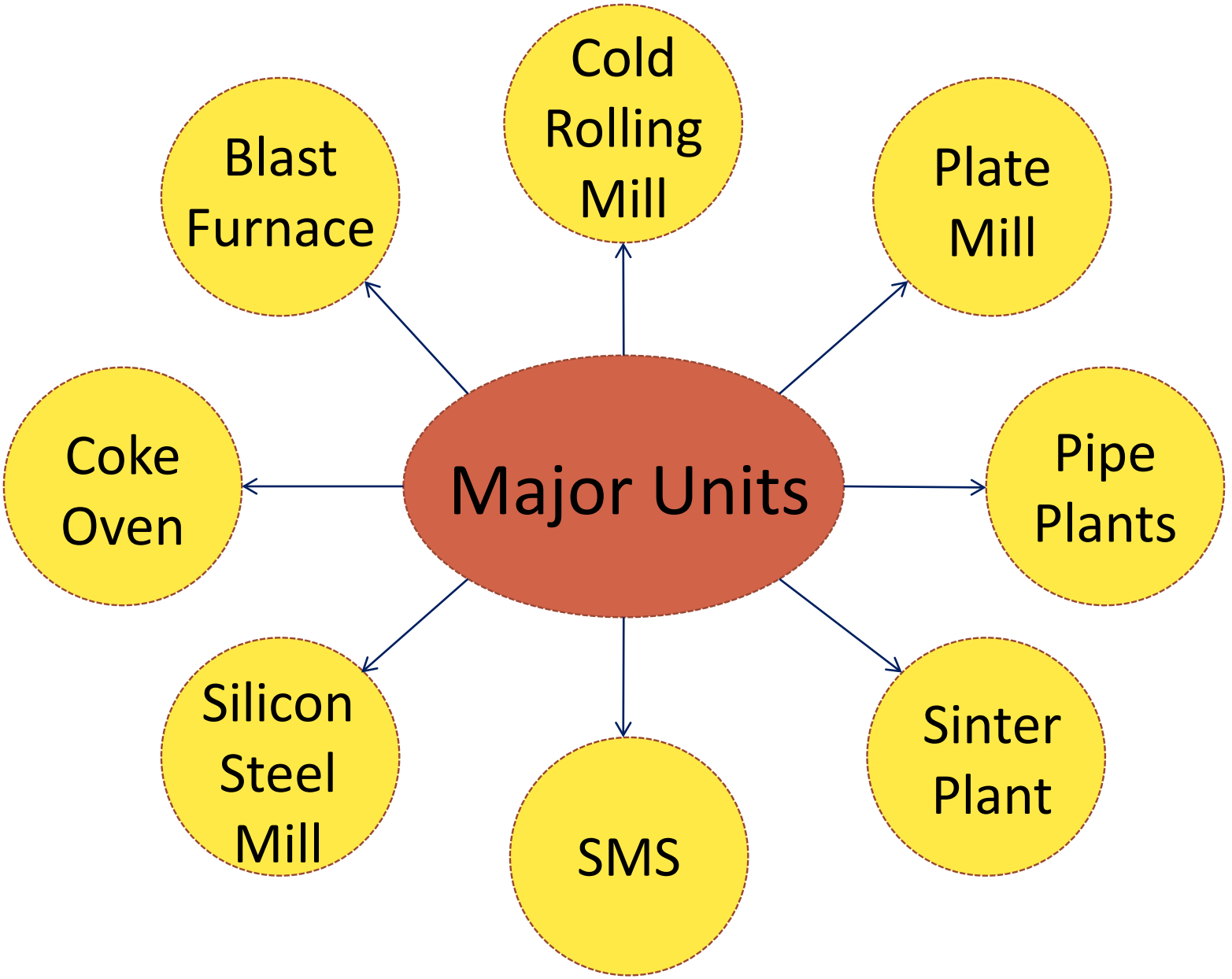
Rourkela Steel Plant

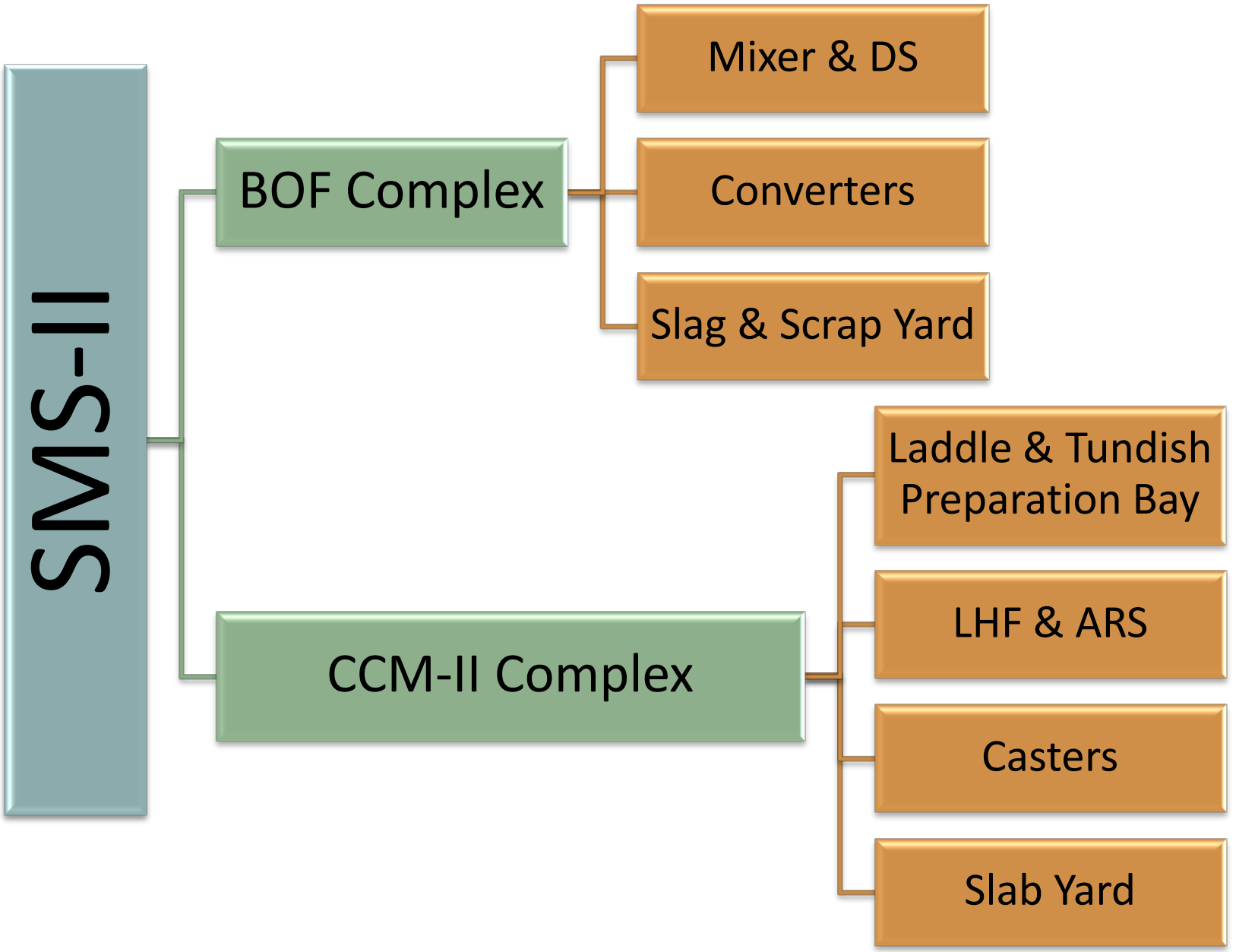
STEEL MELTING SHOP-II

SOUMYAJIT NAYAK
Department of Metallurgical and Materials Engineering
National Institute of Technology, Rourkela

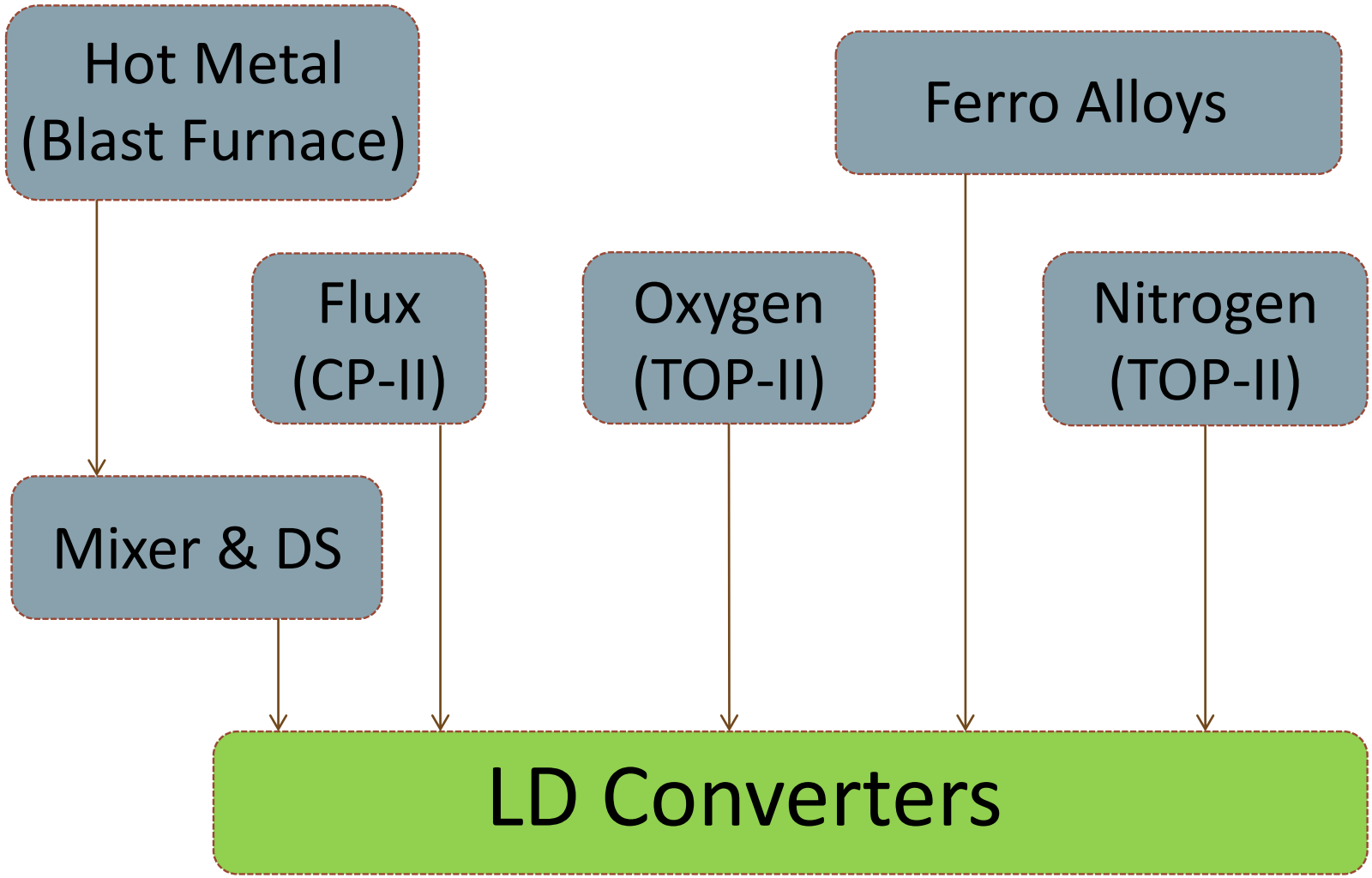
Rourkela Steel Plant:

- Setup in 1959 in collaboration with Germany
- Expansion & modernization from 1994 to 1999
- First plant in Asia to adopt LD process
- First steel plant in India to adopt external desulphurisation & vacuum degassing metallurgy


Major Units
Blast Furnace
Cold Rolling Mill
Plate Mill
Coke Oven
Pipe Plants
Silicon Steel Mill
SMS
Sinter Plant


SMS-II
BOF Complex
Mixer & DS
Converters
Slag & Scrap Yard
CCM-II Complex
Laddle & Tundish Preparation Bay
LHF & ARS
Casters
Slab Yard

Flow Sheet:


Hot Metal
(Blast Furnace)
Ferro Alloys
Flux
(CP-II)
Oxygen
(TOP-II)
Nitrogen
(TOP-II)
Mixer & DS
LD Converters

Mixer & Desulphurisation Unit:

- Two hot metal mixers *store* hot metal, received from all the four blast furnaces.
- *homogenise* the HM w.r.t. temperature & composition
- *supply* HM to the converter
- 1300 T capacity & avg. HM temp. is 1250°C to 1350 °C
- burners are used to maintain temp

- Two DS unit to *remove excess Sulphur* from HM
- By *injection of* CaC_2*/MgAl* based compound

Converters:

- converters receive HM, scrap & Fe alloys with the help of cranes
- concentric vessels
- lined with refractories

- Fe-Si and Si-Mn in the chip form and Al in the form of bars of 20 kg are added
- O_2 from TOP is blown from top through a water-cooled lance at 11 atm pressure.
- tap to tap time (avg) is 45 min

Process:

- Lining of the converter is inspected
- lime and scrap is added
- hot metal is charged
- measurement of bath height by a one metre steel pipe in one of the nozzles
- oxygen is blown from top at a flow rate of 1000-1200 Nm^3/min for agitation of bath, indicated by luminous flame at converter mouth
- converter is tilted to tap the liquid steel in to ladle

Composition:

Hot metal composition	
C	3.40 - 4.50 %
Mn	0.20 - 0.30 %
P	0.15 - 0.20 %
S	0.03 - 0.06 %
Si	0.50 - 1.20 %

Liquid steel composition	
C	0.04 - 0.20 %
Mn	0.14 - 1.24 %
P	0.02 - 0.03 %
S	0.02 - 0.03 %
Si	0.05 - 0.25 %
Al	0.04 - 0.07 %

Continuous Casting:

Ladle Heating Furnace (LHF)

- final adjustment of temperature and chemical analysis of steel
- homogenizing the steel bath
- hydrogen and nitrogen removal

Argon Rinsing Station (ARS)

- removal of non-metallic inclusions
- argon rinsing is started from the bottom

Casters

- provide steel on continuous basis
- a water cooled copper mould, which gives the required dimensions
- Casting size : 220mm thickness

Torch Cutting Machine (TCM)

- cut the slabs to the required length
- done by oxy-acetylene gas flame.

Slab Yards

- slabs produced are stored in two slab yards
- sent to Plate Mill

Thank You