

CM Service for



Integrated Steel Mill Project



posco
포스코A&C

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Introduction of Brazil

CM Service for Integrated Steel Mill Project

Introduction of Brazil

 **The largest territory in South America, The country of passion and soccer,
The home of Samba and Carnival**

The image is a vertical composition of two photographs. The top photograph shows the flag of Brazil, which consists of a green field with a large yellow rhombus in the center. Inside the rhombus is a blue globe with white stars and a white banner across it with the text 'ORDEM E PROGRESSO' in green. The bottom photograph is a panoramic view of Rio de Janeiro, Brazil. In the foreground, the Christ the Redeemer statue stands on a rocky peak, overlooking the city. The city of Rio de Janeiro is visible in the middle ground, nestled between hills and the bay. In the background, the bay of Guanabara and the bay of Ilha Grande are visible, along with the Sugarloaf Mountain (Pão de Açúcar) on the left. The sky is clear and blue.

A horizontal timeline illustrating the historical periods of Brazil. It consists of a blue bar with five circular nodes. Above the bar, years are marked: ~1500, 1500, 1808, 1822, and 1889. The nodes are labeled: 'Ancient times', 'Colonial Times', 'United Kingdom', 'Empire of Brazil', and 'Federative Republic of Brazil'. The 'Federative Republic of Brazil' node is highlighted with an orange dashed border. A large blue arrow points to the right at the end of the timeline.

Period	Year
Ancient times	~1500
Colonial Times	1500
United Kingdom	1808
Empire of Brazil	1822
Federative Republic of Brazil	1889

What about CSP?

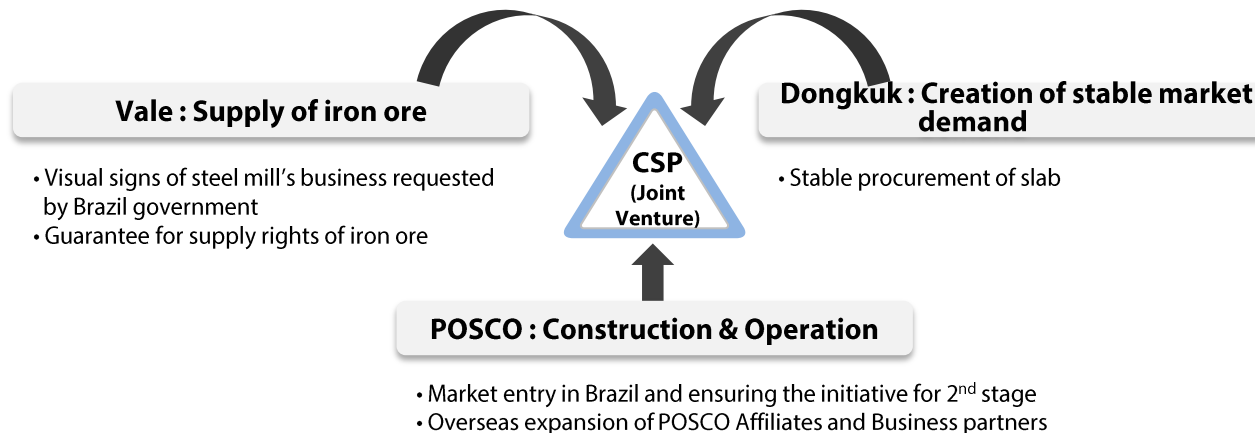




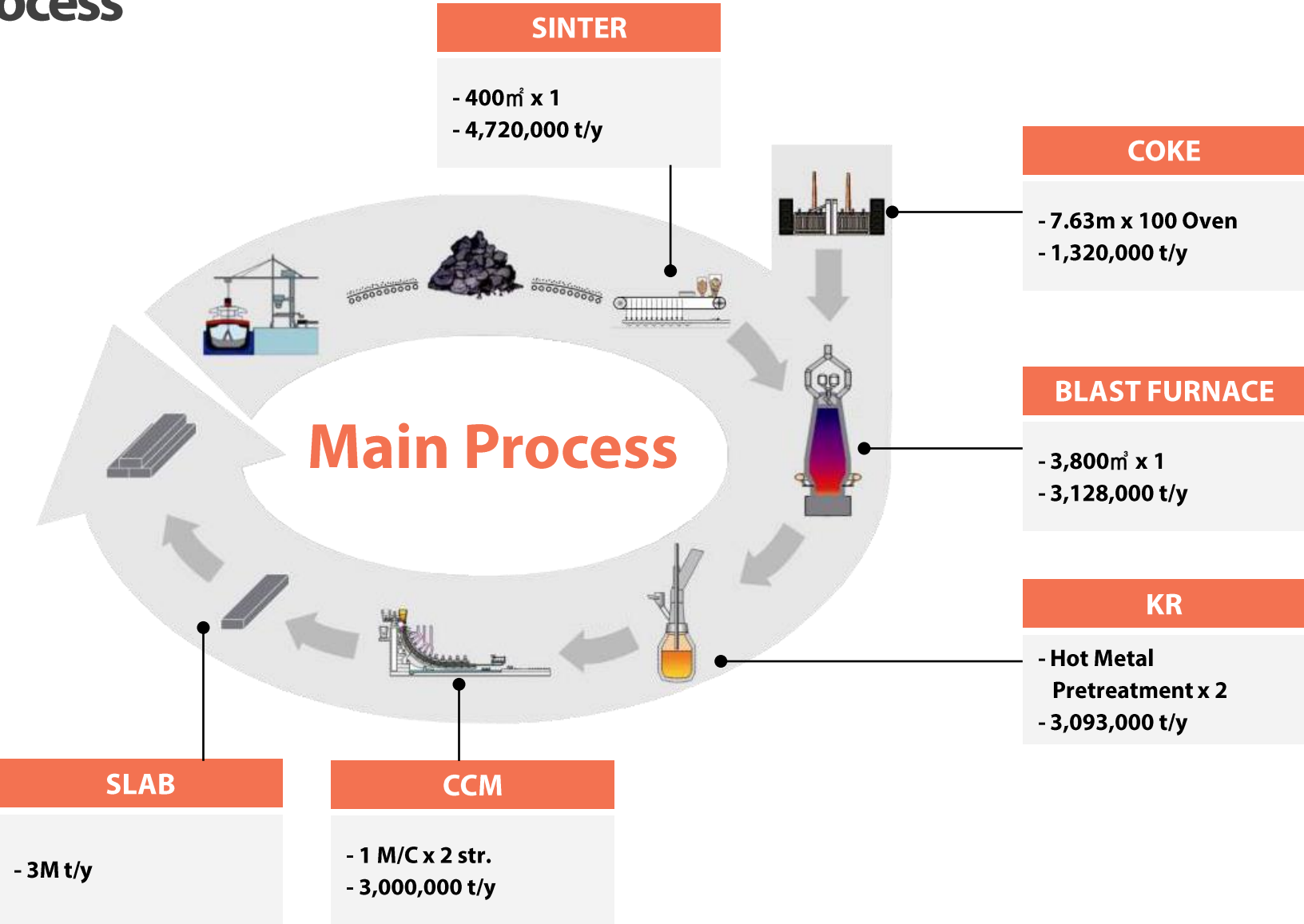
Summary

✓ Establishing “Integrated Steel Mill Plant” to produce 3 million tons/year of steel products in Brazil

Project	Brazil CSP (Companhia Siderurgica do Pecem) Integrated Steel Mill Plant
Capacity	Slab 3 million tons in the 1st stage (Additional 3 million tons by 2nd stage)
Location	Pecem Industrial Complex in Northeastern Brazil
Area	998 ha
Project Period	January, 2012 ~ February, 2016 (50 months)
Project Cost	USD 5.4 billion
Contractor	POSCO E&C and Others
Client	Vale (50%), Dongkuk (30%), POSCO (20%)



Process



Integrated Portfolio

✓ Project management according to 4 groups

EPC contract (by POSCO E&C)

- | | |
|------------------------------------|---|
| 1. Raw material handling | 13. Railway |
| 2. Sinter plant | 14. Transportation |
| 3. Lime plant | 15. Raw water treatment |
| 4. Coking plant | 16. Waste water treatment |
| 5. Blast furnace | 17. Central maintenance |
| 6. Steelmaking plant | 18. Central laboratory |
| 7. Continuous casting | 19. Central warehouse |
| 8. Air separation unit | 20. Slag treatment & recycling facilities |
| 9. Power plant | 21. Mes & network |
| 10. Power receiving & distribution | 22. Utilities |
| 11. Energy center | 23. Site preparation |
| 12. Fuel distribution | |

Internal Infrastructure (by CSP)

1. Administrative buildings
2. Medical center
3. Firefighting
4. Restaurants
5. Urbanization (landscaping)
6. Drainage
7. Internal utilities (power, water, sewage..)
8. LPG
9. Solid waste storage area
10. Bus & gas station

Outside infrastructure (11 Projects by Ceara State)

1. Iron ore continuous ship unloader
2. Iron ore belt conveyor
3. Coal handling system
4. Port expansion- slab berth
5. Port expansion – new bridge
6. Slab loader cranes
7. Slab road (CE-155 expansion)
8. Raw water supply
9. Waste water
10. Sewage treatment system
11. LPG supply

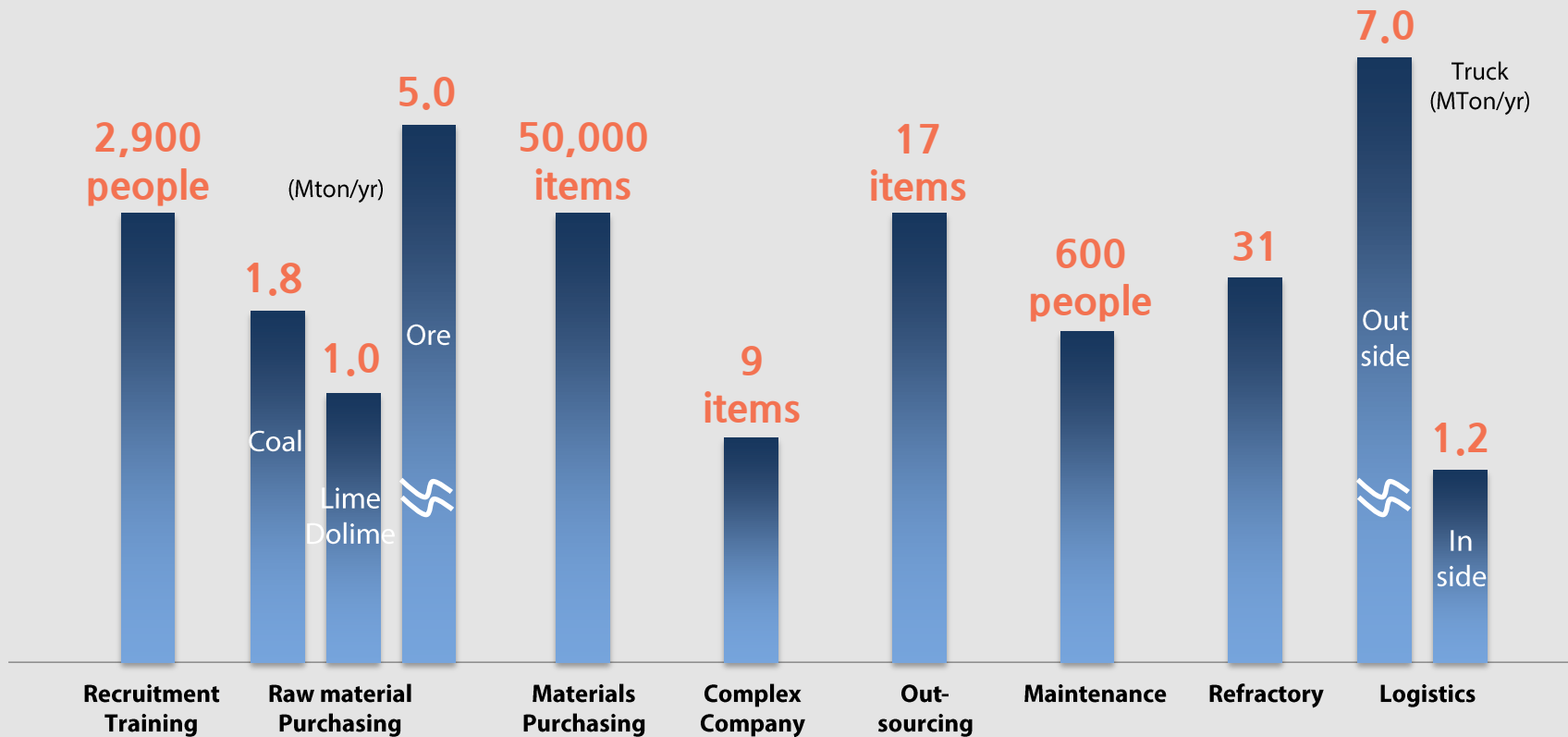
Pre-operation initiatives (27 projects by CSP)

- | | |
|----------------------------|-------------------------------------|
| 1. Operation organization | 15. Corporate process |
| 2. Recruiting | 16. Complex companies |
| 3. Training | 17. Tech documentation |
| 4. Raw material purchasing | 18. Sales |
| 5. Lime & dolime | 19. Cost analysis |
| 6. Material purchasing | 20. Environmental license |
| 7. Spare part | 21. Equipment management |
| 8. Warehouse | 22. Health & safety |
| 9. Outsourcing | 23. Quality management |
| 10. Maintenance | 24. Commissioning |
| 11. Refractory | 25. Site management |
| 12. Logistics | 26. Production planning and control |
| 13. By-products control | 27. Sustainability management |
| 14. IT | |

Operational Readiness Items

✓ Contribution for regional economic activation by creating jobs and employing local residents

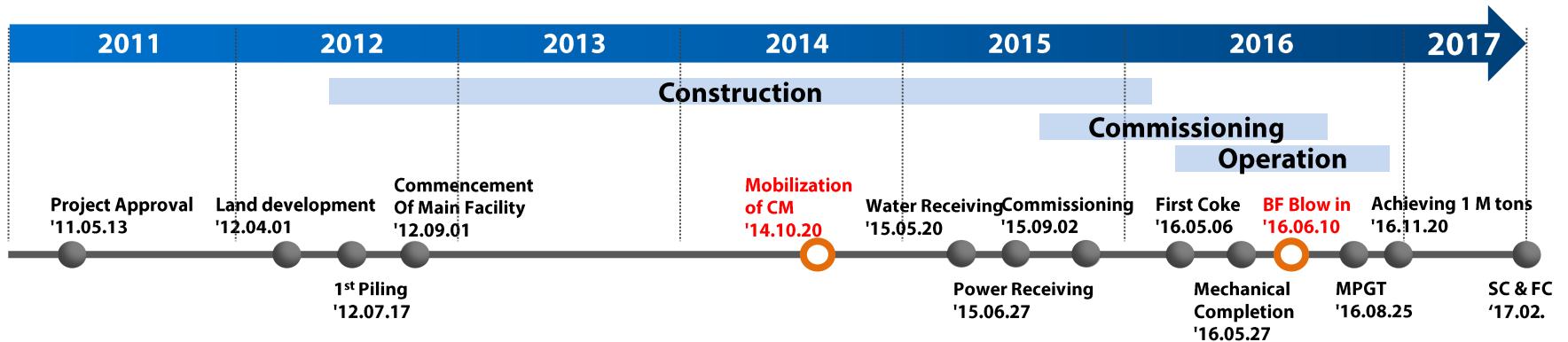
Base on Slab 3Mton/year production



Schedule and Quantity

✓ **Blow-in (Jun.10, 2016) of Blast Furnace after 50-month-construction**
 ⇒ Under stable operation

Milestones



MC : Mechanical Completion / SC : Substantial Completion / FC : Final Completion / MPGT : Minimum Performance Guarantee Test

Work Quantity

Concrete(m³)

| Q'ty: 546,000

Steel (ton)

| Q'ty: 64,000

Mechinery (ton)

| Q'ty: 157,000

Pipe (ton)

| Q'ty: 13,800

Cable (m)

| Q'ty: 7,070,000

Site Photo

Commencement



Completion



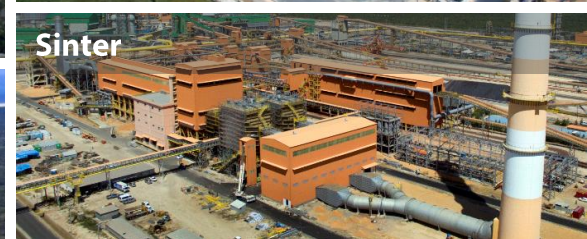
Raw Material



Cokes



Sinter



Blast Furnace



SMP&CCP



3 - CHAPTER
CM Service

CM Service for Integrated Steel Mill Project

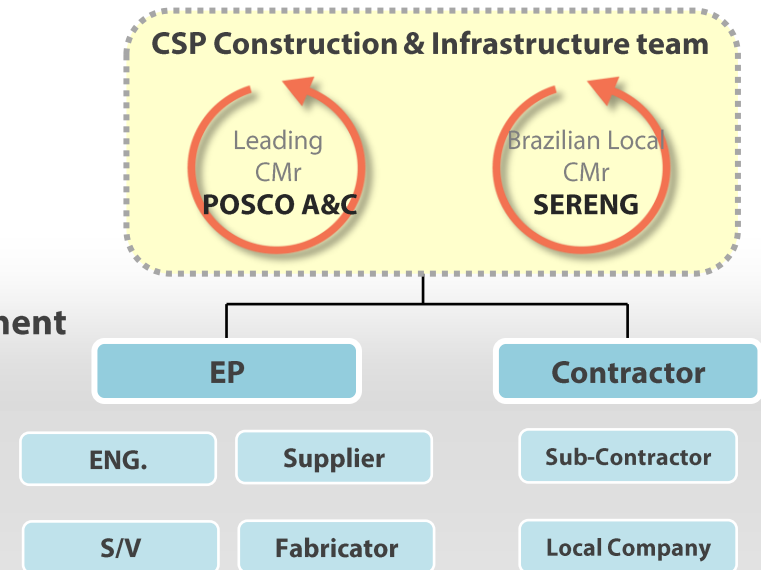
CM Service

Summary

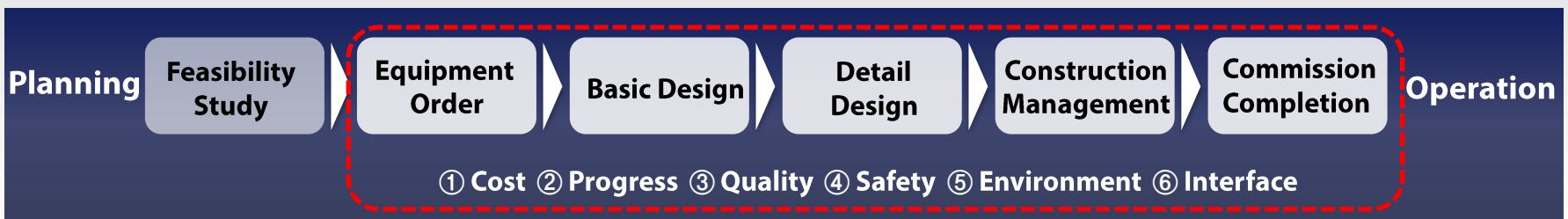
✓ Collaboration with Client and CM organization

Contract

Period	2014. 10 ~ 2016. 09 (23 month)
Cost	USD 4.8 million
Form of Service	Collaboration Construction Management
Form of Visa	Technical Visa (1 year + 1 year)



Scope of Work



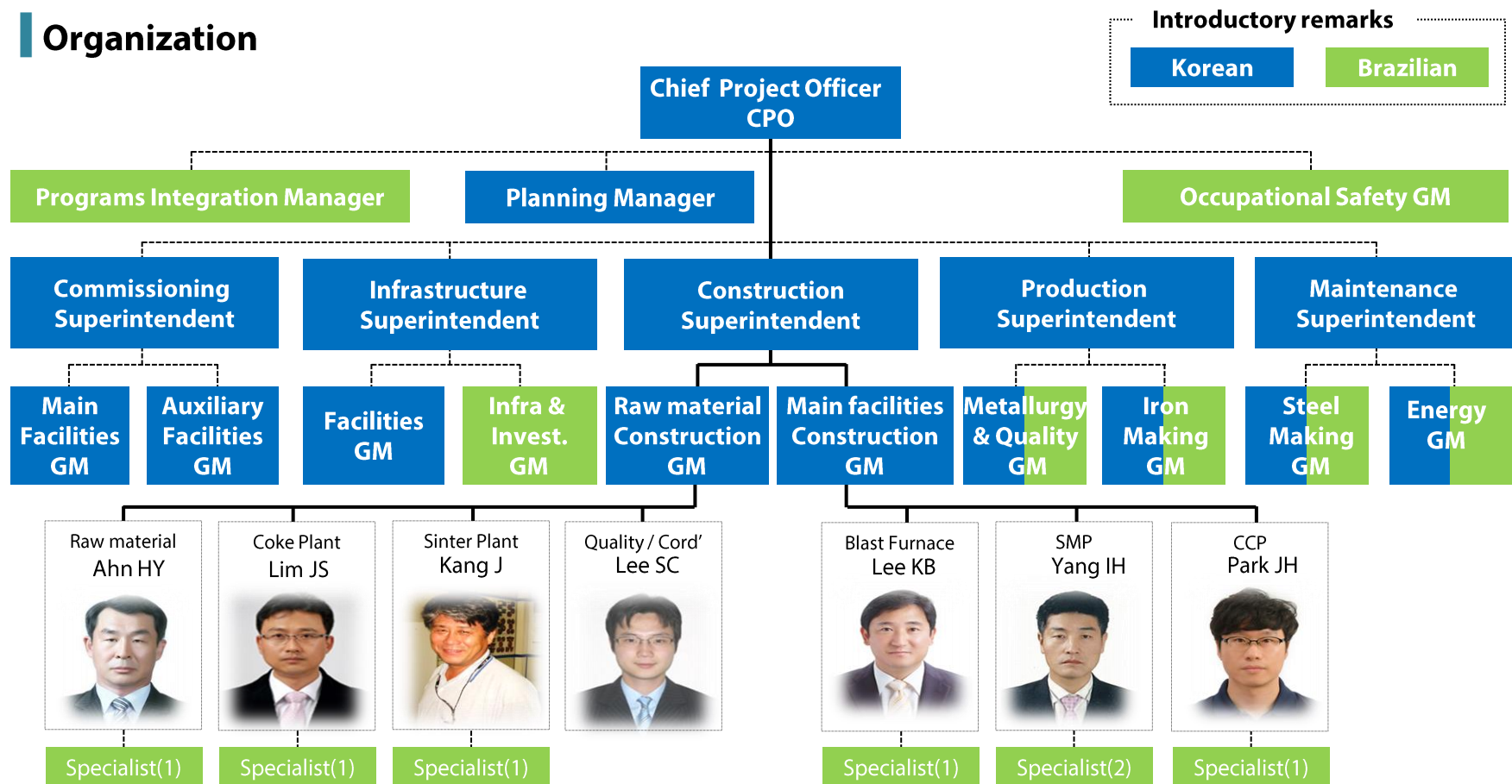
History & Organization

History of Service

- Dec.04, 2013 : Discussion and agreement for CM service
- Sep.30, 2016 : Completion of CM service

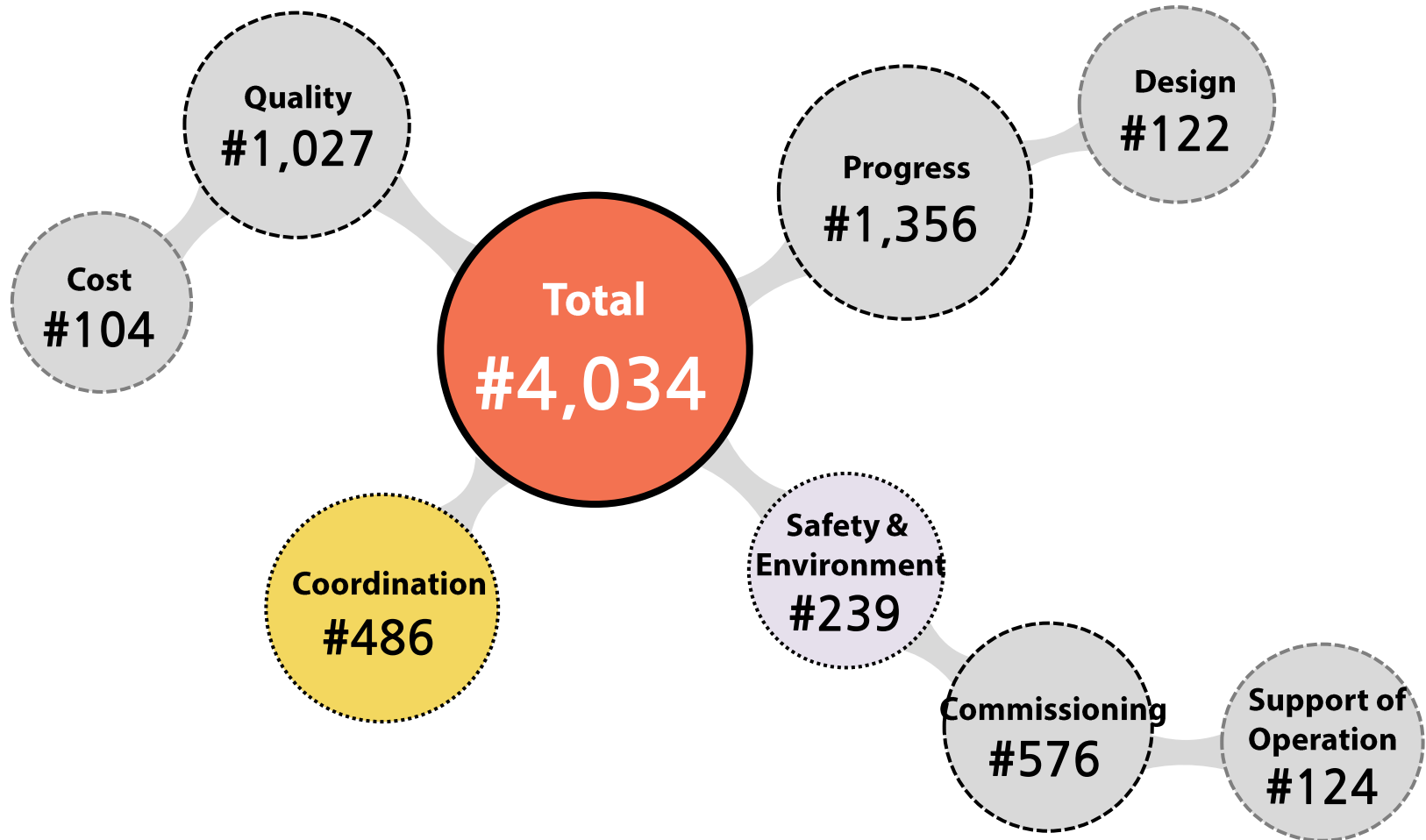
- Oct.20, 2014 : Mobilization of CMr

Organization



Achievement

✓ Achieving 4,034 cases of job performance against inefficient administration and different work environment



Detail Performance

Quality Management

Before

Lack of quality control team
▶ Only led and charged by Contractor

After

Organizing control tower for QC
▶ R&R, ITP, Risk management, Etc.

Case 1. Regular & monthly quality meeting



▶ Developing systematic QC system and improving R&R

Case 2. Crack treatment on BF foundation



▶ Analysis → Repair → Feed-back

Case 3. Long-term equipment storage control



▶ Developing procedure & monthly joint inspection

Case 4. Torque check on main equipment



▶ Check for torque after installation and before operation

Detail Performance

Progress Management

Before

Delay of construction progress (10%)

► Labor strike and delay of customs clearance



After

Minimizing progress delay

► Catch-up plan, Preliminary measures, Etc.

Case 1. Labor union strike (About 155 days by 15 times)



► Conducting a daily rolling- plan meeting

Case 2. Delay of customs clearance and transportation



► Selecting critical Items ⇒ Change of installation sequence

Case 3. Lack of construction manpower



► Taking measures (Labor exchange between facilities and education & training)

Case 4. Fabrication at field



► Suggesting pre-assembly on ground and real-time QC monitoring

Detail Performance

Safety Management

Before

- Lack of safety control team
- Inadequate preparation of a specialized team for construction

After

- Organizing independent safety team in construction division
- Introducing specialized safety for construction

Case 1. Safety one-point program



- Introducing relevant procedure and sharing similar cases of safety accidents

Case 2. Joint safety inspection



- Regular joint safety inspection (2 times/month)

Case 3. Safety community meeting



- Regular meeting between EPC subcontractor and others

Case 4. TBM (Tool Box Meeting)



- Predicting risk factors and countermeasures on a daily basis

Detail Performance

Commissioning and Operation Support

Before

Lack of systematic commissioning procedure
► Insufficient experience in integrated steel plant

After

Minimizing risk by preventative measures
► Reviewing risk factors and trouble shooting

Case 1. Trouble shooting



► Managing critical equipment schedule and its response

Case 2. Support to ensure operational data



► Check for installation of measuring instrument & calibration

Case 3. Control of punch list

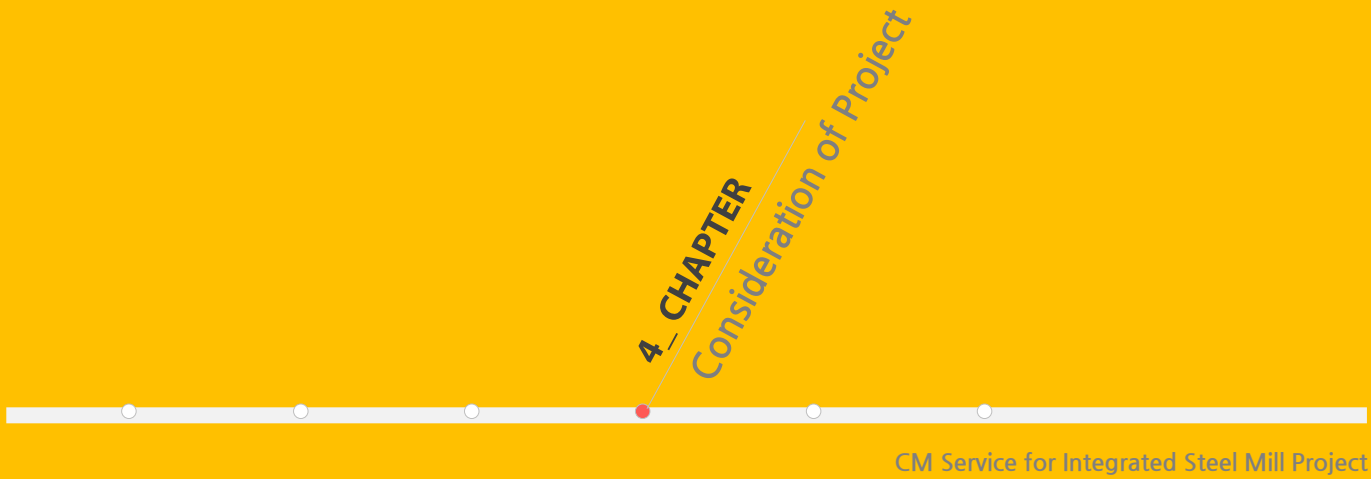
No.	Location	Equipment	Date	Task	Remarks	Responsible Team	Responsible	Remarks	Completion Date	Photo	Photo
1	Material Transporter	Bag Filter Fan	May 11, 2020	CSP Operation & Maintenance Team (20deviation)	Mesh	Construction Team	211 Test Eng. After work on end of the system in accordance with the design.	211 CSP implemented rotating parts and testing.			
2	Material Transporter	EMS Electrical Panel	May 14, 2020	CSP Operation & Maintenance Team (Punch)	Elec	Construction Team	Put the single line diagram in a frame.	211 PMS confirmed in use.	Finished		
3	Material Transporter	EMS Electrical Panel	May 14, 2020	CSP Operation & Maintenance Team (Punch)	Elec	EP Team	Panel without bottom protection (open parts) missing and no high voltage No anti-fall protection.	211 PMS confirmed in use in testing.	Finished		
4	Material Transporter	EMS Electrical Panel	May 14, 2020	CSP Operation & Maintenance Team (Punch)	Elec	Construction Team	Fire fight system not completely installed.	211 CSP confirmed in use.	Finished		
5	Material Transporter	EMS Electrical Panel	May 14, 2020	CSP Operation & Maintenance Team (Punch)	Elec	Construction Team	Gate paneling, Unprotected and in a constant state in the room.	211 PMS confirmed in use.	Finished		

► Technical review and suggestion to meet MC requirements

Case 4. Hand-over procedure



► Reviewing and itemizing construction & commissioning documents



Project Consideration

Localization

- ✓ Compliance with various regulations and laws (Health, Safety, Environment) in Brazil and applying to equipment and facilities



Problem

1. Uncertainty of requirements from relevant laws and obligation
2. Unclear definition of Brazilian standard
3. No proper & timely solution but pointing out problems
4. Delay of response by Contractor



Action

1. Executing technical review and suggesting reasonable alternatives
2. Developing proper procedure for problem solving
3. Organizing a regular meeting for better communication
4. Set-up for TFT for LO/CAI acquisition

CSP

CPO / HSE / Sustainability

[TFT]



PEC

FE / HSE / Contract Management

- ▶ PEC suggests to organize integrated TFT to prepare and get Operation License / Certificate
 - LO (Operation License) from SEMACE
 - CAI (Certificate of Approval of Inspection) from Ministry of Labor and Employment
- ▶ The integrated TFT shall evaluate the impacts of non-compliance on LO and CAI in advance



Pending issues caused by different view in TFT are handed over and added to punch-list so that the project can go forward

Brazil equipment certification system

✓ Operation of Quality Certification System to protect local industries

Problem

1. Lack of QC information
2. Difficulties in understanding and reviewing QC regulations
ex) Language, NBR(Standard) and Portaria(enforcement ordinance)
3. Insufficient experience of Korean suppliers for QC affairs acted by Brazilian government
4. Lack of awareness of QC issues
ex) shipment canceled for uncertified reinforcements



Action

1. Management of Inmetro QC items
- Cooperating local certified agency to manage QC items
2. ENCE Label items(Pump, Motor)
- Supporting administrative work and managing each list
3. Support of QC acquisition for cable and pipe
4. Countermeasures for pending items for QC
ex) Communication, Flame proof equipment, Etc.
5. Checking unknown QC items

➤ **Minimizing adverse influence on Project by organizing self-TFT and preventative actions**

Delay of Customs Clearance

✓ Delay of customs clearance for imported equipment due to excessive bureaucracy and negligence

Problem

1. Lack of manpower in CSP logistics team and passive work attitude
2. Delay of customs clearance due to lack of inspectors and working hours
3. Operational system failure at Free Export Zone(ZPE) : 2013~2014
4. Lack of equipment storage area
5. Complicating procedure of customs clearance, carrying-out, transportation, approvals, etc. at ZPE



Action

1. Simplification of customs clearance by establishing CSP self-inspection system
 - Delegation of power from customs officer(RFB) to CSP staff
 - Supporting administrative work such as official report, document, etc.
 - Result : 4 times better than before
2. Temporary stoppage of shipment and adjustment of quantity
 - 1st : Unstable ZPE system → Stoppage
 - 2nd : Adjusting quantity (1 shipment/month)
 - Result : Reduction in expenses (demurrage)
3. Selection of priority for necessary equipment
 - Sharing information of priority(daily basis)
 - Result : Increase of customs clearance efficiency

➤ Demurrage and progress delay caused by delay of customs clearance - One of key examples for difficulties in CSP project

Labor Union Strike

✓ Suspension of construction due to both frequent illegal labor strike from site and nationwide strike arising from central union



Problem

1. High risk of a labor dispute due to short term, one-time project and Foreign company
2. Management by Korean way
 - Top-down control
3. Insufficient know-how for management of Brazilian labor relations
 - Insufficient experience of local labor culture



Action

1. Activity for stabilizing labor-management culture - Establishing strategy of "4C"
2. Compromising Brazilian way
 - ACT (collective agreement), Instruction and training
3. Enhancing network for foreign relations
4. Developing employment procedure
 - Investigation for criminal record, charging and others

Communication (Trust & Understanding)

- Steady promotion of organization activation
- Encouragement of a joint labor-management conference

Contingency (Risk Management)

- Support for labor-management issues and sharing relevant information
- Update of manual for risk management



Care (Preventative Action)

- Reinforcement of ACT (Field HR team)
- Enhancement of grievance committee, care for labors, etc.

Competency (Enhancement of Labor Management)

- Education and training : Strengthening labor management with sub-contractors, suppliers, etc.



Stabilizing labor-management relations by enhancing "4C" and Understanding step-by-step

CSP Site Issue

✓ CSP construction under direct & indirect impact due to bureaucracy and administrative expediency

Site entrance/exit	Safety	Delay of waste wood disposal
► Site of CSP project belonging to the Restricted Area in Pecem, requiring strict security check & inspection	► Request of safety regulation and training which applied and used to a mine project from the major shareholder	► CSP planned to build a lumberyard by May, 2013
• Only "Gate 1" operated • Lack of turnstile quantity • Lack of manpower for entrance / exit control • Inefficient procedure of bus entrance / exit • Complicated procedure	• Inefficient safety regulation applied • Training from outside unaccepted • Special training required for 11 types of work • Max.94 hours training required before work start	• Lumberyard built in May, 2014 • Wastes left without care for a long period • Issue (safety & environment) • Delay of waste wood disposal • Fire at the lumberyard

➤ **Difficult and unable to solve the above issues due to external circumstances and influences**



CM Accomplishment

Accomplishment

✓ **Successful performance in cultural differences, security concerns and exclusive administrative environment**

1st Ensuring CSP shareholders confidence

- Satisfying requirements from lenders
- Following up technical issues and pending items
- Minimizing risk through preventative measures



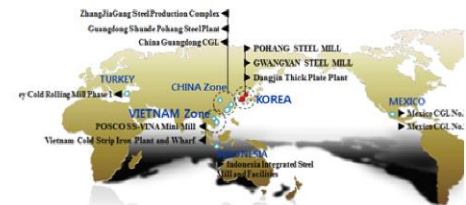
2nd Level – up of CM performance

- Fulfilling CM tasks (construction, commissioning and operation) in phases
- Playing an important role as a Client project leader
- Leading each assigned facility and suggesting guidelines



3rd Expansion of CM business into overseas steel plant markets

- 2 CM cases of integrated steel mill plants (Indonesia PT-KP, Brazil CSP)
- Systematization of CM service by securing a field expert and accumulating know-how
- Establishment of close network between overseas CM and construction companies





Implication

Conclusion

✓ Strong potential in Brazil but required challenge for economic growth against Brazilian Cost and security concerns

Inefficient
administrative
work

Complicating
tax system

Inferior
infrastructure

Security
concerns

Issues
in labor laws



**Preparing
fundamental measures**



**Understanding and acceptance of
multi-culture nature**

The first integrated steel mill plant in Northeastern Brazil...

A project to lead and improve quality of life for the people living there...

Differences coming from other cultures and languages...

However, Creating Another Success Story...

Beads of sweat running down our faces at the area of equator...

**All those challenges and difficulties in the course of construction
and commissioning...**

**Fulfilling our own assignments and, finally, the first splendid flame for
Blow-in, Jun 10, 2016...**

Accomplishing production of One Million tons coming from Blast furnace...

**A driving force and motivation for successful completion were
our “co-workers” who went through all hardships and sufferings with
colleagueship and togetherness and “passion” like pig iron coming from
massive and hot melting pot...**

**We would like to express our gratitude to people involved in this Project for
great interest and kind consideration.**

Muito obrigado !
Thank you very much !

NEAT Tower 23~ 24th Floor, 165, Convensia-daero, Yeonsu-gu, Incheon, Republic of Korea

Tel : 82-2-2018-7700 Fax : 82-2-2018-7799

POSCO A&C