

LINER



CITIC IC LUOYANG HEAVY MACHINERY CO., LTD

BEST

- B—Benefit
- E—Efficiency
- S—Standard
- T—Technology



Liner Presentation



Liner

Liner is to protect shell from direct impact and friction of grinding materials and also used to modulate motion of grinding material. It could improve grinding efficiency and productivity, as well as reduce liner wear.





Our advantage:

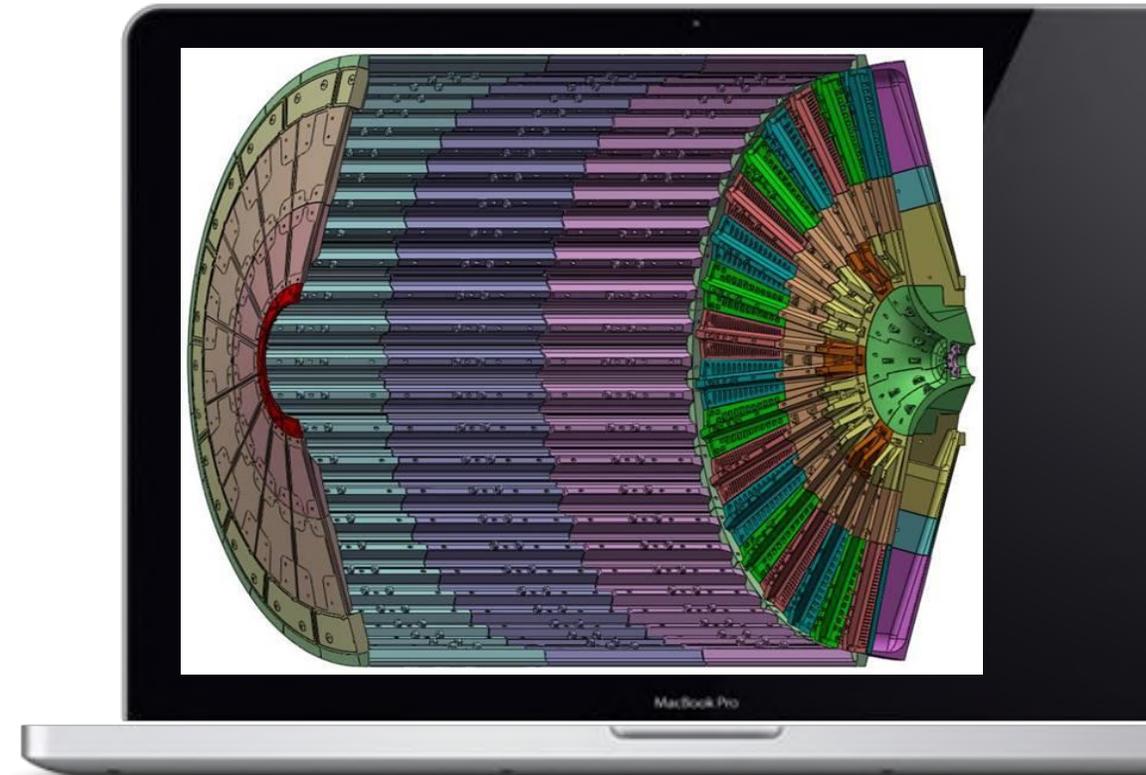
- 1. Pre-sales design, After-sales process tracking & Improvement**
- 2. Equipments and Matching system**
- 3. Quality control & Inspection methods**
- 4. Package & Delivery—Last mile is also essential**
- 5. Cases—Design optimization**
- 6. Service—With 64 years experience of industry service**



01

**Pre-sales design,
After-sales process tracking
& Improvement**

Design



Software

1. Simulation casting software (MAGMA, Intecast CAE)
2. Discrete element Method (DEM)
3. Finite element Method (ANSYS)
4. 3D CAD (Solid Works)
(assembly simulation, drawings& design check)



Design experience

1. 64 years experience in mining machinery.
2. Various types of mill liners design & reform.
3. Ability to convert national and international standards
4. Life-cycle service conception & ability.

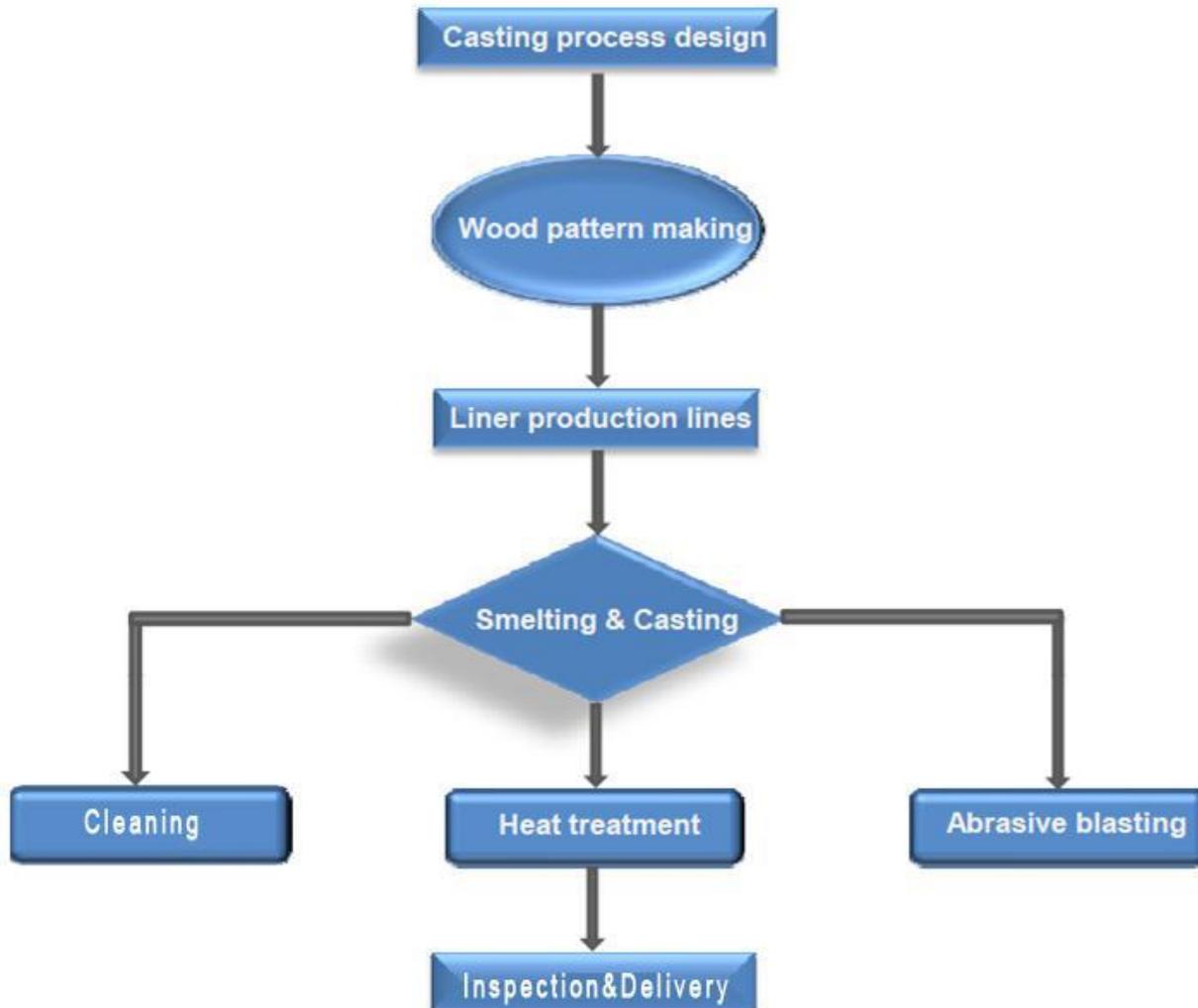


Purpose

Optimize material, Optimize structure, Optimize technology
Extend liner life, Improve efficiency, Lower cost.

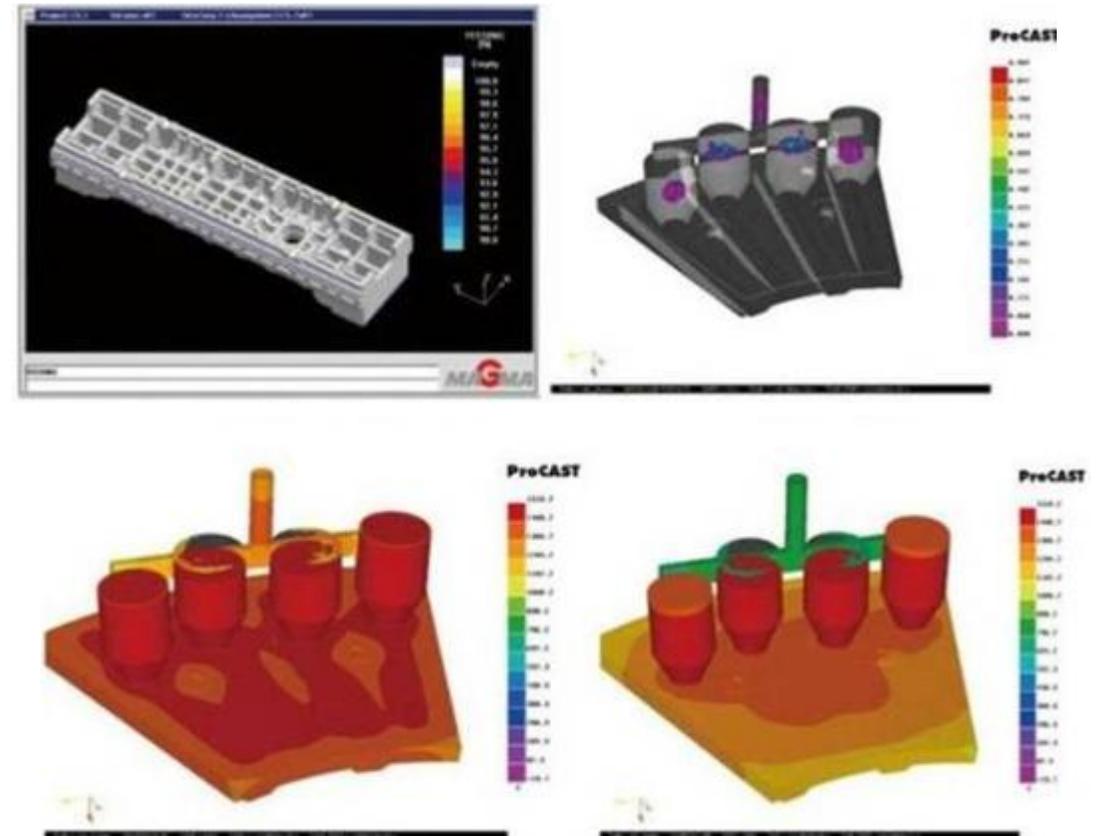
Production technics design

Production flowchart

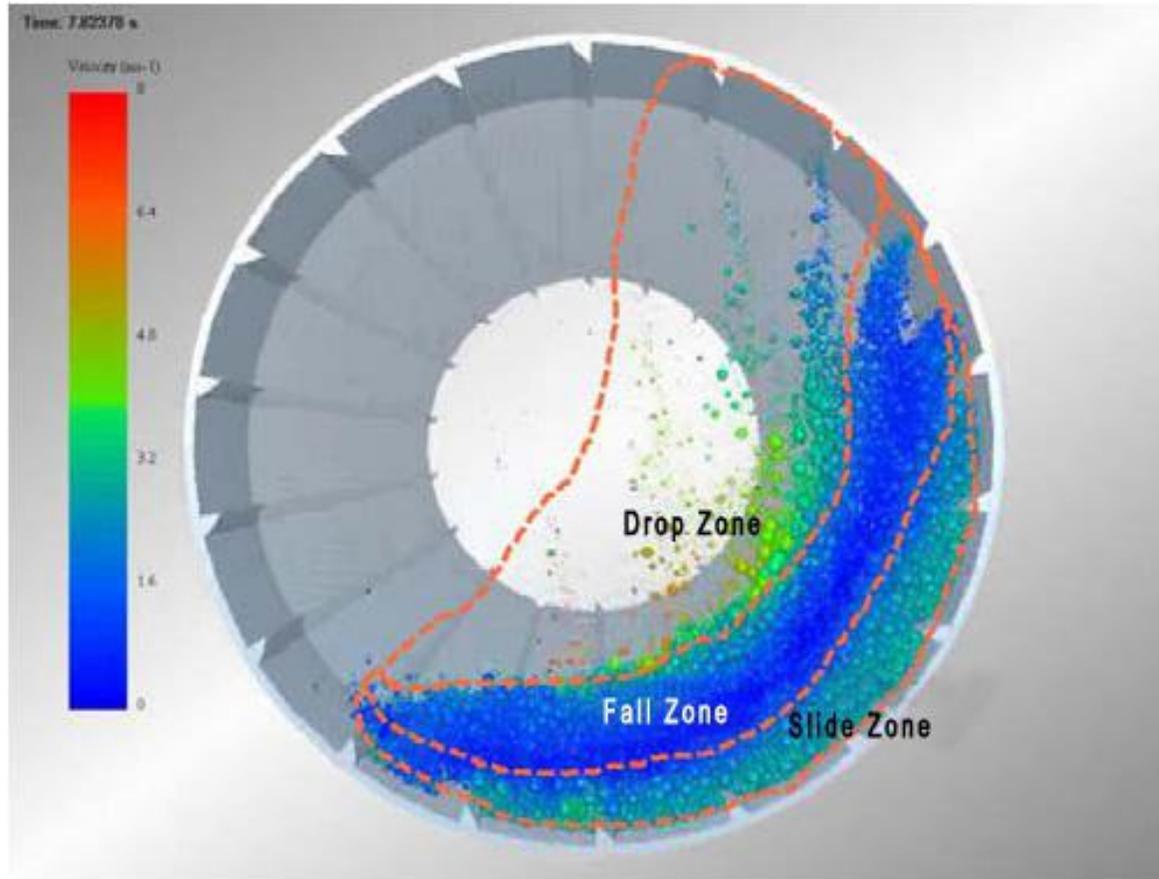


High-tech

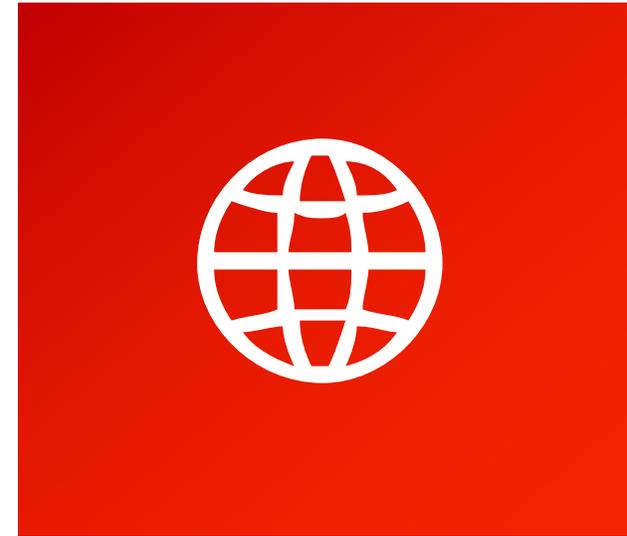
Adopting advanced software (material software, casting software, heat treatment software, etc.). These software could improve liner properties greatly.



Production technics design



Simulation of mill working condition



Reform & optimize



Poor Design :Liner Yield Deformation by Direct Smash of Balls Due



Reasonable Design: The plate of SAG gradually and evenly worn out



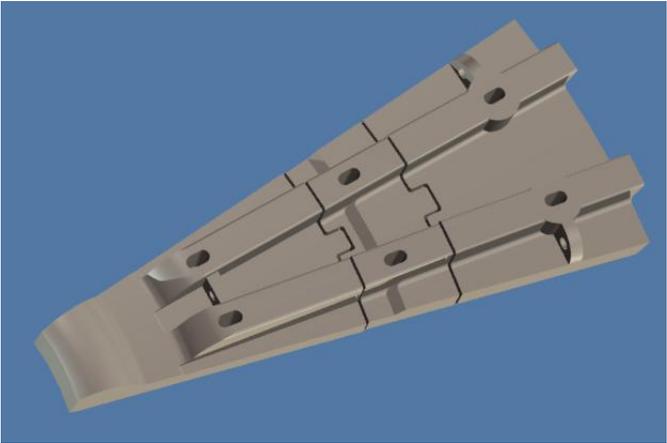
Poor Design : SAG liner's fragmentation



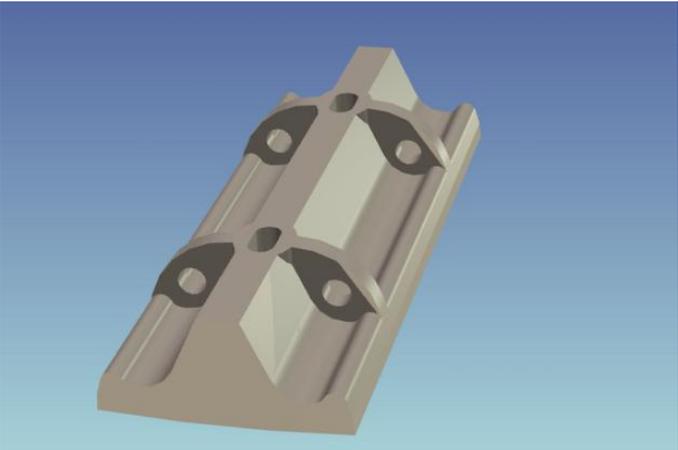
Reasonable Design: The plate of SAG gradually and evenly worn out,and the shape does not change



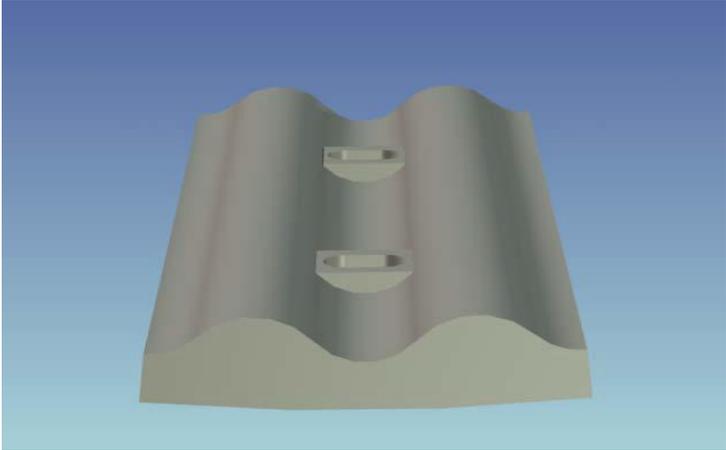
Reform & optimize



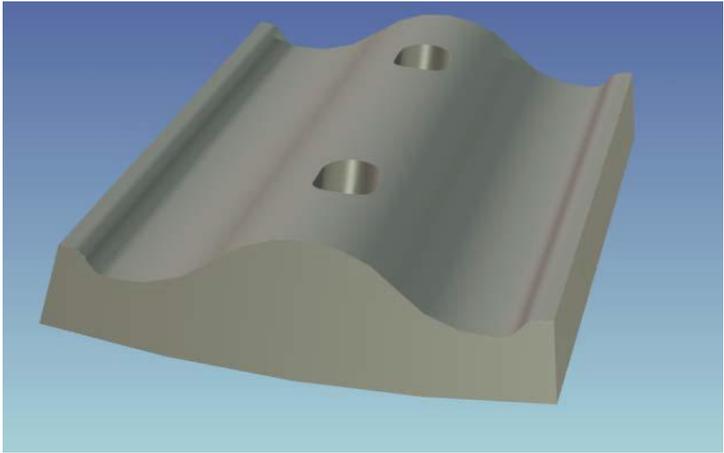
Segment design according to different abrasion degree



Trapezoidal design of liner to improve strength



Double wave crest design of overflow mill liner



Balance upstream design & downstream produce --- improve liner strength & mill efficiency by big data analysis

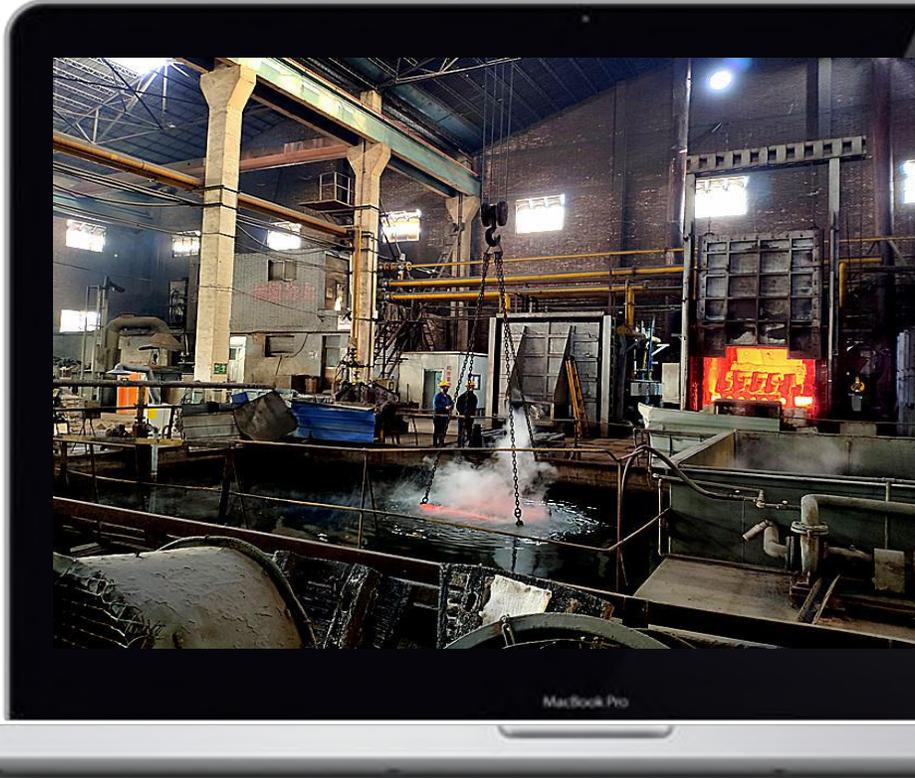




02

Equipments and Matching system

Production equipments



Equipments

- * 5T, 12T, 30T smelting furnaces
- * VRH molding line
- * 2x5m Auto control gas heat treatment furnace
- * 2x5m Auto control gas heat treatment furnace for tempering
- * 1.3x1.6m Medium temperature electric heat treatment furnace
- * 350T brine quenching pool
- * 50T water-based quenching cooling system



Our production ability: molding, smelting, casting, sand cleaning, heat treatment, polishing and warehousing after quality inspection .

DF-100 direct read-out spectrometer, MLD-10 dynamic load wear tester and other testing devices could test, comparison, analysis of physical and chemical property index and abrasion resistant index .

Our annual production capacity of wear-resistant castings can reach 10000 tons.

Production equipments



Pattern



Modeling workshop



Medium-frequency induction furnaces



Mobile-Continuously sand mixer



Production equipments



VRH modeling



2x5m Auto control heat treatment furnace



Casting line



Water-based quenching pool



Brine quenching pool



03

Quality control & Inspection methods

Quality Control

64 years experience accumulation and cultural heritage from Luoyang Mining Machinery Factory(CITIC nowadays)

Perfect equipment management experience

Complete Inspection standards —— before production— after production, test and report in all links of production, finished product quality acceptance.

Experience of QC and delivery to international famous companies.



Quality Control

1. Founded in 1956, Luoyang Mining Machinery Factory is one of the key enterprises in China's first Five-Year plan, After 64 years reformation and development, we have made many excellent achievements in the design and manufacturing of heavy machinery and accumulated rich first-hand experience.



Quality Control

2. Complete manufacturing equipments, Periodic review and maintenance system, Stable manufacturing capacity.

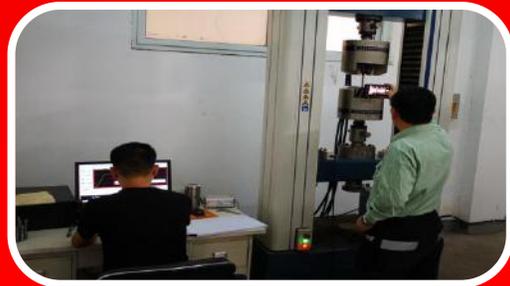


Quality Control

3. Complete test standards:

Before Production: Molding Sand Test—Fuel Examination—IQC—Precious Metal Test

During production: Wood Pattern Inspection—Molding Test—Liquid Steel Test—Heat treatment Test—Visual Inspection—Hardness Test—Mechanical Properties Test



Quality Control

4. Experience of matching standards of international famous enterprises and Long-term relationship of cooperation.



Inspection



Sand detector



DF100 direct-reading spectrograph



Sand detector



Carbon sulfur analyzer

Inspection



Mechanical impact tester



IQC Instruments



Mechanical tensile tester



Inspection



Visual Inspection



Hardness test



Ultrasonic test



Dimension test





04

Package & Delivery—Last mile is also essential

Package & Delivery — Multimodal Transport



Package & Delivery





05

Case—Design optimization

Typical product



$\Phi 9.75 \times 4.57\text{m}$ SAG feed inlet liner



$\Phi 3.2 \times 11\text{m}$ Cement mill shell liner



$\Phi 8.8 \times 4.8\text{m}$ SAG Grid



$\Phi 6.7 \times 11.58\text{m}$ Ball mill shell liner



Typical product



Chromium-molybdenum alloy steel



Low carbon martensite alloy steel

Unique chemical composition, Super mechanical properties



Typical product



Trial Installment of mill liner



Case

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Improvement

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Optimization scheme of mill linings for Turkey DAL Cement Engineering Company

Based on the data analysis of in-service raw material mill and cement mill liner, the material and structure design of liner are improved to solve the problem of fracture, enhance grinding efficiency and improve efficiency.

Russian Emperor Gold Mine liner optimization and improvement design scheme

By optimizing the structure and improving the material of the liner, the fracture problem was solved and the service life was extended by at least 3 months.

Tanzania LAKE Cement Company liner optimization and improvement design scheme

The material and structure was changed the service life was extended through the mapping and analysis of the original liner. — 31 —

Case

On-site

LINER



Tanzania 3.6×15m cement mill liner Surveying & mapping

Case

On-site

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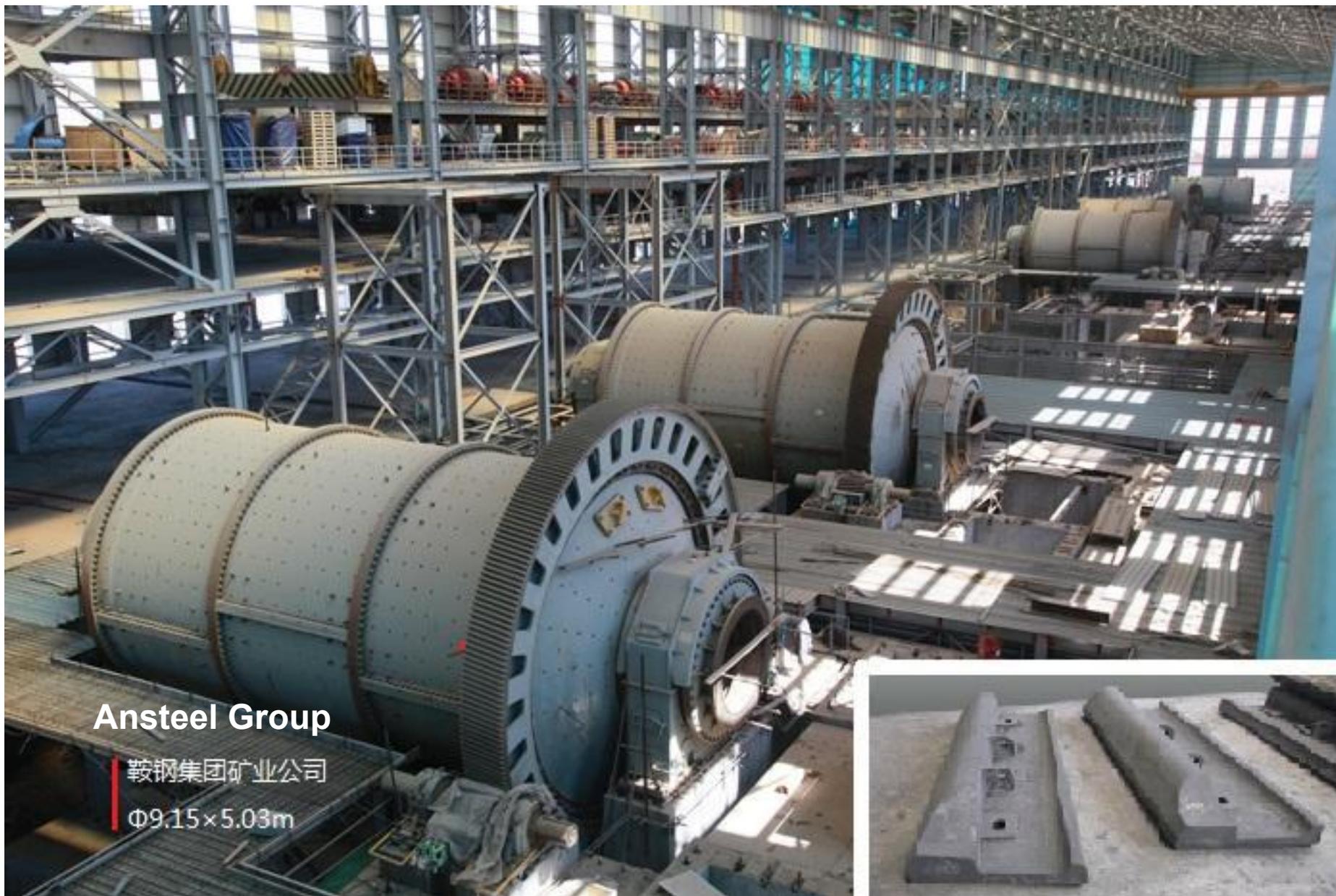


云铜集团普朗铜矿
 $\Phi 9.75 \times 4.57\text{m}$
China Yun Copper (Group)

Case

On-site

LINER



Ansteel Group

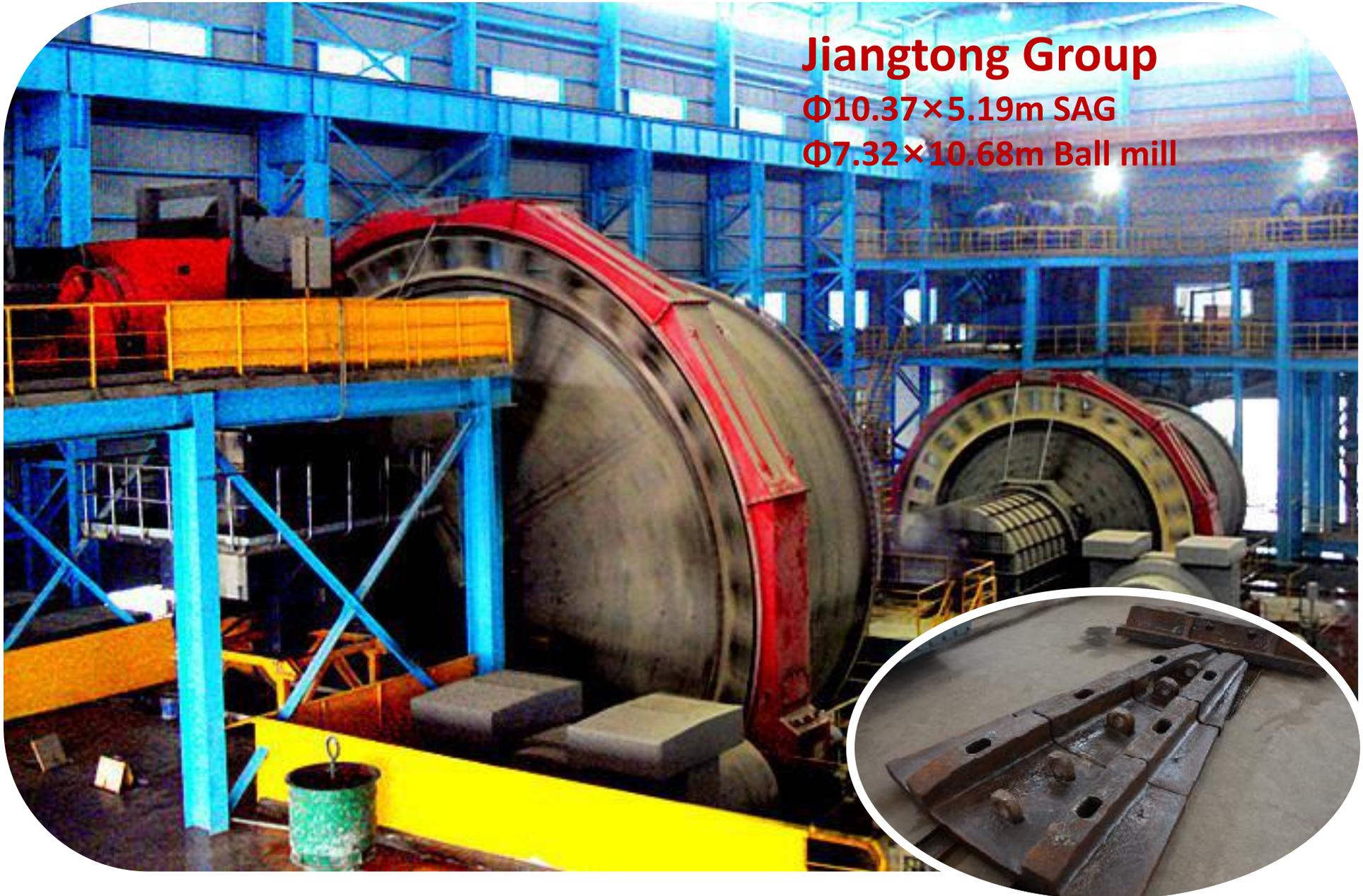
鞍钢集团矿业公司

Φ9.15×5.03m

Case

On-site

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Jiangtong Group

Φ10.37×5.19m SAG

Φ7.32×10.68m Ball mill

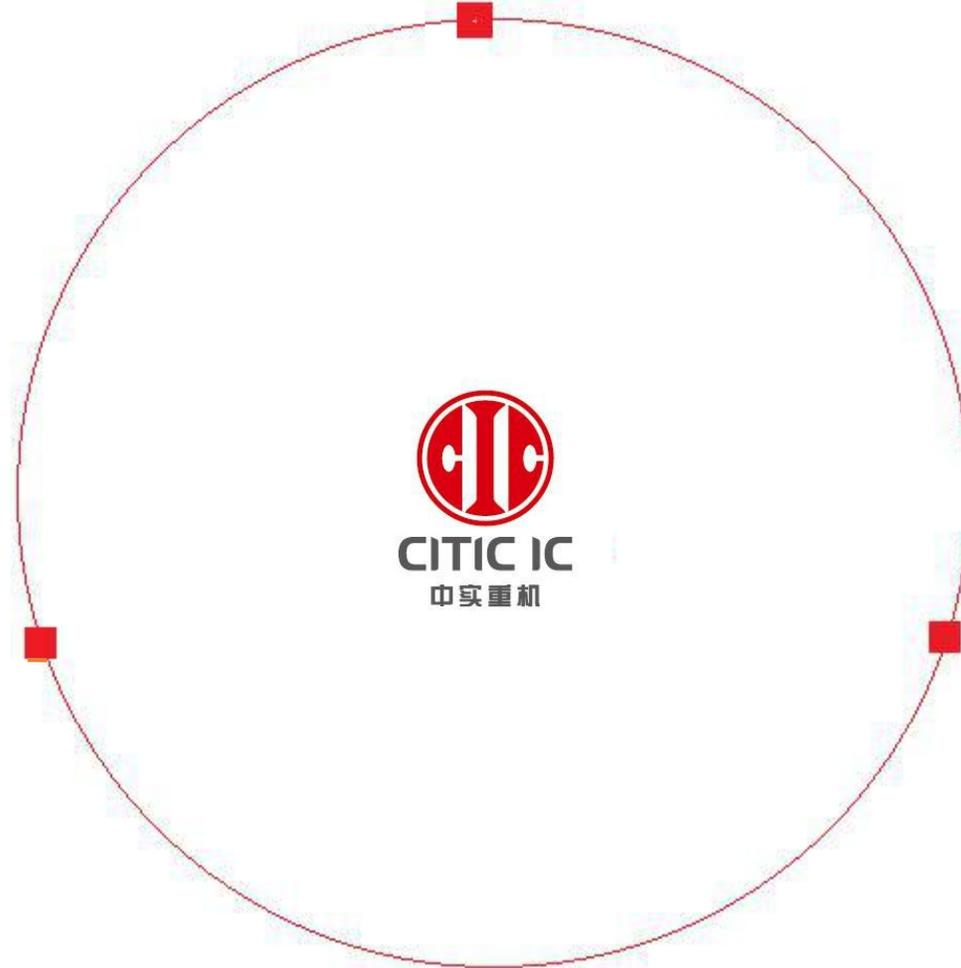


06

Service—With 64 years
service of industry service

Service

1. Full supply chain service: Design-Test-Production-Optimization-QC-Package-Delivery-After-sales maintenance.



2. Rich experience: cooperate with famous corporations at home and abroad for 64 years.

3. Vision: Made in CIC, trustworthy—win-win, efficient and pragmatic, we will not discount for the sake of dreams.

THANK YOU