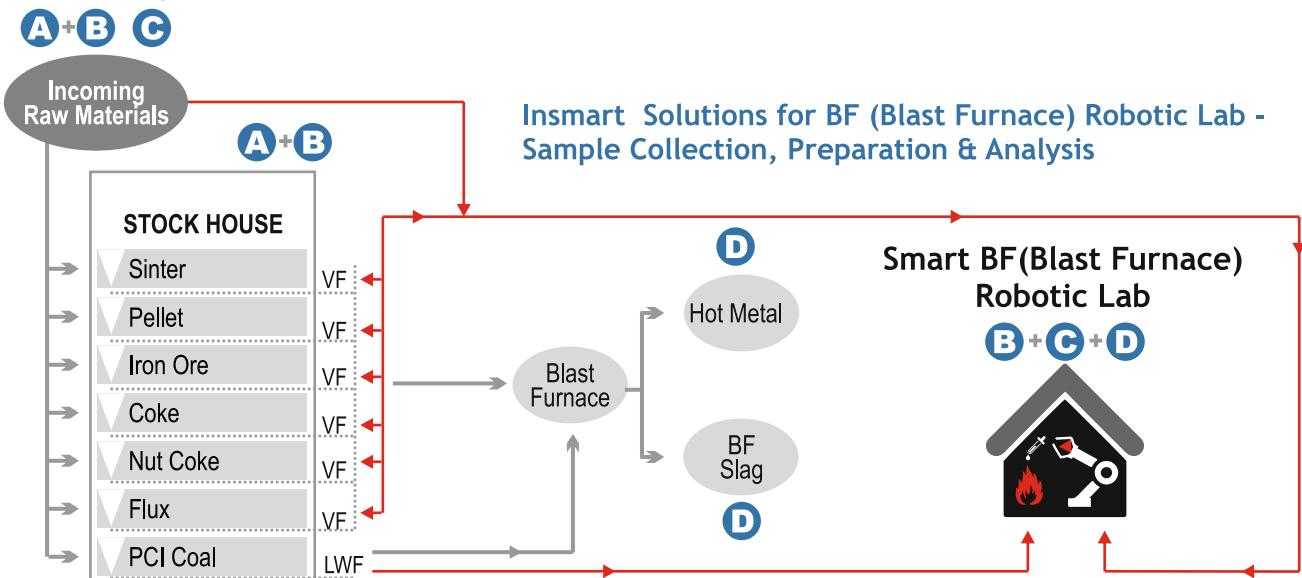
D Insmart Smart Mix Robotic Lab

Smart Blast Furnace Lab

Smart Lab

Blast furnace prime input raw materials are Iron bearing, Fluxes and Fuel. These raw materials are to be assessed as per the quality plan. As per the studies, it is concluded that 60 to 70% Blast Furnace performance depends on input raw materials. Thus, Insmart offers Modern Blast Furnace Lab to achieve:

- Improve productivity & Hot metal quality
- Minimize human interference
- Improved Working environment
- Reduce cost of production.



A Insmart Sample collection Systems Page No.

Sampler for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Samplers	28
Sample Pneumatic Transportation System	30

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	
Insmart Sample Division Equipment	
Rotary Sample Divider	55
Riffle Splitter	56
Insmart Homogenising Equipment	
Turbo Mixer	54
Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47
Insmart Metal Polishing Machine	
Milling Machine	88

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

Insmart Proximate Analysis Equipment Page No.

Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
HGI Test Apparatus	73
Coal Free Swelling Index	74
Tumbler Drum	75
Micum Drum	76
Shatter Test Apparatus	77
CCS Testing Machine	78
Softening Melting Test Apparatus	84
CSR - CRI Test Apparatus	85
RI / RDI Test Apparatus	86
Pellet / Iron Ore Swelling Test Apparatus	87

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

D Insmart Turn Key Solutions

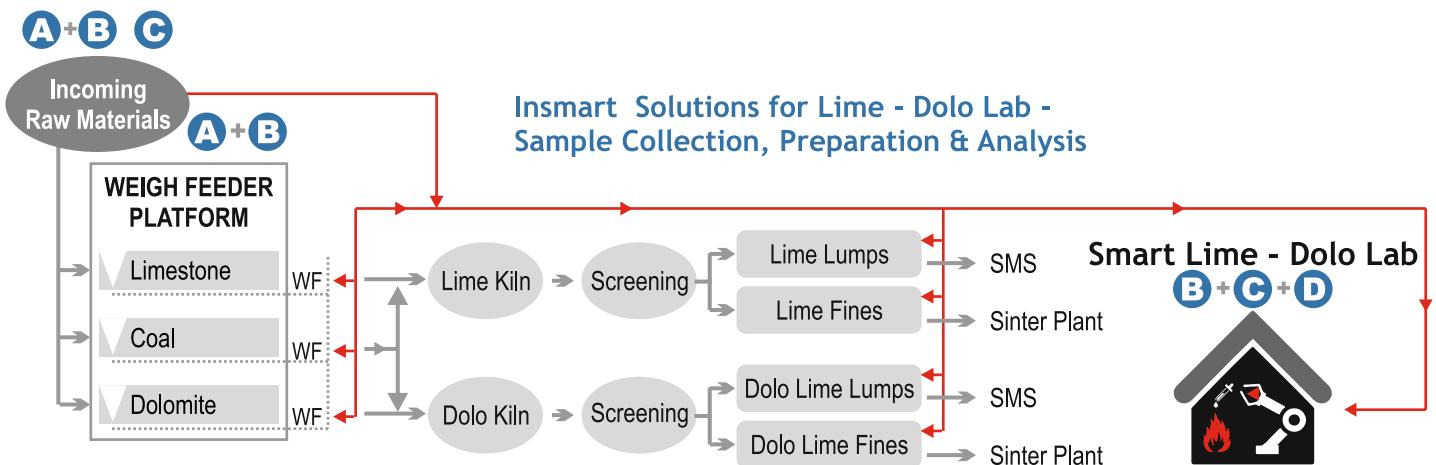
Containerised Lab	23
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Smart Lime - Dolo Lab

Smart Lab

Insmart offered sample collection, preparation and analysis equipment for Lime Dolo Lab helps in achieving:

- Minimize quality variations
- Ensure consistent production
- Reduces production cost
- Minimum human interference
- Standardize quality testing procedures



A Insmart Sample collection Systems	Page No.
Sampler for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Samplers	28
Sample Pneumatic Transportation System	30

B Insmart Sample Preparation Systems	
Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	
Insmart Sample Division Equipment	
Rotary Sample Divider	55
Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems	Page No.
Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80
Insmart Proximate Analysis Equipment	
Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82
Insmart Sieving Equipment	
Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68
Insmart Special Equipment	
Hydraulic Pallet Press	52
HGI Test Apparatus	73
Insmart Auxiliary Equipment	
Fume Chamber & Hot Plate & Hot Plate	83
Glassware Items	
Crucibles	

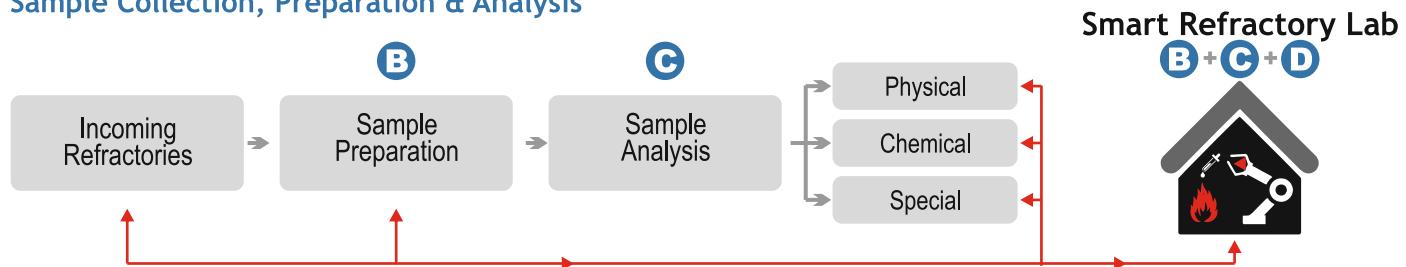
D Insmart Turn Key Smart Lime - Dolo Lab

Smart Refractory Lab

Smart Lab

Quality of Refractory plays a vital role steel plant operations in terms of production cost, safety and efficiency from iron making to finished product. Refractories are used in various furnaces and the quality of refractory differs based on application. Thus, quality assessment of refractory has to be standardized. Insmart make Refractory Labs are custom designed and comes with technical expertise to meet stringent quality requirements.

Insmart Solutions for Smart Refractory Lab - Sample Collection, Preparation & Analysis



B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

Page No.

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Hot Air Oven	80
Insmart Proximate Analysis Equipment	
Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Special Equipment	
Hydraulic Pallet Press	52
High Temperature Furnaces	
Insmart Auxiliary Equipment	
Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

Page No.

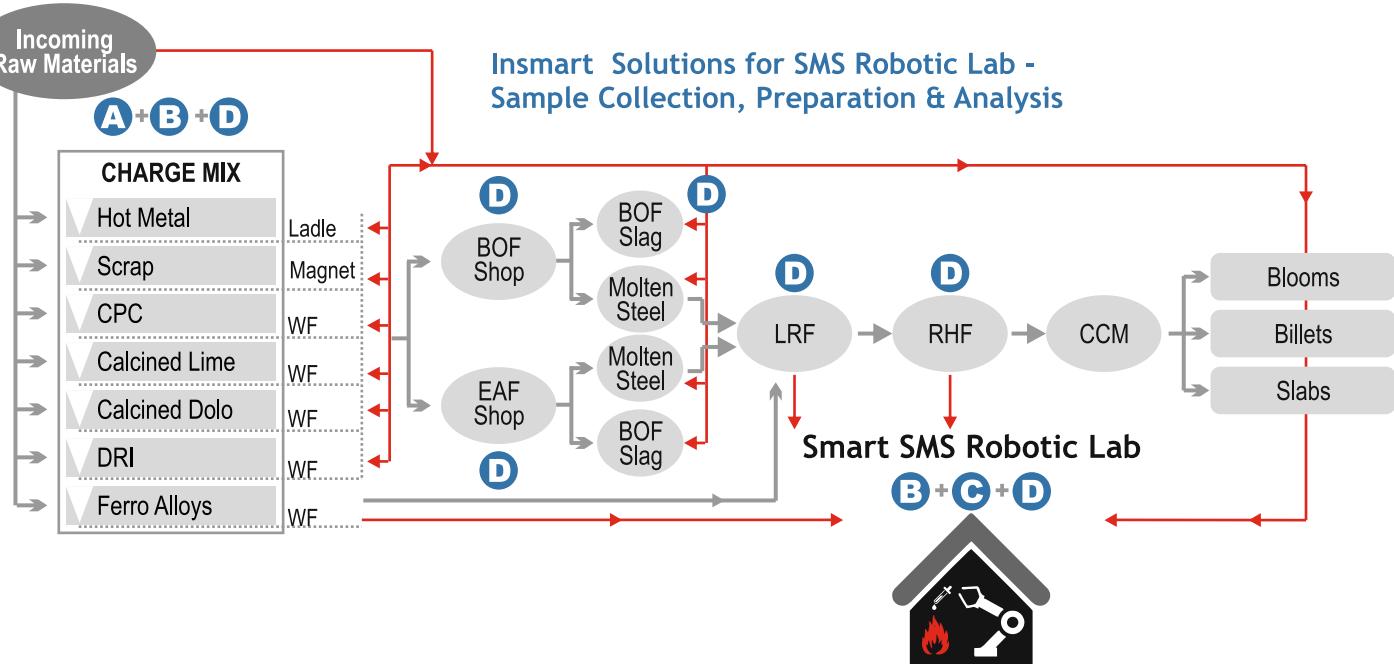
D Insmart Turn Key Smart Refractory Lab

Smart SMS Robotic Lab

Smart Lab

The Steel Melt Shop (SMS) productivity is calculated at every minute. Thus, after the sample is collected, the laboratory must be equipped with faster sample handling and preparation system. Insmart supplies end-to-end solution i.e. Sample Transportation to sample Preparation for express analysis. The benefits of Express Lab are:

- Minimize Tap to Tap time
- Quality Deviations are reduced substantially
- Improve laboratory environment and personnel safety
- Optimizes cost of production.



A Insmart Sample collection Systems

Cross Belt Samplers	26
Truck / Wagon Samplers	28
Sample Pneumatic Transportation System	30

Page No.

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Hot Air Oven	80

Insmart Proximate Analysis Equipment

Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81

Insmart Sieving Equipment

Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
------------------------	----

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

B Insmart Sample Preparation Systems

Insmart Crushing Equipment

Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment

Rotary Sample Divider	55
Riffle Splitter	56

Insmart Pulverising Equipment

Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

Insmart Metal Polishing Machine

Milling Machine	88
End Pin Cutting Machine	89
Button Sample Preparation Machine	90

D Insmart Turn Key Solutions

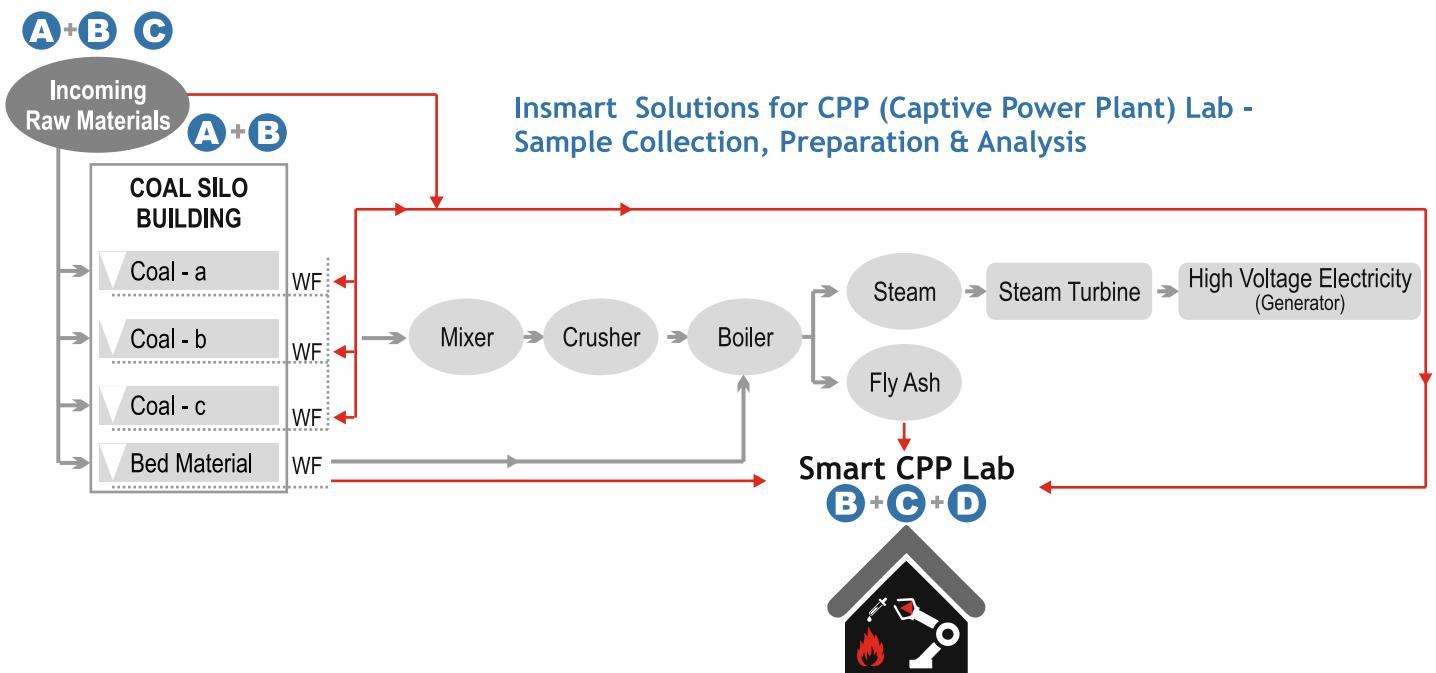
Containerized Lab	23
Insmart Integrated Ferro - Alloys Sample Collection & Preparation System	29

Smart CPP (Captive Power Plant) Lab

Smart Lab

Captive Power Plant performance depends mainly on consistent quality of Coal being fed to it. Insmart offered Power Plant Lab comes with state of art technology for sample collection, sample preparation and analysis. The advantages of Insmart Lab:

- Timely Sample Collection
- Implementation of standard sample preparation
- Accuracy in analysis with minimum human interference
- Helps in achieving higher PLF.



A	Insmart Sample collection Systems	Page No.
	Cross Belt Samplers	26
	Truck / Wagon Samplers	28

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment	
Rotary Sample Divider	55
Rifle Splitter	56

Insmart Homogenising Equipment	
Turbo Mixer	54

Insmart Pulverising Equipment	
Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems	Page No.
--	----------

Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

Insmart Proximate Analysis Equipment	
Muffle Furnace (Volatile Matter)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment	
Gyratory Screen	63
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment	
Hydraulic Pallet Press	52
Insmart Hard Grove Grindability Index	73

Insmart Auxiliary Equipments	
Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

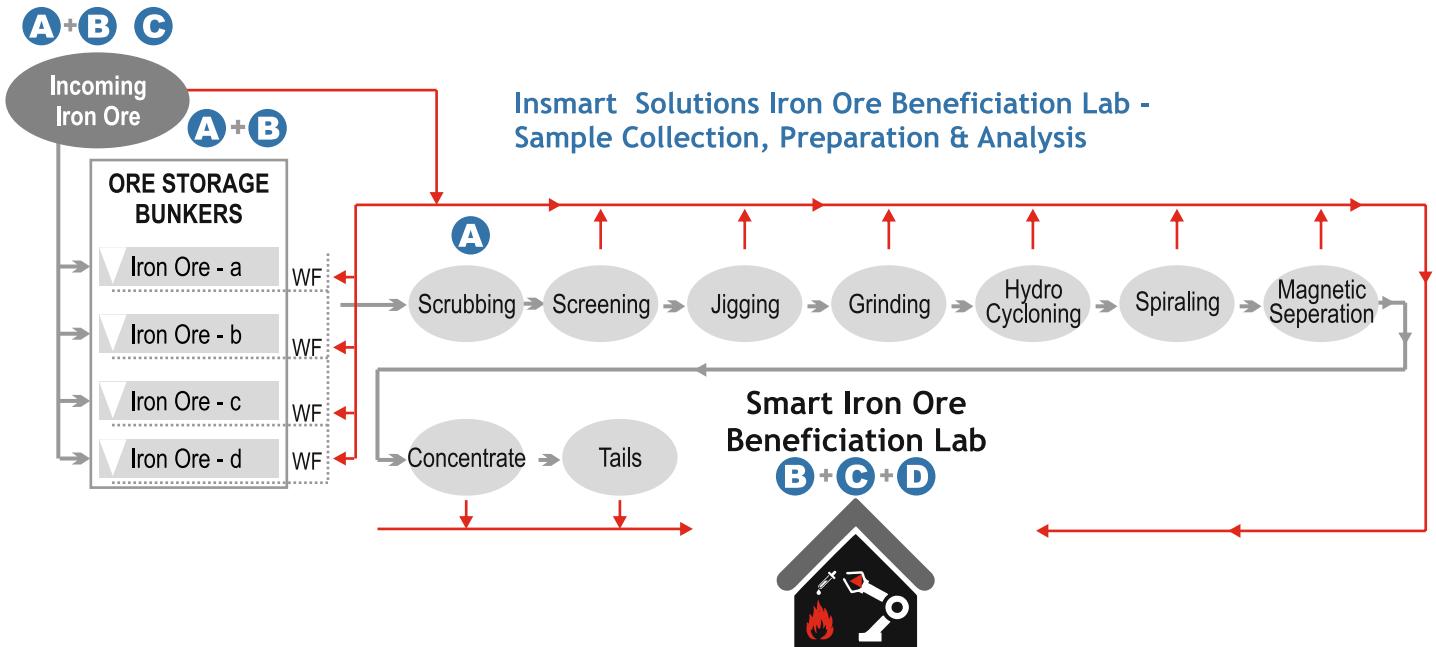
D Insmart Turn Key Smart CPP Lab

Smart Iron Ore Beneficiation Lab

Smart Lab

These benefits derived by Insmart labs would result in long term Customer satisfaction, Branding, Reputation and Financial gains.

- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Achieve consistency in product quality
- Minimum human interference in analysis
- Regulate plant control parameters to minimize quality deviations.



A Insmart Sample collection Systems

Sampler for Powdery Materials	25
Cross Belt Samplers	26
Truck / Wagon Samplers	28

B Insmart Sample Preparation Systems

Insmart Crushing Equipment	
Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment

Rotary Sample Divider	55
Riffle Splitter	56

Insmart Homogenising Equipment

Turbo Mixer	54
-------------	----

Insmart Pulverising Equipment

Vibratory Cup Mill	40
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment	
Surface Moisture Analyzer	79
Hot Air Oven	80

Insmart Proximate Analysis Equipment

Muffle Furnace (LOI)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
-----------------	----

C

Ro-tap Sieve Shaker

Page No.
64

Electro Magnetic Sieve Shaker

65

Vibratory Screen - Single / Multi Deck

68

Insmart Special Equipment

Hydraulic Pallet Press	52
Tumbler Drum	75
Shatter Test Apparatus	77
Mineral Jig	91
Concentrating Table	93
Hydro Cyclone	95
Work Index Ball Mill	70
Work Index Rod Mill	69
Density Separator	94
Laboratory Spiral	96
Davis Tube Tester	97
LIMS	98
Disc Dry Magnetic Separator (HGMS)	99
Perm Roll Separator	100
WHIMS	101
Flotation Cell	103
Infra Red Dryer	105
Pulp Density / Sp. Gravity Apparatus	106

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

D Insmart Turn Key Smart Iron Ore Beneficiation Lab

Smart Research & Development Lab

Smart Lab

These benefits derived from Insmart labs would result in long term Customer satisfaction, Branding, Reputation and Financial gains.

- Improve Accuracy, Repeatability and Reproducibility of Analysis
- Achieve consistency in product quality
- Minimum human interference in analysis
- Regulate plant control parameters to minimize quality deviations.

Pilot Sinter
Testing Lab

Pilot Coke
Testing Lab

Pilot Pellet
Testing Lab

Mineral Beneficiation
Lab

Analytical Lab

High-temperature
Lab

Steel Testing
Lab

B Insmart Sample Preparation Systems

Insmart Crushing Equipment

Jaw Crusher	33
Jaw Crusher with Sample Divider	36
Roll Crusher	38
Roll Crusher with Sample Divider	
Hammer Crusher	39
Hammer Crusher with Sample Divider	

Insmart Sample Division Equipment

Rotary Sample Divider	55
Riffle Splitter	56

Insmart Homogenising Equipment

Turbo Mixer	54
-------------	----

Insmart Pulverising Equipment

Vibratory Cup Mill	40
PBM (Planetary Ball Mill)	44
Disc Mill	46
Hammer Mill	47

C Insmart Sample Analysis Systems

Insmart Moisture Determination Equipment

Surface Moisture Analyzer	79
Hot Air Oven	80

Insmart Proximate Analysis Equipment

Muffle Furnace (LOI / VM)	81
Muffle Furnace (Ash)	81
Insmart Proximate Analyzer	82

Insmart Sieving Equipment

Gyratory Screen	63
Electro Magnetic Sieve Shaker	65
Ro-tap Sieve Shaker	64
Vibratory Screen - Single / Multi Deck	68

Insmart Special Equipment

Hydraulic Pallet Press	52
Work Index Rod Mill	69

Work Index Ball Mill

HGI Test Apparatus	73
Coal Free Swelling Index	74
Tumbler Drum	75
Shatter Test Apparatus	77
CCS Testing Machine	78
Micum Drum	79
Softening Melting Test Apparatus	84
CSR - CRI Test Apparatus	85
RI / RDI Test Apparatus	86
Pellet / Iron Ore Swelling Test Apparatus	87
Milling Machine	88
End Pin Cutter	89
Button Sample Punching Machine	90
Mineral Jig	91
Concentrating Table	93
Density Separator	94
Hydro Cyclone	95
Laboratory Spiral	96
Davis Tube Tester	97
LIMS (Low Intensity Drum Type Dry Permanent Magnetic Separator)	98
Disc Dry Magnetic Separator (HGMS)	99
Perm Roll Separator	100
WHIMS WET (High Intensity Magnetic Separator)	101
Flootation Cell	103
Infrared Dryer	105
Pulp Density / Sp. Gravity Apparatus	106

Insmart Auxiliary Equipment

Fume Chamber & Hot Plate	83
Glassware Items	
Crucibles	

D Insmart Turn Key Smart R & D Lab

Smart Containerised Lab for Steel Sample Analysis (Express Lab)



The system is fully automated and shall be used for sample preparation for rapid and accurate analysis of Metal samples without any manual intervention.

It consists of sample introduction facility, automated sample preparation system, master control system, automated software, robot system, vision system, Optical Emission Spectrometer, sample holding system, sample identification marking system, sample storage system and Analyzed Sample Data Transmission System.

All the above laboratory components are integrated within a container having a size 10'X20'. The operator places the steel samples into semi automated tail cutting machine placed outside the Container Lab. The operator inspects the sample for having proper shape and size, in case there are fins around the sample periphery, the operator grinds the sample to obtain smooth surface in the periphery to facilitate proper grip by the Robotic gripper arms. A pedestal grinder is provided outside the Container lab near pin cutter.

The operator places the OK sample (after cutting the tail and smoothening the periphery of the sample) at the sample entry station called the input station of the Container laboratory, the sample identification is fed in the HMI manually and activates cycle start instruction. The sample shall be picked up by Robot and shall be placed in the automatic milling machine where the sample preparation shall be performed.

After completion of sample preparation (milling the surface), the robot carries the sample to vision system to identify good surfaces (points) by image analysis. After the image analysis through vision system the robot places the sample at spark stand of OES by coinciding right spot w.r.t. spark electrode. After first spark the robot automatically positions the sample for second spark at the second pre identified spot. If the analysis matches the desired levels the analysis is considered as over otherwise the robot places the sample for the third spark and so on, any two analysis should match to declare the result if not the sample is declared as bad sample.

The sample is handled from one spark position to the next position by the robot. After the analysis is over, the result are automatically transmitted to the predefined destination for the user for further transmission as desired. Finally the sample shall be passed to the storage bin after automatically printing the identification of the sample for future traceability.

The complete analysis device is cleaned & the spark stand is sealed automatically to avoid contamination by incoming air, when there is no cleaning activity.



TURNKEY LABS

for Iron and Steel Industry



Turnkey Labs



In iron and steel industry raw material quality and selection of raw materials plays major role for efficient operation. Any green field or brown field project in this industry need many equipment for setting up of laboratory. For selection of laboratory equipment in iron making and express lab, ferro- alloys sample preparation and R & D labs, the lab in-charge need to approach many suppliers for various testing equipment, lab construction, interior design, training of laboratory manpower.

Insmart has set up it's own laboratory for testing of various materials for Physical, chemical, metallurgical tests and mineral beneficiation and characterization. Having vast experience and considering the iron and steel laboratories requirements, insmart offers well integrated, modern laboratories on turn key basis for Coke Oven, Mineral Beneficiation, Sinter Plant, Blast Furnace, Pellet Plant, R and D, Refractory lab, Container lab, Power plant lab etc. The interior design of office, shelves, cabinets, chairs, air conditioners etc are of industrial grade to meet industry standards.



Benefits:

- Single point of contact for entire range of laboratory equipment selection and supply.
- Imparting training to the working personnel and laboratory staff.
- Standardization in sample collection, Sample Preparation and analysis
- Effective utilization of manpower
- Improve safe working standards of laboratory and laboratory personnel
- Optimize sampling frequency and minimize errors
- Optimize cost of analysis

Turnkey solutions includes:

- Laboratory design and Construction
- Physical analysis
- Chemical analysis (Conventional and Modern)
- Metallurgical testing facilities
- Mineral Characterization lab
- Ferro alloys sample preparation system
- Containerized lab (Express lab)
- Pilot test facilities for Mineral beneficiation
- Annual Maintenance Contract (AMC)
- Comprehensive Annual Maintenance Contract (CAMC)
- Pilot Coke Oven, etc.

AUTOMATIC SAMPLERS FOR POWDER MATERIALS

Best suited for continuous sampling of
PCI (Pulverized Coal Injection), Calcined Lime Fines



Automatic Sample Collection Systems



Designed for continuous collection of PCI Coal samples and Calcined Lime Fines, the Insmart sampler is a point sampler for free-flowing materials from gravity chutes / hoppers.

The fully extended rotary screw rotates in the sampler chamber with well distributed apertures in the upright position.

The continuously operating sampler is driven by a geared motor, coupled to a transport screw crossing the flow of material. The screw transports extracted material to a homogenizer, where it is homogenized by flap wings connected at center of a horizontally aligned Homogenising cone.

The sampling station is provided with a secondary sampler that draws a dozed quantity into the sample bottle. Here the sending station is aligned with the secondary sampler. The sending station transports the sample bottle to the Robotic Sample Preparation Lab.

The excess material is delivered to the main chute using a discard material chute thereby ensuring no material wastage.

Sampling cycle is controlled by the controller of the auto sampling process station.



CROSS - BELT CLEAN RADIAL SWEEP SAMPLERS

for lumpy Iron Ore / Iron Ore Concentrate / Limestone /
Sinter / Pallet / Coal / Coke / Dolomite / DRI etc.
auto sample collection



Automatic Sample Collection Systems



Onsite Sampler with integrated sample division system - Tata Steel West Bokaro

Insmart has manufactured and supplied mechanical sample preparation equipment primarily in India, rest of Asia and Africa for over 26 years.

Insmart cross-belt samplers are specifically engineered, designed and manufactured to suit varied site conditions. They are far superior in material quality and yet very cost effective systems.

CLEAN RADIAL SWEEP CROSS BELT SAMPLER HIGHLIGHTS

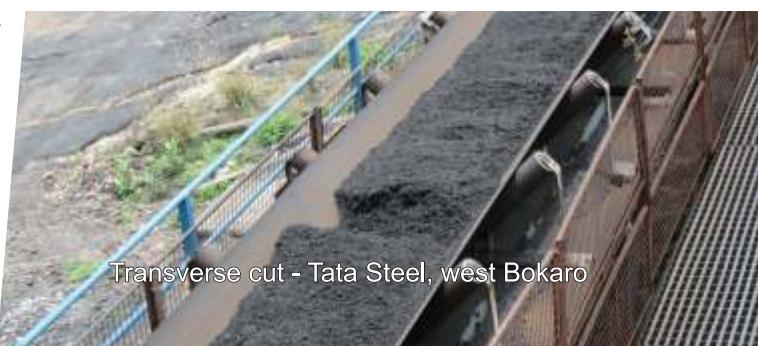
- Comprehensive range of Cross Belt Sampling System which can be retro fitted to troughed belt conveyors with minimal modifications.
- It is possible to integrate on-site sample preparation with Insmart Cross Belt Samplers. Insmart can also provide systems to return excess sample back to the belt.
- The rotary scoop aperture moves perpendicular to the centerline of the belt being sampled keeping the belt safe and collecting a complete band of material from the moving belt conveyor.
- The belt conveyor at the sampling area is securely supported by more condensed impact idlers. This makes a perfect arc in the cutter path from entire cross section of the belt.
- The radial scoop passes through the entire stream of material during one continuous operation with the minimum cutter velocity at the tip of the radial scoop being 1.5 times the speed.
- Scoop design, scooping speed and non metallic cutter tips ensure that all particles including ultra-fines falling in the scooping path are collected.
- The rotary scoop is counter weighted in order to avoid potential structural problems with the sampling system.



Integrated Sampler with on site sample preparation at NALCO



Heavy Duty Rotary Scoop



Transverse cut - Tata Steel, west Bokaro

CROSS - BELT CLEAN RADIAL SWEEP SAMPLERS

for lumpy Limestone / Clinker / Bauxite / Coal / Coke
auto sample collection



Automatic Sample Collection Systems

Cross Belt Clean Radial Sweep - Design Features

- Available to suit any belt size, speed or capacity.
- Large range of top sizes can be accommodated.
- Clean radial scooping action - collecting material from entire belt cross section (including fines).
- Heavy duty rotary scoop and enclosure construction .
- Detailed engineering of mechanical components.
- Direct drive.
- Geared motor with brakes.
- Non-sticky arched enclosure.
- Garland type troughing idlers.

Dome Shaped Sampler Enclosure & Inspection Door

- Easy rotary scoop access.
- Obstruction free unique dome design to ensure smooth flow of material from collection scoop/bucket to the sample collection chute. Inside surfaces are kept as flat as possible thereby, reducing places for material to stick.

- Maintains material velocity right upto to the discharge section.
- Electrical safety interlocks to prevent equipment operation when doors are open.

Heavy Duty Rotary Scoop

- Ultra heavy duty and special material of construction components for long life.
- Engineered to operate effectively even during uneven belt loading.
- Counterweighted to balance stored energy for smooth sweeping action.

Circular Garland Idlers

- Aligns belt perfectly to rotary scoop trajectory.
- Extra protection along skirt boards to prevent material loss in spillage.

Technical Specifications:

S.No	Specifications	Product Specifications & Equipment customization Range
1	Equipment Name	Mechanized "Cross Belt Clean Radial Sweep Sample Collection system"
2	Material	Lumpy Iron Ore / Iron Ore Concentrate / Limestone / Sinter / Pallet / Coal / Coke / Dolomite / DRI etc.
3	Max. Lump Size	-10 to -100 mm (Occasional 120 mm)
4	Bulk Density of material	400 to 1800 Kg/m ³
5	Belt Capacity (Working Operational)	20 to 3400 Tons/Hr
6	Belt Conveyor inclination	Flat to 20°
7	Belt Conveyor Width	450 to 2400 mm
8	Trough Angles	25° to 45°
9	Belt Speed	1 to 4.5 m/sec
10	Frequency of Sample Collection Range	1 to 60 Per Hour
11	Increment (Quantity per operation)	1.5 Kgs to 120 kg (Belt width & belt loading dependent)
12	Width of scoop	Upto 3 times the lump top size
13	Scoop wiper tip speed	1.5 m/sec to 6.75 m/sec
14	Total quantity collected per hour basis	~1.5 to ~650 kg
15	Automation	PLC controlled advanced systems completely aligned to the belt operations. Programmable sample collection frequencies.
16	Basic Material of Construction	Sampler Enclosures
		Mild Steel (Stainless Steel enclosures in case of AFR sampling)
		Sampling Scoop
		Stainless Steel / Steel
		Scooping Tips
		Non metallic - Polyurethane polymers
		Motor Protection
		IP 65 in case of AFR sampling
		Counter weight for scooping arm
		Mild Steel, Stainless Steel
		Impact idlers(Garland Type)
17	Motor Power	4.5 to 18 kW, 400 V ± 10

Get in touch with us to find the most suitable solution for your purpose.

TRUCK / WAGON SAMPLER

Best suited for Ore concentrates like -
Zinc & Lead Concentrates, Copper Concentrates
Marble Fines and Paint Additives



Random Sample Collection Spots

Due to constant need to assess the quality of as-received raw materials in process plants, Insmart has designed extremely powerful Auger samplers which collect samples using hydraulically operated drives.

Representative samples are collected by embedding the Auger arm into the material and collect samples from the entire cross section of the trucks / wagons.

Auger Sampling

For material unloading sites where the full stream mechanical sampling systems are not available, Trucks or Wagons can be sampled using the Insmart designed and operated mechanized auger sample collection systems.

Insmart supplies end-to-end sampling system from collection to analysis keeping alive the BIS standard guidelines.

The auger is equipped with a bided screw shaft that augers material across the truck / wagon cross section upto a depth of 2 meters.

A Robot mounted auger arm rests on an electrical jack & can collect increments from the wagon or truck at multiple points, keeping alive the random sampling parameters.

On its upward movement the increment is passed through a container and the sample of approx 1 Kg from the collected gross sample is collected as representative sample.

This also ensures, zero material wastage at the sample collection stage.

The collected increment is simultaneously transferred via a chute to the adjoining sample preparation platform

placed on the mobile truck platform.

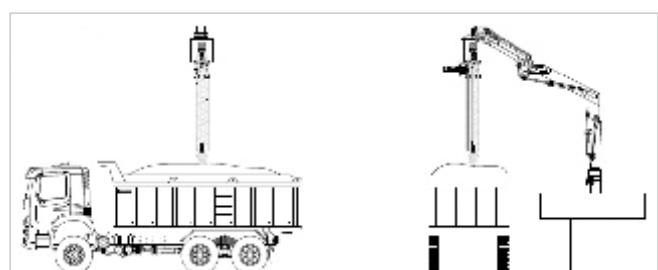
Insmart's Auger sample collection system is a heavy-duty machine that has been developed to efficiently extract run-of-mine samples which could include high density contaminants as well.

The truck movement and auger operation process for automated sample collection can be conveniently performed in a manless manner.

The entire sample collection process is powered by electrical supplies.

Advantages

- Sample drawal from entire vertical cross section of the trucks/wagons.
- Operation with a variety of materials including cross seam materials.
- Functions with a single operator.





Ferro alloys form an essential raw-material in steel making and the most commonly used are; Ferro Vanadium, Ferro Molybdenum, Ferro Silicon, Ferro Chrome and Ferro Manganese. The alloys are commonly supplied in jumbo bags carried in trucks.

Out of several trucks carrying Ferro Alloys, a few trucks are selected at random for sampling. From each truck, 3 jumbo bags are picked up at random. These 3 bags of 1 ton each are processed in the system one after the other.

The Ferro-alloy material is received with a maximum input size of 70 mm.

To begin with details of each lot or sub-lot are registered in an inward register for material identification. These registration details are also entered in the identity tags attached to the trolleys.

Each jumbo bag of 1 ton is lowered by a mobile crane on a receiving hopper where it gets punctured by a piercing cutter. The received material is fed by a vibrating feeder on to the conveyor.

A provision for manual sample feeding is also provided. Here approx. 25 Kg bags are kept on a table, manually punctured and emptied on to the conveyor.

The conveyor lifts the material and feeds it through a second vibro feeder into a special sample divider which is programmed to handle 1 ton of material in about 10 minutes.

The sample divider contains a rotating bucket which collects representative sample at periodic frequency from the falling stream. This sample divider collects approx. 150 kg material in several increments and feeds the material into vibratory screens for sieving.

The material passing through the primary sample divider passes through another sample divider where 7 to 9 kg material is drawn in several increments and collected into a mobile trolley for chemical analysis.

After all 3 jumbo bags are processed approx. 25 to 30 kg material is collected in the mobile trolley. The discard material from both the sample dividers is about 840 Kg, which is dumped in a discard bin.

Approx. 450 Kg representative sample material is collected and subjected to sieving on the multi deck vibrating screens. Different size fractions are segregated and collected in separate

bins. The large fraction is carried in a separate trolley while the three smaller fractions are carried in a single trolley. The individual size fractions are separately weighed and their particulars recorded by the operator. This completes sample draw and sieving operation.

The operator then carries approx. 25 to 30 Kg sample along with the sample identity tag to the sample preparation section, where the tag details are recorded into the log book.

The mechanized sample preparation cycle begins with feeding the entire 25 to 30 Kg of representative sample material into the specially designed slotted conveyor which uniformly feeds the material into the vibrating hopper of the Primary Jaw Crusher.

The Unique action of Tungsten Carbide lined jaw blades crushes the sample material to minus 12 point 5 mm size. The crushed sample falls onto an inbuilt sample divider to obtain a representative sample quantity of 3 Kg while the remaining sample is discarded. The representative sample is conveyed into the secondary Jaw Crusher where it is crushed to minus 5 mm. The sample is further divided in a falling stream Sample Divider to obtain the desired quantity of about 120 grams. The balance material is disposed of in the discard material bin. This completes the crushing operation.

The representative sample of approx. 120 grams is then fed into the Vibratory Cup Mill for pulverizing. The VCM grinds the sample to minus 100 mesh in about 3 minutes. The ground sample is emptied by the operator in a tray and three parts of 40 grams each are prepared by weighment. These separate parts are filled in bottles which are labeled by the operator for identification purposes. The first bottle is sent for XRF and carbon-sulphur analysis, the second is referee sample and the third is handed over to the supplier. This completes the pulverizing operation.

The entire size analysis and sample preparation process can be smoothly performed by a single operator very easily.

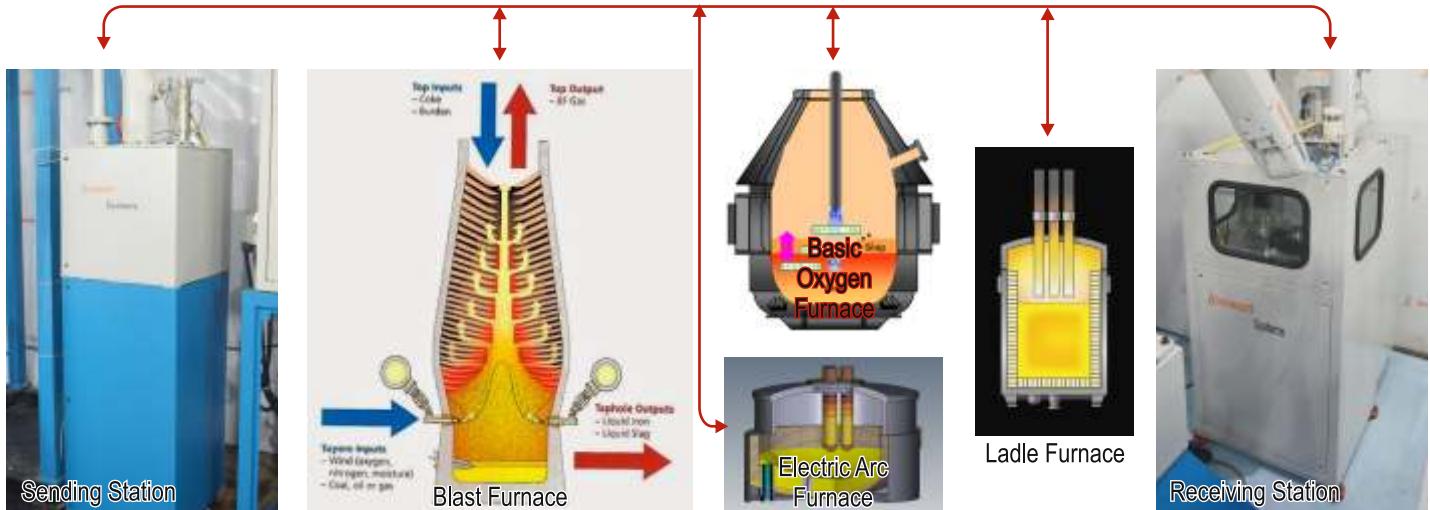
Insmart's automated sieving and sample preparation system is designed to provide repeat accuracies in sampling processes and remove the need for a person to carry the sample to the processing unit and to put large quantities of discard samples to the yard. Thus, Insmart's sampling solutions are highly reliable, help customers in saving time and provide much faster payback time.

PNEUMATIC SAMPLE TRANSPORTATION SYSTEMS

Customisable Solutions for Steel Plant (Blast Furnace and Steel Melting Shop)



Pneumatic Sample Transportation Systems



Pneumatic Sample transportation system - Customizable section for Steel Plant (Blast Furnace and Steel Melt Shop).

Timely and accurate analysis plays vital a role in productivity, quality and cost of steel making. Present practice of steel industry is: hot metal, steel and slag samples are collected and sent manually to labs. These samples are labeled manually and identification is entered manually at every stage of operation. The analysis is communicated to the user through telecommunication or mail communication for further course of corrective actions.

Demerits of present system:

- Delay in sample analysis
- Sample mix up and mishandling
- Communication gaps
- Fatigue to the manpower
- Low productivity
- Higher quality rejections
- Higher production cost

Considering the above, Insmart has introduced fully indigenous pneumatic sample transportation with automatic sample ID printer and ID reader. In this system, sample collection is done manually and sample ID is generated manually at source of generation only one time. After that, the sample moves into Insmart supplied fully automatic pneumatic sample transportation system. The system delivers the sample to the lab and the empty bottle is automatically sent back to sample collection point.

Salient Features:

- Sample ID Printer
- Sample sending station
- Series of Seamless Pipes & Bends
- Bottle tracker in the pneumatic line (saves time in case of system failures by identifying bottle location)
- Set of Blowers
- Sample receiving station

Controlling details:

During standard operation the bottles are transported with up to 16 m/sec (60 km/h) through the transport tube network. The speed can be considerably reduced during the sample landing locations at sending and receiving stations. Here the sample bottles glide at a very low speed of only 2 to 3 m/sec. and this controlled transport condition allows the problem-free transport of laboratory samples and ensures that the bottles remain undamaged and intact for longer time.

Advantages:

- Higher productivity
- Improve quality
- Minimize production cost
- Improves working standards of sampler and laboratory system



ROBOTIC SAMPLE PREPARATION LABS

for Sinter Plant / Pellet Plant / Blast Furnace / DRI



Robotic Sample Preparation Labs



Steel Plant Labs with Robotic Sample Preparation Systems

Insmart systems automated and robotic sample preparation systems are custom built and they are best suited for Pallet / Sinter / Beneficiation / BF / DRI etc.

An investment with a quick returns

Insmart integrated auto sampling, auto transportation and integrated robotic labs provide complete end-to-end sampling to analysis solutions using advanced robotics sample handling technology for process material testing.

Insmart Robotic Labs have the following distinct advantages:

- Extremely rapid sample preparation with unparalleled consistency.
- Elimination of human involvement in day to day operations. Thus, eliminating human errors.
- Comprehensive sample traceability from collection to analysis.
- Synchronized process control with high reliability.
- Fully programmable data interpretation parameters to suit every plant.
- Insmart Robotic System increases operation health and safety of employees and eliminate heavy lifting and working in dusty environment.
- Personnel are also isolated from hazardous zones/materials. Thus, improving personnel safety.
- Automated Samplers and Sample Transportation systems can deliver reliable samples for analysis every hour or every half an hour from various sampling points.
- Automated Robotic lab handles the sample preparation and

sample analysis with zero chance of errors and works with 98% availability.

The Automatic Steel Plant laboratory setup includes:

- Automatic Sampling Systems
- Automated Sample Transportation Systems
- Automated Robotic Sample Preparation Systems
- Analytical Equipment System integration
- Seamless integration with plant softwares

Our Automation facilitates speedy n' accurate analysis data availability for quick process control on following plant parameters:

- 1) Sinter Plant: Sinter Basicity, Size Analysis
- 2) Pellet Plant: Pallet CCS, Pallet Fe / B2
- 3) Blast Furnace: Slag Analysis (B2 / Alumina), Hot Metal Analysis
- 4) Input Raw Material: Fe, Silica, Alumina, MPS, Fines Content, etc.
- 5) DRI (sponge iron) Plant: Fe/C Ratio, Fe metallic, Non-mag %, etc.
- 6) SMS (Steel Melt Shop): Carbon Sulphur Analysis, Slag Analysis, Steel Sample (spectro) Analysis



CONVENTIONAL SAMPLE PREPARATION LAB for Steel Plants



Sample Preparation Systems

Jaw crusher with built in sample divider

Best suited for Size crushing & Sample Division
Stage wise sample crushing (-150mm to -3 mm in 2 quick steps)
Sample Drawal Output:
~ 2 Kg sample for grinding at -3 mm stage



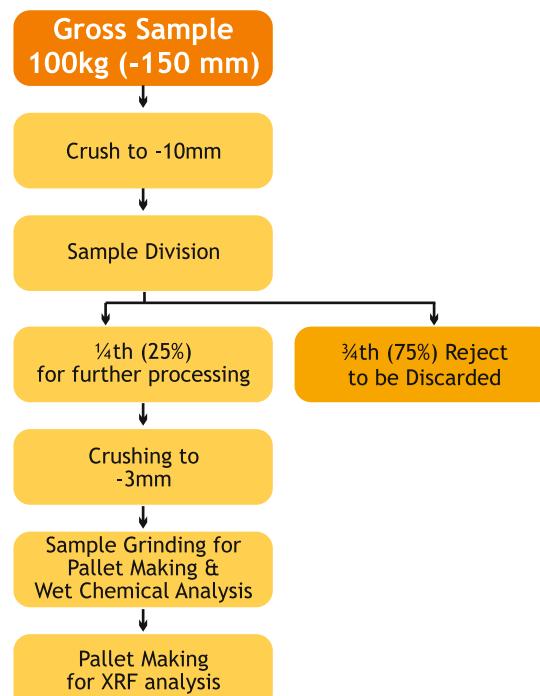
Vibratory Cup Mill (VCM)

Best suited for grinding most of the materials within 3 minutes
Output range: 150 to 38 microns

40 ton Hydraulic Pallet Press

Best suited for Pallet making of most of the materials within 90 seconds

Conventional Sample Preparation flow sheet for Iron Ore & Additives



JAW CRUSHERS

3 variants



Sample Crushing Systems



Optional Dust Extraction System

Jaw Crusher is a basic sample preparation unit and is essential to address all primary size reduction requirements. Desired crushing takes place when fed particles experience stress and the compressive pressure exerted by the jaw blade toggling action exceeds its fracture stress. By this action the feed particles are crushed to smaller sizes. The product size will depend upon the crusher blade gap and feed particle characteristics (for eg.: material hardness, weak planes, weathering, thermal history etc.).

Working Principal of Jaw Crusher

Lumpy test material to be crushed is fed into the crushing zone through a hopper. The crushing zone consists of two parallel side walls of hardened and tempered steel and two special profile Jaws. One jaw is provided with oscillatory motion, whereas the other jaw is hinged to adjust the gap and get desired output size through an adjustable screw mechanism. The crushed material comes out from the crushing zone and gets discharged into a large collecting receptacle.



Provision is made to extract the flying dust, through vacuum suction system.



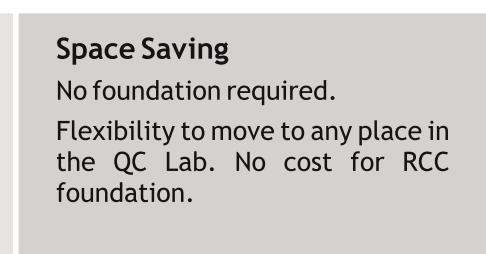
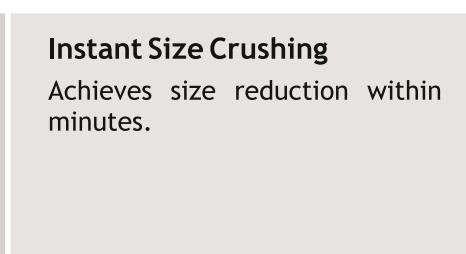
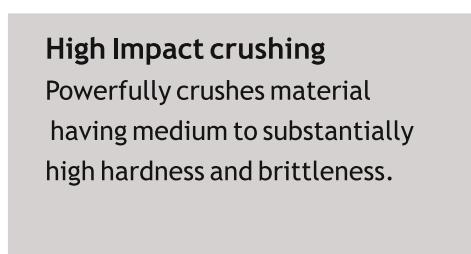
JAW CRUSHERS

3 variants

Sample Crushing Systems

FEATURES:

- Ideal for Primary & secondary crushing of the ores/minerals like: Magnetite, Hematite, Laterite, Limestone, Bauxite, Manganese ore, Quartz, Chromite, Coal, Pet coke, Met coke and Ferro Alloys.
- Firm design does not require any foundations and gives customer a freedom to shift the equipment as per the requirement.
- Dynamic Jaw Blade gap adjustment mechanism makes it convenient to crush the material to different sizes by performing simple jaw blade gap adjustments.
- Eliminates the need for procuring multiple crushers.
- Available in 3 variants.
- Environment Friendly equipment: Comes with provision of dust extraction systems in-order to arrest the flying dust that gets generated during sample disintegration process.
- High speed operation, economical mode, robust & space saving designs make Insmart crusher a favourable choice for instant size reduction of diverse material samples with repeatedly accurate performance.
- A range of Jaw crushers are available to crush the materials with top size ranging from 150 mm to 65 mm and provide final outputs of upto 3mm.
- All Insmart Jaw crushers achieve extremely rapid comminution by toggling action.
- Extraordinarily fast and effortless maintenance.
- Extreme forces generated during toggling action can bring about fragmentation of very hard materials.
- Different types of Jaw Blade Sets are available to suit material variability.



Highlights of Crushing Environment:
150 mm Jaw opening accepts input size suitable for a variety of lump sizes.
High material reduction, upto 3 mm size, is achieved by faster and more efficient crushing with 2 stage process.
Movable Jaw with toggle speed of numerous strokes per minute.
Jaw blades made from hardened steel provide improved analytical results as they give minimum sample contamination.

Gap Adjustment Feature:
A jaw blade gap adjustment system provides a continuous gap width setting arrangement to produce desired size reduction.
Gap width setting range: 0 to 50 mm in increments of 1 mm

Safety Features:
To help machine operator's material handling activities, the Jaw crusher is provided with an Over load relay which efficiently trips the motor in case of material clogging due to sudden material dumping.
Pulley guard prevents all accidental contacts with the belt and pulley assembly while machine is in operation.

JAW CRUSHERS

Equipment Technical Data Sheet



Sample Crushing Systems

Technical Specifications: Insmart Jaw Crusher (3 Variants)									
Mounting Type	Floor mounting		No foundation required						
Working Principle	Impact								
Maximum Feed Size	IJC 3 ≤ 150mm		JC 2 ≤100mm		IJC 1 ≤65 mm				
Feeding entrance size-mm	165 X 150		110 x 105		110 x 100				
Lumps bigger than designated feed size can be manually broken before feeding them on to the hopper									
Feed Hopper	Batch Feeding Hopper		To ensure non-choking batch feeding into the crushing media						
Throughputs *All crushers with unique jaw blade gap adjustment mechanism to get different desired outputs	IJC -3: ~500 Kgs/Hr at -150 mm feed and 50mm output at a sample moisture of 5-6% IJC -2: 250 Kgs/Hr at -100 mm feed and 12.5mm output at a sample moisture of 5-6% IJC -1: 100 Kgs/Hr at -65 mm feed and 12.5mm output at a sample moisture of 5-6%								
Crushing materials	Ideal for Primary & secondary crushing of the ores/minerals like: Magnetite, Hematite, Laterite, Limestone, Bauxite, Manganese ore, Quartz, Clinker, Chromite, Coal, Pet coke, Met coke and Ferro Alloys Crushes materials with medium to substantially high hardness and brittleness								
Hardened steel Jaw Blades	IJC 3 Size: 325 x 151 x 30mm		IJC 2 Size 270 x 100 x 28mm		IJC 1 Size : 260 x 100 x 19mm				
Floor area (m²)	Jaw Crusher – Feed Size upto 150 mm		Jaw Crusher – Feed Size upto 100 mm		Jaw Crusher – Feed Size upto 65 mm				
	0.7307		0.4725		0.4275				
Material of construction for movable and fixed Jaws [Anti material slip, abrasion resistant materials] Like: Hardened Steel, Manganese Steel, Tungsten Carbide coated, Tungsten carbide lined									
Crushing enclosure side plates	Material of construction: Hardened Steel								
Motor Drive IJC 3	Motor Power : 3.7 kw / 5.5kw		5HP/7.5HP Motor	RPM :1440	3 Phase induction Motor				
Motor Drive IJC 2	Motor Power : 2.2/3.7kw		3/5HP Motor	RPM :1440					
Motor Drive IJC 1	Motor Power : 1.5 kw		2 HP Motor	RPM :1440					
Required Power [to be provided by end user]	3 phase neutral + earthing through 20 amps 4 Pole MCB (Red, Yellow, Blue, Neutral,Earthing)								
Overload Relay	IJC 1 - 5 Amps		IJC 2 – 6 Amps		IJC 3 – 10 Amps				
Total Machine weight [with packed material]	IJC 3	770 Kgs		Machine weight : 650 kgs					
	IJC 2	620 Kgs		Machine weight : 500 kgs					
	IJC 1	470 Kgs		Machine weight : 350 kgs					
Machine Size [in millimeters]	IJC 3	Length: 1220		Width: 599					
	IJC 2	Length: 1050		Width: 450					
	IJC 1	Length: 950		Width: 450					
Dust Extraction Systems [optional]	Removes airborne dust, improves operating environment and eliminates cross contamination								
Purpose	sample crushing for laboratory use								

Sample Crushing Systems



Crushing, Sample Division & Excess Material Discharge Unit

- A unique combination of crushing with inbuilt sample division system for reliable and reproducible particle size reduction & quantity reduction
- Representative sample drawal in the range of 2% to 25%
- Provided with 3 variants to accept a wide variety of materials with top size ranging from 150 mm to 65 mm and provide final outputs of upto 3mm.

Key Features:

- Provides Reliable and Replicateable particle size reduction & quantity reduction.
- Efficient stage wise size reduction and simultaneous quantity reduction .
- Most suitable for sample with varied sizes.
- Floor mounted. Robust, no foundation required.
- Cost saving. Does not require any RCC foundation.
- Digitally adjustable jaw blade gaps setting arrangement for obtaining varied outputs is also available.
- Representative sample drawal in the range of 2% to 25% (sample size specific).
- Enhanced operator and equipment safety features like vibratory feed hopper, over load relays, proximity sensors, phase parameters.

Benefits of Insmart 's Crusher with in-bilt Sample Divider:

- This is a combo unit for primary and successive 2 stage crushing. It performs a sequential sample crushing and sample drawl strictly as per the procedure laid down in various standards.
- The unit covers all the activities from crushing of upto 150 mm size gross sample to drawing representative lab sample (input size acceptability is variant dependent).
- It replaces the need for using multiple lab crushers and thus saves on cost, space, manpower and power consumption.
- Product comes with completely adjustable manual as well as digital controls for stepwise size crushing of gross sample from -150 mm to secondary crushing and tertiary crushing in the prescribed steps.
- Similarly digitally controlled outputs at every stage of size reduction. Thus, it eliminates the need of conventional quarter coning process. Saves on time and improves accuracy.



Sample Crushing



Representative Sample Drawal

Insmart Combo unit is a combination of four principal Assemblies.

1. Primary Crushing System
2. Multi Stage Sample Drawl System
3. Secondary & Tertiary Stage Crushing System
4. Discard Material Handling System

1. Primary Crushing:

Insmart Combo unit takes a feed of up to 150 mm from collected gross sample. The material travels through a vibratory feeder to Insmart Combo unit. It gives following outputs at different stages of its operation. For e.g.

- i) Upto 50 mm of entire gross sample.
- ii) Upto 10 mm representative sample.
- iii) Upto 3 mm representative sample.

2. Multi-Stage Sample Drawal system

- Insmart sample drawal attached with this combo unit comes with a wide range of sample division capabilities.
- The machine is capable of drawing representative sample in a range of 2 % to 25 %. This is achieved by digitally adjusting the material flow rate.

3. Secondary & Tertiary Crushing:

Insmart Combo unit takes a feed of crushed quantity from the crusher. The material travels through a Vibratory Feeder to Insmart Combo unit which gives following multiple outputs that may depend 2nd or 3rd stage crushing.

- i) Representative sample at 2nd stage
- ii) Representative sample at 3rd stage

4. Discard material handling system:

- For smooth stage-wise crushing the discard material should be timely discarded in order to avoid cross contamination.
- For this purpose the system is provided with discard bin for sample discard at different size reduction stages.
- For ease of operation IJC3-FSSD & IJC2-FSSD is provided with wheeled trolley.



Technical Specifications: Jaw Crusher with Built in Sample Divider - Three Variants

Variants	Crusher cum Divider - Large (IJC3 – FSSD)	Crusher cum Divider - Medium (IJC2 – FSSD)	Crusher cum Divider - Small (IJC1 – FSSD)
Input Particle Size	Upto 150 mm	Upto 100 mm	Upto 65 mm
Capacity	For laboratory Use		
Purpose	To Draw true representative sample from the bulk sample (2% to 25%)		
Principal of operation	The entire material is made to fall in a long single vertical stream and a cut is taken at regular intervals		
Sample Divider Motor	Special motor drive, 20 rpm, 230 V, + Neutral & earthing		
Power	2 Pole MCB, 4 amps Single Phase		
Equipment Dimensions (LxWxH mm)	1900 x 690 x 1650	1600 x 650 x 1500	1470 x 600 x 1410

ROLL CRUSHER

Sample Crushing Systems



For fast and effective reduction of feed material by crushing between the rolls.

Principal of operation:

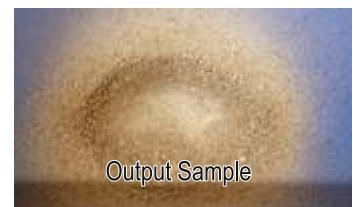
The hard and brittle geological materials are trapped between the two rotating grooved rolls. One of the roll is given power through a "V" belt pulley system and is fixed on a stationary bearing block. The gap between the roll can be adjusted by a spring loaded screw rod. After the desired gap is adjusted the position is locked by a lock nut.

High pressure Roll Crushers having constant preset load with high pressure hydraulic accumulator are also manufactured.

Provision is made to change the speed of rolls electronically.



Feed Sample



Output Sample

Features:

- Ideal for secondary crushing of the ores/minerals like: Magnetite, Hematite, Laterite, Limestone, Bauxite, Manganese Ore, Quartz, Chromite, Sinter etc.
- The crushing is due to entrapment of particles between the rolls thereby the particle gets ruptured this also facilitates low energy consumption during grinding.
- Unique design that operates two rolls with single drive.

- Insmart Roll Crushers have got a unique facility of gap adjustment by two screw mechanism that can easily change the nip angle for getting the desired reduction ratio.
- Firm design does not require any foundations and gives customer a freedom to shift the equipment as per the requirement.
- A range of roll crushers are available to crush with a feed size range of -25 to -3 mm size.

Technical Specifications

Roll Crusher with grooved & plain rolls	Roll Crusher with grooved & plain rolls of 200mm diameter and 150mm width
Roll Diameter	200 mm (Grooved / Plain)
Rolls width	150 mm
Type of Rollers	Manganese Steel/Hardened Steel
Feed Size	Upto -25 mm
Output Size	Upto -1 mm
Crushing Capacity	~200 Kgs/Hr (depending on reduction ratio, it varies)
Roller Speed	120 rpm
Hopper Feeder	Feed Hopper with size 350 X 350mm provided with screen of 20mm dia openings for protecting the operator hands and oversize particles from entering the crushing zone
Roll Gap Adjustment	The gap between the roll can be adjusted by a spring loaded screw rod from 1-12 mm
V- Belts	One of the roll is given power through a V-Belt pulley system and is fixed on a stationary bearing block
Motor Size	3 / 5 HP Heavy Duty Motor
Power Supply	3 Phase, 440 V, 50 Hz, AC Supply with neutral earthing
Type of mounting	Mounted on fabricated steel frame

HAMMER CRUSHER



Standalone Hammer Crusher



Hammer Crusher - integrated with Automatic Sample Preparation Units

Application:

The Hammer Crusher (2 TPH Max Capacity) is used to crush 120mm sample of raw coal to -10 mm.

Equipment Operation: The sample to be ground is introduced into the crushing chamber through a hopper or conveyor.

The rapidly rotating hammers cause a huge centrifugal force on to the feed material which disintegrates as it gets sheared between the fixed toothed circular inserts and rotating hammer arms.

The instance when the particle size becomes smaller than the size of underneath sieves, it passes through the sieve mesh and gets collected in a large canister.

No dust is dissipated in the process thereby eliminating the need for separate dust extraction and the customer is saved of regular cleaning exercise.

The small space which separates the toothed circular inserts and rotating hammer arm plates determines the product fineness.

Technical Specifications:

1. Name of Equipment	Swing Hammer Crusher
2. Max. feed size	120 mm
3. Output size	upto 10 mm
4. Capacity	upto 2Tons/hour
5. Grinding Material	Raw Coal
6. Toothed circular inserts	up to 500mm
7. Rotating hammer Arms & Hammer Crusher Sieve	Hardened Steel with Tungsten Carbide hammer & non- Punching, non corrosive sieves
8. Motor Drive	5.6 Kw, 7.5 HP/10 HP motor as RPM: 500, 415V, 3 phase induction motor.

Special Features:

1. A highly innovative helical feeding system ensures that a regulated feeding of the material in crushing zone is maintained and the operators hand does not enter the grinding zone.
2. A Positive air pressure system to evacuate the ground material into collection bin eliminates manual cleaning of the crushing zone after each operation.
3. Specially designed crushed material transfer aperture ensures that no flying dust escapes the crusher and thus all the fed material is contained within the material trolley and collected for analysis.

Thus, there is no need of additional dust extraction system.

Feeding Air Dried Sample Vs As-is-Sample

Comparison Particulars	Sample without air drying	Sample with cross seam material / high density material
Insmart Hammer crushers	Accepts samples with upto 20 % surface moisture content	Accepts samples with upto 20% contamination of stones / shale material with density upto 1.8 T/M ³
Other Make Hammer crushers	X – Feature not available	Leads to sieve puncturing in most cases

VIBRATORY CUP MILLS

Sample Grinding Systems



Insmart vibratory cup mills offer the full benefits of program controlled grinding processes for the preparation of samples for elemental analysis and phase analysis. Controlled by programmable controllers, it results in a reproducibility in sample preparation and consequently brings optimum analysis results.

Vibratory cup mills are suitable for the grinding of even harder minerals like Slags, Ferro alloys and other materials upto a fineness of 38 microns. The high speed of the drive motor and the gyratory motion of imbalance mass enables even hard material to be ground within a very short time.

- It is meant for most efficient lab scale Pulverising operation in mining, metallurgy, cement, steel, aluminium, ceramics industries and the ground product is ideal for instrumental analysis using x-ray fluorescence analysis. The equipment performs fine grinding of dry as well as wet laboratory samples with equal ease.
- Ideal for exceptionally rapid grinding of extremely hard, Brittle and soft materials down to laboratory fineness.



Working Principle of Vibratory Cup Mill:

The Vibratory Cup Mill brings about an impact of the hammer and/or the ring (grinding media) on the grinding materials inside the bowl this causes the size reduction. The collision intensity depends on heaviness and differential speed of the grinding media. The imbalance mass in the motor drive creates vigorous motion of the bowl and the grinding media. The equipment attains maximum impact from the very start of the grinding to attain most optimal and repeatable results in few minutes.

Grinding bowls are used for a range of applications, with capacities of 50 ml, 150 ml & 450 ml. Hardened steel, Stainless steel and Tungsten carbide lined bowls are designed for easy handling where the operator simply clamps the bowls and starts the grinding operation.

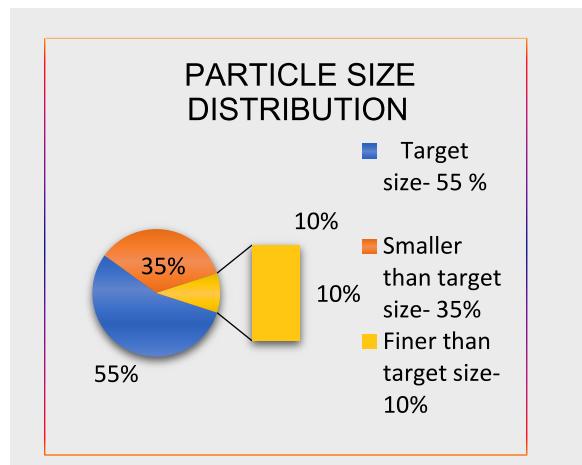
Insmart vibratory cup mills are fully insulated against noise and have safety cut-outs for operator protection. The dust and noise pollution at the workplace is therefore substantially reduced.

Insmart vibratory cup mills are high-quality, precision engineering products with compact dimensions and are therefore ideally suited for QC scale grinding operations.

The design of the machines corresponds to the current accident prevention guidelines.

Salient Features:

- Fine grinding within minutes.
- For high speed grinding of minerals, ores with extremely high repeatability.
- Detachable grinding bowl set for better cleaning. Superior quality bowls to eliminate cross-contamination during grinding.
- Independent precise time control system to achieve the desired material fineness for different materials.



VIBRATORY CUP MILLS



Sample Grinding Systems

Flexibility in Grinding Output

- Range of size reduction from -8 mm to 38 microns is achieved by faster and more efficient grinding (material dependent)
- Programmable cycle time setting is possible to suit the material fineness
- Easy Replacement of Bowl and Bowl location plate

KEY POINTS - VIBRATORY CUP MILL

Highlights of Grinding Environment: <ul style="list-style-type: none">150 ml bowl is fed with input material size of upto 8 mm, suitable for a variety of sample types.Exceedingly quick grinding (30 seconds to 3 mins).Fast grinding achieves the desired particle size in the range of 100 to 325 mesh.Material of Construction: Grinding cup and rings are made from hardened steel, Tungsten Carbide (lined & Coated), Agate or stainless Steel (depending upon material to be ground) provides improved analytical results as it gives reduced sample contamination.Easily operable Pulverising set.Dry & wet pulverizing.	VCM Main Features: <p>Programmable Grinding: Grinding cycle time can be completely preset. Thus, required fineness is achieved even under intermittent power supply conditions.</p> <p>Programmable cycle time: Setting is possible to suit the material fineness.</p> <p>Changeability in Bowl location plate: No change of bowl location plate is required and bowl sets of 50ml to 150 ml can be placed on the same bowl location plate.</p> <p>Four Bowl Simultaneous Grinding: In case of multiple material grinding requirements, 4 Bowl VCM provides the facility of grinding 4 different materials at the same time. This option is available only with 50 ml bowls.</p>	Safety Features: <p>Over Load Tripping: In order to counter power surges Motor drive is provided with additional protection through OLR-trip.</p> <p>4 Pole MCB with reliable circuit breaker is also provided for additional machine safety during power surges.</p> <p>Door sensor: Material Grinding is done in an enclosure fitted with a door to load & retrieve the material. Thus, grinding is performed in a protected area.</p> <p>In case the door is opened while machine is in operation, the machine is provided with suitable sensors that stop the machine in order to avoid any possible accident.</p>
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EQUIPMENT SPECIFICATIONS:

Purpose	Pulverizing for laboratory use				
Mounting Type	Floor mounting No foundation required				
Working Principle	Friction				
Maximum Feed Size	upto 8 mm				
Output Size (adjustable)	Start Range : < 100 mesh	End Range : < 325 mesh	Cycle time: 30 sec to 3 mins for 20 to 80 gm sample (upto ml bowl set)		
Throughput at usual Product size	15-20 samples per hour, per bowl				
Pulverizing materials	Bauxite, Sinter, Pellet, Coal, Coke, Concrete, Corundum, Geological ores, Glass, Granite, Graphite, Laterite, Limestone, Various Iron ores, Quartz, Silicates, Slag, Ferro alloys.			Pulverizes materials with medium to substantially high hardness and brittleness.	
Motor Drive	Motor Power : 1.5 kw	2HP Motor	RPM : 1440	Volts: 415	3 Phase induction Motor
Required Power	3 phase neutral + earthing through 10 amps 4 Pole MCB [Red, Yellow, Blue, Neutral, Earthing]				
Machine Size (in millimeters)	Length: 600	Width: 720	Height : 950		
Weight (Kg)	Machine: 230	Wooden Box: 80	Total Machine: 310		

VIBRATORY CUP MILLS

RANGE OF GRINDING BOWLS



Special anti-slip Bowl & Bowl location design for tight Bowl holding capabilities while grinding



MATERIAL VARIABILITY & GRINDING MEDIA:

VCM Bowl Materials	Main Component of the materials	Material suitability	Bowl Resistance to abrasiveness	Grinding Time	Output Range
Hardened Steel	Fe - Cr	Slag, Iron ore, Sinter, Clinker, Bauxite, Laterite, Quartz, Granite, Sinter, Gypsum, Limestone, Pigments, Corborundum, Embrittled materials like high density plastics	superior	1-3 mins	100 to 325 mesh [suitable for XRF / XRD and or wet chemical analysis]
Tungsten Carbide - Coated	Fe - WC	Coke, Coal, Pellet	Excellent	1-2 mins	Upto 72 mesh
Tungsten Carbide - Lined	WC	Ferro manganese, Ferro silicon, Ferro chrome	Excellent	1-5 mins	Upto 325 mesh
Stainless Steel	SS	Tablets, Salts, Fertilizers	Superior	1-3 mins	325 mesh

VIBRATORY CUP MILLS



Material Definitions:

Material	Material Type
Slag, Ferro alloys, Granite, Feldspar, Quartz, Iron ore, Sponge iron, Sinter, Coke	Hard-abrasive
Clinker, Quartz, Rock, Bauxite, Ceramics, Carborundum, Pellet	Hard-brittle
Glass, Calcite, Coal, Coke, Tablets, Fertilizers	Medium-hard
Gypsum, Salts, Graphite, Pigments, Mica	Soft
Alloys, Ceramics, Salts, Tablets, Silicon Carbide, Silicon nitride, Coke, Coal, Embrittled e.g. high density plastic	Brittle

Utility:

Elemental & Phase Analysis	For preparing ground samples in a less mill operation time without any undesired grinding media grazing. Application areas: Mined material processing industries like: Iron & Steel, Cement, Glass, Ceramics, Material developmental R & D Labs
Metallurgy	For pulverizing cast iron samples or blast furnace slag to establish additives application
Mining, Cement and Iron & Steel industry	Meant for processing minerals or ores for physical or chemical analysis
Ceramics industry	For grinding lumpy samples to produce raw powder to determine Calcium carbonate and magnesium oxide-content
Earth Sciences	Meant for preparing samples for chemical/elemental analysis for soil testing purposes, bore hole samples

Grinding Media and Sample Quantity:

Volume	Useful Capacity (sample quantity)	Grinding Media
50 ml	10 gms by weight for materials of specific gravity upto 1.6 gms/cm ³	Bowl & Hammer
100 ml	30 gms by weight for materials of specific gravity upto 1.6 gms/cm ³	Bowl with hammer & Ring
150 ml (100 cc)	50 gms by weight for materials of specific gravity upto 1.6 gms/cm ³	Bowl with hammer & Ring
450 ml	300 gms by weight for materials of specific gravity upto 1.6 gms/cm ³	Bowl with hammer & Ring

PLANETARY MICRO MILLING



Sample Grinding Systems

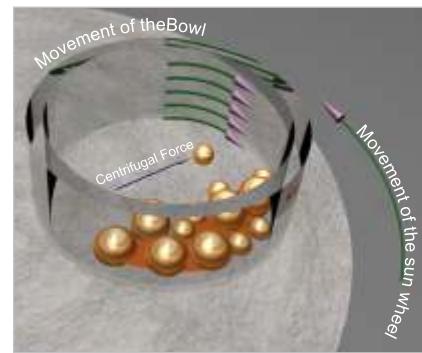


Max. overall capacity 500 ml x 4 nos.

For analytically pure and contamination free batch grinding of test samples in dry as well as in suspension from as large as 10 mm particle size down to extreme end fineness. Most suitable for thorough mixing, homogenising, emulsifying and dispersing.

Principle of Operation

Grinding is carried out by high-energy frequent impact of balls. The energy level of balls are as high as **50 times** (at 400 r.p.m.) the gravitational acceleration. Thus, Insmart Planetary System makes grinding extremely fast and efficient. Rotation of base plate provides the centrifugal force to the grinding balls and independent rotation of bowls (in opposite direction) makes the balls to hit the inner wall of the bowls several times more, because of the short returned path. Since the bowls are rotating in opposite direction a considerable part of grinding is done due to friction.



FEATURES:

- FINAL FINENESS:- Less than 1 micron upto nano levels.
- CONTAMINATION:- Analytical pure grinding.
- SPEED RATIO:- 1:1, 1:2, 1:3 or 1:4 between sun disc and bowl (user to select).
- HOMOGENIZING:- Homogenising is achieved by continuous mixing during grinding process.
- Reproducible Grinding / Homogenizing.
- Permanently Lubricated Bearings.
- COOLING:- An air exhaust system is provided to enhance the grinding time. (ventilator).
- MAINTENANCE FREE:- Systems is driven through a self-diagnostic type micro-controller based A.C. frequency controlled drive, having various setting and indicating parameter.
- Machine can run uninterruptedly upto 10-12 hours.

OPTIONAL FEATURES:

- RS 232 port.
- Continuous purging of inert gas, while grinding in single bowl system.
- Special bowl set designed for inert/ special atmosphere grinding - suitable for charging and removal in a glove box.
- Special bowl set designed for low temperature operation (liquid nitrogen).
- Measurement of temperature and pressure of gas inside the bowl while in operation.
- Embedded Thermo-electric device for external cooling of bowls during grinding (cold air circulation).

SPECIFICATIONS	
APPLICATION	For fine and ultra fine grinding of soft medium and hard materials.
FEED SIZE	Up to 10 mm
OUTPUT PARTICLE SIZE	1 micron or smaller (depending on characteristics of material, number & size of balls, time and speed selection)
SPEED (setting and digital display)	Sun Disc speed for regular model 40 to 400rpm / for mini models 40 to 600 rpm
DIRECTION ROTATION	PROGRAMMABLE: Forward/Reverse/Alternate with LED indication
TIME (Setting & digital display)	RUN TIME (1-999Min/Sec) + OFF TIME (1-999Min/Sec) = 1 CYCLE, NO. OF CYCLES (1 TO 999) TOTAL TIME=(RUN TIME+OFF TIME)*NO. OF CYCLE
NUMBER OF BOWLS	1 (single), 2 (twin), 2 to 4 large (250 ml useful capacity), 4 or 8 small (80 ml. useful capacity)
MATERIAL CONSTRUCTION OF BOWLS AND BALLS	Hardened steel with tough core / AISI 304-SS/ Agate / Polyurethane / Ceramic / Lined Tungsten carbide / Zirconia / Toughened alumina / Corundum (natural and sintered)
POWER SUPPLY (to be provided by user)	SINGLE PHASE 230V A.C. 50/60 HZ, 10 Amp 2 Pole MCB with Proper earthing
MOTOR & DRIVE	1.5Kw (2HP). Microprocessor based variable frequency drive.
WEIGHT & DIMENSIONS	Machine : 300kg 860x560x730mm Packed : 470kg 1066x787x1016 mm (wooden box)

PLANETARY MICRO MILLING

Sample Grinding Systems



Single Bowl (mini)
Max. overall capacity 500ml



Twin Bowl (mini)
Max. overall capacity 250ml x 2 nos.



Four Bowl (mini)
Max. overall capacity 80ml x 4 nos.

MATERIAL OF BOWLS & BALLS:

- Hardened Steel
- Stainless Steel
- Stabilized Zirconia (ZrO_2 -98%)
- Tungsten Carbide Lined / Coated
- Agate
- Corundum
- Toughened Alumina
- High Density Polyethylene
- Polyurethane
- Tungsten Carbide lined with Ti Al N coating

SAFETY FEATURES:

- DOOR SENSOR:- If door is not closed properly machine will not start.
- MOTOR OVER LOAD PROTECTION:- The system is built in with self diagnostic, over load, high voltage and low voltage protection.

OPTIONAL SAFETY FEATURES:

- VIBRATION DETECTION SYSTEM:- Undesired vibration due to imbalance load is detected by a sensor to switch OFF the machine Automatically.
- DOOR LOCK:- An electromagnetic automatic lock is provided, it locks the safety cover as soon as start command is given.
- Fault indication with audio-visual alarm.

Sr. No.	Material of bowl	Overall Capacity	500 ml	250 ml	80 ml	50 ml
			Useful capacity	Upto 250 ml Nos.	Upto 125 ml Nos.	Upto 40 ml Nos.
1.	Agate (Ball dia. in mm and quantity)		Ø12 - 15 Ø16 - 12 Ø20 - 4	Ø12 - 15 Ø16 - 8 Ø20 - 2	Ø12 - 10 Ø16 - 8	Ø12 - 6
2.	Tungsten Carbide (Ball dia. in mm and quantity)		Ø6 - 50 Ø8 - 30 Ø16 - 10	Ø6 - 40 Ø10 - 20 Ø16 - 4	Ø6 - 30 Ø10 - 10 Ø16 - 2	Ø6 - 20 Ø10 - 4
3.	Hardened steel/ Stainless steel (Ball dia. in mm and quantity)		Ø10 - 20 Ø16 - 14 Ø20 - 8	Ø10 - 20 Ø16 - 8 Ø20 - 2	Ø10 - 12 Ø16 - 4	Ø10 - 6 Ø12 - 2
4.	Alumina/ Corundum (Ball dia. in mm and quantity)		Ø12 - 16 Ø16 - 10 Ø20 - 6	Ø12 - 16 Ø16 - 4 Ø20 - 2	Ø12 - 10 Ø20 - 2	Ø12 - 6
5.	Zirconia (Ball dia. in mm and quantity)		Ø6 - 14 Ø10 - 24 Ø20 - 10	Ø6 - 40 Ø10 - 16 Ø20 - 2	Ø6 - 24 Ø10 - 10 Ø20 - 1	Ø6 - 20 Ø10 - 10

MATERIAL SPECIFICATION

Grinding set	Composition app.	Hardness	Density app.
Agate	99.9% SiO ₂	7.0 Mohs	2.65 gm/cc
Sintered Corundum1	99.7% Al ₂ O ₃	9.0 Mohs	3.9 gm/cc
Zirconia	98.0% ZrO ₂ , 1% Y ₂ O ₃	8.5 Mohs	5.7 gm/cc
Stainless steel	77.3%Fe, 18.0% Cr, 2.5% Ni	53 HRC= app.	7.8 gm/cc
Chrome steel	86.0%Fe, 11.5% C,	60 HRC= app.	7.8 gm/cc
Tungsten Carbide	94.0%WC, 6.0% C _o	HV= 1300 kg/mm	14.4 gm/cc
Polygate	Abrasion resistant Elastomer	95 A°	1.00 gm/cc



DISC MILLS

Sample Grinding Systems



- Fine grinding to a fixed desired size is achieved by subjecting the fed material to instant pressure and friction in between a fixed and a rotary discs.
- The grinding media consists of a vertically rotating disc that moves against another vertically oriented but fixed circular disc.
- A specially designed auto feeder delivers the material into the grinding zone.
- Rotating motion of a unique-petal-type-design disc causes initial material crushing. The high rpm rotation of the moving disc also generates high centrifugal forces which move the material to the periphery. Here the final grinding is achieved.
- The ground sample exits from the disc gaps to a domed enclosure and it is deposited in a container located below the vertically aligned discs.
- Desired sizes can be obtained by adjusting the disc gaps. The gap width between the grinding discs is adjustable and can be adjusted in the range between 0.1 and 3 mm.
- Can be used for batch as well as continuous operations. Ideal ground product for classical method of analysis. Purely dry grinding operation
- Ideal for Pulverising of clinker, Coal, Coke, Iron ore, Manganese ore, Quartz, Glass, Granite, Silicate.

Application Examples:

Gypsum, Bauxite, Drilling Cores, Clinker, Coal, Coke, Concrete, Dried Soil Samples, Glass, Granite, Ores, Quartz...

Product Advantages:

- Excellent secondary size reduction mill for lab scale fast grinding
- Precise disc gap setting mechanism provides repeatability
- Openable grinding chamber and disc hood for easy cleaning
- Discs made out of Long-lasting Tampered steel.
- Dust-free grinding with provision for dust extraction system



Applications	Preliminary and fine grinding
Fields of application	Mineral labs / Geology studies / Cement labs
Suitable	Medium-hard, hard, brittle Material Types
Applicable Principle	Pressure, Friction
Material feed size	Upto 6 mm
Final output	Upto 212 µm / 72 mesh
Drive Speed	2800 rpm
Grinding discs material	Hardened Steel, Manganese Steel
Disc Gap setting	0.1 - 3 mm
Container capacity	3 liter
Motor Drive	3-phase geared motor 2.2 kW / 3 HP
W x H x D mm	1100 x 1100 x 800
Net weight kg	150

HAMMER MILLS

most ideal for Coal / Coke Pulverizing



Sample Grinding Systems



- Ideal for milling even easily oxidizable coal samples with upto ~12% superficial moisture without external air drying.
- No flying dust escapes the mill and thus all the fed material is contained within the mill and collected for analysis.

Key Features:

- A highly innovative helical feeding system ensures regulated feeding in the grinding zone.
- A safety hopper mesh to protect operators hand from entering the grinding zone during material feeding.
- A Positive air flow system to transfer the ground material into collection bin eliminates manual cleaning of the grinding zone after each operation.
- No need of additional dust extraction system

Application:

Pulverizes small quantity of Laboratory sample (upto 5 Kg/hour). Sample upto a maximum size of -5 mm can be pulverized to - 212 micron as per the defined particle size distribution in IS 436.

Equipment Operation:

- The coal sample to be ground is introduced into the Pulverising chamber through a hopper. The material travels through a helical screw and it is uniformly delivered into the grinding chamber.
- The rapidly rotating hammer's centrifugal force disintegrates material by shearing action between the fixed toothed circular inserts and rotating hammer arms.
- As particles get smaller than the size of underneath sieves, the material passes through the sieve mesh and gets collected in a stainless steel container.
- No dust is dissipated in the process. Need for separate dust extraction is eliminated and no sample is lost.
- Small space separating the toothed circular inserts and rotating hammer arm plates determine the product fineness.



Feed Hopper with regulated material flow



Grinding Media with interchangeable sieve

HAMMER MILLS

most ideal for Coal / Coke Pulverizing



Sample Grinding Systems

Feeding Air Dried Sample Vs as-is-Sample

Equipment	Air Dried Sample	Sample without air drying	Sample with cross seam material / high density material
Insmart Hammer Mill	Air drying of sample (upto 40°C) before pulverization is permissible as per IS 16143	Accepts samples with upto 12% surface moisture content	Accepts samples with material density upto 2 T/m³
Other Make Hammer Mill	Mostly accept material after air drying	Feature not available	Leads to sieve puncturing in most cases



Working principle	Impact action
Max. feed size	Upto 5 mm
Output size	Upto 212 microns
Capacity	5000 gms / hour
Grinding Material	Coal, Coke
Toothed circular inserts	Size: 200mm
Grinding Media with Rotating Hammer Arms & Hammer mill Sieves	Hardened Steel / Tungsten Carbide Lined / Stainless Steel
Sieves	Interchangeable sieves of following sizes can be provided -850 microns, -250 microns, -212 microns
Motor Drive	1.5 Kw, 2 HP , RPM: 2800, 415V, 3 phase induction motor.
Dimension	L= 680mm, W= 530 mm, H= 1070mm
Weight of machine	150 Kgs

Sample Grinding Systems



Insmart Pot Mill is an ideal equipment for achieving analytically pure and contamination free micro milling of ceramic as well as metallic powders. The equipment accepts dry samples as well as samples in suspension form. Samples as large as 200 micron particle size can be reduced to materials of extreme fineness (less than 1 micron).

Most suitable for micro milling of hard materials like Carbides, Bouxites & Ceramics etc.

Principle of Operation

Micro Milling is carried out by rolling of the balls on material as well as frequent ball impact within the milling media.

The sample is fed in the pot along with balls of suitable material and the pot is made to rotate on P.U. coated support rollers. The pot rotational speed can be varied in the range of 20 to 200 rpm. Pot rotates about its axis, while the balls inside the pot spin about their own axis in the same direction, the material gets trapped between the inner wall of bowl & balls and gets rolled over by weight of balls and thus gets pulverized.

- Pot Material (inner lining) variants.
 - a) Tungsten Carbide
 - b) Toughened Alumina
 - c) Stabilized Zirconia
- Pot capacity 500 ml to 5000 ml (5 liters).

Features:

- **Micro Milling:** End fineness, smaller than 1 micron.
- **Analytically Pure Milling:** Since the material is kept in isolated bowl.
- **Reproducible Milling:** Pot speed can be set from 20 to 200 rpm by selecting suitable roller speed through digital display settings. On - off cycle can be programmed for long running hours. Reproducible grinding results are achieved by selecting the set parameters in the memory.
- **Homogenizing:** Homogenising is achieved by continuous mixing during milling process.
- **Maintenance Free:** System is driven through a self-diagnostic type micro controller based A.C. Frequency controlled drive, having various setting and indicating parameters.
- Permanently lubricated bearings

Specifications:

APPLICATION	For fine and ultra fine milling of soft, medium and hard materials.
FEED SIZE	Up to 200 microns
OUTPUT PARTICLE SIZE	1 micron or smaller (depending on characteristics of material, time and speed selection)
SPEED (setting and digital display)	Plate speed for regular model 20 to 200rpm
ROTATION DIRECTION	Selectable: Forward/Reverse/Alternate
TIME (Setting & digital display)	RUN TIME + OFF TIME = 1 CYCLE, NO. OF CYCLES (0 TO 255) (0 to 255 MIN.) TOTAL TIME=(RUN TIME+OFF TIME)*NO. OF CYCLE
NUMBER OF POT	1 No.
MATERIAL CONSTRUCTION OF POT AND BALLS	Hardened steel with tough core /AISI 304-SS/ Agate / Poly urethane / Ceramic / Lined Tungsten carbide / Zirconia (stabilised) / Toughened alumina / Corundum (natural and sintered)
POWER	Single Phase 230V A.C. 50/60 HZ

BALL MILLS

Sample Grinding Systems



Application Materials:

Alloys, Catalysts, Cement Clinker, Ceramics, Clay Minerals, Coal, Coke, Concrete, Fibers, Glass, Gypsum, Iron Ore, Limestone, Metal Oxides, Minerals, Ores, Quartz, Slag, Sinter, etc.

Product Advantages:

- Faster and finer grinding than any other ball mill.
- Narrow particle size distribution thanks to special drum design which improves mixing of the sample.
- Easy operation via touch screen.
- Most suited for day average sample grinding & mixing.

Insmart Ball mills are completely novel kind of mills for high power granulating. The unique amalgamation of high friction and collision results in exceptionally fine particles within the shortest amount of time.

- Ball mills are very useful for fine grinding of the materials like limestone, clinker, iron ore and other minerals.
- Mills of varied capacity 2 kg, 5 kg & 10 kg are available with recommended quantity of grinding media of assorted balls sizes.
- Provision exists for both wet/dry grinding as a cooling jacket is provided.
- The mill's horizontal rotations enable the High Carbon-High Chrome balls of different sizes bombard the sample as the mill rotates. The material which gets trapped between the balls and the surface disintegrates.
- This frictional reaction after material entrapment between the balls surface of the mill grinds the sample to required fineness.

Operation Principle and design advantages:

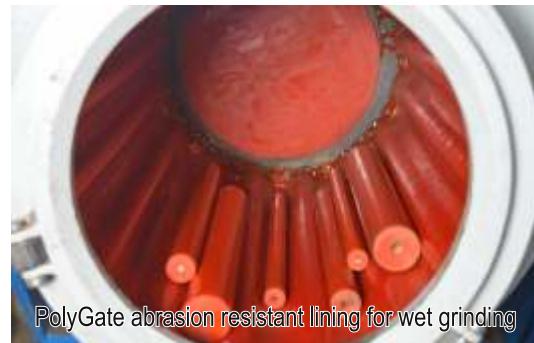
The new size reduction mechanism operates on impact and frictional forces that are generated from controlled circular drum movements and allows superior grinding performance.

This exclusive blend is produced by the cylindrical drum and the movement of the grinding balls within the drum. The drum moves on a tumbling course without changing their orientation.

The material contact with the drum and ball movement causes strong friction between grinding balls, sample material and drum walls. This considerably enhances the mixing of the particles resulting in smaller grind sizes.

Technical Specifications - Ball Mill (3 Variants)	
Applications	size reduction, homogenizing, comminution
Feed material	medium-hard, hard, brittle, dry / wet samples
Size reduction principle	impact, friction
Material feed size	Upto 15 mm
Final fineness	Upto 200 mesh
Batch size / feed quantity	2 Kg, 5 Kg, 10 Kg
Speed at 50 Hz	50 rpm
Grinding balls	Hardened steel
Setting of milling revolution	100 to 225 or more
Motor power	2 Kg - 2 Hp, 5 Kg - 3 Hp, 10 Kg - 3 Hp
Required Power	2 Kg-10 Amps, 5 Kg & 10 Kg-16 Amps, 4 pole MCB
Power connection	3-phase, 440 V, Neutral + Earthing
Drive Protection	IP 55

Sample Grinding Systems



- Two sizes of rod mills viz. 7" x 14" & 14" by 28 " are available with recommended quantity of grinding media of assorted sizes.
- For special applications the rod mills are provided by PolyGate wave type abrasion resistant lining with grinding media specially designed for wet grinding applications.
- Mills can be operated for wet grinding as well as dry grinding.

Brief Description:

Wet and dry grinding is accomplished with the mill operating locked in the horizontal position. For charging and emptying the mill, it is tilted on its axis. The mill stand has an adjustable shelf so that containers of varying size can be used for holding mill discharge. Single piece, round corner construction permits easy, through cleaning and eliminates cross contamination.

A Grate discharges holds back the grinding charge. It can be used as a ball mill by replacing the rods with steel grinding balls.

Technical Specifications	
Size of Mill	7" Diameter x 14" Length and 14" Diameter x 28" Length
Rod Charge	5 to 15 Kgs
Motor Capacity	0.50 HP, 1200 r.p.m.
Feed Size	6 mesh
Product Size	100 mesh (depends upon hardness of the feed).
Material of construction	Hardened Cast Steel of Grinding Media (wear resistant) / PU (Polyurethane)

Insmart 40 TON HYDRAULIC PRESS



Sample Compaction Systems



Operational Procedure:

The steel ring or aluminium cup is inserted in the die set chamber of the 40 ton press and filled with 8-12 gms of ground sample material. The die set is then moved beneath the pressure enclosure and the Pallet formation is started.

During the 50 seconds (programmable) pressure build-up cycle the compactness of the powder increases. The maximum pressure force is held over a certain period of time to allow complete development of the inter-particulate cohesive forces and guarantee maximum Pallet strength which is essential before impinging X-rays on to the pellet.

Key Features:

Digitally adjustable tonnage (5 to 40 Tons). Digitally set compaction time. Automatic de-compression. Auto ejection. Self-standing, Floor mounted. Protection for overheating of oil & motor.

Compacted pellets withstand the one meter drop test.

Provision for Pallet Breaker for "B & C type" SS rings. Thus, they can be re-used by breaking the compacted Pallet in Insmart provided Pallet breaker.

Pallet PRESS ADVANTAGES:

Insmart's 40 Ton press produces strong pellets with a smooth surface.

Compaction pressure regulation in the range of 5 to 40 Tons.

Comes with pressure force control, as well as time for pressure build-up & holding time for compaction.

Easily operable pelletizing set.

Exceedingly quick compaction (50 seconds - programmable).

Sample Compaction for XRF/XRD analysis.

Sample type: Cement, Lime stone, Slag, Laterite, Bauxite, Dolomite, Feldspar, Clay, Iron Ore, Quartzite etc.

Handles all demanding pelletizing operations efficiently and cost effectively.

Ensure safe operation and simple maintenance.

Achievable pressure force of upto 40 Tons.

Comfortable parameter setting, using display and very few key pad operations.

Digitally adjustable tonnage (5 to 40 Tons).

Digitally set compaction time & Automatic Decompression.

Auto ejection.

Self-standing, floor mounted.

Protection for overheating of oil & motor.

* Please note we also manufacture 25 Ton Hydraulic Pallet Press for cement research labs where the total number of compaction samples are less than 10 per day.

Insmart 40 TON HYDRAULIC PRESS



Sample Compaction Systems

Die Set variants:

Type - A

Pallet with Aluminium Cup base or bare Pallet (without Ring)



Type - B

Pallet with S.S. Ring

B1 Ø 35X Ø 40 X 14mm B2 Ø 32X Ø 40 X 14mm



Type - C

Pallet with S.S. Ring

Ø 35X Ø 51 X 8 & Ø 51.5X Ø 35 X 8.5/8



Purpose	Making Compacted Pallets for laboratory use			
Application	Preparation of pallets for spectral analysis			
Mounting Type	Floor mounting, no foundation required. Saves on cost of building RCC foundation			
Working Principle	Pressure			
Maximum Feed Size	Pulverized Samples			
Output	Compacted Pallets			
Max Force (Load)	400 kN (40 Tons.) with Digital display of set and Actual Load			
Feed materials	Bauxite, Cement, Clinker, Limestone, Laterite, Gypsum, Minerals, Silicates, Slag, Iron ore.			
Hydraulic Pump feed rate	2.49 mm ² / Sec during piston forward movement 4 mm ² / Sec during piston return movement			
Hydraulic pump capacity	3 LPM (Litres per Minute) at 250 bar			
Hydraulic pressure	250 Bar (Max.)			
Normal Operating Pressure	200 Bar. (With Digital display of Set and Actual Load)			
Maximum Fill Height in die	20 mm			
Pellet Ring Type	A Type, B Type & C Type			
Pellet Dimensions (ring internal diameter (ID) & Outer Diameter (OD) in mm)	A Type: 40 Dia. B Type: 40 OD & 35 ID with 14 mm Height. C Type 1: 51 OD & 35 ID with 8 mm Height. C Type 2: 51.5 OD & 35 ID with 8.5/8mm Height.			
Time for one compaction cycle	Approx. 50 Sec. (Programmable).			
Oil Tank Capacity	17 Litres			
Motor Drive	Motor Power: 1.5 kw	Motor Power: 2 HP	RPM : 1415	Volts: 415 3 Phase induction Motor
Required Power [to be provided by end user]	3 phase neutral + earthing through 10 amps 4 Pole MCB [Red, Yellow, Blue, Neutral, Earthing]			
Machine Size [in millimeters]	Length:550	Width: 635	Height: 1260 (Without Pallet Breaker) 2030 (With Pallet Breaker)	
Machine Weight (in Kg)	Machine: 270	Wooden Box: 100	Total Machine: 370	

TURBO MIXERS



Working Principle:

Turbo mixer works on the principle of inversion Kinematics. Here the relative motions of the link mechanisms remain unchanged.

Every mechanism has moving members which move relative to each other about the joints which connect them. These relative motions result in the multiple trajectories.

The material (Solid powders or Liquids) kept in the Jar spins on its own axis and simultaneously the top and the bottom end of the jar moves in three dimensional motion. Thorough mixing, blending and Homogenising are the result of rotational and multi direction reversals of material inside the Jar.

Model: TURBO MIXER 3 VARIANTS

VARIANT	TURBO MIXER 2-LITERS	TURBO MIXER 5-LITERS	TURBO MIXER 10-LITERS
Input Material	Solid Powders and liquids of various densities	Solid Powders and liquids of various densities	Solid Powders and liquids of various densities
No. of Mixing Chambers	One	One	One
Container Material	Stainless Steel	Stainless Steel	Stainless Steel
Overall capacity	2 litre Container	5 litre Container	10 litre Container
Timer Cycle Display	digital display		
Spin Speed	Upto 50 RPM		
On & Off Time cycle	Settable in the range of 0-255 Minutes		
Time Setting per Cycle	Run Time + Off Time = 1 Cycle		
Total Time	(Run Time + Off Time) X no. of Cycles.		
Direction of rotation (Programmable)	i) Clockwise and Anti clockwise ii) Alternate in Alternate Cycle		
Power Supply	0.75 Kw. (1Hp) 230v-AC + Neutral, 6 Amps MCB.		
Safety Features	Protection grill sensor for operator safety. Current over load Safety for Motor Protection.		

FALLING STREAM SAMPLE DIVIDERS



Sample Homogenizers & Dividers



Features:

Unlike commonly used process of sample division like Riffle Splitters or coning & quartering, our falling stream sample dividers are designed to split out a representative proportion of a sample with a high degree of dividing accuracy.

Insmart Falling Stream Rotary Sample Dividers are used to divide large samples into accurate and highly reproducible sub samples. A very reliable method for mass reduction of samples which represents the gross sample.

The sample is fed at a controlled rate to create a falling stream and through a rotating splitting mechanism varied percentages of representative samples are captured in a container. The remainder of the fed sample passes to a removable discard container or can be conveyed away as waste.

Falling Stream Sample Divider variants:

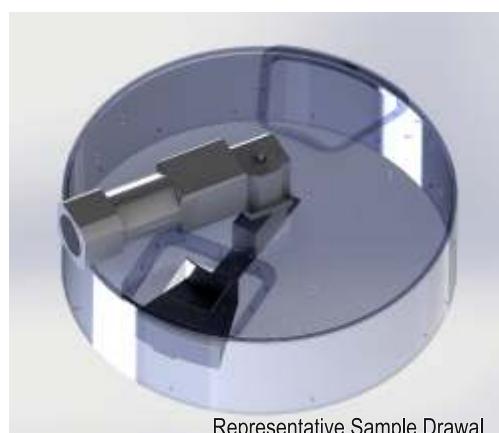
Sample Divider Variants	Lump Feed Size	Sample Drawal %	Capacity
Sample Divider Small-1	Upto 10mm	2% to 10%	60 Kg/ hour
Sample Divider Small-2	Upto 16 mm	2% to 10%	60 Kg/ hour
Sample Divider Medium	Upto 50 mm	5% to 25%	250 Kg/hour
Sample Divider Large	Upto 100 mm	10% to 25%	500 Kg/hour

Falling Stream Sample Dividers provide much better sample splits

Sample Splitting Method	Standard Deviation in % terms
Cone & Quartering	6.810
Riffle splitting	1.010
Rotating Splitting	0.125
Random Variation	0.076

Benefits:

- Rotary Sample Dividers ensure the representativeness of a sample and thus the reproducibility of the analysis.
- Near exact division of larger quantities with settable speed of 20 rotations/ minute.
- Various division ratios are offered in the range of 2 to 25 %.
- Insmart Sample Dividers are necessary in every laboratory involved in research, development and process monitoring in order to produce small yet representative sample quantities.



Representative Sample Drawal

RIFFLE SAMPLE SPLITTERS



Sample Homogenizers & Dividers



Insmart sample splitters accurately divide the granular materials for sampling purposes. Precision riffling is achieved by simply loading the hopper with material to be divided, feeding the sampling in a levelling manner. Alternating fixed wide chutes deliver half the sample to each pan. This arrangement ensures even sample distribution and eliminates particle segregation.

- Riffle Sample Splitters are classified as precision "rifflers" because of their ability to accurately divide granular materials for sampling purpose.
- The unit meets standard methods for reducing samples of aggregate to testing size.
- Both Polyurethane / SS-304 are available in desired gap width.

Applications:

- Heavy metals or ores
- powder material analysis
- Sampling of beach sand
- Iron ore assay preparation



Available Sizes of Riffle Splitters:

Riffle Sample Splitter	3 mm
Riffle Sample Splitter	5 mm
Riffle Sample Splitter	6 mm
Riffle Sample Splitter	10 mm
Riffle Sample Splitter	12.5 mm
Riffle Sample Splitter	16 mm
Riffle Sample Splitter	20 mm
Riffle Sample Splitter	30 mm
Riffle Sample Splitter	40 mm
Riffle Sample Splitter	50 mm

ROTARY SAMPLE DIVIDER



Insmart Rotary Sample Dividers are able to qualitatively and quantitatively divide dry, granular or powder materials of all kinds and provide samples that are representative of the gross sample.

- It consists of a turn table having removable sample containers passing through a free flow from a vibrating feeder.
- It is able to divide 8 equal quantities of true representative samples from the feed sample. Equipment works on unique planetary sample division technique.
- The sample containers are self-aligning and interlocking, which allows fast assembly and clean-up between charges.
- The split samples are representative and can be combined to yield the large size samples as well.



SS Feed Hopper



Sample Collection Containers

Features:

- Divides equal quantity of true representative samples from the collected bulk sample. Equipment works on unique planetary sample division technique.
- The sample divider allows easy cleaning.
- The equipment works on planetary motion system to uniformly distributes the sample in an annular area

- A falling stream is created and the collection containers are rotated uniformly under the following stream to divide the bulk sample equally.
- Operable on level surface without Foundation.

Specifications:

Feed Size	Upto 10 mm
Feed Quantity	Upto 25 kg
Output volume	Eight equal divisions
Materials to be divided	All Ores & Minerals
Power requirement	4 pole 10 amp MCB, 3 Phase with neutral & 0. 4 pole 10 amp MCB, 3 Phase with neutral & earthing, 0.5 Kw, 415 V, AC 50 Hz
Operating Process	The bulk sample is poured into a hopper and passed through a vibratory feeder. The material falls like a falling stream and the eight containers rotate at a fixed rpm to collect the representative sample from flowing stream equally in each container.

SEMI-AUTOMATIC SAMPLE PREPARATION LAB

for Agglomeration, Iron Ore Beneficiation,
Iron Making, Coke Making & Power Plant



Sample Preparation Systems

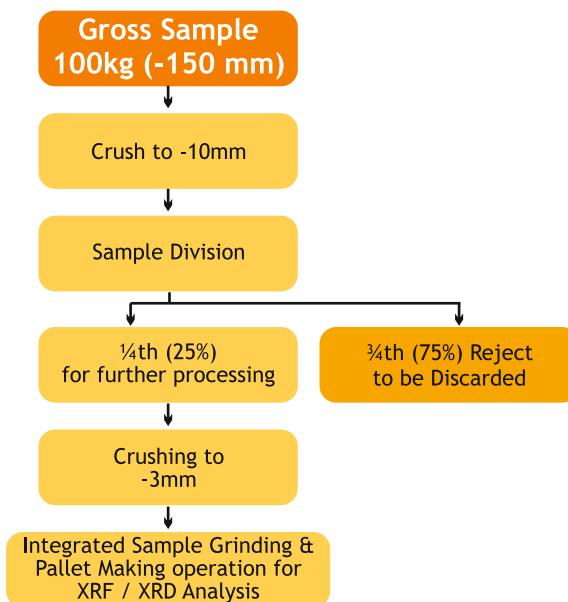
Jaw crusher with built in sample divider

Best suited for Size crushing & Sample Division
Stage wise sample crushing (-150mm to -3 mm in 2 quick steps)
Sample Drawal Output:
~ 2 Kg sample for grinding at -3 mm stage



Semi-automatic Grinding & pelletizing Unit
Best suited for auto grinding and auto Pallet making for most of the materials within 5 minutes

Semi-automatic Sample Preparation flow sheet for Limestone, Oron Ore, Sinter, Pellet, Coal, Coke, Sponge Iron & additives



Insmart PULVERIZER & PALLETIZERS (3 Variants):

- . SEMI AUTOMATIC - Autocombo A
- . ROBOT ENABLED VCM & Pallet PRESS - Autocombo B &
- . AUTOMATIC - Autocombo C



Integrated Sample Preparation



Auto Combo A

Auto Combo B

Auto Combo C

Insmart Auto-combo is a high quality Lab class Auto Grinding & palletising unit that grinds sample and makes a Pallet in a single operation in as little as 5 minutes leaving the lab technician to better plan other sample preparation processes.

The robust combo machines provides a clear improvement in speed & sampling performance with result reproducibility.

There are 3 variants in Auto combo series

1) Auto-combo-A: For labs that want to maintain manual sample preparation and sample analysis but do not want to lift the heavy bowl of grinding mill and deal with the cleaning of the bowl. Auto-combo A also offers automatic pelletization once the Pallet ring is placed in the die set. It also features cleaning of the pressing surfaces but it does not self-clean the die-set.

2) Auto-combo-B: For labs that receive samples through pneumatic sample transportation system and have a fully automated quality control loop including robot, XRF/XRD integration and other analytical equipment connected to the network.

3) Auto-combo-C: For labs that have a manual receiving station for pneumatic sample transportation or with no pneumatic sample transportation system. Labs that have chosen not to go with robotic sample preparation but still need automation in sample preparation and sample analysis.

Standard features in all Auto-combo variants offer:

- Automated grinding of samples.
- Automated palletization of ground samples.
- Automated cleaning of grinding bowl.
- Automated “gargle cycle” to eliminate cross contamination from previous operation.

Perfect Equipment for High Sampling Loads in Robotic Lab operation

The automated method of operation, high motor drive RPM and counter balance arrangements in this integrated equipment ensure short grinding time for even harder materials.

The provisions for place and pick mechanism require no manpower intervention during the entire sample processing cycle

and thus makes it ideal for Robo-lab operations.

Stronger. Faster. Better

Auto Combo integrated PLC and HMI control system ensures error-free, automated preparation of a variety of samples with varying hardness and brittleness.

A programmed gargle cycle after each round of sample preparation activity guarantees a contamination free environment.

Better Method Provided by Insmart Auto Combo

- Comes with standalone or integrated automation systems with space-saving, ergonomic design
- Sample feeding by operator or robot
- Dust extraction facility for zero cross-contamination
- Well integrated with robotic lab
- superb repeatable and consistent output

Equipment parameters	Auto Combo A	Auto Combo B	Auto Combo C
Interactive Touch Screen Human Interfaces (HMI)	✓	✓	✓
Compatible for Robotic Labs	✗	✓	✓
Compatible for XRF/XRD integration	✗	✓	✓
Auto recording of sample source	✗	✓	✗
Pre-fed Grinding & Pelletizing Sequence	✗	✓	✓
Eliminating Cross Contamination during Grinding & Pallet making	✓	✓	✓
Automatic Sample Feeding	✗	✓	✓
Pre-set Grinding & Pelletizing Time	✓	✓	✓
Auto Compaction	✓	✓	✓
Grinding Media Cleaning	✓	✓	✓
Pelletizing Media Cleaning	✗	✓	✓
Auto Pallet Feeding	✗	✓	✓
Auto Sample Dosing	✗	✓	✗
Sample Identification & Coding	✗ SEMI AUTO	✓	✗
Auto Setting of Material Type & Compaction Force	✗ SEMI AUTO	✓	✓
Clean Pallet Delivery	✗	✓	✓
Integration with analytical equipment like XRF/XRD	✗	✓	✓
Auto Data Updation	✗	✓	✓

Semi Automatic - Grinding & Palletizing Units

Auto Combo A



Integrated Sample Preparation



A robust equipment assembly is a big step above the conventional sample grinding and pelletizing systems which involves two separate equipment assemblies and many manual intervention steps with respect to handling of heavy grinding bowls, bowl cleaning and Pallet making process where except for mechanised grinding and compaction, every step is performed manually.

Auto Combo A comes with a facility of auto grinding and integrated auto pelletization system. It is an ideal combination for labs that want to maintain manual sample preparation and sample analysis but do not want to lift the heavy bowl of grinding mill and deal with the cleaning of the bowl. Auto-combo A also offers automatic pelletization once the Pallet ring is placed in the die set.



UNIQUE FEATURES:

Touch screen based system interaction

On receiving crushed sample the operator feeds a pre fixed quantity of sample manually and feeds details of sample origin in the touch screen.

Auto Grinding and Auto Pallet making

Once the operator feeds the sample identification the Auto-Combo identifies the type of sample such as raw mill, kiln feed, clinker etc. from the sample ID and automatically sets the tonnage and compaction time.

Pre-set auto grinding based on sample type ensures ideal grinding and sound pellets for XRF/XRD analysis.

Auto compaction using the pre-defined tonnage and compaction time. On choosing the sample type in the touch screen the system Auto selects material grinding time required for grinding the sample and the chosen compaction pressure for pelletizing the sample.

Utilizing right sample quantity and controlling cross contamination

Once the operator feed a weighed quantity of sample with binding agent and acknowledges the sample arrival on screen, the sample specific grinding and pelletizing sequence kicks in.

Pre-programmed auto cleaning and gargle cycle of grinding media and pelletizing set is built in for all new samples. It is a unique system of eliminating cross contamination while grinding different types of samples.

Auto self cleaning system

For avoiding cross contamination the system uses compressed air and high performance brushes for cleaning of the grinding bowl and other sample contact surfaces.

Manual Interventions

A trained operator can easily perform the manual feeding of sample origin, pouring measured quantity of sample and binder tablet.

Manual cleaning of pelletizing die-set using a air suction system. Placing the Pallet ring into die set for each sample.

Final Output

Once auto pelletization is completed the Pallet is removed manually. The operator de-dusts and cleans the loose powder material from compacted Pallet and feeds it to the XRF/XRD analyzers.

The sample ID & sample type is manually entered into the analysis system.

All result tabulation, recording and forwarding of analysis data is performed manually.

Automatic - Grinding & Palletizing Units with Robotic integration (Auto Combo-B)



Integrated Sample Preparation



UNIQUE FEATURES:

ID specific grinding & palletizing operation

Operating parameters are Sample ID based. This eliminates the chance of a particular sample result being erroneously tagged to the wrong sample ID. The Auto-Combo software automatically correlates the sample ID and sample results and stores the sample data together with the rest of the analysis in an open database.

The database is updated in real-time and can be easily connected to the automatic raw mix feeder control system or any other software or plant ERP for example.

Utilizing right sample quantity and controlling cross contamination

Volumetric dosing and auto binder tablet feeding is used in Auto-Combo-B. Ensuring optimum quantity is ground and homogenized with binder tablets before auto transfer for Pallet making.

Pre-programmed auto self cleaning and gargle cycle of grinding media and pelletizing set is built in for all new samples; a unique system to grind sample & eliminate cross contamination.

Secondly, the unit performs self cleaning after every grinding and Pallet making cycle. This action is performed by using very powerful compressed air jets coupled with powerful suction cleaning to free the grinding and pelletizing chambers from sample traces.

Auto Grinding and Auto Pallet making

Pre set Auto grinding based on sample type and dosed quantity Auto compaction using the pre defined tonnage and compaction time.

Self contained stacks of Pallet rings and Binder tablets

The equipment is provided with a stack of substantially high

number of reusable (25 Nos.) Pallet rings so that the auto Pallet ring feeding mechanism never goes out of rings even if a few rings are in the XRF/XRD analysis cycle. The system accepts analyzed sample rings after auto Pallet breaking and cleaning.

Here, the Auto Combo B commands the XRF system to return the ring on the same conveyor which delivered the sample ring to it. On receipt the Auto-combo B "de-pelletizes" the ring and store it in its ring storage system only to be used for the next cycle.

Similarly, a storage tank for binder tablet stores the weekly stock and submits a pre decided quantity to the vibratory cup mill bowl.

Auto check on structural integrity & surface cleaning

Auto Pallet surface cleaning with directed jets of compressed air and suction pressure eliminates superficial dust on both sides of the compacted pellets.

Similarly the system Auto checks on structural integrity of pellets. If strong, Auto-Combo loads it on a small conveyor to be carried to the XRF system.



Automatic - Grinding & Palletizing Units with XRF / XRD integration (Auto Combo-C)



Integrated Sample Preparation



UNIQUE FEATURES:

Turreted multiple sample feeding systems

Auto-Combo C comes with turreted manual sample feeding systems where the operator can feed measured quantities of material in the designated cups and systems kicks in to auto grind and pelletize the sample as per the pre defined cycle.

A pivoted turreted sample cup holder where the cups sequentially pour designated samples for grinding by simple rotating motion

The turret sequences simultaneously received samples and they are processed in the pre programmed manner. The sequence planning and priority is programmed into the Auto-Combo-C software.

ID specific grinding & palletizing operation

Once the operator feeds the sample in cups designated for raw meal, kiln feed, clinker sample, the sample designation based operating parameters take over.

This eliminates the chance of a particular sample result being erroneously tagged to the wrong sample; the Auto-Combo software automatically correlates the designated sample cup to the type of sample & generated sample ID. The sample results and sample data is stored together with the rest of the analysis in an open database.

The database is updated in real-time and can be easily connected to for e.g. the automatic raw mix feeder control system or any other software or plant ERP.

Utilizing right sample quantity and controlling cross contamination

Taking support of the manual sample receiving stations once the operator feed a weighed quantity of sample and acknowledges the sampler arrival on screen, the volumetric dosing and auto binder tablet feeding process kicks in. Ensuring optimum sample quantity is ground and homogenized with binder tablets before auto transfer for Pallet making.

Insmart Auto-Combo C is a perfect match to any of the existing semi automated sample preparation systems in cement plants where QC labs are using a manual sample receiving station from pneumatic sample transportation or do not have a pneumatic sample transportation system or the labs that have chosen not to go with robotic sample preparation but prefer automation in sample preparation due to high sample load and improve on the reliability of sample preparation process.



Auto Grinding and Auto Pallet making

Pre-set Auto grinding based on sample type and dosed quantity. Auto compaction using the pre defined tonnage and compaction time. Auto combo selects material grinding time required for grinding the sample from sample-ID and automatically sets grinding & pelletizing time.

Pre-programmed for auto self cleaning and gargle cycle of grinding media and pelletizing set is built in for all new samples; a unique system to grind sample & eliminate cross contamination.

Secondly, the unit performs self cleaning cycle after every grinding and Pallet making cycle. This action is performed by using very powerful compressed air jets coupled with powerful suction cleaning to free the grinding and pelletizing chambers from sample traces.

Self contained stacks of Pallet rings and Binder tablets management is similar to Auto Combo B.

Auto check on structural integrity & surface cleaning

Auto Pallet surface cleaning with directed jets of compressed air and suction pressure eliminates superficial dust on both sides of the compacted pellet.

Similarly the system Auto checks on structural integrity of pellets. If strong, Auto-Combo loads it on a small conveyor to be carried to the XRF system.

Compatible for XRF/XRD integration

Various samples pellets such as Limestone, Raw mill, Kiln Feed, Cement are sequentially send to integrated XRF/XRD system for analysis.

Once analyzed the Auto Combo-C also commands the XRF system to return the ring, on the same conveyor which delivered the sample ring to XRF. It will "de-pelletize" the ring and store it in its ring storage system for the next cycle.

GYRATORY SCREENS



Insmart Gyratory Screen is a self contained unit with only three moving parts. Unit can be used for both wet or dry screening in either single or multiple deck applications.

Gyratory screen is designed to provide precise and accurate sieving of material, it adopts eccentric mechanism which drives the material on the screen surface with uniform gyratory reciprocating swing motion. Initially the materials are spread and stratified on the full screen surface, then the gyratory reciprocating motion gradually discharges the materials out from the outlet in the sizing process.

- Circular screens of different sizes from 18" diameter to 60" diameter are available.
- These screens can be operated for both wet and dry screening operations.
- Provision exists for single deck, double deck as well as triple deck facility for batch and continuous operation.



Gyratory screen motion is the most effective method for screening. It is reliable and economical continuous process equipment, which provides solutions to variety of needs of screening, sifting, classification, grading oversize or undersize, removal, de-dusting, de-watering, de-lumping.

Features:

- Screen long service life- No vertical component avoids the impact and damage to screen.
- Full utilization of screen surface- Gyratory reciprocating motion ensures that the material is constantly in contact with screen surface.
- Environmentally Friendly: Fully enclosed structure, no dust pollution, improved working conditions for operators.
- Top-class design: Unique technology, easy installation and maintenance, convenient and quick screen replacement.
- Customized order: Multi- layer, different capacity and mesh size can be customized according to customer's requirement.
- Quick Screen Changes: Quick release device is provided to take down the screen.

Advantages:

- Low power consumption
- High processing rate per unit area of screen
- Accurate separation
- Minimum screen blending
- Screening up to 200 mesh
- Ball tray for anti blinding
- Multi-deck arrangements upto Four decks.

Application Industries:

- Mineral processing
- Chemical industry
- Pharmaceuticals
- Ceramics
- Abrasives

Factors Determine Screening Capacity :

Material Size, Bulk density of the material, Nature of material, Moisture contamination, flow-in temperature, type of feeding, etc.

RO-TAP SIEVE SHAKERS

Dry sieving of samples to determine particle size distribution



Sieving



Installation Prerequisites

- Civil foundation is not required for the installation of the equipment.
- Level surface ground is required for the placement of the equipment.
- Three phase power supply is needed for the installation of the equipment.

Operating Qualification

415 V, 50 Hz, AC, 4 pole MCB, 10 Amps, 3 Phase neutral with earth supply is required.

The Equipment is specifically meant for determining the particle size distribution of sample by dry sieve analysis of various samples in the size range of -10 mm to 38 μ .

It is operated on two simultaneous motions an oscillatory motion with tapping given at the top. They provide oscillatory & tapping stroke in the ratio of 280:140 strokes per minute.

- An ideal unit for determination of granulometric analysis of various test products on dry basis.
- Provision exists for varying the screening time with digital display timer.
- The gyratory motion is transmitted through self lubricated gearbox.
- Simultaneous gyratory and tapping mechanism ensures better screening efficiency.
- Does not require any lubricating oil fill. Self lubricating gear box.
- Upto eight nos. of 2" height and 8" diameter test sieves excluding top cover and bottom pan.
- Timer is provided to set the screening time depending upon the particle configuration.
- Separate electrical panel box for controls.

Operating Features:

The Ro Tap sieve shaker comes with a unique horizontal, circular motion with vertical tapping action which assures accurate and consistent results. These rugged shakers are built for heavy use and can be bolted to bench tops for stable operation.

Widely used in research & development, quality control of raw materials, intermediate and finished products as well as in production monitoring.

Best suited for measuring the quantitative particle size distribution of solids, separating and fractioning of sample quantities.

Built-in 99 minute x 0.1 second digital timer for precise control.

Test Sieves Technical Specifications:

Overall Size of Test Sieves	200 mm Dia x 50 mm Height.
Material of Construction	Brass Frame Fitted with S S Cloth Standard Test Sieves with Brass Frame
SS Cloths	200 mm Dia
Purpose / Capacity	For screening geological materials like Rocks, Minerals, Sand, Stem of Sediments and Soil, Iron Ore, Iron Oxide, Ferrite, Brittle Alloys, Graphite etc.
Input feed size	- 5mm
Material of Construction	Mild Steel
Number of Taps	Upto 280 per minute
Number of Oscillations	Upto 240 per minute
Motor	0.50 H.P.
Power Supply	415 Volts, 50 Hz A.C. 4 Pole MCB, 10 Amps, 3phase, neutral with earth.
Safety Features	Current over load safety for motor protection.
Type of mounting	Capable of operating on a level platform / floor mountable.



Insmart Electromagnetic Sieve Shaker is ideal for determining the particle profile. The permutation of a vertical movement with a rotary motion of the material produces faster and efficient sieving.

Selection of operation mode between continuous or alternating is provided for better sieving efficiencies. Programmable range in process time is from 1 to 99 minutes and amplitude of vibration is from 0.5 to 2.0 mm.

A special clamping device ensures a tight grip on the sieves, but allows for quick and easy removal and replacement of sieves.

Shaker can hold up to eight sieves. Anti-vibration mountings isolate vibrations from the work surface, further reducing noise levels.

The sieves are glued with mesh and jointless rim for easy stacking. Sieves Size are 50 mm height x 200 mm diameter.

Sample should be processed in dry condition.

Features:

- Sieving is done by three dimensional electromagnetic Motion.
- The material to be sieved is propelled upward periodically from the woven sieve cloth, as it returns to the mesh of the sieve it is forced through the apertures to the collecting bin located on the base.
- Samples are kept on the sieve, which are placed on the collecting bin, and a cover is kept on the top of the sieve set.
- Timer with Digital display is provided for controlling the cycle time.
- Vibrations are imparted through an unbalanced motor. Frequency and amplitude of vibrations can be varied.
- **Power requirement:** 2 Pole, 6 Amp MCB (Single Phase with earthing) A.C., 50/60 Hz, 230 V.
- **Motor:** 65 W, 2800 rpm.

R.O.M. SIEVE SHAKERS



Application Examples:

Gypsum, Bauxite, Drilling Cores, Cement Clinker, Coal, Coke, Concrete, Dried Soil Samples, Glass, Granite, Ores, Quartz, Limestone.

Product Advantages:

ROM Sieve Shakers are dynamic vertically aligned screening equipment for separation of large sample quantities of coarser particles.

Perfect Screening equipment to fill the gap between laboratory testing with conventional test sieves and quality control size fractioning of large volumes of coarse materials.

- Meant for size fractioning of lumpy ROM ore.
- Screens with square apertures of 50 mm to 3 mm are available
- 50 Kgs of material can be processed at a time.
- Screens are made of PU frame with spring steel cloth of various apertures
- Meant for dry screening processes.

Operation Brief:

Approx. 50 Kgs of calibrated lumpy ore (CLO), is loaded manually on the top screen and lidded. The screens are clamped to the vibrating platform with fastening belts. Shaking system is switched ON for set time (approximately. 3 mins).

After set time, belts are loosened and screen with retained material are taken off and weighed individually. The equipment conveniently accommodates upto 6 screens which are vertically aligned & in the following chronology:

Containers Size:	Screen Sizes:
450 X 450 X 100 mm	Tightening Cover 50mm 30mm 20 mm 10mm 6 mm 3 mm Bottom collecting pan



Technical Specifications	
Size of Screen Trays	450 mm (W) x 450 (L) x 100 mm (H)
Construction of Screen Trays	Polyurethane with wire mesh cloth screens
No. of Screen Trays	Six Nos. Screen & One receiver
Motor	Vibro Motor
Power Supply	3 Phase, 415V, 50 Hz Ac supply with Earthing & Neutral. 10 Amps, 4 pole MCB (Red, Yellow, Blue, Black, Green)

WET SIEVE SHAKERS



Specifications:

Construction	Mild Steel / Stainless Steel
Test Sieves	Up to 8 nos
Motor	1/4 HP
Accessories	Water hose, sprinklers & Holder
Timer	Automatic, 0 - 60 Minutes (Optional)
Capacity	1 Set of Sieves
	2 Set of Sieves
	4 Set of Sieves
Power Supply	240 Volts
Sieves Range	150 to 10 microns

Insmart Wet Sieve Shaker is an ideal sample preparation equipment for specimens with a high fraction of granular materials and excessive fines content present to make dry sieving difficult. The fines can granulate and stick together in lumps, preventing an accurate assessment by sieving.

Purpose:

For efficient Screening to dislodge the clayey adhered coatings of ore grains.

Wet sieving is also useful for direct particle sizing of problem materials including:

- Soils and mineral aggregates with high fine contents
- Materials that are fragile but not soluble, such as coal or other minerals
- Lightweight powders
- Sludge and glazes
- Kaolin and fillers
- Abrasives
- Micro granulations

Process:

The unit can accommodate 8 nos of standard test sieves of 2" height and 8" diameter and with a spray nozzle (Eye type) for uniform spray of water for efficient screening.

Timer provision exists for predetermined screening time.

Efficient control of grinding and milling depends upon accurate screen analysis.

The gyratory motion of the suspended shaking mechanism is vertically aligned in a manner that the sample passes through sieves very rapidly. The water spray from the top lid helps the undersize particle to pass through smoothly preventing particles from adhering or agglomerating.

The final product is received in the bottom.

The high efficiency and low cost of screen analysis unit makes it indispensable in every mineral laboratory.

The standard shaking unit consists of the vibratory mechanism and sieve rack which is suspended to provide full gravity action during the screening process.

Wet screening kit consists of a special top cover and funnel attachment for bottom pan.

Features:

- Heavy duty belt driven motor
- Ideal for wet sieving analysis
- Sturdy construction
- Accuracy of mechanical sieving
- Easy maintenance
- Efficient Drainage System

SINGLE, DOUBLE & MULTI DECK VIBRATORY SCREENS

Sieving



Features:

- Linear Straight line Action for a smooth Particle movement
- Excellent Separation
- Screen Decks are easily Changeable
- Zero Maintenance
- Motor mounting on suspended frame for better vibration transfer
- Mounted Twin Motor Drives

Structured Body:

Body of a Vibrating Screen consists of a base frame and screen supporting structure. The base frame is welded using heavy channels and angles in order to contain the continuous vibration. Screen supporting structure and screen are made from wear resistant steel.

High strength Springs:

Suitable helical coiled springs are provided with the Vibrating Screen. Entire screen holding structure is supported by these springs. Special care has been taken to manufacture these springs which bear entire load along with continuous vibratory motion.

Driving Motor:

The foundation frame of the Driving Motor is provided by projection on one side of the Vibrating Screen and supports from base frame are also provided to hold the motor foundation. The size of motor varies as per the size of Vibrating Screen. Power requirement is 3 phase earthing through 16 Amps, 3 phase MCB.

Classifying lumpy samples is best achieved by using Insmart decked vibrating screens which comes in three variants of single, double & multi deck vibrating screens.

The inclined screen design is proven in Limestone, Bauxite, Laterite and mining ore applications.

Side tensioned wire mesh cloth screen decks are made of high strength materials.

Multiple size decks on a single platform are available.

High-performance vibro-motors bring about vigorous and continuous shaking of size fraction.

Coiled Screen:

The screens are made from special coiled sheets to provide sufficient resistance to wear and tear. The mesh size of the screening surface can be made as per the requirements of the customer.

The number of screening surface depends upon the number of decks of the screen. The inclination is given to the screen according to the suitability of work.

No. of Decks:

Normally 3 or 4 deck vibrating screens are provided against special request). In case of 3 or 4 deck Vibrating Screen special collecting (discharge) launders are also provided.

Customer is advised to check on various factors while selecting screening equipment such as:

- Particle shape and size
- Feed rate, required number of size distribution
- Moisture content
- Bulk density of material
- Number of products to be screened
- Method of loading

For each application there is an optimum combination of amplitude, frequency and attack angle.

The major benefits of horizontal screens include lower overall height and more-efficient fine processing.

The efficiency improvements are mainly due to a lower travel rate of the material.

WORK INDEX ROD MILL



Brief Description:

Wet and dry grinding is accomplished with the mill operating locked in the horizontal position. For charging and emptying the mill, it is tilted on its axis. The mill stand has an adjustable shelf so that containers of varying size can be used for holding mill discharge. Single piece, round corner construction permits easy, through cleaning and eliminates contamination. A Grate discharges holds back the grinding charge. It can be used as a ball mill by replacing the rods with steel grinding balls.

- Mills can be operated for wet grinding.
- As per the standard procedure the feed is crushed to -½" and 1250 CC packed in a graduated cylinder is weighed, a representative sample is screen analysed. The weighed sample is ground duly in closed circuit with 100 percent circulating load in a 12" x 24" long tilting Rod Mill with a wave-type lining and revolution counter, running at 46 r.p.m.. The Grinding charge consists of Six 1.25" Dia and two 1.75" Dia steel rods of 21" long and weighing 33,380 Grams.

Technical Specifications

Size of Mill	12" Diameter x 24" Length
Rod Charge	33,380 gms (21" length x 1.25" Diameter - 6 nos and 21" length x 1.75" Diameter - 2 nos)
Motor Capacity	0.50 HP, 1200 r.p.m.
Mill Speed	46 r.p.m. (fixed)
Feed Size	6 mesh
Material of construction	Hardened Cast Steel of Grinding Media (wear resistant)



Utility:

This Index is widely used in the mineral Industry for:

- Comparing the resistance of difference material to ball milling
- Estimating the energy required for ball milling.
- Ball mill scale-up.

Brief:

- Insmart make Bonds work index ball mills are manufactured strictly as per the standard of Dr. F C Bond.
- Both the mills are supplied with recommended grinding media and assorted sizes of balls.
- The Work Index ball mill is supplied with software.
- With software version Bonds Work Index Ball Mill is a highly exported equipment as it single handedly helps the customer to quickly decide on the required changes in the plant ball mill grinding characteristics by quickly determining the resistance of the material to grind when there is a change in the material characteristics.

Purpose:

In a world with limited energy resources, need to design the energy requirements of engineering processes cannot be over emphasized.

The Bond's Ball-Mill Work Index is a measure of the resistance of the material to grinding in a ball mill. This Index is widely used in the industry for comparing the resistance of different materials to ball milling, for estimating the energy required for grinding and for ball mill scale-up.

Deeper Insights:

In the Cement industry, comminution is the highest consumer of energy. Napier-Munn et al. (1996) stated that 30 -50 per cent of the total plant power consumption for ore processing plants and up to 70 percent for hard ores is attributed to comminution.

Whittles et al. (2003) observed that about 1.5 per cent of the annual electrical energy production in the United States of America is used in comminution processes in the minerals industry. Thus effective use of data from grindability tests can be used to evaluate energy requirements and grinding efficiency.

The energy required to grind one ton of an ore from a given feed size to a specified product size is a material property that needs to be determined for different ore deposits like Limestone, Bauxite, Iron Ore, Laterite etc.

The Bond's work index has generally been accepted as a measure of the grindability of an ore.

Advantages of Inbuilt software systems:

It takes shorter time : The values of model parameters are fed into program, the accurate ball mill index of the material to be determined and the details of the simulation can be automatically printed out in a couple of minutes.

It usually takes 8 hours for the grindability test.

It gives high accuracy for the determination with few prediction errors introduced by the batch grinding model. Thus, various experimental tests in actual grinding are eliminated.

CORE SPLITTER

Characterisation



As a part of feasibility studies, the drill core Samples are required to be subjected to observe Lithology and characteristics are to be recorded with one half of the core while the other half is secured in the core library.

The mineralogical characteristics are very important to estimate the ore profile and reserves etc.

The core splitting machine is provided with interlocking through Proximity sensors such that it works only when the door is closed, this prevents falling of split cores and entry of physical Limbs inside the working chamber.

Ideal equipment for splitting hard cores.



Technical Specifications

Feed Core Diameter	30 to 100 mm
Core length	200 mm
Maximum Pressure	Up to 250 Bar
Power Supply	4 Pole, 20 Amps MCB, (3 phase + Neutral with Earthing) . AC, 415 V- 2.2 Kw (3 hp), 1415 rpm
Safety Features	The machine is provided with interlocking through Proximity sensors that it works only when the door is closed, this prevents falling of split cores and entry of physical Limbs inside the working chamber
Maximum applied splitting Force	Up to 12 Tons (High Speed Impact)
Type of cutting	High Speed, high force edge impact with immediate withdrawal of splitting edge
Core Mounting	V Block Type
Construction	Heavy duty steel frame with safety door and enclosure
Display of Maximum	Analog Type Pressure Display
Timer	0-60 Seconds to set the impact tool time

CORE CUTTER

Characterisation



The core sample cutter is housed in a closed Container for effective cutting of core samples with minimum noise. A pump is provided for cooling while cutting the core sample. Manual movement of Core against a wheel with diamond edge is provided for effective and efficient cutting.

The Core Cutter machine is used for:

Cutting of core samples precisely into two equal halves irrespective of Hardness of the core.

The rock / core Sample include Hard and compact Quartzite, Granite, Basalt, Limestone, Sandstone, Shale, clay stone etc.

Features:

- The unit is designed in such a way that for cutting of cylindrical rock specimens from PQ up to NQ size. The outfit includes diamond impregnated cutter, a water supply system and sample holder.
- Provision exist for supply of coolant during cutting of core sample.
- The machine is floor mounted.
- For collection and draining of cutting fluid / material a collection tray of stainless steel or non - corrosive material along with fluid passage drain is provided.
- Proper safety feature including electrical insulations are provided.
- Appropriate Tool kit for easy removal and fitting of core bit of sizes and routine maintenance is provided.

Technical Specifications

Motor	3 H.P
Cutter Dia	400 mm
Cutter Disc	Cutter Disc with diamond tips
Cutter Speed	1440 rpm
Core length	Maximum 260 mm
Core dia	Maximum 100 mm
For Cooling & cleaning (Water Pump)	Water Cooling System
Power Supply	3 Phase , 440V, A.C.Motor
Working Height	1100 mm
Clamping Mechanism	Sample held in between Jaw
Core Clamping Trolley	Manually Operated by rotary wheel towards the cutting disc. Sample kept on trolley and held by Jaw Mechanism
Safety	Machine will not function if the doors are not in closed position
Machine Weight	150 kgs
Core Mounting	V Block with adjustable Screw
Type of Cutting	High Speed wheel based cutting
Construction	Mild steel frame with glass safety door and enclosures
Machine Size	1200 (L) x 750 (W)x 1600 (H) mm

HARDGROVE GRINDABILITY TESTER



Characterisation



The HGI is worked out through a stepwise method:

- Digital cycle counter for setting the revolution of the machine and automatically stopping after desired revolution.
- A 50-gms sample of prepared coal that is uniform in size (-1.18mm) is placed within a bowl unit.
- The bowl unit undergoes a measured number of revolutions under a specified rotating load.
- Steel balls inside the bowl unit crush the coal sample.
- The coal fines are collected and the amount of coal lower than a specified size is noted and converted into a Hardgrove Grindability Index (HGI) value.
- Generally the resulting HGI Index values fall in between 30 (indicating higher opposition to pulverization) and 100 (indicating lesser resistance).
- The results allow users to formulate correct assessment of the power needed and resistance to grindability, factors that are important for optimizing plant processes.

Accurate and precise computations obtained through Insmart HGI has helped customers in coal processing.

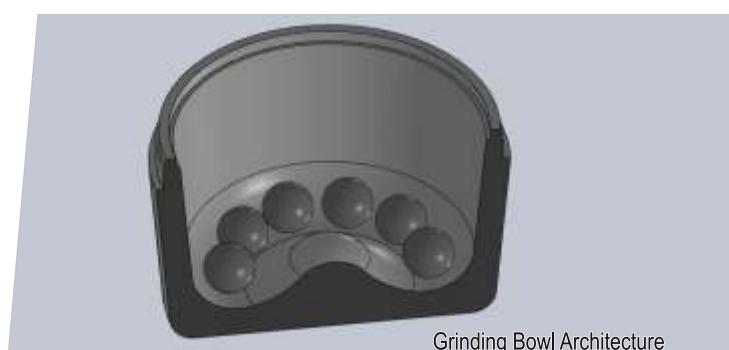
Heterogeneity in procured coal with varying percentages of combustible and non-combustible material brings another challenge to the coal consumer that is to continuously measure the resistance of coal to crushing. The measure of grindability can be obtained by using Hard Grove Grindability Index (HGI).

On popular demand from our customers Insmart has developed a compact coal grindability index determination unit. The unit is constructed in strict accordance with IS 4433 as well as ASTM D 409 and conforms to proposed procedures for the determination of the Hardgrove Grindability Index of coal and coke.

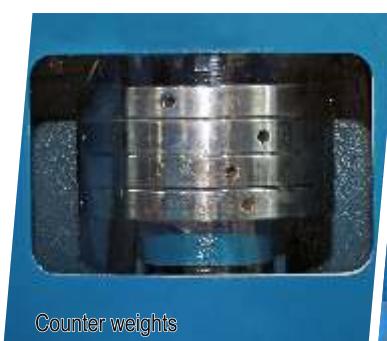
The Hardgrove Grindability Index value provides information for determining grinding power consumption and pulverizer capacities.



Sample preparation work table



Grinding Bowl Architecture



Counter weights



Bowl locking mechanism

COAL FREE SWELLING INDEX

to measure swelling properties of Coal for preparing Coke



Characterisation



Swelled Coal Sample Buttons



Standard Swelling Index Profile



Purpose:

To measure swelling properties of Coal for preparing Coke.

Brief Description on Procedure:

Insmart Make Free Swelling Index (FSI) is provided with a furnace, Silica Crucible and temperature controller in order to achieve accurate Swelling Index.

For measuring Swelling Index of coal, 1 gram of a representative sample having particle size of - 212 Microns is charged into a Silica Crucible.

As a next step the crucible is gently tapped for 10 to 12 times on a leveled platform so that the coal sample settles and gets a flat top.

The furnace temperature is allowed to attain the test temperature of $820^{\circ}\text{C} \pm 5^{\circ}\text{C}$. On obtaining the required temperature, the operator opens the furnace top cover and places the loaded Silica Crucible on to the refractory plate and closes the top. In order to achieve swelling index, the test sample is retained in the furnace for 2.5 minutes.

On completion of 2.5 minutes of heating, a buzzer is sounded and automatically heating is stopped. Here the sample takes the shape of a coal button based on the coal type.

The crucible is gently removed from refractory plate with the help of SS Tongs and kept aside to cool. Now the swollen coal button is compared with the shape of standard Swelling Index Profiles. This test is repeated for minimum 4 samples to achieve consistency.

Result:

- i. Swelling Index Number from 0-2 indicates that coal is not suitable for coking i.e., coal is of low grade
- ii. Swelling index number above 8 cannot be used for coking as this represents a weaker coal.

Technical Specifications:

Furnace: Consists of two sections i.e., Top Panel and Bottom Unit

a. Top Panel

- i. Temperature : Minimum $900^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- ii. Operating Temperature : 850°C
- iii. Heating Elements : Silicon Carbide
- iv. Thermo couple : K Type
- v. Duration of Test : 2.5 minutes (After placing Crucible)
- vi. Plate dimension : Dia 100 mm x 20 mm Thick

b. Bottom Unit : Bottom Unit consists of the following

- i. Digital PID temperature controller
- ii. Timer set with Buzzer

TUMBLER DRUM



Insmart Tumbler Drums are trusted equipment to test and determine the resistance to degradation by impact and abrasion of hard lumpy ores like various Iron oxides, Sinter and Pellets, etc.

The test sample is placed in a standard Tumbler Drum and rotated for a specified number of revolutions. The sample is removed and screened by means of standard sieves. The individual size fractions are weighed. From the masses of the different size fractions obtained after sieving the Tumbler and Abrasion indices are calculated.

The equipment complies with IS:6495

Specifications:

Material for wear resistance parts	Suitable Steel Grade
Motor	3HP
Breaking	Mechanical System
Structure	MS Channels & Angles
Gear Box	MM Gears with 1 : 60 Ratio
Drum Plate Thickness	Side portion of 10 mm and 6 mm for periphery
Shaft	Suitable graded Hardened Steel
Control Panel	Consists of: Time control, RPM Control with Proper switches and accessories
Programmer	PLC/Microprocessor based
RPM speed DESIGNED	25 rpm
Size of the DRUM	W 500 x L 1000 mm (Confirming to IS-6495:1984)
Steel angle Lifter	50 X 50 X 5 mm.
Height of drum axis	700 mm.
Electrical Power requirement	4 Pole, 16 Amp MCB 3 Phase/ with earthing) A.C. 50/60 Hz, 415 Volts, Motor-2.2 Kw (3 H.P.)



The Test apparatus is specially designed to meet the MICUM test which is a relative measure of resistance of coke to degradation by abrasion.

The coke after selecting +50 mm size material through sieving is subjected to the Micum Test under standard conditions in a rotating drum. The drum is made to rotate for 100 revolutions at a rate of 25 rotations per minute (RPM) in approximately 4 minutes. The mean results of three Micum tests after size analysis with the help of sieves with the apertures in the size range of 60 mm to 10 mm are treated in the indices after taking cumulative percentages of retained material over 40 mm screen and 10 mm screen. This determines the resistance to breakage by abrasions.

The equipment complies with IS 1354.

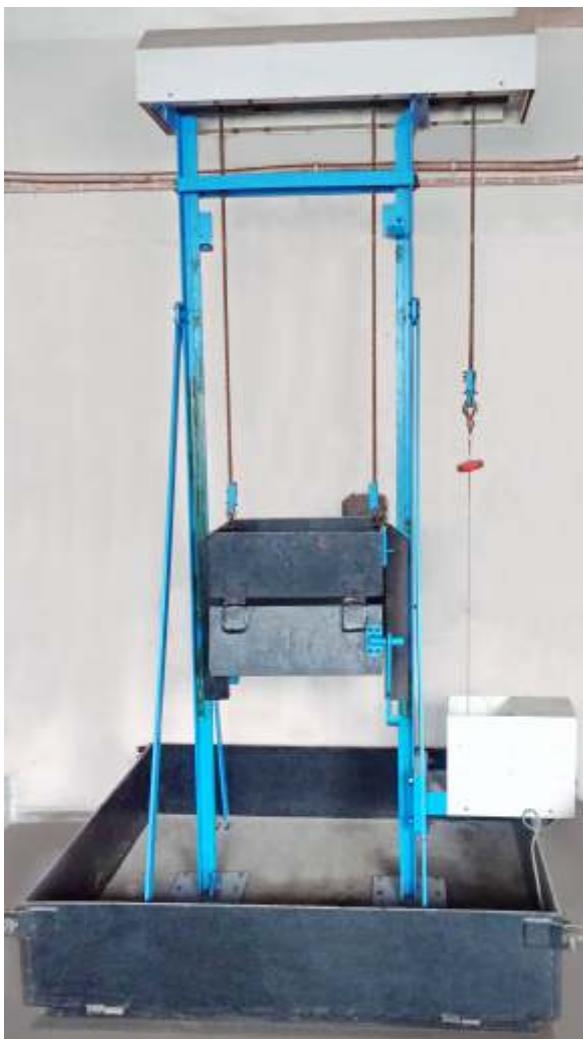
The System consists of three parts:

1. Control Panel
2. Three phase drive
3. Rotating drum

Specifications:

Size of the Drum	1000 x 1000 mm
Material for wear and tear resistance parts	Suitable Steel grade
Size of Door	600 X 500 mm
Motor	5 HP
Breaking	Mechanical System
Structure	MS Channels & Angles
Gear Box	MM Gears with 1 : 60 Ratio
Drum Plate Thickness	Side portion of 10 mm and 6 mm for periphery
Shaft	Suitable graded Hardened SS material
Control Panel	Consists of: Time control, RPM Control with Proper switches and accessories
Programmer	PLC / Microprocessor based
Sieve Material	Graded G I material

SHATTER TEST APARATUS



Purpose:

A conventional and trusted method of measuring the shattering resistance of different friable and non-friable materials during free fall. Insmart Shatter Test Apparatus is extensively used for materials like Iron Ore lumps, Sinkers, Pellets, etc.

Equipment Description:

The equipment is provided with a 25 kg container which is automatically lifted to an approximate height of 2 meter by a remote controlled motorised lifting facility. The top box is provided with different tilting angles to help in tilting the top box in different positions as per users choice.

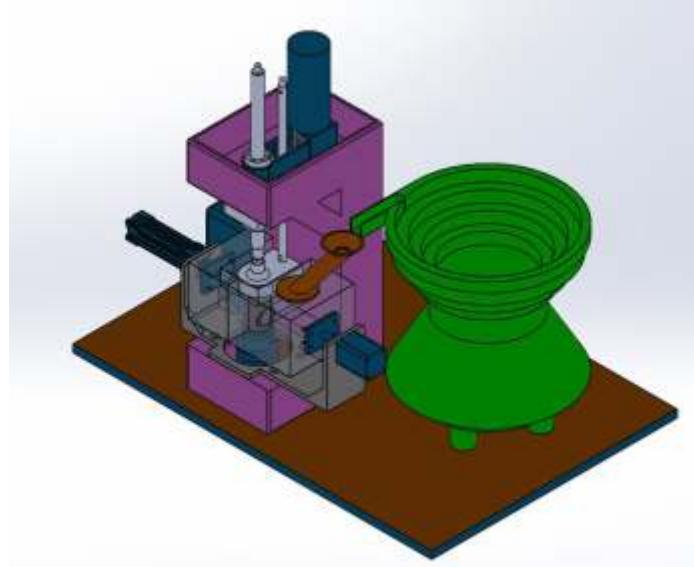
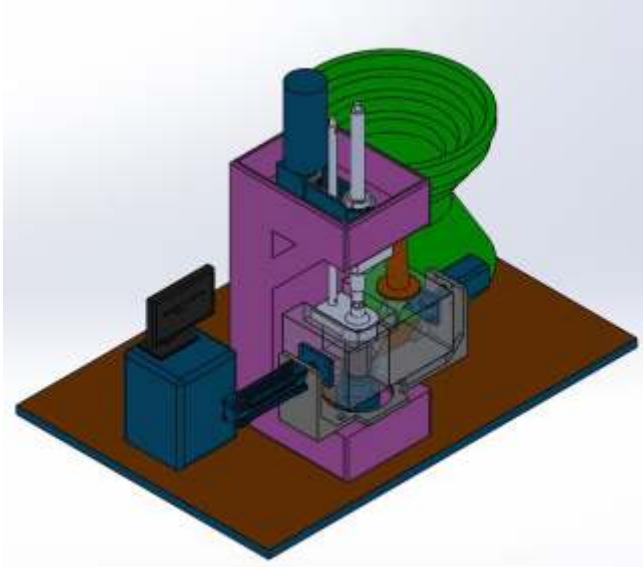
The base plate comes with a lever mechanism and it's shutter type opening makes it easier to pull the shutter.

This equipment is made as per IS 9963 standards.

Specifications:

Equipment Dimension	Total Height	2000mm
	Base Plate length	1500mm
	Base plate height from bottom	300mm
	Sample box insertion width	560mm
	Sample fall open length	2000mm
Container	560 x 420 x 200 mm (permanent Silo type)	
Base Plate	12.5 mm Thick x 1220 mm long x 270 mm wide	
Sieve Plates	600 mm square x 200 mm thick hard wood sides, tolerance +/- 0.2 to 0.5%	
Container capacity	0.055 m ³ & capacity of 0.017 m ³	

PELLET CCS TESTING MACHINE



Automatic Cold Compressive Strength testing machine for Iron Ore Pellet

A. Technical Specifications:

Insmart make state of art technology Cold Compressive Strength (CCS) testing machine is designed and developed in accordance with IS 8625-1986, ISO 4700 and ASTM E 382 standards. The standard machine is for fired iron ore pellets.

- Pellet vibratory feeder capacity - 500 nos
- Load cell capacity - 1500 kg

B. Electrical requirements:

- Power supply 3 phase + Neutral + Earth
- 440 V input power supply
- Data digital output - RS 232 to host computer
- Compression speed - 15 mm / min (as per standard)
- Maximum compression load - 1500 kilograms

C. Salient features:

- Designed as per the standards
- Automatic pellet feeding mechanism
- Pellet counting system for pellets subjected to test

- Automatic display of CCS in kg per centimetre square
- Display of standard deviation, average, maximum and mean CCS.
- Apply of constant load by flow professional control (FPC) valve
- Control station (attached to the machine or computer controlled as per user requirement).
- Automatic or manual mode can be selected for operation.
- Load cell is factory calibrated.
- Auto cleaning system for compressed pellets.

SURFACE MOISTURE ANALYZERS



Ovens & Furnaces



Use of this special equipment can yield the requisite results within a short span of 5-6 hours as against 24 hours consumed in the conventional process.

The moisture content of coal ranges from 6% by weight in anthracite coals to 45% by weight in lignite, thus determination of surface moisture content in as received coal sample is important.

Surface moisture (free moisture) is, as the term implies, water held on the surface of the coal and determined as the loss in weight in an air atmosphere under rigidly controlled conditions of temperature, time and airflow confirming to ASTM D 3302.

Our Specially designed moisture Analyzer system is provided with unique features. The system is designed to accommodate four crushed samples of 1000 gms each with built-in load recording systems.

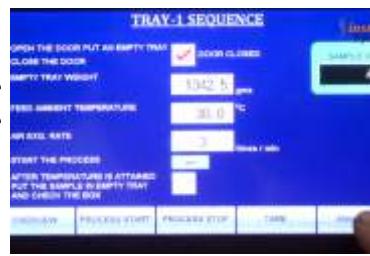
Surface Moisture Analyzer circulates dry air or nitrogen gas at a flow rate of one to four volumetric air exchanges per minute.

The Analyzer is provided with dynamic temperature control mechanism to achieve uniform heating of upto 40°C.

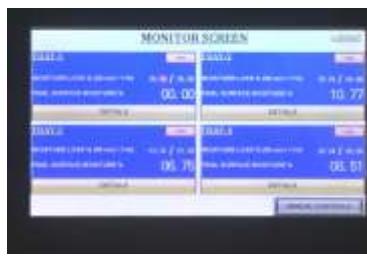
These air exchange and temperature control mechanism provide accelerated removal of coal surface moisture.

Once the weight loss weightment difference of 0.05% (between two consecutive half hour readings) is achieved the hot air flow is switched off automatically and the hooter alarm is blown. This confirms the completion of air drying process for the specific sample.

The analysis results are graphically and tabularly exported to a PC.



Operating Console



Test Status Display



Log for Temperature & Air-dried-loss



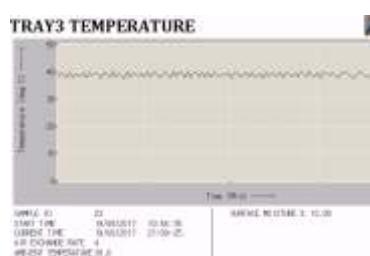
HMI display of test completion



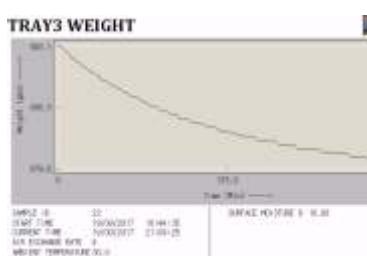
Intermittent Weighment System



Air flow Control



Dynamic Temperature Graph



Dynamic Weight loss Graph (ADL)

HOT AIR OVEN

to air dry ROM Coal/Coke, Dolomite/Fe Ore and Fines samples



Ovens & Furnaces



Application:

Moisture determination of Iron Ore, Limestone, Dolomite, Coal, Coke Fines, Coke, Pellet, Quartzite, etc.

Also, used in drying of various samples for different purposes.

TECHNICAL SPECIFICATIONS:

1. Standard Size Oven : 1000 mm x 1000 mm x 700 mm (W x H x D), Can be custom designed
2. Working Temperature : $108^{\circ}\text{C} \pm 3^{\circ}\text{C}$
3. Design Temperature : 250°C
4. Temp controller : PID control with thyristor for over temperature protection, Digital display.
5. Number of Trays : 4 tray, can be custom designed
6. Thermocouple : K Type

General Technical Specifications:

- | | |
|----------------------|---|
| Rating supply | : 3 kW, 230 V, Single phase + Earth + Neutral |
| Insulation | : The Oven consists of three layers of insulation. The Oven skin temperature is 5°C above ambient. |
| Air Exchange | : Provision for preheating of the inlet air to maintain a uniform temperature in the air drying chambers with 4-5 air exchanges per minute with a provision of a tall chimney for air extrusion. |
| Construction | : The outer of the Oven is made of MS sheet with perforation duly powder coated. The inside layer is made of SS 304. The front door of the Oven is made of 1.6 mm to withstand the heat from the door opening. All heat affected parts are painted with heat resisting Aluminum paint. |
| Heating elements | : Kanthal APM heating element. |
| Control Accuracy | : $\pm 3^{\circ}\text{C}$ |
| Control Panel | : The Oven is provided with a control panel in fully wired condition installing the following Digital temperature controller to control temperature. |
| Temperature Controls | : Capable of giving a substantially uniform zone as per IS 1350 or ISO 3088 standards and the temperature is ramped up to 108°C in 15 minutes from cold and maintain this temperature up to the end of the run up period. |
| Air circulation | : Inlet and outlet ports distribute the air uniformly throughout the Oven area without the possibility of sweeping solid particles from the trays. Using controllers, the temperature over the entire working area of the Oven floor is maintained within the specified temperature limits. |

MUFFLE FURNACE

for Ash, VM & LOI determination



Insmart muffle furnaces are best suited for laboratory use with temperature range 800°C to 1100°C. As required, we provide both readymade as well as made to order customized muffle furnaces.

These laboratory muffle furnace units are operated for in general purpose heating in laboratories, ashing, sample drying, and heat treatment requirements for various research facilities in mineral labs.

SPECIFICATIONS:

Inner Muffle chamber size: 5"x7"x14" (WxHxD)

Working Temperature: 1150 °C ± 3 °C

Temp controller with dual display: Indicator cum controller

RATING: 3.5 KW, 230 V, single phase supply

INSULATIONS:

The furnace consists of three layers of insulation. The innermost layer consists of 2" thick Ceramic wool of 1425°C grade, the middle layer of 2" thick which shall be Ceramic wool of 1280°C and the outermost layer carries loose ceramic wool. The furnace skin temperature is less than 100°C under regular operation temperature of 1100°C. The insulation in the front collar is 75 mm thick.

HEATING ELEMENTS:

The heating elements are wound on a ceramic muffle of inner size 5" wide x 7" height x 14" deep. The heating element is made from 14 SWG wire of rating 3.5 KW, 230V. The heating element is enclosed in a layer of high density ceramic wool of 400 kg/cu.m density of HTZ grade. The next layers shall be ceramic wool of 1280°C and then 3" of loose ceramic wool all around the furnace.

CONTROL PANEL:

The furnace is provided with a control panel with the following PID Digital temperature controllers.

- Load contactor for controlling heating load.
- Type K Thermocouple
- Incoming and outgoing terminals and indication lamps
- Control Accuracy: +/- 3 °C
- Max. Operation Temp. : 1100 °C

APPLICATION:

- a. Temperature 850 °C for Ash content in Coal
- b. Temperature 900 °C for VM Content in Coal & LOI content in Ores

Insmart Proximate Analyzer

for Automatic Ash, Volatile Matter & Moisture Analyzer



Ovens & Furnaces



Insmart has indigenously developed an Automatic Ash, Volatile matter and moisture Analyzer for coal samples.

Designed to address the demands of high sample load management and need for quick analysis results at coal laboratories and coal based thermal power plants.

Insmart coal sample analyzers have completely automated the age-old technique of measuring the changes in weight of a sample after it is subjected to high temperatures.

Key Advantages:

1. Designed as per IS 1350 guidelines.
 2. Completely automatic sample handling: From sample feeding and precision weighing to automatic Ash, VM, IM Analysis of the coal samples.
 3. Multiple mini furnaces and ovens to provide extremely accurate and fast analysis of upto 140 samples a day.
 4. Each sample is pre coded and analyzed separately thereby keeping the sample ID intact.
- Thus, the results of Ash Content, Volatile matter and moisture % are obtained within the same time lines as stipulated in IS 1350.
5. Easily integrated with Robotic Sample Preparation System.
 6. Automatic dosing of 1 gm samples in crucible.
 7. Robotic sample feeding and retrieving of samples to the mini furnaces and ovens.
 8. Automatic sample ID recognition and result reporting as per the sample ID.
 9. High precision auto weighing systems and auto control of initial and final weightment.
 10. Large screen status displays.
 11. Extremely useful for coal fired thermal power plants which receive coal from multiple sources and have multistage coal sample analysis as part of their process control.



FUME CHAMBER & HOT PLATE



A fume hood is designed to limit exposure to hazardous or toxic fumes, vapors or dusts.

A fume hood encloses five sides of a work area, the bottom of which is located at a standing work height.

Air is drawn in from the front (open) side of the cabinet, and either expelled outside the building or made safe through filtration and fed back into the room.

For exceptionally hazardous materials, an enclosed glovebox may be used, which completely isolates the operator from all direct physical contact with the work material and tools. The enclosure may also be maintained at negative air pressure to ensure that nothing can escape in the lab environment.

Benefits of Fume Hood:

- protect the user from inhaling toxic gases (fume hoods, biosafety cabinets, glove boxes)
- protect the product or experiment (biosafety cabinets, glove boxes)
- protect the environment (recirculating fume hoods, certain biosafety cabinets, and any other type when fitted with appropriate filters in the exhaust airstream)
- Secondary functions of these devices may include explosion protection, spill containment, and other functions necessary to the work being done within the device.

Technical specification of Fume Hood:

Fume Hood	
Dimension	: 1500 x 900 x 2200 mm
Bed Size	: 1350 x 750 mm
Carcass	: 1. Melamine Resin filled laminated Flat press board 2. Thickness: 16 mm 3. Sealed by POLYPROPYLENE edge tapes
Shutters	: The shutters and drawers fronts will have chemical resistant POLYPROPYLENE Thermo Foil face E1/E2 grade core material the urethane acrylic coating on top of thermo foil is resistant to deformation and scratches POLYPROPYLENE.
Door	: Single, vertical sliding, concealed type door balanced with counter weights & wire rope.
Ducting	: Rigid ducting of FRP of 200 mm dia 10 feet 4 mm thick rigid FRP pipe provided with suitable rain hood
Baffle	: A stable, non – adjustable with a single slot on the back baffle to aid in distributing the flow of air into and through the hood. The baffle is spaced out from the back and it is removable for cleaning.
Baffle thickness	: 3 mm thick FRP Sheet
Impeller	: Dynamic
Motor	: 1 HP , 1440 RPM
Blower	: Silent high efficiency remote blower consisting of continuous rating motor and chemical resistant impeller. The blower is designed to give a face velocity at safe working height as per the International safe velocity norms.
Blower casing	: FRP biphenyl A fume rate resin with 6 mm thick Direct Coupling
Sash	: The sash is made of glass with vertical rising frame. The bottom of the sash frame will have a length handle. The sash be counter operation. The glass panel is made of 5 mm toughened glass.
Bottom Arrangement	: FRP biphenyl A fume rate resin with 6 mm thick
Suction capacity	: 800 – 1000 CFM

INSMART MAKE HOT PLATE



1. The termination for the heating element is 18 SWG (1.2mm) nichrome double twisted wire (ALLOY WIRE) capable of withstanding high temperature.
2. The top plate is made of 8 mm thick Mild steel plate with collar.
3. The hot plate is insulated with ceramic wool insulation blanket of 25mm thickness on the bottom and a Controller, Load Relay, indication lamps all completely wired and assembled in ready to use condition.
4. The sides of the hot plate are made of 16 SWG (1.6 mm) Powder coated mild steel sheet.
5. The hot plate is provided with a two metre long cable with metal clad plug.

Technical Specifications:

Size	: 450X 600 mm
Heating elements	: Imported INCOLOY 800 Rod
Rating of Heating Elements	: 3000w, 230V
Power requirement	: Single Phase 230 volts

SOFTENING & MELTING TEST APPARATUS

for determination of softening melting characteristics of iron ore sinters / pellets / lumps



Metallurgical Tests



The equipment will be used for determination of softening melting characteristics of iron ore sinter / lump / pellet and strictly conforms to the stipulations of IS: 9660 (latest edition) (Method 1, Section 2). It consists of a cylindrical container, lower stainless-steel pipe, upper graphite ram, upper stainless-steel pipe, etc.

Cylindrical container

The container opens at both the ends and is made of graphite (for example from broken arc furnace electrodes, etc.) the dimensions are: ID = 50 mm, and L = 100 mm. A perforated bottom plate having five holes (one at the center), also made of graphite, fits to the graphite container to the lower stainless-steel pipe.

Lower stainless-steel pipe

The lower stainless-steel pipe fits tightly into the graphite bottom plate and it is long enough to extend outside the furnace tube in the ambient. It rests upon a rigid ground support and bears all the load. It has a side tube for inlet of reducing gas. The gas line is also be connected to a manometer and its pressure is recorded throughout the test.

Upper graphite ram

After the graphite cylinder is fitted with alternate layers of coke / iron bearing material / Al₂O₃ balls to a height of 90 mm, a graphite pressure ram perforated axially like the bottom plate is placed over the upper Al₂O₃ ball layer. The central hole will be used for introducing thermocouple.

Upper stainless-steel pipe

This pipe will fit tightly on the upper graphite ram as shown in Fig. 3. The length of the pipe is such that it extends outside the furnace into the ambient. The ram is provided with a central hole along its length to allow thermocouple to be introduced. The hole also serves as exit for reacted gases. On the top of this pipe, a cylindrical cover is fitted with an outlet for reacted gases and the other for thermocouple leads. The top plate of the cover supports the load to be applied on the iron bearing material during reduction.

The apparatus includes a water gauge for continuous recording of pressure of the inlet gas, gas pipettes / infrared gas Analyzer for analysis of the inlet and outlet gas and a pointer attached to the top stainless-steel cap for indicating the setting due to softening, during the course of reduction under load, as stipulated in IS: 9660.

Furnace:

Max Temperature	: 1300 °C
Heating element	: Nichrome / Kanthal
Heating rate	: 21 °C / minute (as per standard)
Furnace Type	: Split

COKE CSR / CRI TESTING EQUIPMENT

Coke Strength after Reaction with CO₂ (CSR)
and Coke Reactivity Index (CRI)



Metallurgical Tests



The most widespread test for characterizing coke degradation potential in a blast furnace is the Nippon Steel Cooperation (NSC) CSR/CRI test. This is a standardized test to determine the coke reactivity according to the endothermic solution loss reaction ($C + CO_2 \leftrightarrow CO$) and the coke mechanical strength after reaction. The weight loss of coke represents the Coke Reactivity Index, CRI, and the remaining coke on the +10 mm sieve represents the Coke Strength after Reaction, CSR. The Indian Standard referred for this is IS 4023: Method B.

1. Sieves

- a) 19mm, 21 mm square aperture sieve set – 1 no (450mmX450mm square)
- b) 10mm aperture sieve (round aperture) – 1 No (200mm X 200mm square)

2. Gas Flow / regulating control panel

Gas regulating control panel is for flow of inert gas and/or Carbon dioxide gas during test period. Flow rate of CO₂ and N₂: 5 LPM +/- 1.0 LPM

3. Reduction Tube – 1 No

Reduction tube is made of non-scaling, heat-resisting metal to withstand temperature of 1150 deg C.

The reduction tube has gas inlet and outlet points.

Inside diameter of tube: 76+/- 1.0mm

4. Sample Holder – 1 No

Sample holder is made from INCONEL 600.

It is equipped with a thermocouple to measure the temperature of the sample.

The sample holder has a loose fitting and perforated bottom with Alumina balls for distribution of reduction gas.

5. Online Electronic weighing balance – 1 No, ±5.0 grams

Online weighing balance is installed for continuous online measurement of sample during reduction to measure the loss of sample due to gaseous reactions during reduction.

6. Temperature control panel – 1 No

Temperature control panel will assist in temperature regulation and automatic control of sample testing temperature during entire test duration.

7. Idrum: 20 rpm, 30 minutes, Drum length 700 mm, Dia 130 mm.

8. Gas Burning chamber

The reacted gas is burnt in a gas burning chamber. Gas burning chamber is equipped with electrical burner which maintains 700 deg minimum to ensure complete burning of Carbon monoxide to carbon dioxide.

9. Ambient Air quality monitoring system – 1 No (One CO and one O₂)

Online Carbon Monoxide and Oxygen monitors are installed in the testing area. The system will create awareness and help in taking appropriate actions to ensure personnel safety.

10. Hoist Crane – 1 No

One hoist crane is installed above for lifting, positioning of retort inside the furnace and removal of the same after the reduction test. It is hand operated.

11. Work Station

One PC (4 GB RAM, 500 GM Hard Disk) along with its accessories

One HP Inkjet (Black and white)

Online data logging of time vs weight loss during test period.

12. Performance Guarantee

a) Furnace temperature – 1150 deg C (Max) ± 5 Designed. Designed for protection against over shooting of temperature. Electrically heated.

b) Retort dimensions as per the IS Standard (Customer can select any standard)

c) Gas flow control 5 LPM ± 1 LPM

d) Online weight of sample accuracy 0.1gram

e) Repeatability of CSR: ±5% from average of 5 tests from same lot of coke sample.

RI / RDI TESTING EQUIPMENT

Reduction Degradation Index (RDI) and Reducibility Index (RI) determination for Iron Ore Lumps/ Pellets and Sinter.

Metallurgical Tests



Significance of the test:

The Reduction Degradation Index set up supplied by Insmart Systems, Hyderabad is used for the determination of the degradation index of Iron Oxides: Lump Ore, Sinter and Pellets. The equipment is designed and developed as per the IS 10823:1994, section – 1 standard guidelines for reduction degradation. The Indian Standard IS 10823:1994 is harmonized with the ISO 4696 standard.

Reduction Degradation:

The size degradation of the iron bearing materials occurs because of reduction at 500 degree centigrade under Carbon Monoxide (CO) and Nitrogen (N₂) atmosphere and related stresses introduced in the matrix due to phase changes. The cooled oxide material is tumbled for 300 revolutions in total. Sieving with the test sieves having square mesh apertures of 6.3mm, 3.15mm and 500 micron.

Test Apparatus:

- Cylindrical Furnace** – The Furnace is tube type, divided into three zones for uniform temperature control and attain desired sample temperature.

Heating Element: Kanthal

Furnace Skin Temperature: Below 50 deg. C

2. Sample preparation

Iron Ore Sinter, Lump Ore, Iron Ore pellets are to be screened.

Sample size: +10mm to -12.5mm

Sample Quantity: 500grams ± 1.0 gram

Oven dry the sample for 2 Hours at 105 ± 5 deg C

a) Sieves set – 2 Nos

Square mesh – 12.5mm, 10mm, 3.15mm, 0.5mm.

b) Weighing balance - 1 No

Capacity – 1 Kg, Readable: 0.10 Grams.

3. Gas Mixing Chamber - 01 No

Gas mixing chamber for mixing of reduction gases along with gas drying and flow regulation.

Gas mixing chamber to mix maximum of 4 gases.

Flow rate of CO and N₂: 20 LPM +/- 1.0 LPM

CO : 30% +/- 0.5

N₂: 70% +/- 0.5

4. Reduction Tube – 1 No

Reduction tube is made of non-scaling, heat-resisting inconel to withstand

temperature of 1000 deg C.

The reduction tube has gas inlet and outlet points.

Inside diameter of tube: 75+/- 1.0mm

5. Sample holder – 1 No

Sample holder is made from INCONEL 600.

It is equipped with a thermocouple to measure the temperature of the sample.

The sample holder has a loose fitting and perforated bottom with Alumina balls for distribution of reduction gas.

6. Online Electronic weighing balance – 1 No, ±5.0 grams

Online weighing balance is installed for continuous online measurement of sample during reduction to measure the loss of sample due to gaseous reactions during reduction.

7. Temperature control panel – 1 No

Temperature control panel will assist in temperature regulation and automatic control of sample testing temperature during entire test duration.

8. Tumbler drum

130mm internal dia vessel,

200mm length

30 +/- 1 for rpm for 10 mins

9. Gas Burning chamber

The reacted gas is burnt in a gas burning chamber. Gas burning chamber is equipped with electrical burner which maintains 700 deg minimum to ensure complete burning of Carbon monoxide to carbon dioxide.

10. Ambient Air quality monitoring system – 1 No

Online Carbon Monoxide and Oxygen monitors are installed in the testing area. The system will create awareness and help in taking appropriate actions to ensure personnel safety.

11. Hoist Crane – 1 No

One hoist crane is installed above for lifting, positioning of retort inside the furnace and removal of the same after the reduction test. It is hand operated.

Additional features are inbuilt for RI Measurement.

12. For REDUCIBILITY INDEX measurement of Iron Ores: Lump Ore, Sinter and Pellets, the temperature requirement of the sample is 950 deg C ±10 deg C.

Reduction time is 3 hours.

PELLET FREE SWELLING INDEX

Pellet Swelling Index determination of Iron Ore Pellets



Free Swelling:

A Volume increase of iron ores or agglomerates which occurs during reduction under constrained conditions.

Sample: Iron Ore Paellet or Iron ore lumps

Quantity: 2.0 Kg

Sample size: +10 mm to -12.5mm

Test sample quantity: Out of 2 kg, 75 nos representative pellets

Sample use per test: 18 nos, to be placed in 3 rows, each row 6 pellets.

Gap between each row: 30mm max

Distance between adjacent pellets in a row: 10mm minimum.

Free swelling Index:

A relative measure of the volume increase of iron ore pellets which occurs during reduction under specified conditions. The Index is expressed as percentage.

Insmart Systems supplies the test apparatus in accordance to the IS 8624, Test Method 4.1.

1. Electric Tube Furnace, 1100 deg C Max (Operating 900±10 deg C)
2. Sample holder
3. Reduction tube, INCONEL 600
4. Reduction tube dia 75±1mm
5. Reduction Gas (CO and N₂) Mixing chamber
6. Gas flow measurement, control and monitor
7. Pellet volume determination apparatus (Kerosene Method)
8. Electrical control panel for furnace temperature control - three zone
9. Furnace Skin Temperature: 50 deg C maximum
10. Computer for data capturing and analysis
11. K - type Thermocouple for temperature measurement (±0.5 deg C)
12. Gas burning chamber
13. Skip hoist arrangement for retort charging and removal in furnace.

MILLING / POLISHING MACHINE

by milling of Steel, Pig Iron samples for OES analysis and other Analytical procedures



Polishing Machine



Polishing Machine with indexing



This system is manufactured for preparation of Lollipop metal samples for Optical Emission Spectrometry (OES). Lollipop sample is kept on a designated place in the Automatic Milling Machine. The Milling Machine removes the cast raw surface to expose the bare metal surface for OES.

Sample Material : Ferrous like Steel, pig iron samples, diameter from 40mm to 55 mm, round or Lollipop with parallel surfaces.

Operation mode : Semiautomatic - having facility to be integrated to Robotic system.

variants : Single spindle, Twin spindle & Robo milling.

ADVANTAGES:

1. Automatic Operating procedure:

Milling depth and feed rate, is preselected. The milling depth of cut is repeated unless setting is changed, even if the sample height changes. The operation cycle is accomplished automatically, after the sample is placed in the clamping device and operation cycle is switched on.

2. Quality and speed:

The robust design and higher drive rating of the machine takes care of the loads falling on the machine to discharge allowable load. This enables the machine to perform in extremely short duration i.e. 27 seconds. The transverse table retracts downwards after the completion of the polishing stroke to provide clearance between cutter and the sample during return stroke. The transverse movement of the table is operated through servo motor which follows the speed as pre selected through PLC (rapid traverse speed during tool approach and return to home position enhances the processing speed).

3. Reproducibility of the automation for consistent analysis:

Top-quality sample surfaces are obtained as a result of the milling spindle speed and miller feed rate. The accurate automatic repetition through servo system as per preset programme for repeated samples guarantees reproducibility of the sample surface for analysis.

4. Safe operation and changeover of the cutting inserts: Since the machine works only in completely enclosed vicinity without manual intervention and supported by foolproof programming and sensors chances of any accident gets eliminated. The polishing process is observed through a transparent glass window provided in the enclosure. As the cover opens, a safety switch automatically de-energizes the machine.

5. Changing the inserts: alarm is generated periodically indicating preset number of samples have been processed and inserts need to be changed. For changing inserts an automatic switch is provided to de-clamp the cutter holder from the spindle and similarly for clamping of the cutter.

Other Salient features:

- a. Total time taken (including loading & unloading) per sample is 30 seconds maximum.
- b. Milled chips collection system.
- c. High intensity customized compressed air cooling arrangement for cooling the sample, during cutting as well as directing the chips to chips collection unit.
- d. Digital display & setting for depth of cut (from 0.2 to 2 mm) with an increment of 0.1mm.
- e. Total Run time of machine can be seen on display board.
- f. Machine can operate at minimum 6Kg /cm² DRY compressed air.
- g. Cutting pin of lollypop sample is not required as the pin gets accommodated in clamping system.
- h. The clamping device can accommodate sample size upto 55 mm round or lollypop sample.
- i. Selection of cutter and milling inserts depends upon the sample material viz. Ferrous or nonferrous material.
- j. Retraction of cutter after polishing by lowering the table (this enhances the life of the milling inserts substantially)
- k. No foundation required for the machine.

END PIN CUTTING MACHINE

for Shearing of filler pin from lollipop samples



Metal Sample Preparation



The structure and encloser is fabricated out of mild steel plates. The stem (filler pin) is inserted in a cutter bush (Tungsten Carbide) so that the lollipop sample rests on plate, facing the operator. To keep the sample in cutting position, operator has to lift a shutter manually.

After keeping the sample in cutting position and holding the shutter by one hand, operator presses a foot button. The moving tungsten carbide cutter mounted on a lever moves up due to movement of pneumatic cylinder and cuts the filler pin by shearing. The lollipop samples rests on the plate and the filler pin (stem) falls into the collection bin. The operator collects the lollipop sample and leaves the shutter to close the opening automatically.

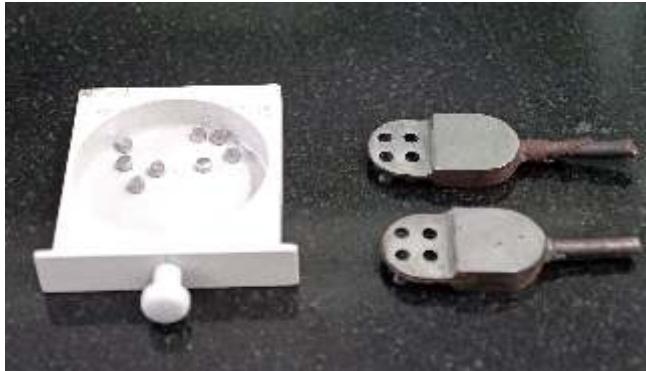
Technical Specifications:

Action	: Shearing by fixed and moving cutters
Movement	: Hydraulic
Job Feed	: Manual Horizontal
Job Removal	: Manual
Filler Pin	: The detached filler pins are collected in the bin provided. The bin can be emptied periodically
Max Filler Pin Diameter	: 8 mm
Material of Construction of Cutter	: Tungsten Carbide
Max. Hardness of Filler Pin	: 40–45 HRC
Activation of Cutting Action	: By foot switch
Safety	: Die opening is closed by a manually operated Shutter
Overall Size of Machine	: 350mm x 700mm x 1500mm (Height)
Weight of Machine	: 200Kg.



BUTTON PUNCHING MACHINE

To analyze the composition of Carbon and Sulphur, Hydrogen and Nitrogen through combustion



Sample Punching is done through applying a concentrated force, by means of four punches, on the surface of a sample piece. Depending on the thickness and the shear strength of the material a small piece of material equivalent to the diameter of the punch and the thickness of the sample piece gets separated. Each sample punched from this machine can be used for analyzing Carbon, Sulphur, Hydrogen and Nitrogen in the Analyzer.

For analyzing the composition of Carbon, Sulphur, Hydrogen and Nitrogen through combustion method, a polished double thickness sample is placed on the working platform to initiate the punching process. On placing, operator manually switches on the start button, the punches fitted inside the machine produce the button sample of Dia. 6 mm and equivalent to the thickness of the polished sample. Operator removes the sample piece and collects the punched sample from the collecting plate located under the punch & die.

Technical Specifications:

Feed material	: Double thickness sample Or rectangular piece duly polished
No. of punched samples collected	: 4 Nos.
Depth of punch	: Min: 2mm, Max: 4 mm
Max. width of the sample piece	: 32 mm
Max. thickness of the sample piece	: 4 mm.
Sample material	: Medium to low carbon steel
Duration of operation	: < 30 seconds
Required quantity for analysis	: 4 samples Aprox. 1 Gram each
Motor	: ½ HP
Power supply	: 4 pole, 10 amps, MCB, 3 Phase + Neutral with Earthing, 415 V AC
Power actuation	: Through Hydraulic power pack.
Overall Dimension	: 490 x 450 x 810mm

MINERAL JIG

Gravity Separation



The Insmart mineral jig is an ideal system for gravity concentration process for materials with different densities.

- Ideal gravity separation unit for the samples having coarser liberation size in the range of 20 mm to 1 mm.
- Varieties of chamber sizes with relevant mechanisms are made available as per the specific requirement of the customer.

Mineral Jig is designed for the recovery of minerals and other heavy industrial products by employing the proven, inexpensive basic laws of gravity to effect concentration.

The Insmart mineral jig operates on the principle of hindered settling and is effective where there is a differential in the settling rate of the treated solids.

Typical applications include the recovery of fluorspar, chrome, magnetite, manganese, and iron ore

It is ideal for installation in grinding circuits treating rod or ball mill discharge ahead of classification.

In this application, the mineral jig removes the heavy mineral as soon as it is liberated and thus prevents losses due to over grinding.

Advantages:

- The rotating water valve results in a highly selective product. The principle of the rotating water valve is that water is added to the hutch only on the upstroke of the diaphragm. Thus, the jig bed is subjected to upward pulsations only.
- Therefore, gravity separation is effected by the hindered settling principle where the “suction” effect on the material in the feed compartment is diminished resulting in a more selective higher grade hutch product.
- Rotating water valve also reduces water requirement and thereby dilution. This is important from a water consumption standpoint and from a dilution standpoint in applications where the unit is installed in a closed circuit grinding classification circuit.

Various Models available are:

- Simplex Jig 4" X 6" and 8" X 12"
- Duplex Jig 8" x 12" and 24" X 36"

Specifications:

Size of Jig	200 mm x 300 mm Simplex Mineral Jig
Motor Rating	415V, 3 Phase 50 Hz
Capacity	Batch Scale
Screen Size	2 mm & 3 mm tapered wedge bar bedding screen to fit into the Jig
Diaphragm Temperature	Can operate in Ambient temperature upto 45°C
Construction of Trash	M S Construction Screen.
Stroke Length	upto 25 mm or more.
Drive Bearing	Self aligning ball bearing
Yoke Bearing	split bronze bushed bearings
Rotary water valves	Chain driven to assure proper timing

MINERAL SEPARATOR

Gravity Separation



Insmart Mineral separator is most suitable for quick and efficient separation of mineral grains having close specific gravity over a wide size range.

Insmart Mineral separator is supplied with two easily interchangeable stainless-steel trays enabling efficient separation over a wide size range.

The unit is provided with easily interchangeable Stainless Steel Trays to allow for both coarse and fine particle separation.

- Mineral Separator is utilized for quick and efficient separation of mineral grains having close specific gravity over a wide size range.
- The Flat & V Type SS trays are made available for gravity separation tests with respect to Granulometry of the test sample

The flat tray is capable of making very efficient separations of samples finer than 100 microns. This is of value in predicting slime table performance or carrying out release analysis where fineness of the material determines heavy liquid analysis.

The 'v' profile is able to accurately predict sand table performance when treating hydraulically classified products. This is of great value in optimization of plant performance.

Product Application:

Best suited to obtain data on higher specific Gravity Ranges. Fast assessment for gravity concentration performance.

Operation Brief:

50-100 grams sample can be tested at a time.

After placing the wetted sample on the tray, the cyclic motion mobilizes the mineral particles enabling stratification. Reciprocating horizontal movement of the tray ensures effective separation. The heavy minerals sink to the tray surface and are thrown up stream by the end Knock action. The lighter minerals are carried downstream by the flow of water and discharged via the tailings launder. The unit has flexibility for adjusting the inclination and speed.

Choice of "V" profile tray (for separations in 1000 to 100 micron size range),

Flat Tray (for separations in 100 to 10 micron size range) is available

Power Requirement: 2 pole, 6 Amp MCB (Single Phase with earthing) AC, 50/60Hz, 230 V,

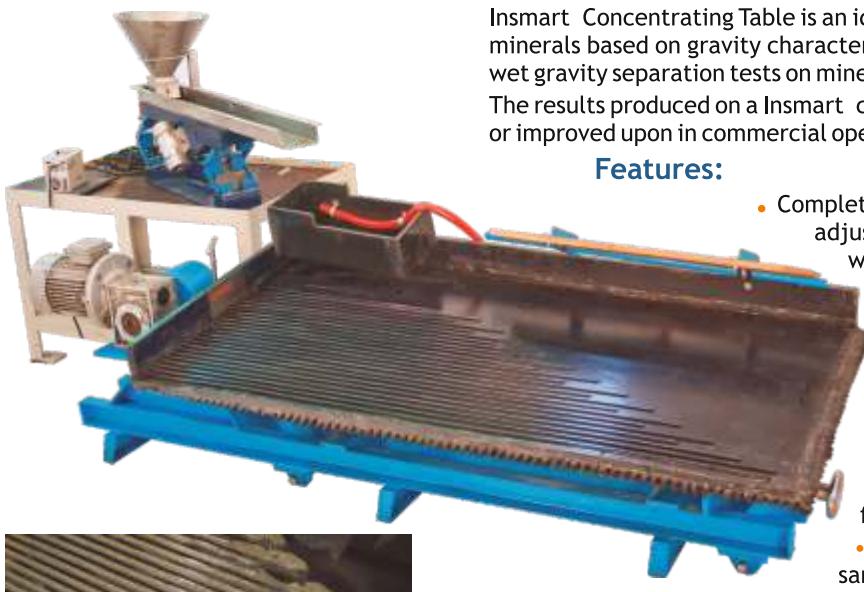
Motor: 0.37Kw,(0.5 HP), 1415 rpm.

Applications:

- Gold
- Silver
- Platinum
- Tin
- Tantalite/Tantalum
- Metal-bearing sulphides
- Zirconium
- Titanium minerals
- Chromite
- Iron
- Manganese

CONCENTRATING TABLE

Gravity Separation



Polyurethane Lined Riffles

Insmart Concentrating Table is an ideal equipment for evaluating the separation of ore minerals based on gravity characteristics and other differences. Designed to carry out wet gravity separation tests on minerals and other granular materials.

The results produced on a Insmart concentrating table can always be either duplicated or improved upon in commercial operations using full-size tables.

Features:

- Complete Table, easy side tilt mechanism & end elevation adjustments, variable speed drive, mounting bench with storage shelf, water distribution manifolds with cutting pans. Extra interchangeable deck can also be supplied so that the Table has riffling systems to handle both 'sand' and 'slime' feeds.

Designed primarily for the concentration of a variety of minerals including, but not restricted to, iron, tungsten, chrome, tin, copper, gold, silver and lead. Other applications include treatment of clays and in the removal of impurities from glass sand.

- Concentrating table with option of slime deck and sand deck are available for wet gravity separation based on the intermediate / fine size feed or test samples.

- The decks are made of monolithic polyurethane for abrasive resistance.
- The configuration of cleats is designed with respect to the retention time depending upon the granulometry of the sample.

Application:

- Reiterating Crushed slag to recover residual free metallics.
- Cleaning of Spiral concentrate.
- Precious metal separation.
- Soil remediation.
- Wire/Plastic reclamation.

Salient Features:

- Adjustable stroke length.
- Provided with Feed Box having regulated feed through Vibratory Feeder.
- Riffles and deck form a common surface.

Advantages:

- Optimum Control of Product Grade.
- Effective & Precise separation
- Very high recovery
- Capable of achieving sharp cut. Higher grade concentrates

Specifications:

Size	54" x 24" (Approx)
Deck Variant	Slime Deck and Sand Deck
Deck Construction	Polyurethane Deck
Feed Size	- 20 # to + 325 #
Capacity	60 to 80 Kg/hr
Stroke Length	Adjustable
Deck - angle	Adjustable
Speed	Variable
Tilting Frame Construction	Tilting frame is made out of mild steel and powder coated
Drive	variable speed control
Water	Tap water
Feed Box	polyurethane.
Electrical Power requirement	4 Pole, 10 Amp MCB 3 Phase / with earthing) A.C. 50 Hz, 415 Volts, motor- 0.75 Kw (1 H.P.)
Machine Size	1500 (H) X 2200 (L) X 850(W) mm

DENSITY SEPARATOR

Gravity Separation



Insmart Density Separator relies on the principle of hindered settling to separate particles of greater density and/or size from those of lower density and smaller size. This simple, reliable, separator greatly enhances the performance of any wet gravity circuit.

- For classifying the particles in the size range of 20 to 325 mesh and to achieve extremely sharp partition curves density separator is the most suitable gravity separation equipment.
- The separation process takes place based on hindered settling principle

Application:

- Classify particle by size
- Upgrade a feed consisting of two or more groups of particles of different specific gravity
- Use as washing system for mineral sands, coal etc. It is ideally suited to the treatment of alluvial minerals or beach sands as the size distribution of these materials usually falls between the size limits of application of the separator.
- The apparatus can be used for a large variety of mineralogical separations and it should also be useful for treating many other types of granular materials.

Operation Brief:

- For producing an extremely sharp portion when the classifying particles are in the range of 20 to 325 mesh

- The separation process takes place by a hindered settling of large / denser particles away from lighter / finer particles. The under flow consisting of quick settling particles is efficiently de-watered.
- By measuring the density in the teeter bed and comparing this density with known values, discharge of underflow is regulated.
- Sharp Classification
- Minimum water requirement

Power Requirement:

2 pole, 6 Amp MCB (Single Phase + with Earthing) AC, 50/60 Hz, 230V, Motor: 0.75Kw, (1 HP), 1415 rpm

HYDRO-CYCLONE TEST RIG

Gravity Separation



Insmart Hydro Cyclone is a continuous device that utilizes centrifugal force to accelerate the settling rate of particles.

- For optimizing the parameters viz. diameter of apex, vertex and back pressure to get the desired cut for commercial operations Hydro-cyclone test rig is the ideal and energy efficient system.
- Cyclones made of abrasive resistant polyurethane material in the size range of 1" dia to 5" dia with relevant sizes of vertex and apex are available.
- Cyclone feed material should be having 1:3 solid liquid ratio.

Application:

Hydro-cyclone is one of the most important devices in the mineral industry; it is widely used in the mineral industry processing as a classifier, which has proved extremely efficient at fine separation size. Hydro-cyclone is widely used in closed circuit grinding operations but it also has many other applications, such as desliming, dewatering, and thickening.

Although the hydro cyclone by nature is a size controlling machine, the number of applications in mineral are many

- Classification in grinding circuits
- Dewatering and thickening
- Desliming and washing
- Enrichment of heavy minerals

Operation Brief:

Cyclone Test Rig is designed for laboratory testing of classifying various solids in a slurry.

When feed slurry enters the hydro-cyclone tangentially under pressure, as a result of high centrifugal forces, particles coarser than the "cut point" size migrate into a primary vortex adjacent to the wall and move forward to discharge with a small volume of water via the spigot. Particles finer than the "cut point" size migrate into a

secondary upward-moving vortex, along the axis of the hydro-cyclone and discharge with the majority of the water via vortex finder.

It is equipped with a 2 inch Cyclone, a new, larger 0.53 cubic meter tank sump, Pinch valve to regulate flow, internal piping and valves to circulate the slurry through the cyclone from the sump or to re-circulate the slurry, and a pressure gauge to monitor the pressure drop across the cyclone.

Equipment is conveniently mounted on a sturdy structural steel frame.

The 2 inch cyclone is also provided with 3 nos each of apex and vertex finders of suitable size for selecting the desired set for the required separation.

Required Power: 415V AC, 4 pole, 16 Amps MCB (3 Phase with Neutral + Earthing).

Motor Drive 3.75 Kw, 5 HP, 50Hz.

Supply include 2" dia PU Cyclone, Epoxy Coated 0.5 m³ tank, Pump, Motor, Valves, Pressure Gauge etc.

Optional Supplies:

2" Cyclone Complete with different spigot, vortex finder to obtain d₅₀ cut size in the range of 3-7 microns 2.6 SG.

SPIRAL TEST RIG



The spiral test rig is designed for closed circuit testing of spiral concentrators.

Application:

- The Spiral Test Rig is used to assess various parameters like separation efficiency, Spiral profiles, Quality and Quantity of products etc.
- The Rig Comprises of 500 Litters capacity rugged wear resistant non corrosive sump.
- Spiral separators of varied profiles with and without wash water facility are available for processing test sample having the size range of 1000 to 38 microns.
- The spirals are made of fibreglass base with PU lining which gives longer life.
- The spiral test rig is supplied with different profile of spirals as per customer requirement for processing coarse, intermittent and fine size samples.
- Insmart Spiral test rig is supplied with either a pulp distributor or cyclone as per the customer requirement.
- Spiral feed material should be having 1:3 solid liquid ratio.

Specifications:

Feed Distributor	Lightweight 4 way distributor to handle up to 40 gpm slurry
Grouping of Outlets	Feed rate to the spiral is maintained through grouping any number of outlets from the distributor. The balance of outlets not in use are grouped together and returned to the sump via a common collection box.
Sampling System	Manually operated to facilitate the simultaneous collection of 3 spiral Products for rougher spiral (wash water) and 2 products for high grade & fine grade spirals
Spiral Series	Spirals of various profiles used in low grade, high grade and fine mineral separation are supplied as per customer requirement
Model	With Wash Water Facility / Without Wash Water Facility
Construction of Spiral	Polyurethane /Fibre Glass
Power requirement	4 pole, 16 Amp MCB (3 Phase + neutral with earthing) AC, 50/60Hz, 415 V Motor2.25 Kw (3 HP), 1415 rpm.

DAVIS TUBE TESTER



The Insmart Davis Magnetic Tube Tester (DTT) is used for determining the magnetic content in ore samples from exploration.

- The Davis Magnetic Tube Tester consists of an extremely powerful electromagnet which can generate a magnetic field intensity of up to 5,000 gauss, a glass separation tube and a motor driven agitation mechanism.
- The tube is positioned between the poles of the magnet at an angle of approximately 45 degrees (the angle is adjustable).
- This is an ideal equipment for determining the magnetics during exploration works.
- The Davis Magnetic Tube Tester will determine magnetic content and it takes only about 10 minutes for an accurate determination.
- Most reliable magnetic separator during exploration / exploitation of magnetite deposits for faster and accurate estimation of magnetite content from non-magnetics.
- Insmart make DTT, is supplied with electromagnet with variable intensity in the range of 100 to 5000 gauss instead of conventional horse shoe permanent magnet



Slurry Feeding Zone

Description:

During the operation a small electric motor drives the agitating mechanism that supports the water filled glass tube.

The tube moves to and fro while it rotates simultaneously.

Any magnetic particles present in the product sample inside the tube are collected in the zone of intense magnetism.

A vigorous washing action by agitation is applied to these magnetics.



Oscillation Zone



Electro Magnetic Zone



Control Panel



Magnetic Material

LOW INTENSITY DRUM TYPE DRY PERMANENT MAGNETIC SEPARATOR (LIDDPMS)



Principle of magnetic separator

- Stationary magnetic system and revolving outer drum
- Magnets provide alternating polarization
- Revolving on drum surface improves cleaning of collected material
- Drum transports magnetics to discharge where Non-magnetics is discharged through discharge spigots, ports or slots.

Strong, drums operate at a fixed rpm for superior magnetic protection in applications requiring a high degree of product purity.

Insmart Drum Separators effectively collect fine ferromagnetic and paramagnetic materials in ore treatment operations.

The permanent magnets make possible more efficient separation performance for a broader range of applications.

As material reaches the drum, the magnetic field attracts and holds ferrous particles to the drum shell.

Operation:

As the drum revolves, it carries the material through the stationary magnetic field. The nonmagnetic material falls freely from the shell, while ferrous particles are held firmly until they are carried out of the magnetic field.

Application:

- Reliable magnetic separator commonly used in sponge iron plants for lab scale separation of sponge from the non-magnetics.
- The unit is supplied with ferrite magnets of low intensity upto 1000 gauss or as per customer requirement

Permanent Magnetic Drum Separators provide efficient separation and years of trouble-free automatic removal of magnetics from rock products, mineral and ores, sponge iron etc.

DRUM TYPE WET ELECTROMAGNETIC SEPARATOR



A tank structure with support frame for counter current operation will be supplied with feed entry towards the bottom of the drum. The drum rotation will be counter current to the feed flow.

The tank is constructed in SS 304 with mild steel channel based support frame. The tank will be complete with individual SS check valves for feed box, concentrate and tailings outlets.

The tank will be supplied with neoprene scrapper assembly for retrieval of magnetic concentrate.

ELECTROMAGNETIC DRUM ASSEMBLY

Drum Size: 600 mm diameter x 300 mm width

Magnetic Field: Variable Electromagnetic Coil Based

Magnetic Intensity of EM Coil: Up to around 4,500 Gauss to 5,000 Gauss at surface of the SS drum.

Multiple Pole electromagnet assembly

Provided with Mild Steel Hub with groove to Mount V belt Drive: 1.0 Hp AC geared motor drive (Drum Speed: 0 - 22) (Provided with VFD drive to vary drum speed)

CONTROL PANEL

- Completely Enclosed Dust Proof Control Panel Box (IP 65)
 - 3 Phase 440 volts AC supply to Control Panel
 - 415 Volts 3 phase Variable Power Transformer (10 KW rating Air Cooled)
 - 0 - 110 Volts DC supply to electro magnet
 - Main Switch & indicator lamps for incoming supply
 - DC / AC Ammeter & Voltmeter
 - 3 Phase Silicon Diode Bridge Rectifier and Surge Suppression circuit for supply to magnet
 - Suitable contactors, overload relays and HRC fuses for necessary control of magnet

Material of Construction:

Outer Shell: SS (3 mm thick)

Shaft: EN8 90 mm diameter

Side Plates: SS 4 mm thick

PERM ROLL SEPARATOR

Magnetic Separation



Insmart Permanent (perm) Magnetic Roll Separators are based on High-intensity, High grade, High power rare earth- permanent magnets that generate an exceptionally high magnetic gradient. Used as the most cost-effective way to process weakly magnetic materials.

- The rolls are supplied with permanent magnet of desired field strength as per customer requirement.
- Facility exists for easy & quick replacement of permanent rolls of desired intensity.
- Provision exists for varying the splitter position as per required separation.

Dry granules of the material are fed onto short Kevlar belt conveyor of approx 1 mm thick for material passing over rolls of customized magnetic configuration.

The non-magnetic particles fall freely at the end of the roll while the magnetic particles adhere momentarily to the roll and are later discharged into a separate chute by means of an adjustable splitter below the belt.

Since the material is never in contact with the magnetic roll there is no wear on the magnets and under normal conditions magnetic strength is retained indefinitely.

Process Applications:

- Beach sands beneficiation
- Chromites recovery
- Glass sand beneficiation
- Feldspar cleaning
- High-purity quartz cleaning
- Iron and manganese ore beneficiation
- Kyanite cleaning
- Limestone and dolomite cleaning
- Magnesite beneficiation
- Metal recovery from waste
- Wollastonite beneficiation

Rare Earth Roll Magnetic separators are ideally suited for applications that would satisfy the following criteria:

1. Material is dry & free flowing.
2. Particle size is above 100 mesh (150 Microns)

3. Objective is to clean the product of very feebly magnetic contaminants for example removing iron from Silica sand.

Other objectives could be to eliminate non-magnetic fraction from a magnetic material for example cleaning beach mineral sand components like ilmenite and garnet or concentrating rutile.

Major features offered are:

- Permanent rare earth magnets used (Nd-Fe-B). Neodium- Iron-Boron
- Quick belt change mechanism available.

Applications in following industries:

As per the Peak magnetic intensity on magnetic roll surface can be in the range of 9500 gauss to 12,000 gauss.

Kevlar belts can be made available in varying thickness depending upon the application requirement.

WET HIGH INTENSITY MAGNETIC SEPARATOR (WHIMS)

Magnetic Separation



The Wet High Intensity Magnetic Separator (WHIMS) can be used in a wide variety of applications throughout the mining and metals industry. Some typical applications are:

Ferrous metal ore, Recovery of Hematite, Siderite, Chromite, Manganese Ores, Clay, Limestone, Magnesite, etc.

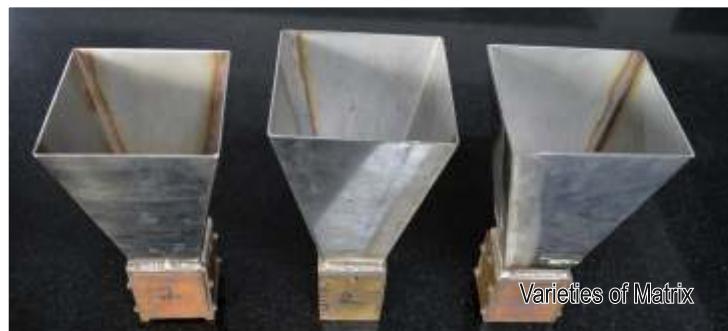
- Insmart's wet high intensity magnetic separators are supplied with varied field strengths from 1.6 Tesla to 2.2 Tesla at 2 mm air gap.
- Varieties of canister assemblies with wool matrix, ball matrix, rod matrix and grooved matrix are supplied as per process requirement.

Para magnetic to feebly magnetic minerals can effectively be separated from non-magnetic using Insmart make WHIMS.

Provision exists for varying the Field Strength from 2000 to 22000 gauss.

The test samples in the size range of fine to coarse size can effectively be processed by selecting suitable matrix. v.i.z. wool matrix, ball matrix, rod matrix & grooved matrix

Capacity: The capacity of the equipment depend on the percentage of magnetic material present in the test sample, the capacity can be in the range of 75 to 100 gms per test.



DISC DRY MAGNETIC SEPARATOR

Magnetic Separation



- The Insmart Disc Dry Magnetic Separator is used for separation of the magnetic content in Ore samples from prospecting programs.
- The Disc Dry Magnetic Separator consists of electromagnetic coils.
- The Disc Dry Magnetic Separator is designed for use in laboratories, pilot plants for feasibility & amenability studies.
- The machine consists of a hopper with vibratory feeder.
- The beauty of the machine is that it comes with various variable parameters like feed rate, belt speed, disc rotation speed, magnetic field strength & gap between disc and belt. Thus, it provides the customer with multiple settable parameters to suit the magnetic susceptibility of various ore samples.
- Disc Dry Magnetic Separators are ideally suited for applications that would satisfy the following criteria
 1. Material is dry & free flowing
 2. Particle size range from -5 mm to 150 microns
 3. Objective is to separate feebly magnetic material from highly magnetic concentrates for example **separation of Iron from silica sand**.
- The unit is manufactured & supplied in the variants of Single Disc to 4 Disc models in order to suit different applications. Each disc is designed to offer varied range of intensity. This facilitates separation of minerals of different susceptibilities in a single operation.

Specifications:

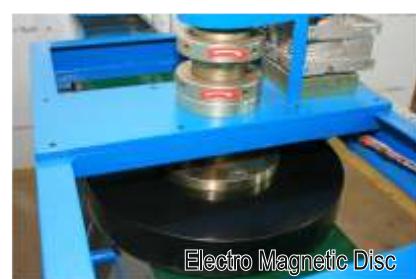
Feed Size	Above 100 mesh & below 5 mm
Belt Speed	0.4 to 2 m/sec
Belt motor with Gear box	3 phase, 415 volts, 1415 r.p.m, 2 H.P Motor, Gear ratio 1 : 7.5
Magnetic Intensity	0 to 1.4 T
Magnetic Disc Motor	3 phase, 415 volts, 1415 r.p.m, 2 H.P Motor, Gear Ratio 1 : 7.5
Power Requirement	5 core cable, 3 phase with neutral and earth, 415 volts



Control Panel



Vibro Feeder



Electro Magnetic Disc



Output Chute

FROTH FLOTATION CELL

Physico Chemical



Attrition Impeller

Ideal equipment for up-gradation of various Ores & Minerals by Physico -Chemical Process, specifically Sulphide Minerals. Flotation is an effective tool for optimizing the quantification of Flotation reagents for commercial applications.

- Insmart make Flotation cell has the flexibility of operating as Flotation cell as well as attrition scrubber & this can be achieved by simply changing the diffusion type impeller to attrition type impeller.
- 3 nos. of varied capacity cells of ss304 make v.i.z. 500, 1000 & 2000 gms are provided. These can be used for indicative as well as confirmatory tests.
- The equipment is supplied with Rotameter for controlling the inlet air flow in addition to a small compressor for supply of air.

Operation:

The Sub-Aeration (Sub -A) Flotation Machine is a versatile one and is adaptable for roughing, cleaning and re-cleaning tests.

The equipment provided with both propeller and attrition type impellers. Provision exists for varying the capacity as three nos. of cells having capacity of 500, 1000 and 2000 grams are available, which makes for preliminary and confirmatory tests.

Specifications:

Mounting	Can be mounted on a flat levelled platform.
Motor & Drive	i) 1 H. P. (For Impeller drive) ii) ¼ H. P. (For Up-Down movement)
Power requirement with Earthing	4 Pole 10 amps 3 phase + Neutral
Machine Size	710 (L) X 315 (W) X 960 (H) mm.
Electrical Control panel	variable rpm, up down, on off.

VACUUM FILTRATION UNIT

Auxiliary



Solid-Liquid separation system for de-watering various test products obtained during wet processing like wet grinding, flotation etc.

- Most ideal solid/liquid separation system for filtration of various test products obtained during wet processing.
- The unit is supplied with varied porosity filter cloths to select the appropriate filter cloth matching the particle size distribution.
- The unit consists of filtration chamber, moisture trap, filtrate receiver all mounted on a single platform for flexible movement of the system to the place of test work.

Unit having different perforated filter cloths for filtration of slurry having varied particle configuration.

Vacuum Filtration Unit is provided with Vacuum Pump, Moisture Trap, Filtrate receiving Tanks. Motor 0.5 HP, 230 VAC.

INFRARED DRIER

Auxiliary



The infra Drier is designed for drying washed fractions from various Ores or minerals sample.

- Insmart make infrared drier has specific provision for condensation of evaporated water generated during drying of wet samples.
- Provision exists for the let out of water after condensation.
- The life of infrared bulbs is increased substantially because of the existing provision of condensation

The drying Rack is supplied with 8 nos of infrared lamps in ach row having 250 watts each. The drier is provided with individual switches for lighting bulbs as per requirement. Provision exists for condensation of water vapors that are generated during drying of test products. The condensed water is diverted to collect at the bottom of unit.

Specifications:

Stand Size (W x L x H)	1120 x 650 x1700 mm
No. of bulbs	8 Nos (4 in each row)
Bulb Capacity	250 watts
Materials of construction	Stainless steel

SPECIFIC GRAVITY, PULP DENSITY METER

Auxiliary



Purpose: Uniquely designed equipment for correlating the ore specific gravity with the percentage of solids in the pulp. It provides accurate and fast measurement of Specific Gravity, Pulp Density and Solid-liquid Ratio with various ores /mineral powders. The unit is supplied with relevant software.

Description: Best suited equipment for research centers and plant control of concentrates, tailings etc.

Ideal equipment for quick and accurate measurement of:

- Specific gravity
- Solid -Liquid ratio
- Pulp density

The unit consists of Stainless Steel 304 quality body Jar. Provision exists for collection over flow water. The unit can be operated in batch as well as on-line measurements.

Advantage: No manual calculations as the unit is supplied with the latest software which provide accurate and fast measurements.

Specifications:

Capacity	300 gms (Minimum)
Feed Size	-1 mm
Requirement	Tap Water connection is required
Mounting	Bench Top Equipment
Power requirement	230V, 6 AMP MCB, single phase with Earthing

ULTRASONIC SIEVE CLEANER

Auxiliary



Ultrasonic Cleaning Chamber

The ultrasonic bath range includes three sizes for cleaning test sieves and grinding tools quickly and easily. The gentle yet thorough cleaning of test sieves in an ultrasonic bath increases their working life as damage which could occur during manual cleaning is avoided.

- Efficient de-clogging of chocked test sieves by Insmart Ultrasonic sieve cleaner.
- Easy to operate and efficient, fast de-clogging device.
- Bench top model can be placed near to the water source in the laboratory.

Capacity:

The Compound High Frequency Generator System is of rectangle shaped Stainless Steel assembly, and Can Accommodate 300 mm by 50mm size test Sieves

Operation:

A high-frequency generator in the ultrasonic bath produces about 35000 oscillations per second, which are transferred into the cleaning solution and causes it to resonate. The energy density of the sound field is so high that a cavitations effect sets in. Innumerable extremely small vacuum bubbles develop in the ultrasonic bath and collapse in microseconds due to pressure and suction. The pulses triggered by this remove dirt particles even at the deepest, least accessible places or they result in homogenisation, dispersion and degassing.

TANK SIZE	457 x 360 x 470 mm (LxWxH)
TANK MATERIAL	SS 304/16 gauge
POWER	250 watts
TRANSDUCERS	C-4 Material, 4 nos bonded at the bottom of the tank
HEATER	600 watts controlled by thermostat
OUTER BODY	SS 304 SS SCREEN MESH BASKET PROVIDED

VALUED CLIENTS



Steel & Ferro Alloys

- Aarti Steel
- Abhijeet Steel
- Bhushan Steel
- BMM Ispat
- Chhattisgarh Ispat
- Chandrapur Ferro Alloys
- Electro Steel Castings
- ESSAR Steel
- Essel Mining & Ind
- Facor Alloys
- Gold Star
- India Techno Mech
- Ispat Industries
- Jindal Steel
- JSPL
- JSW Steel
- Kalyani Steel
- Kirloskar Ferro Alloys
- MGM Steel
- Navbharat Ferro Alloys
- NINL
- Premier Alloys
- RINL - Vizag
- Salem Steel
- SNAM Alloys
- SAIL - BSP, RSP, DSP
- Sona Alloys
- Sunflag
- Tata Steel
- Uttam Galva Steel
- Usha Martin
- Visa Steel

Aluminium

- BALCO
- HINDALCO
- MALCO
- NALCO
- Vedanta Aluminium

Copper

- Birla Copper
- Hindustan Copper
- Hindustan Zinc
- Vedanta Group

Coal

- Amba River Coke
- ABG Cement
- ACC - 7 Plants
- Ambuja Cement
- Adani Power
- Bajaj Energy
- BALCO
- Bharat Beneficiation & Power
- Bhushan Power & steel
- Bureau Veritas Coal Labs
- Calcutta Electric Supply Corporation (Goenka Gr)
- CIMFR Labs
- Coal India
- Diamond Cements
- Dr. Amin Labs
- EMCO Energy
- GMR Energy
- Godavari Power & Ispat
- GVK Power
- Haldia Energy
- Hindalco CHP
- Hind Energy
- Hindustan Zinc
- IGI Coal Labs
- IICT
- Indorama Synthetics
- Indrajit Power
- CSIR Labs
- Jai Prakash Associates
- Jindal Power
- JSW Energy

- JSW Ispat
- Kesoram Cement
- Lanco Industries
- Nabha Power (L&T Power)
- Maihar Cement
- Maithan Power
- Mahanadi Coal Fields
- Mangalam Cement
- Maratha Cement
- Mitra SK
- NALCO CHP
- NMDC
- NTPC various plants
- OPG Power
- Orissa Power
- Prism cement
- Rourkela Steel Plant
- Rosa Power
- SGS Coal Labs
- SKS Ispat & Power
- SLR Metaliks
- Steel Mont
- Talwandi Power
- TATA Steel
- Thermal Powertech Corporation India
- Ultratech Cement
- Utkal Alumina International
- Vasavadatta cement
- Vedanta Aluminium CPP

Mineral

- AMD (Dept. of Atomic Energy)
- Aryan Mining - Barbil
- Essel Mining
- GSI
- Geetarani Mohanti Mines
- Hindustan Zinc Ltd. - Jawar, Dariba, Agucha
- IBM
- Indian Rare Earths (IREL)
- JSPL - Barbil, Tannar
- MEL - BBH Mines
- MOIL - Nagpur, Bhandara, Balaghat
- MSPL
- NALCO - Damanjodi
- NMDC - Kirandul, Bacheli
- ONGC
- Sarda Mines - Barbil
- Tata - Joda, Novamundi, Sukinda
- UCIL
- Vedanta Group - Sesa Goa, Lanjigarh

Mineral Labs

- MEL
- SHALINA Lab
- SGS
- Research & Education**
- ACC R & D Center, Mumbai
- BRC (Bhabha Atomic Research Center)
- Banaras Hindu University
- Center for Advanced Technology - Indore
- CSIR Labs
- Dalmia Institute of Scientific & Industrial Research
- Delhi University
- DRDO (DMRL, ASL, LASTEC, SSPL, HEMRL, RCI)
- IIT - Chennai, Delhi, Guwahati, Hyderabad, Mumbai, Kharagpur, Patna, Roorkee
- IGCAR
- IMMT - Bhubneshwar
- JNU
- Navsari Agricultural University - Gujarat
- National Institute of Oceanography
- National Physics Laboratory
- National Chemical Laboratory - Pune

- NCCBM
- N.I.T. - Rourkela, Suratkal - Trichi
- NGRI
- Osmania University
- RRCAT
- Ultratech R & D Center - Mumbai

Certification Agencies

- Inspectorate Griffith
- Intertek (Caleb Bret)
- Mitra SK
- SGS

Cement

- ACC Limited
- Adhunik Cement Ltd
- Alsthom Industries Ltd
- Ambuja Cements Ltd
- Anjani Portland Cement Ltd
- Asian Concretes Cement Ltd
- Bagalkot Cement & Inds.Ltd
- Bangur Cement Ltd
- Bharti Cement Corp. Pvt. Ltd
- Binani Cement Ltd
- Birla Cement Ltd
- Burnpur Cement
- Cement Corporation of India Ltd
- Cement Manufacturing Co.Ltd
- Century Cement
- Chettinad Cement Ltd
- Dalmia Cement (Bharat) Ltd
- Deccan Cement Ltd
- Emami Cement Ltd
- Goldstone Cements Ltd
- Green Valley Industries Ltd
- Heidelberg Cement India Ltd
- J.K. Cement Ltd
- J.S.W. Cement Ltd
- Jaypee Cement Ltd
- JK Lakshmi Cement Ltd
- K. J. S. Cement Ltd
- Kesoram Cement Ltd
- Khyber Industries (P) Ltd
- Lafarge India (P) Ltd
- Maihar Cement
- Malabar Cements QLtd
- Mangalam Cement Ltd
- Manikgarh Cement Ltd
- Meghalaya Cements Ltd
- My Home Industries Ltd
- OCL India Ltd
- Orient Cement Ltd
- Panyam Cement & Mineral Ind Ltd
- Parasakti Cement Ltd
- Penna Cement Industries Ltd
- Prism Cement Ltd
- Rain Cements Ltd
- The Ramco Cements Ltd
- Reliance Cement Company Pvt Ltd
- Sagar Cement Ltd
- Sanghi Industries Ltd
- Saurashtra Cement Ltd
- Shiva Industries Ltd
- Shree Cement Ltd
- Shree Jaya Jyothi Cement Ltd
- Sonar Bangla Cement
- Star Cement
- Tamil Nadu Cements Corp. Ltd.
- The India Cements Ltd
- The K.C.P. Ltd
- UltraTech Cement Ltd
- Kalburgi Cement Pvt Ltd
- Wonder Cement Ltd
- Zuari Cement Ltd

17 plants

14 plants

3 plants

3 plants

5 plants

3 plants

5 plants

2 plants

Malaysia
England
Oman
Damman
Peru
Mauritania
Bahrain
Bangladesh
Philippines
Jebel Ali
Saudi Arabia
Zambia
Zambia
Dubai
Mexico
Oman
Kenya
UAE
Damman
Norway
Saudi Arabia
Thailand
Philippines
UAE
Oman
Bhutan
Nepal
Zambia
Oman<br