AFCM 2015 VIETNAM 24th Technical Symposium & Exhibition

GEBR. PFEIFFER

Upgrading of VRM technology - Experiences with the new MVR

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Agenda

- MVR mill – Design features
- MVR mill – MulitDrive®
- MVR references
- Cement Industry Challenges
- Conclusion

1864	Foundation of the company
1890	1st air separator for the cement industry
1894	1st mill for the cement industry
1925	Largest cement mill in the world
1956	1st MPS mills for raw material and coal grinding
1979	The world‘s 1st VRM for cement grinding
1994	Launch of MPS B-Series with improved performance
2000	Establishment of Gebr. Pfeiffer (India) PVT. LTD
2005	Establishment of Gebr. Pfeiffer Inc. / USA
2006	1st MVR mill
2007	1st MultiDrive® mill
2011	The world‘s largest VRM for cement grinding
2014	Already 20 MVR mills sold

Gebr. Pfeiffer SE is a 100% family-owned group of companies

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MVR mill
Design features

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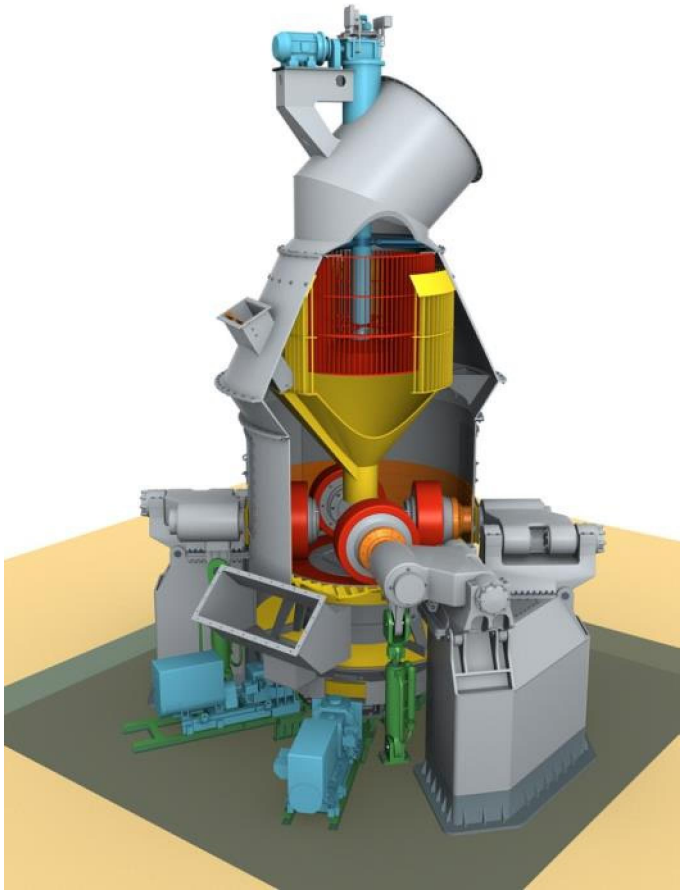
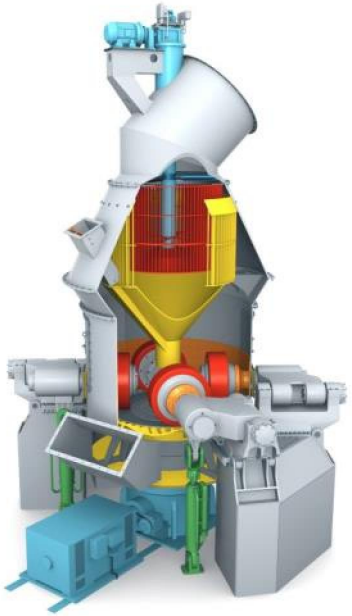
MVR mill – main function groups

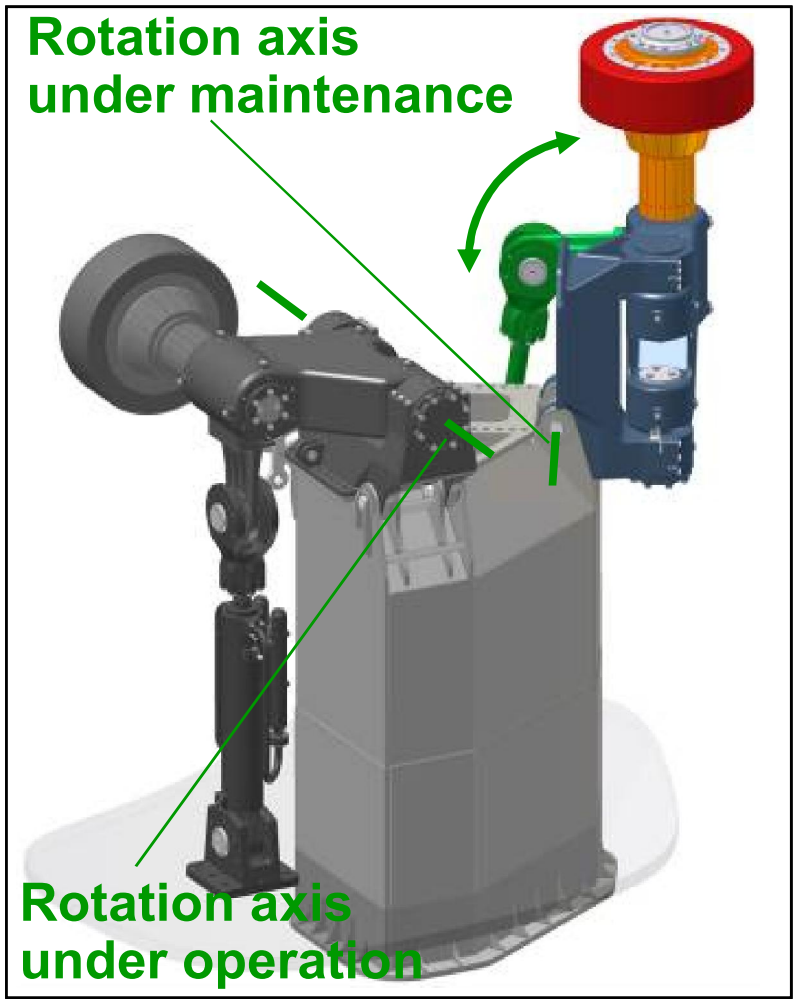
- SLS classifier
- Housing with nozzle ring and hotgas duct
- Grinding table
- Grinding rollers
- twin supports
- drive train options



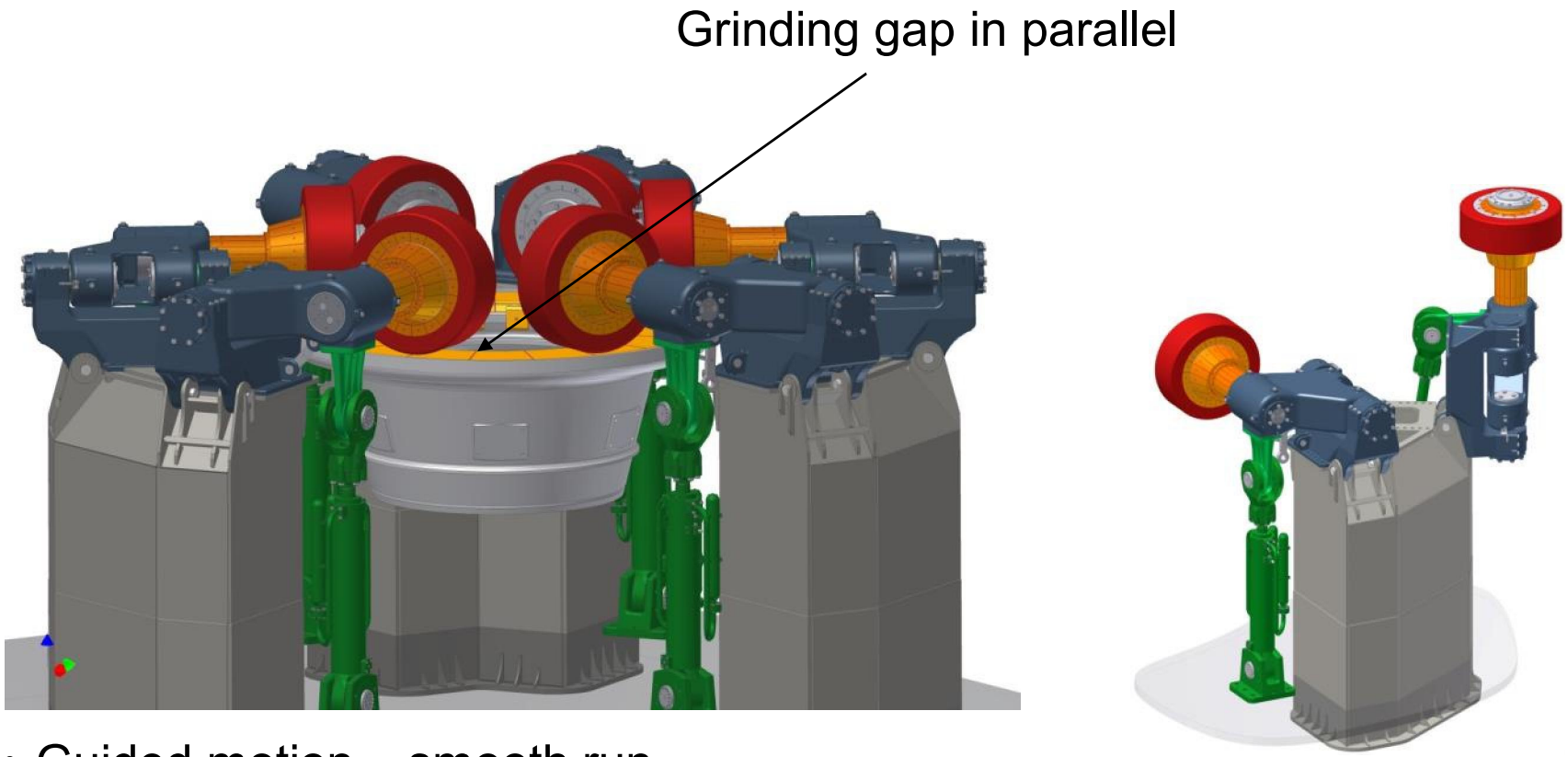
MultiDrive® up to **12 000 kW**
- Table support with girth gear
- 2 to 6 drives



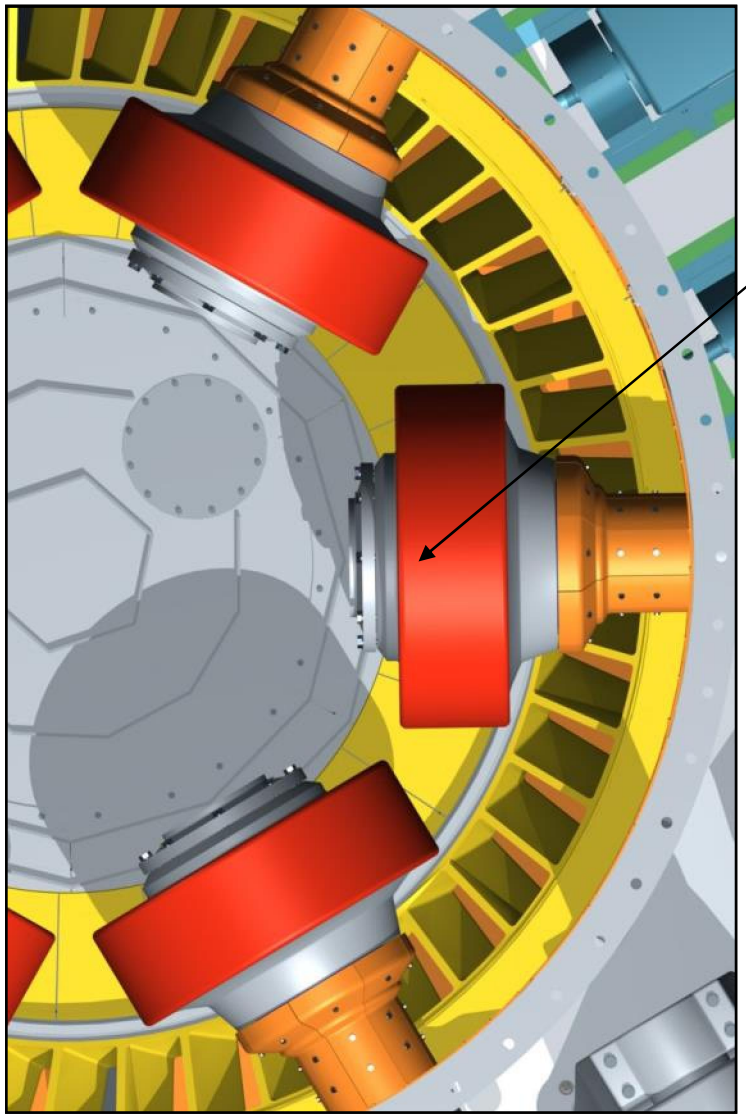
Conventional Drive
up to 7 000 kW



- Roller assembly consists of
  - Roller with cylindrical wear parts
  - Roller axle
  - Roller arm
  - Bearing stand
  - Hydraulic tensioning cylinder
  - Articulation piece, fork head and anchor plate
- Two rollers side by side on a common twin support



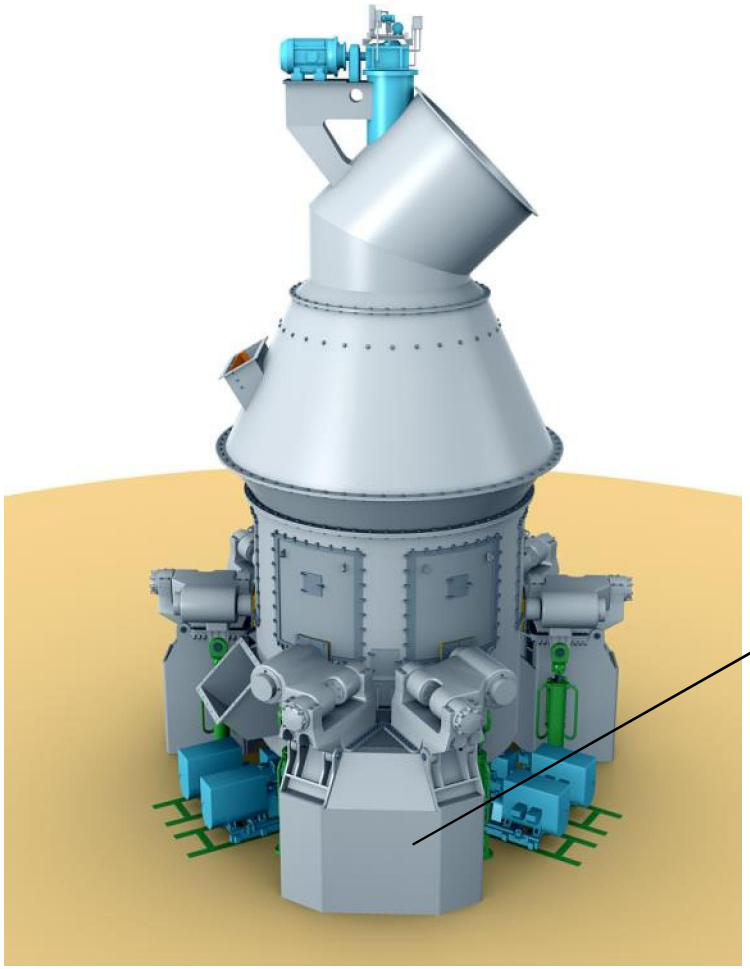
- Guided motion – smooth run
- Grinding gap always in parallel
- Positive effects on power transmission
- Tensioning cylinder swing out roller for service

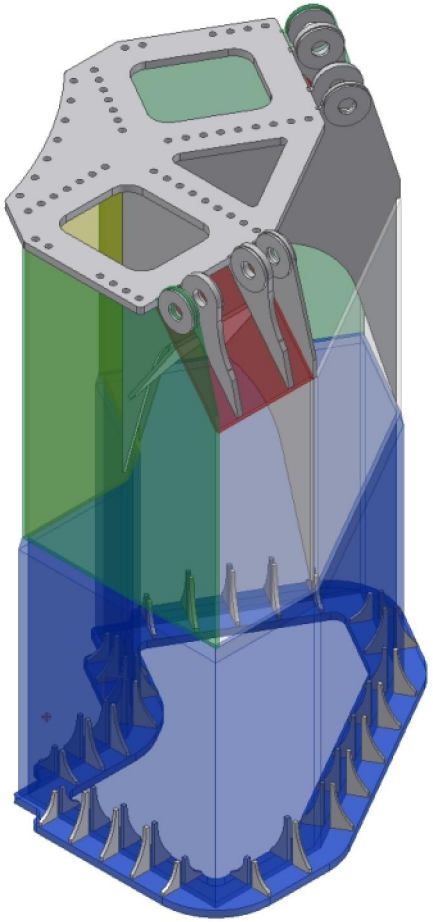


The modular roller system, with only 5 different sized roller modules, uses symmetric tyres and can provide capacities of up to 1,400 t/h

The symmetric design allows the tyres to be removed, flipped over and reinstalled to extend their wear life

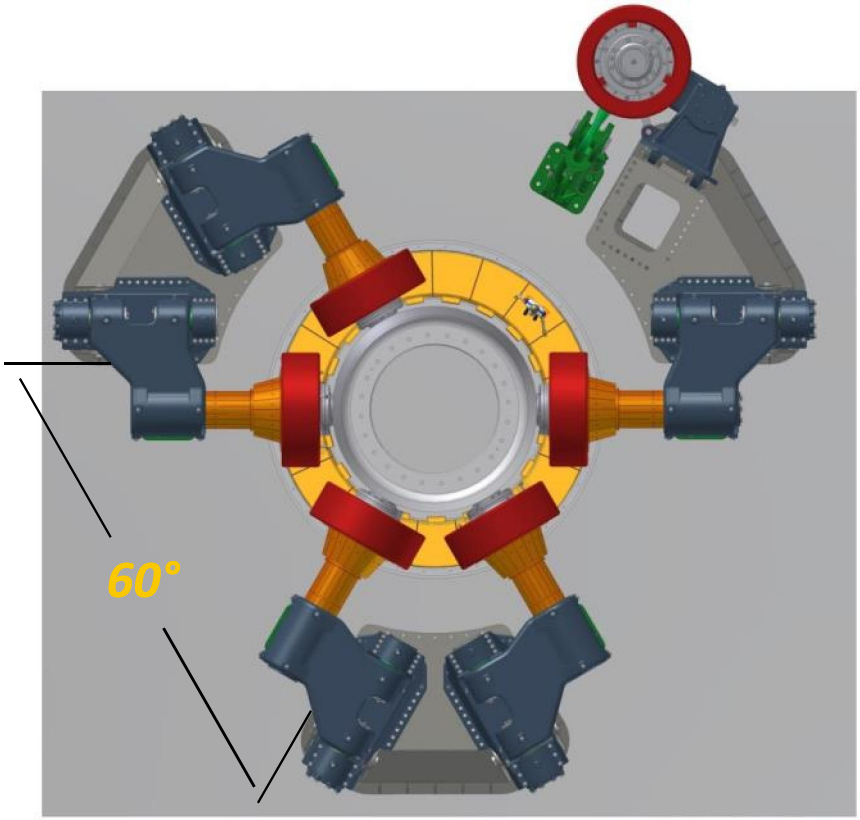
Twin support



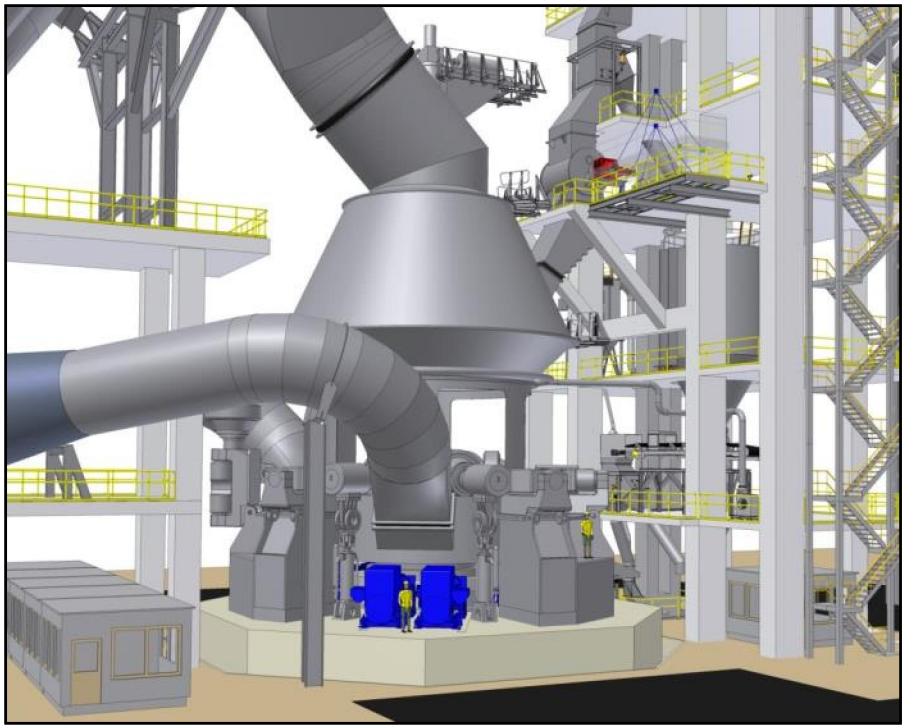


Support

Base of support

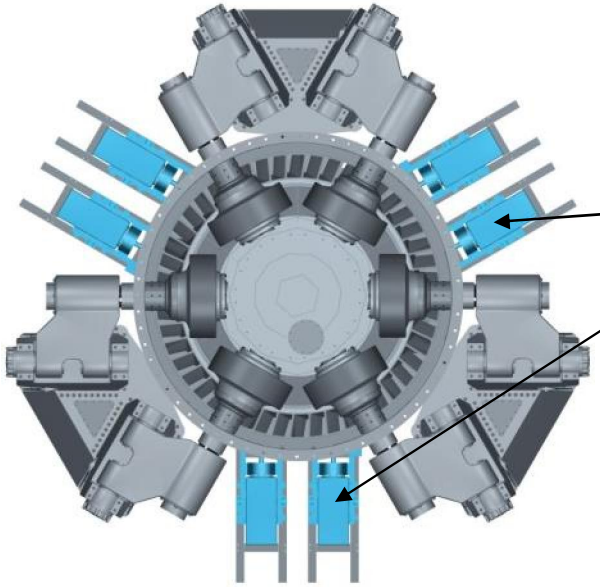


Active Redundancy:
Table support designed to take unbalanced axial and radial forces



Advantages in plant layout:
Wide angle between supports

Modular drive design
MultiDrive®



Up to 12,000 kW with only 3 different types of drive modules

A mill can be equipped with up to 6 identical drives.

Active redundancy

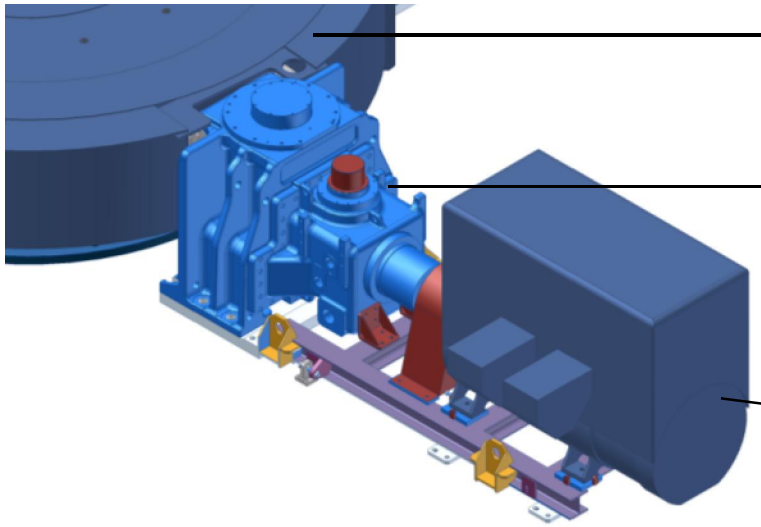


Table thrust bearing

+

KMRS

+

Motor

+

Frequency converter

The PFEIFFER-MVR roller mill
Essential design features

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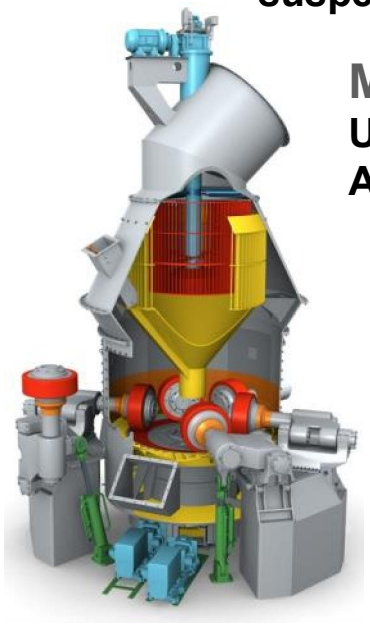
Active Redundancy
Up to 6 grinding rollers and 6 drive modules: mill operation continues even if a roller or drive module is under maintenance.

Hydraulic system for operation and maintenance
For maintenance purposes no extra component is required to swing the rollers out of the mill.

Parallel grinding gap
The geometry of the grinding elements in combination with our MVR suspension system ensures a parallel grinding gap in any operating point.



Modular drive design
Up to 12 000 kW with only 3 different types of drive modules.
A mill can be equipped with up to 6 identical drive modules.

Symmetric wear parts
The modular roller system with only 5 roller modules and symmetric tyres provides capacities of up to 1 400 t/h. For an extended lifetime tyres can be turned in case of wear.

Space saving twin support
1 support for 2 roller modules for ease of maintenance work.

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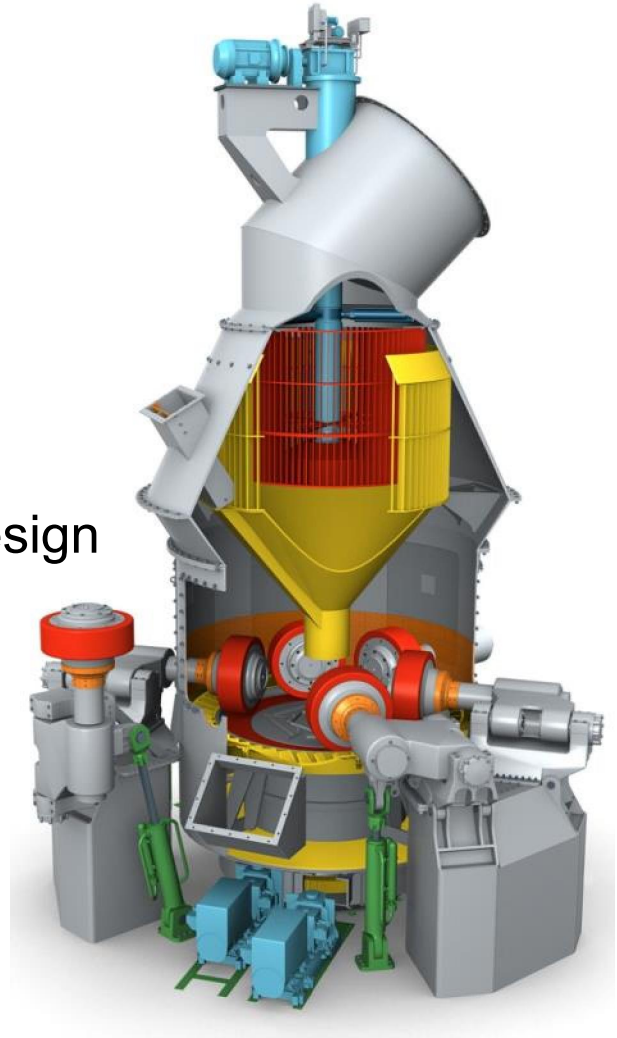
Unchanged

- Process Design
- Safety Factors
- Levels of spec. grinding force
- Nozzlering
- Gas Velocity Design
- Classifier
- Wear Protection

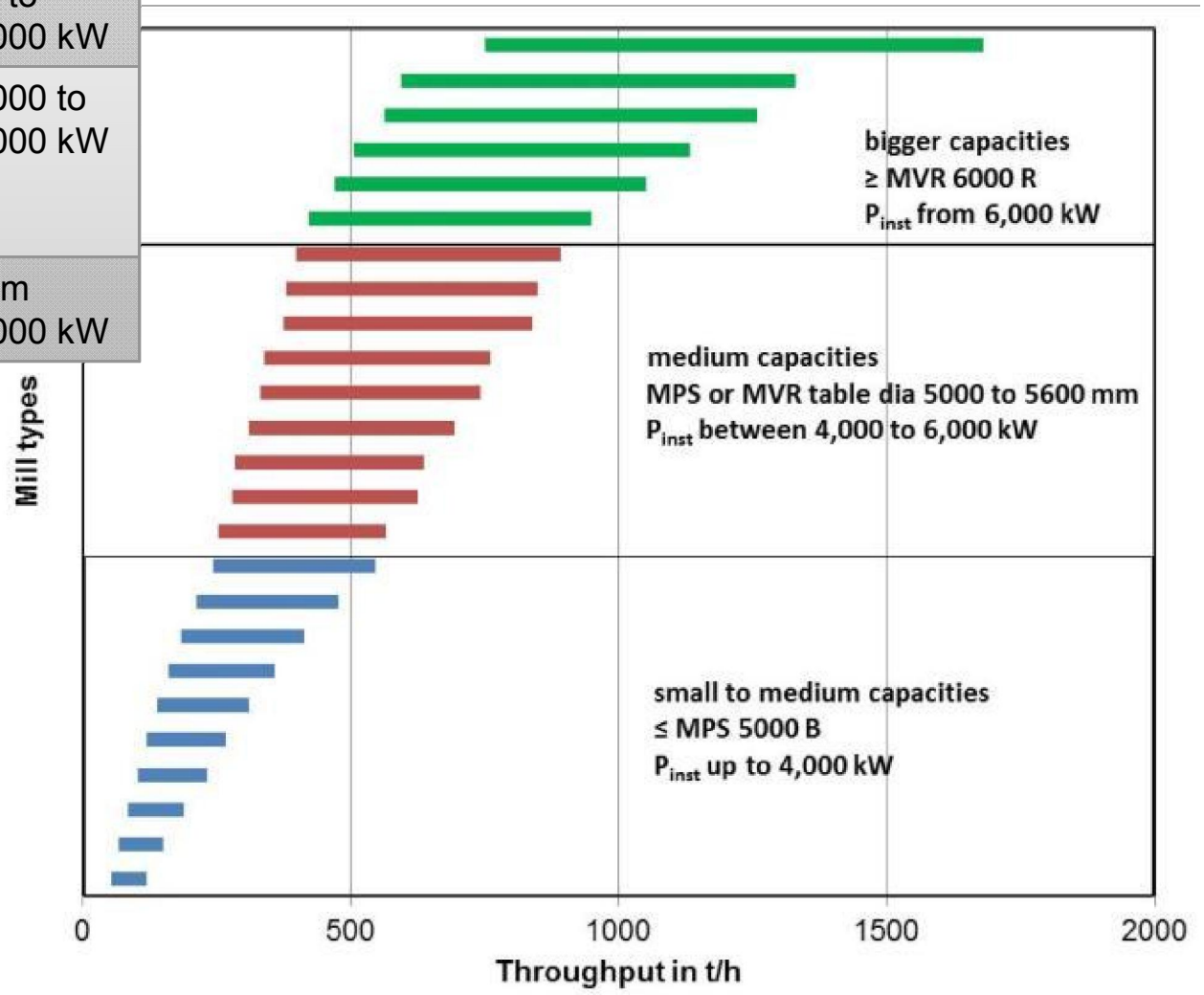


Changed / Improved

- Capacity Range
- Number of rollers
- Roller Suspension
  - Flat Table
  - Cylindrical Rollers
  - Parallel Grinding Gap
- Modular drive with variable speed
- Active Redundancy

Which mill to choose?
MPS or MVR?

Capacity	Mill type	installed power
small to medium	≤ MPS 5000 B	up to 4,000 kW
medium	MPS or MVR table diameter 5000 to 5600 mm	4,000 to 6,000 kW
bigger	≥ MVR 6000 R	from 6,000 kW



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MVR references

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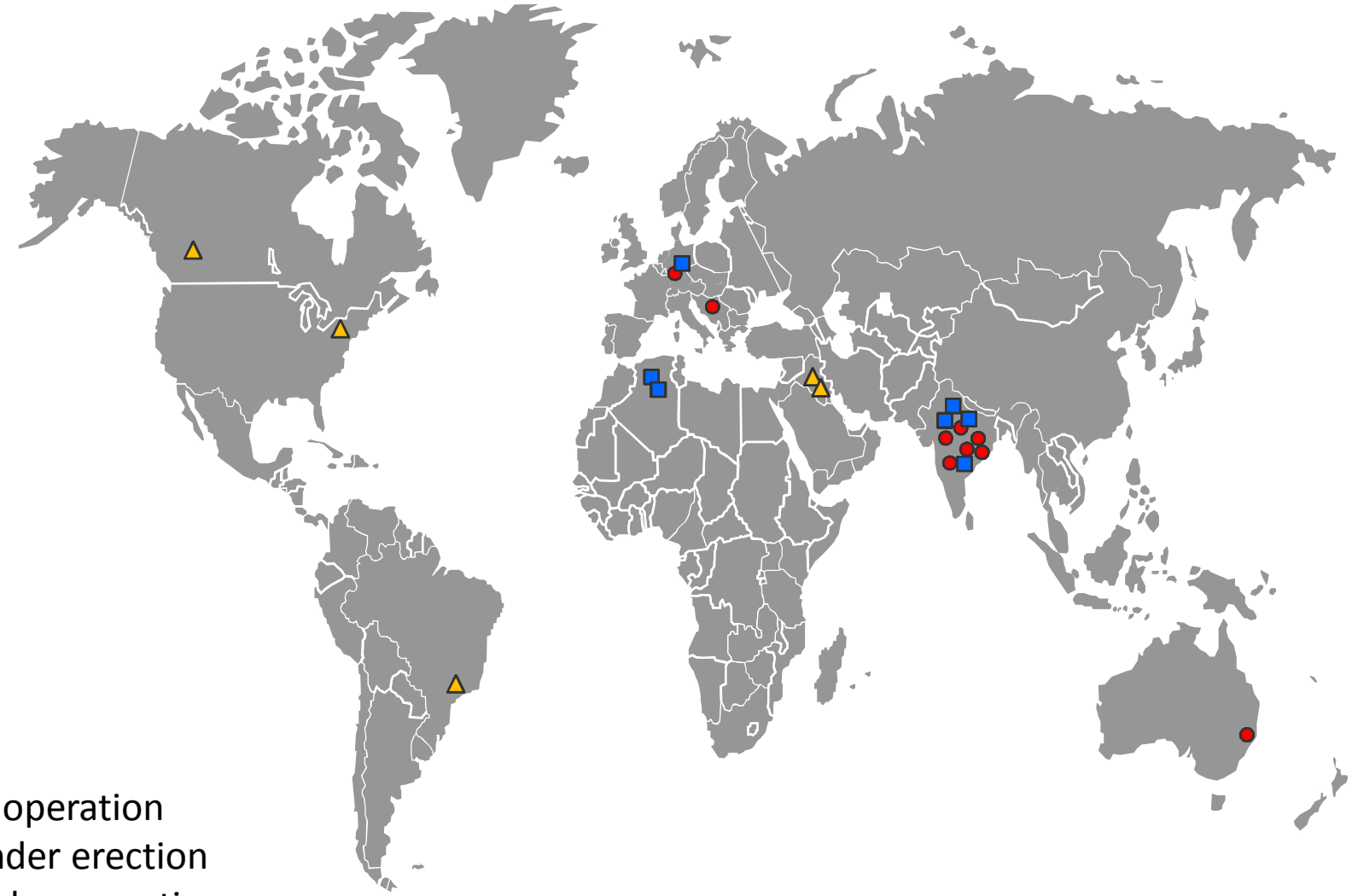
MVR worldwide



- in operation
- under erection
- order execution

MVR 6000 C-6 – technical features

	MVR 6000 C-6
Number of rollers	6
Roller diameter	2,120 mm
Roller wear part weight	6 ton per roller
Roller wear part material	High chromium alloy cast iron
Installed drive power	6,700 kW (planetary drive)
Classifier	SLS 5600 BC
Bag Filter	875,000 m³/h (operation) 320 g/m³ (raw dust content) <= 20 mg/nm³ (dust load outlet) 12 mbar (pressure drop)

Operational results
SHREE CEMENT Ltd. - RGU

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MVR 6000 C-6	OPC	PPC
Clinker	90 %	56.5 %
Gypsum	8 %	6 %
Fly ash, wet/dry	2 / 0 %	13.5 / 24.0 %
Clinker temperature	135 °C	135 °C
Feed moisture	1.1 %	2.3 %
Product rate	311 t/h	334 t/h
Fineness	2,840 Blaine	3,700 Blaine
Specific energy consumption (shaft: mill)	17.7 kWh/t	15.7 kWh/t

Operational results
SHREE CEMENT Ltd. - BGU

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MVR 6000 C-6	PSC	PPC
Clinker	45.8 %	57 %
Gypsum	4.2 %	5 %
Fly ash, wet/dry	50 % GBFS	7 / 31.0 %
Feed temperature	ambient	ambient
Feed moisture	6.1 %	0.8 %
Product rate	235 t/h	424 t/h
Fineness	3,830 Blaine	3,940 Blaine
Specific energy consumption (shaft: mill)	25.1 kWh/t	13.9 kWh/t

Operational results

		GGBFS		GP Cement	
		G	A	G	A
Throughput	t/h	190	197	208	215
Feed moisture	%		9		2.5
Residual moisture	%	0.5	0.5	0.5	0.2
Fineness	cm^2/g	4,200	4,400	3,800	3,800
Spec. energy cons. mill	kWh/t	26.3	24.8	22.8	21.5
G: Guarantee, A: Achieved					

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Cement Industry Challenges

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Cement Industry Challenges
Low Carbon Technology Roadmap 2050

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	Partners' roles	
	Cement producer	Pfeiffer (GPSE) Grinding system
Alternative fuel and raw materials	Flexibility in regard to changing market demands (cement) or market supply (coal, petcoke, fly ash, bottom ash, etc.)	e.g. XRF of single components, calculation of LSF, Grinding tests to evaluate behavior of material
Thermal and electrical energy efficiency	Energy efficient system High reliability and net availability	e.g. Trials at Indian plant for grinding without external heat

Cement Industry Challenges
Low Carbon Technology Roadmap 2050

		Partners' roles	
		Cement producer	Pfeiffer (GPSE) Grinding system
Clinker Substitution	• By-products of other processes that have to be taken "as-is"	Flexibility in regard to market supply (fly ash, bottom ash, etc.)	• e.g. XRF of single components • e.g. Grinding tests to evaluate behavior of material
	• Special requirements for drying and grinding, target fineness • Specific product characteristics are required • Market acceptance has to be received for new products, e.g. Portland Limestone Cement	Achievement of required product quality (especially cement)	• e.g. Grinding tests to evaluate behavior of material • Optimization at plant site • Process support • Additional equipment (e.g. pre-hydration)
	Waste Heat Recovery (WHR)	x	Lowest possible heat input
	New technologies including CCS	x	to be discussed

Conclusion

- Pfeiffer mills in operation worldwide since many decades
- MPS is well proven technology
- MVR is in operation since 2006
- Energy-efficient system with high capacities (up to 12,000 tpd)
- Simple installation with low maintenance cost

- Active redundancy
- MultiDrive®

- Optimization is a continuous process
- Working together gives maximum feedback and response
  → maximum performance
- All over support (process & mechanical)
- Training of people to set skills to high standards

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