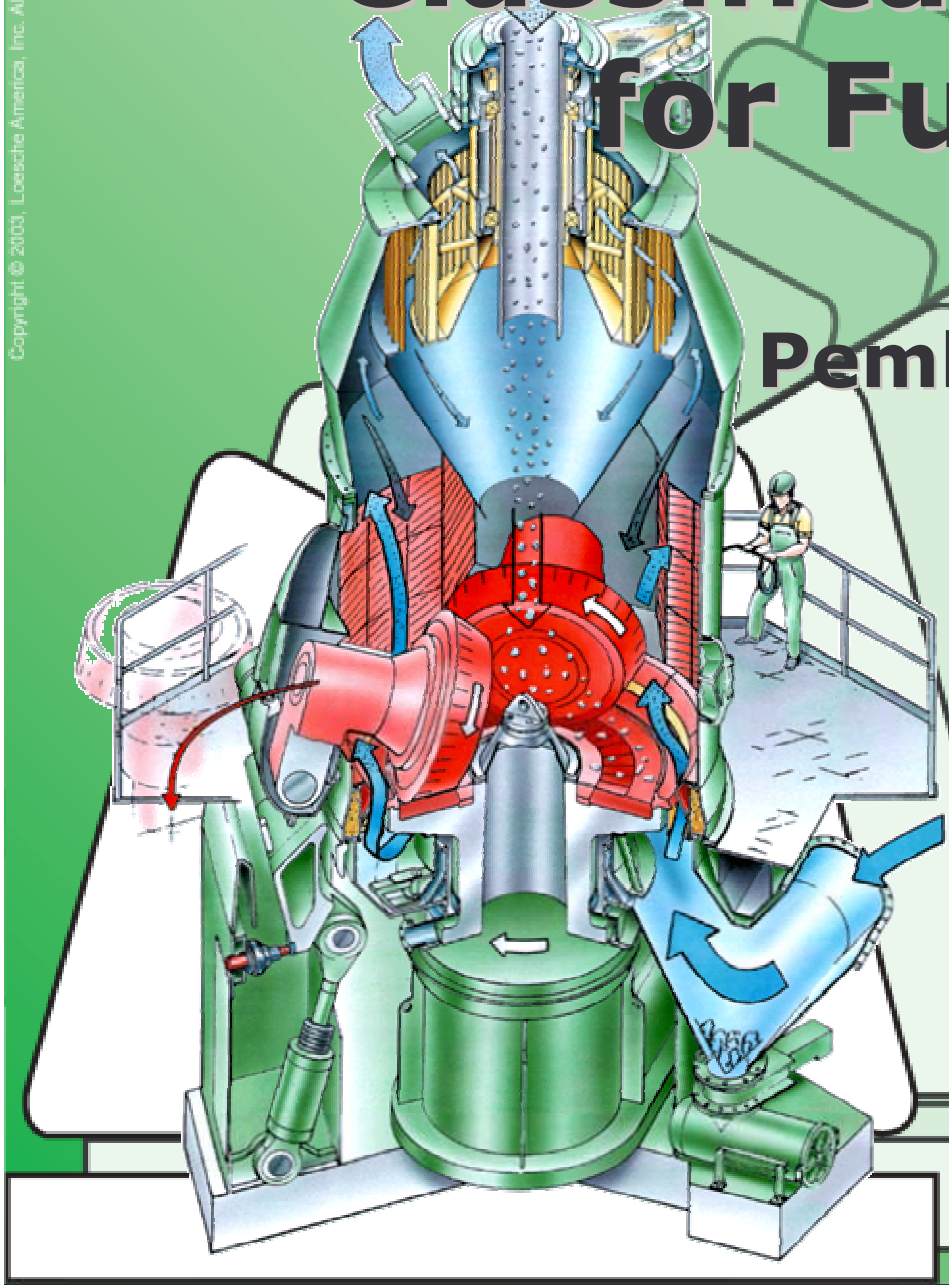
Classification Upgrades for Fuel Pulverizers



Loesche America, Inc.
Pembroke Pines, FL 33029
954-602-1424
loescheamerica.com

LOESCHE America, Inc.

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Abstract

Classifier Performance Improvements:

- **Increased capacity and improved product fineness**
- **Improved burner efficiency, thus improved boiler unit performance and emissions**
- **Steeper fineness distribution slope angle**
- **Reduced amount of super fine and of coarse pulverized fuel**
- **Reduced NOx emissions and reduced LOI**
- **Reduced internal product re-circulation**
- **Eliminated over-grinding and reduced wear, power absorption and pulverizer vibration**
- **Reduced differential pressure across the pulverizer, reduced gas flow, thus reduced excess gas to the boiler and improved burner efficiency**

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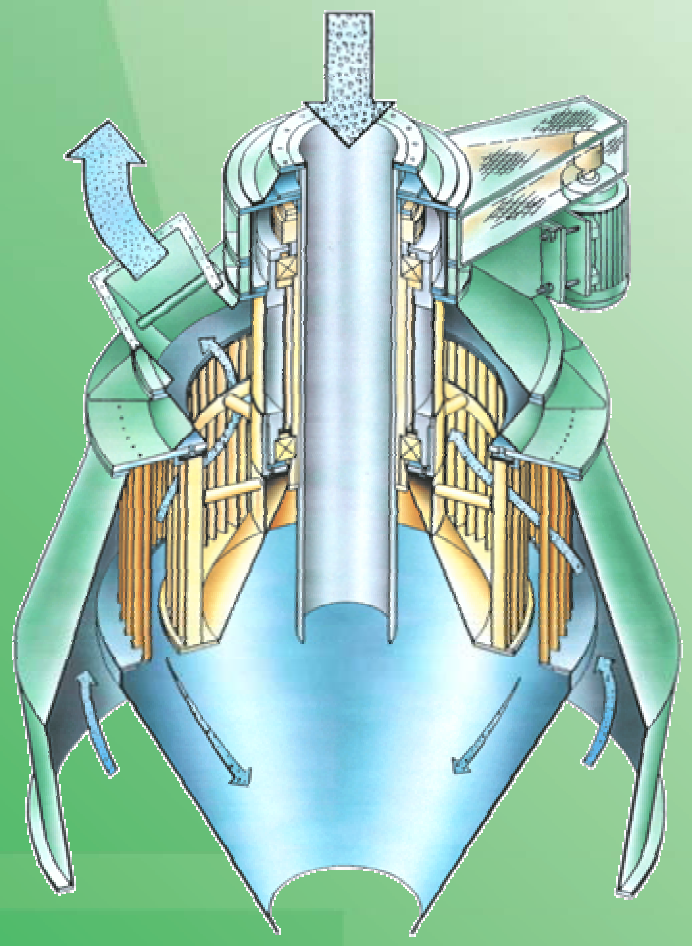
Brief History and Development

Loesche has been developing new classification technologies since 1906 when the initial coal mill was patented. The experiences in grinding coal, pet coke, minerals, cement clinker, limestone, etc. contributed to the successful development of the LSKS Dynamic Classifier.



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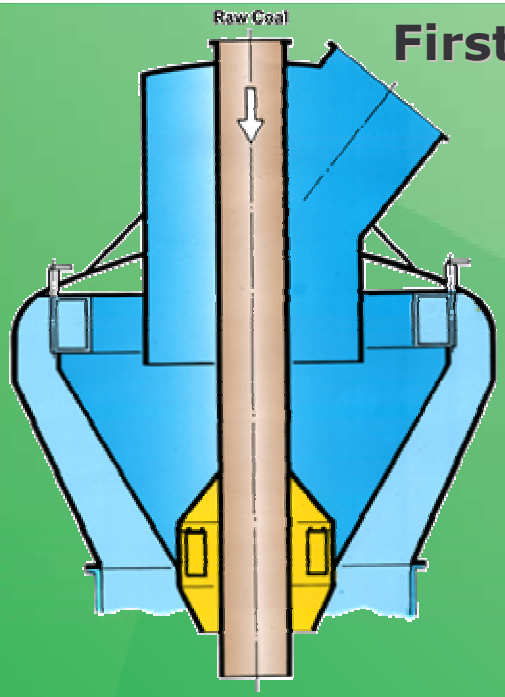
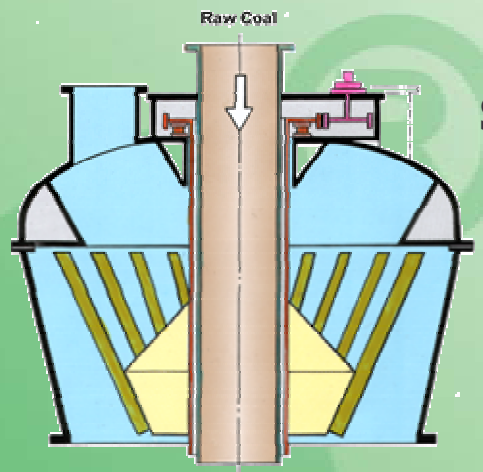


First Generation
Static



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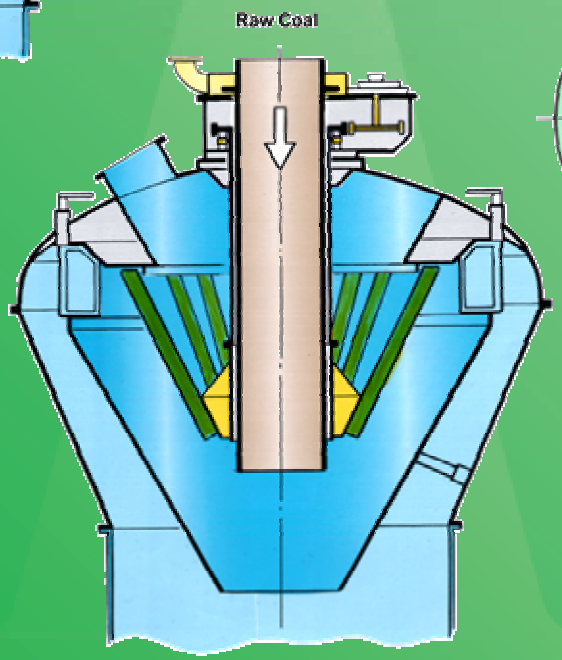
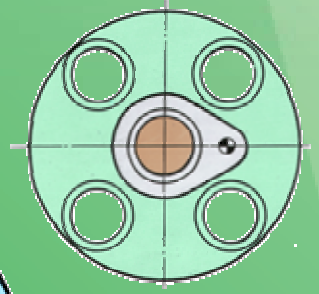
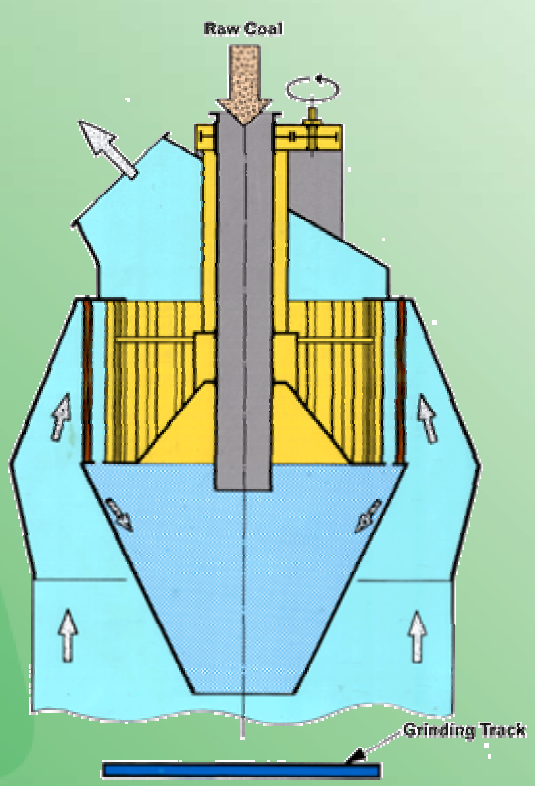
Dynamic







Third Generation
Static-Dynamic

Fourth Generation
High Efficiency
Static-Dynamic

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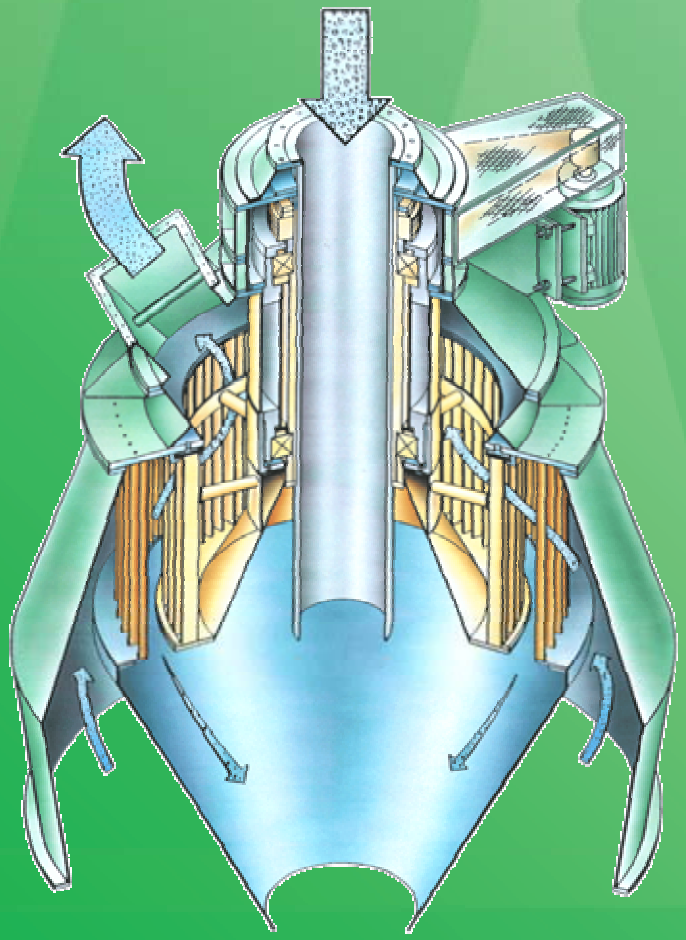
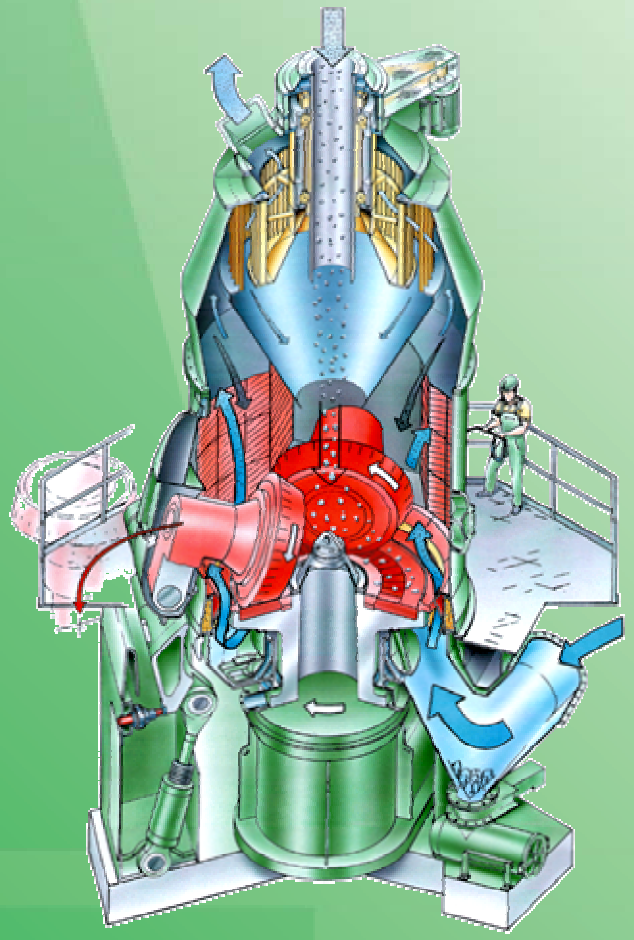
Static-Dynamic High Efficiency Classifier





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How does it work

LSKS high efficiency static / dynamic classifier was developed during continuous efforts to improve the grinding process with vertical roller mills.

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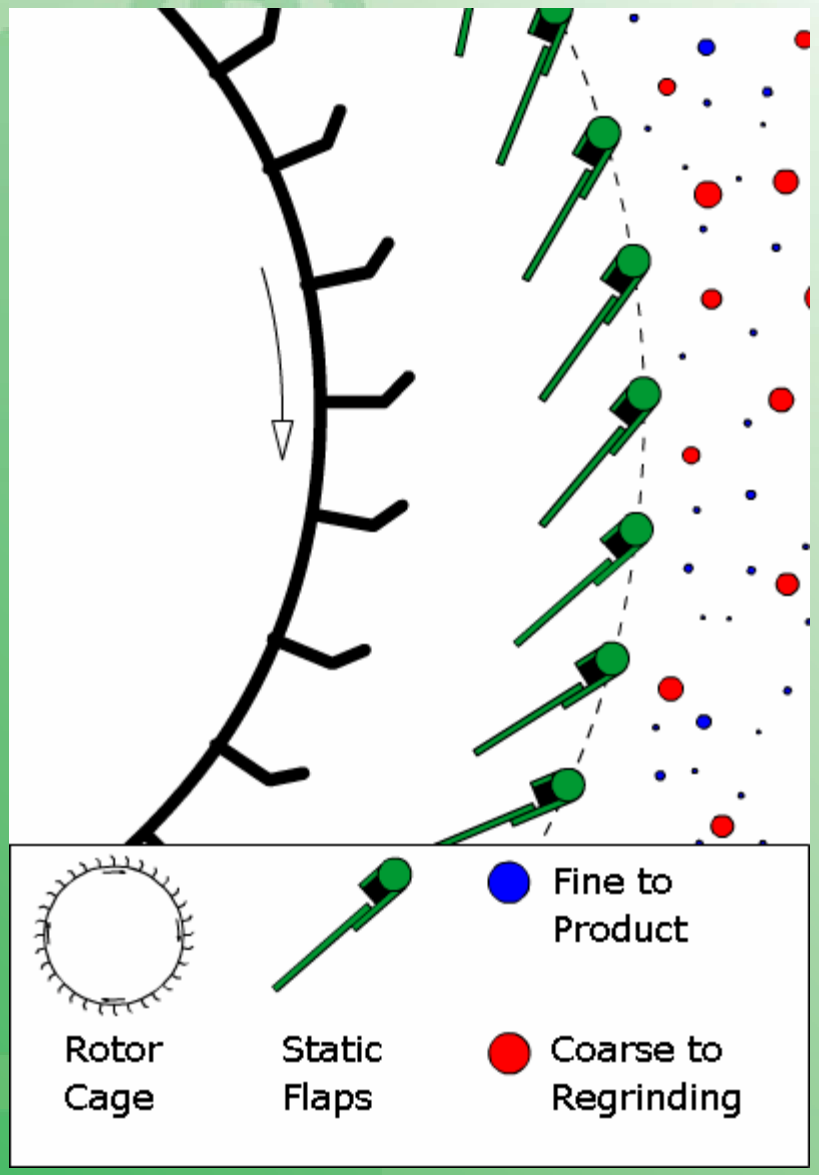
The newly developed Loesche LSKS high efficiency classifier improves the performance of coal and petroleum coke pulverizers, resulting in higher boiler efficiency.

This is due to the redesigned air and product flow velocities and new flow characteristics within the classifier.



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Problems and Solutions

Problems	Solutions offered with LSKS
High LOI	✓ Reduced
High NOx Emissions	✓ Reduced
Burner and Boiler Performance	✓ Improved
Mill Performance	✓ Improved
Fuel Variations	✓ Variable

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Maintenance and Operating Costs

- Reduced Power Consumption of mill and fan
- Reduced Power Consumption of the classifier drive
- Reduced wear of the grinding components
- Reduced wear of the pulverizer Lining
- Controlled Fineness
- Variable fuels

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Results

- Example of Benefits
  - Actual results from an existing installation:

TECHNICAL DATA	STATIC	DYNAMIC
PRODUCTION CAPACITY T/H	30 st/h	35 st/h
Fineness % PASSING 200 MESH	80	93
Fineness % PASSING 100 MESH	92	95.5
MILL DIFFERENTIAL (INCH/WG)	2.4	2.4
PF-DISTRIBUTION	+/- 10	+/- 6
PRIMARY NOx (mg/m³ N)	1050	850
PRIMARY NOx REDUCTION %	100	80
FEED COAL HARDGROVE	60	60

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Results

Boiler Data			Static	Static Dinamic
Boiler Load:		MW	225	250
Steam Flow:		t/h	604	670
Combustion Gas:		t/h	1069	1106
Raw Coal Requirement:		t/h	82	84
NO_x Primary:		mg/n^3N	1080	770
Non-Burned Residue in Fly-Ash:		%	7	3,5
Spec. Power Consumption Mills:		kWh/t	11,5	13,05
average per boiler				
Fineness Coal Dust:	%R 0,075 mm		19	11
	%R 0,150 mm		4	0,45
equivalent to:				
	%R 0,09 mm		13	7,5
	%R 0,2	mm	1	0,01
Coal Dust Distribution:		%	+/- 15	+/-5
max. valves			yes	No
Distributor to PF-Pipes:			Yes	Yes
Adjustable Slide Gates:				

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References

-Coal-

New Installations

Equipment Type	Qty	Year	Buyer	Location/Country
LM 19.2D/LSKS 30D	1	2002	The Monarch Cement Co.	Humboldt [US]
LM 23.2D/LSKS 36ZD	1	2003	Essroc - Nazareth	Nazareth [US]

Upgrades

Equipment Type	Qty	Year	Buyer	Location/Country
LSKS 21D on Raymond 643 and Raymond 673	2	2000	Roanoke Cement Co.	Cloverdale [US]
LSKS 19 on 2 Raymond 533	2	2001	Ash Grove Cement Co.	Seattle [US]
LSKS 21D on Raymond 593	1	2001	Ciment Quebec, Inc.	St. Basile [Can]
LSKS 36D on Raymond 963	1	2002	Puerto Rican Cement Co.	Ponce [US]
LSKS 30D on Raymond 754	1	2003	Dacotah Cement	Rapid City [US]
LSKS 25D on Raymond 643	1	2002	TXI Hunter Cement	New Braunfels [US]

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Reference

Ciment Quebec Coal Mill Classifier Modification – 2001

Raymond 593: LSKS 19
50HG, 10% moisture content. 90% passing 200 mesh

Description	Before	Guarantee	After	%Change
Mill Capacity	7.9 mt/hr	9.4 mt/hr	9.8 mt/hr	**+24%**
Mill Fineness	90%P200mesh	90%P200mesh	98.6%P200mesh	**+9.5%**

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Reference

Ash Grove Cement Company, Seattle WA - 2001

2 Raymond 533:

48 HG, 10% moisture content 75% passing 200 mesh -> 92.6% passing 200 mesh

Description	Before	Guarantee	After	%Change
Mill 1 Capacity	5.8 st/hr	7 st/hr	7.7 st/hr	**+33%**
Mill 1 Fineness	83%P200mesh	90%P200mesh	92.5% P200mesh	**+11.5%**
Mill 1 Power Consumption	23.96 kwh/st	N/A	21.67 kwh/st	**-10.5%**
Mill 2 Capacity	5.4 st/hr	7 st/hr	7.2 st/hr	**+33%**
Mill 2 Fineness	79%P200mesh	90%P200mesh	92.6% P200mesh	**+17%**
Mill 2 Power Consumption	25.4 kwh/st	N/A	22.98 kwh/st	**-10.5%**
Mill Fineness achieved		N/A	98.3% P200mesh	**+24.4%**

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Installation Process

- Engineering
- Classifier pre-assembly in workshop
- Dynamic balancing
- Shipment to site
- Replacement of existing classifier

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Manufacturing

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New Installation

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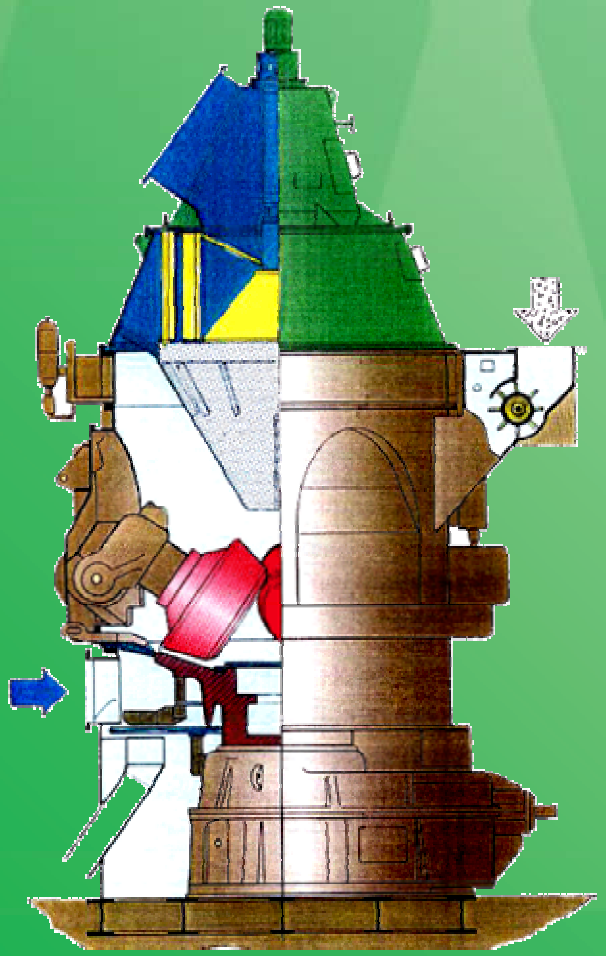
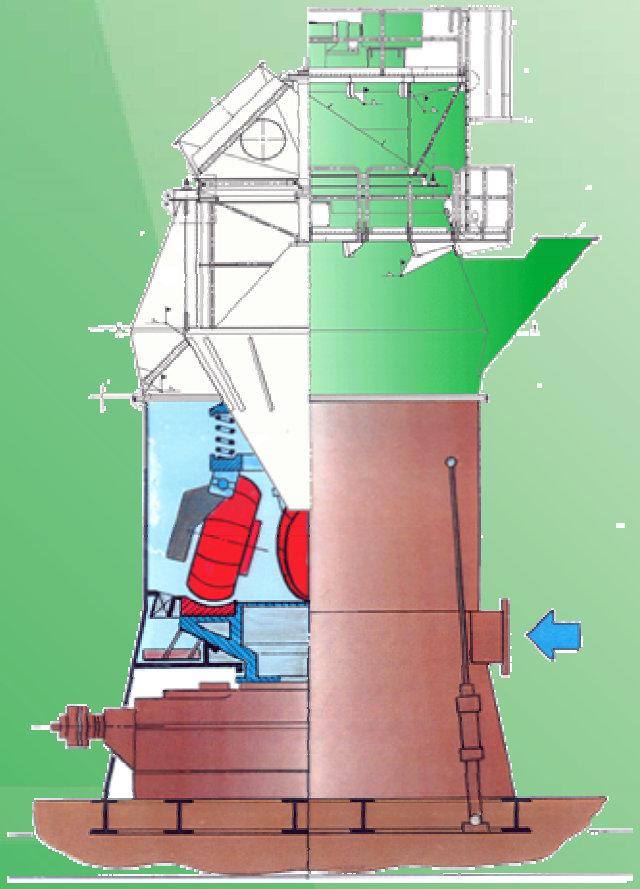
Existing Pulverizer





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Summary

Dynamic Classifiers present the best value for the upgrades of the existing units

- **Proven Solutions to Common Problems**
  - **Lack of Capacity**
  - **Coarse product**
  - **High levels of unburned coal in Ash (LOI)**
  - **High NOx levels**
  - **Restricted fuel usage**
  - **High Wear and low burner performance**

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Summary

- Benefits
  - Increased Capacity
  - Controlled Fineness
  - Reduced unburned coal in ash (LOI)
  - Reduced NOx levels
  - Flexible operation with alternative fuels
  - Improved burner performance and wear life

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Contact

Loesche America, Inc.

Tel **954-602-1424**

bjurko@loescheamerica.com

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