

Experience from the commissioning of Andasol 3



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UTE Andasol 3 / Ferrostaal

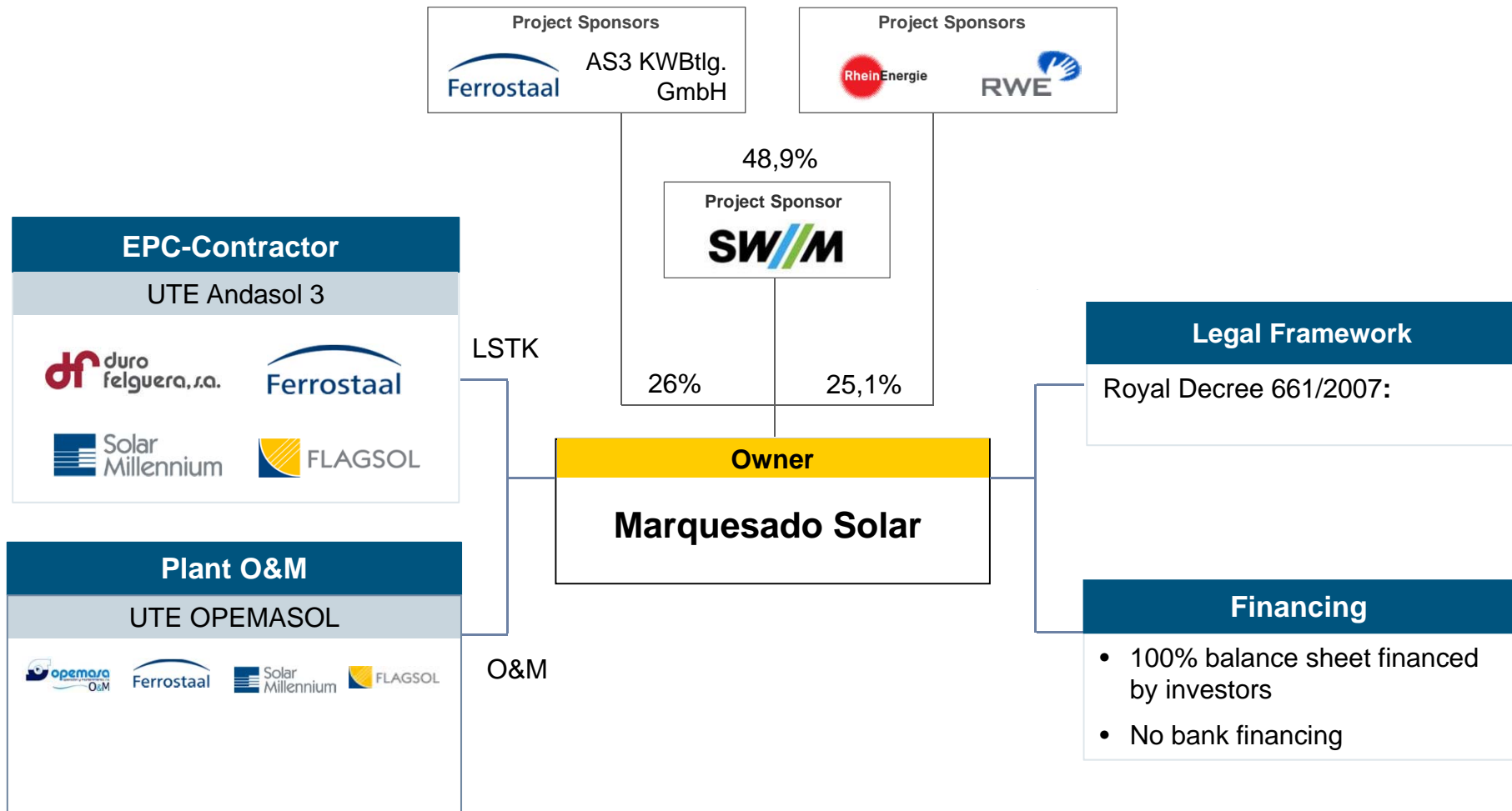
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- (1) Project Structure / Plant Overview
 - (2) Different Project Phases
 - (3) TOP
 - (4) Partial Commissioning
 - (5) Commissioning of SF
 - (6) Commissioning of TES
 - (7) Further Key Commissioning Milestones
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Project Structure

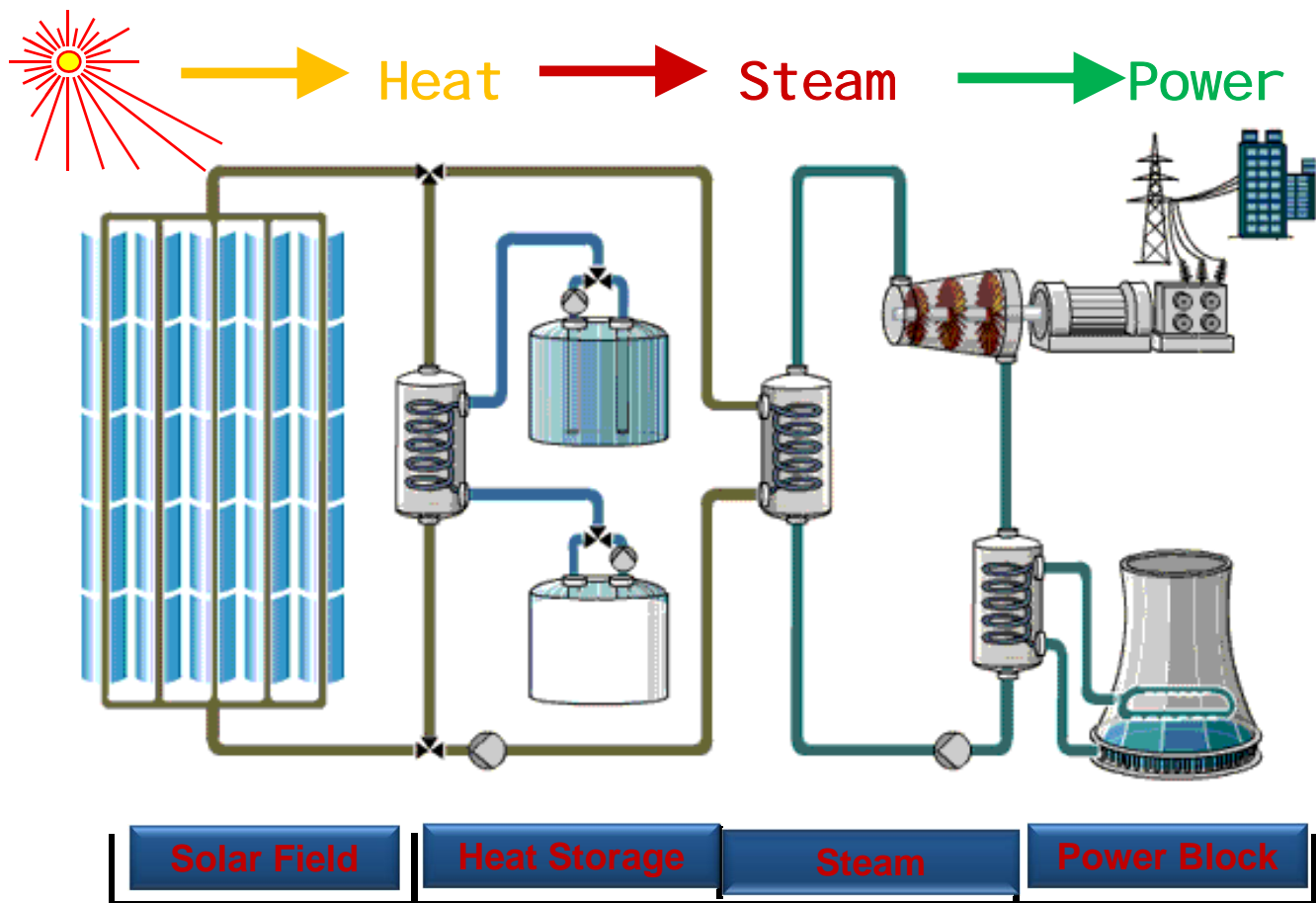
ANDASOL³

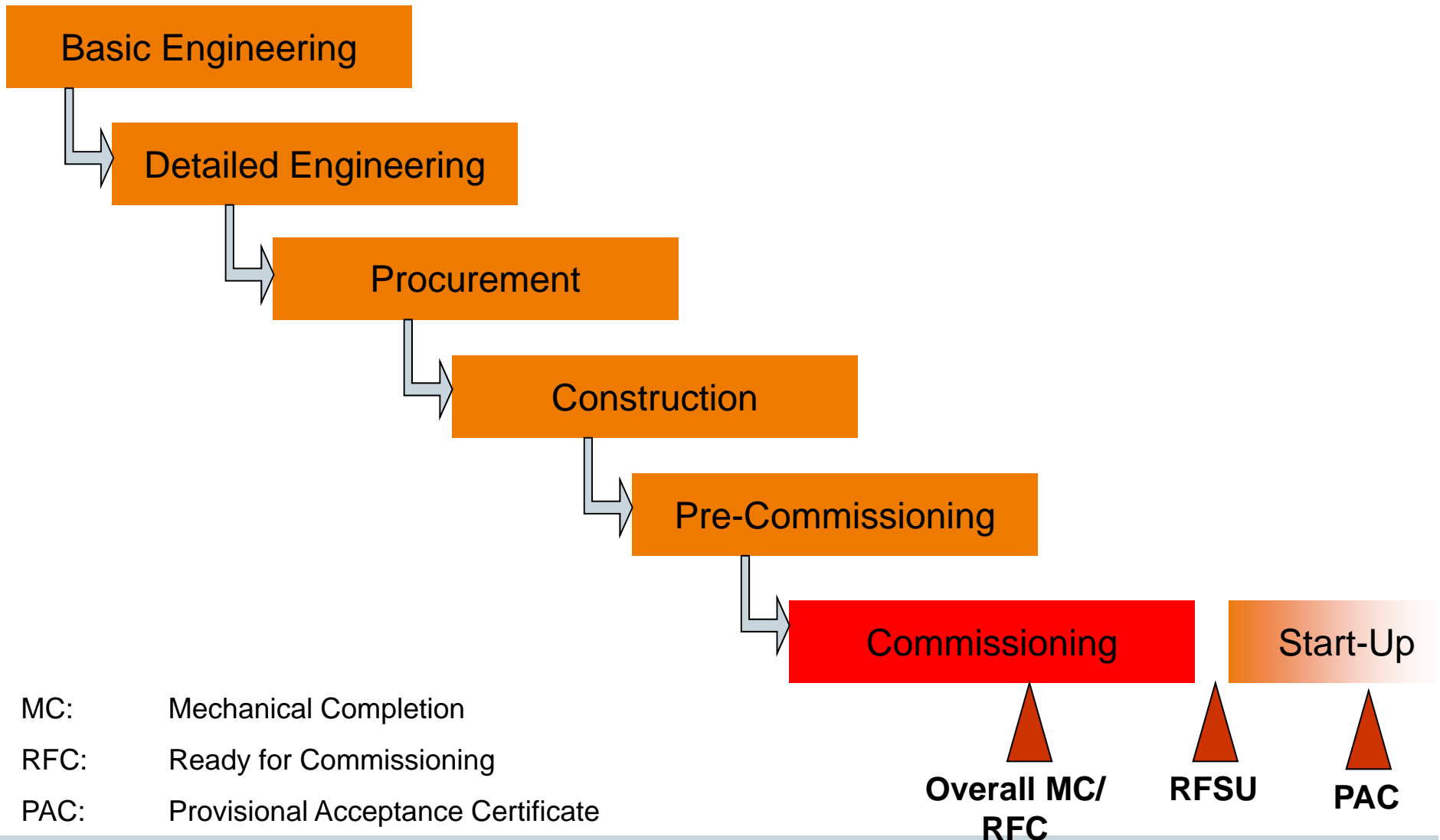
Investment of foreign strategic investors:



Plant Overview

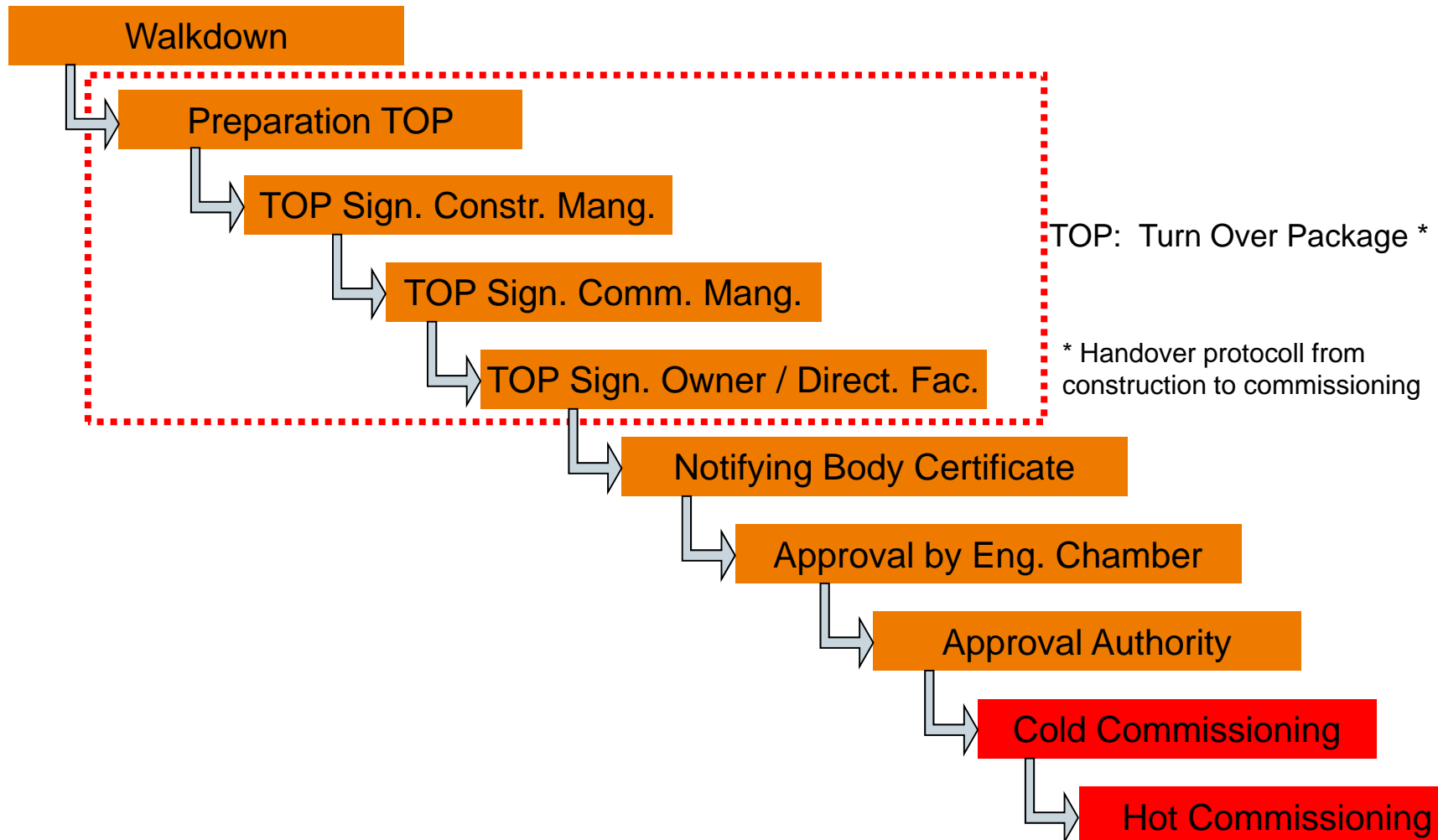
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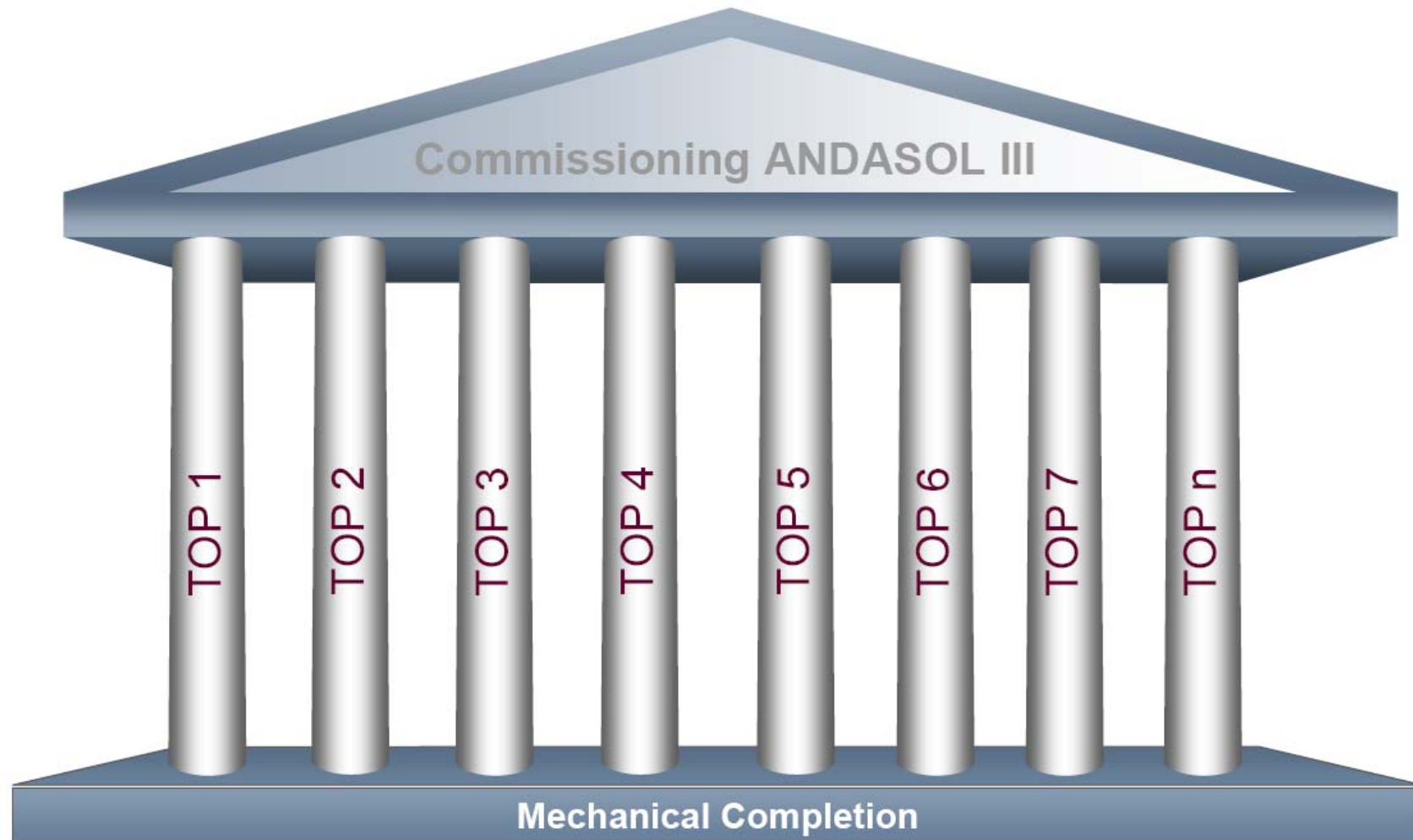




From Pre-Commissioning to Hot Commissioning **ANDASOL³**

Pre-Commissioning









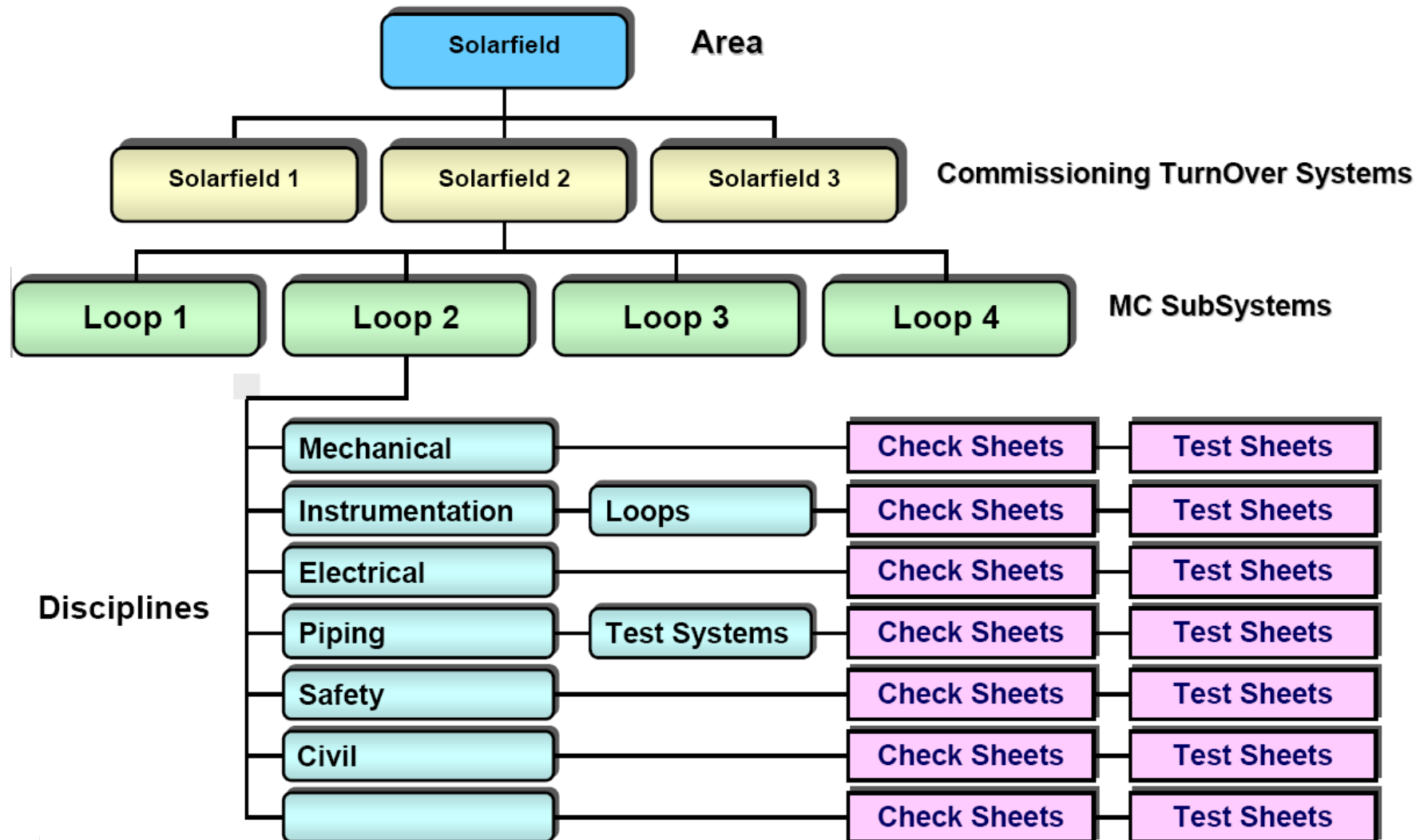
Example TOP Status Summary

ANDASOL³

DATE: 07-jul-11

<div><div></div><div>ANDASOL 3</div></div>						
TOP STATUS SUMMARY						
CODE	TOTAL	WALKDOWN	CONSTRUCTION SIGNATURE	COMMISSIONING SIGNATURE	DELIVERED INDUSTRY	CLIENT SIGNATURE
E	48	45	45	44	42	33
BOP	25	25	25	23	25	0
TES	5	5	5	5	5	1
HTF	4	4	4	4	4	2
PB	29	29	29	28	29	12
SF	13	13	13	13	13	13
	124	121	121	117	118	61
TOTAL		97,58%	97,58%	94,35%	100,00%	49,19%

System Breakdown Structure for Solar Field Commissioning

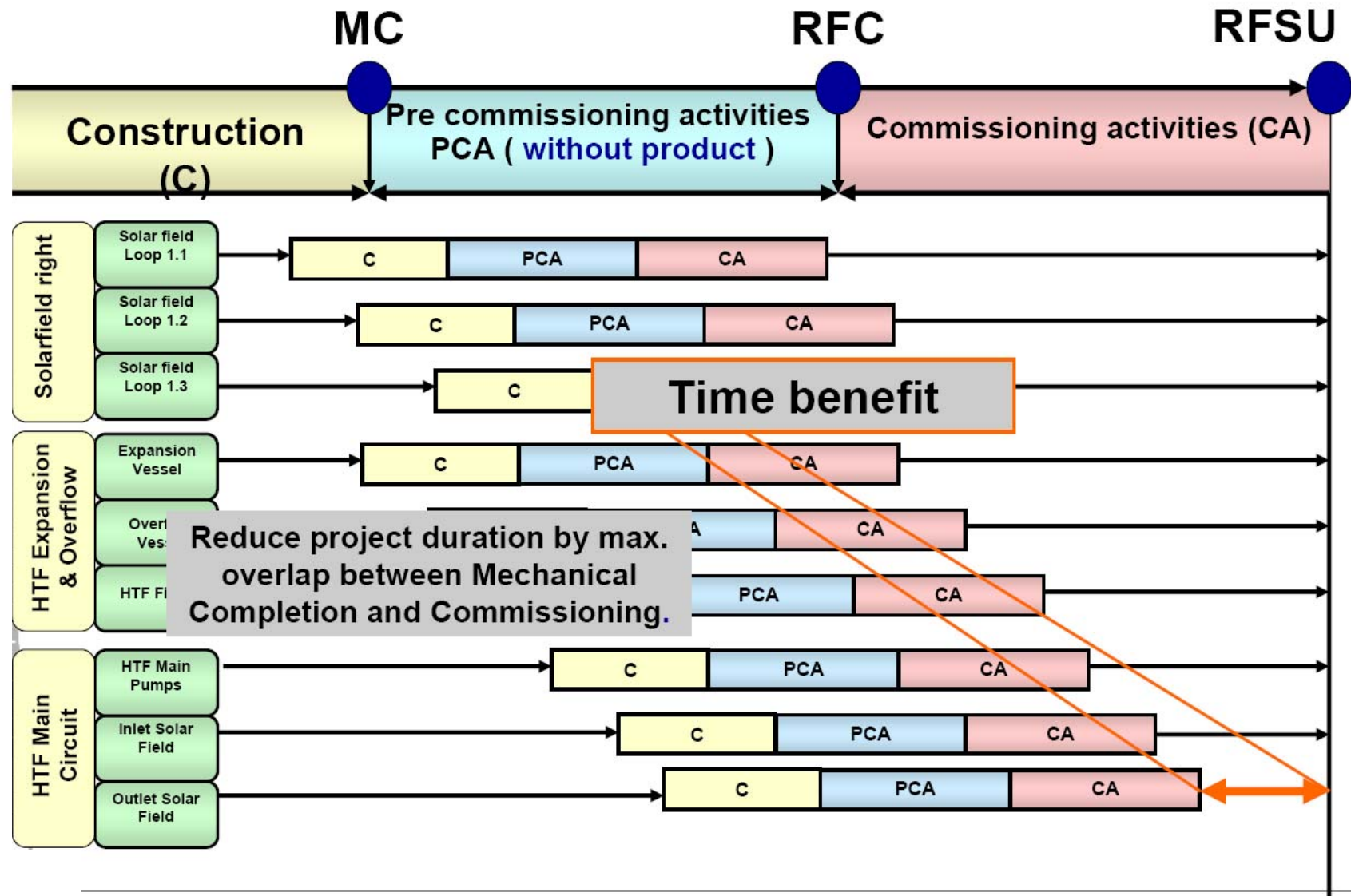


Example: Hydro-testing of the 152 SF loops

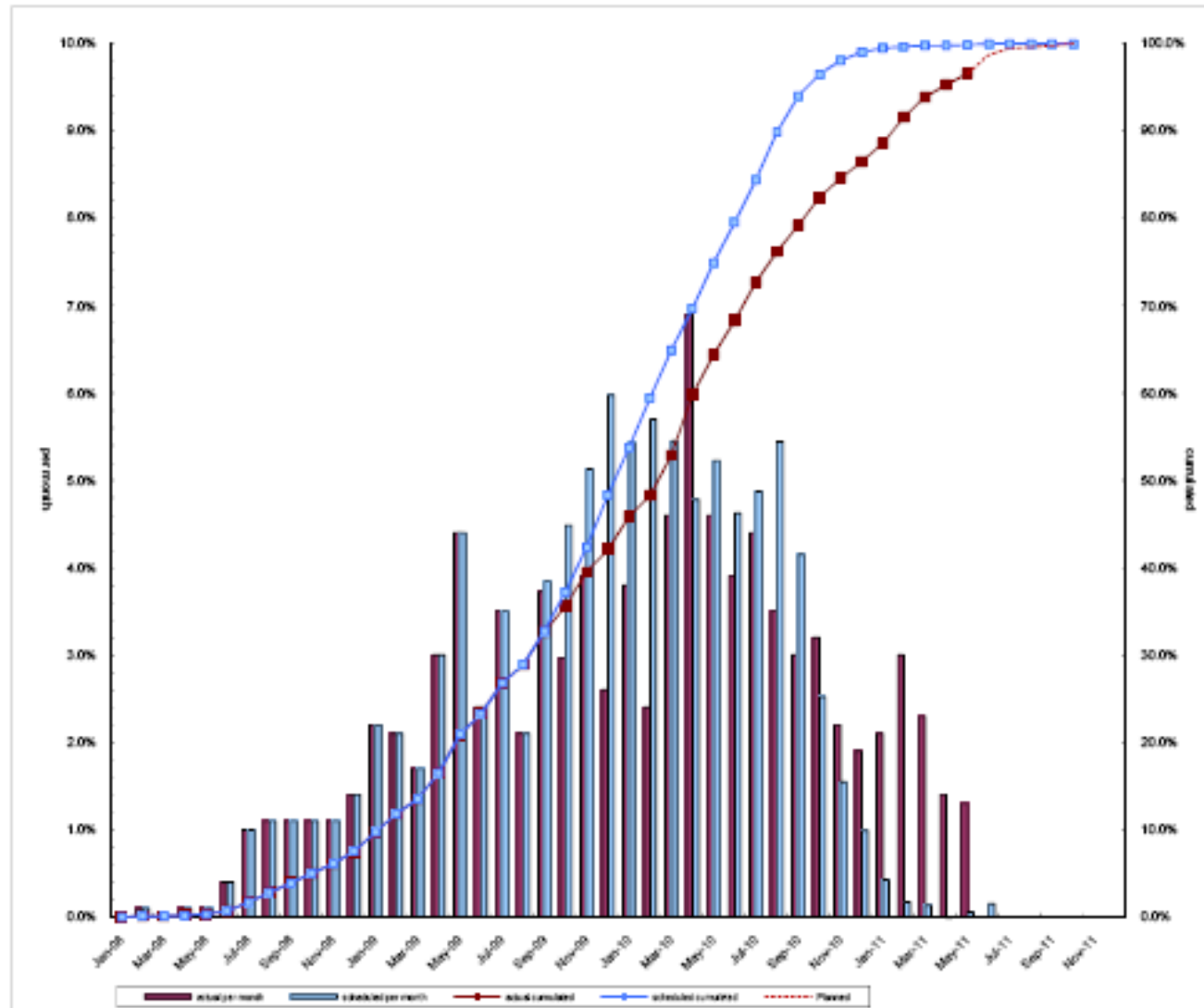
ANDASOL³



Overlap between Mechanical Completion and Commissioning

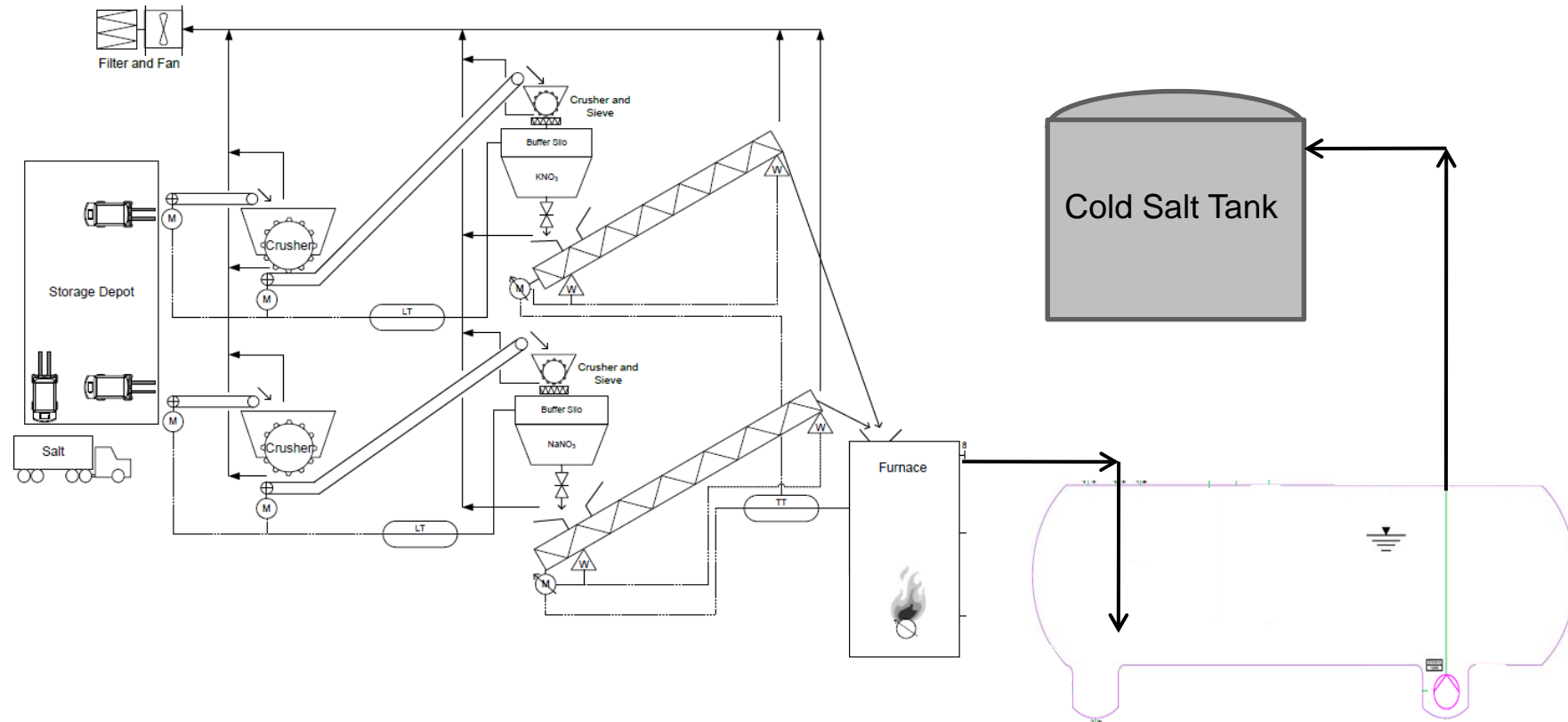


Example: Progress Curves



TES Commissioning: Salt Melting Process

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Salt
Handling
Station

Salt
Melting in
Furnace

Buffer Tank
with Pump

Pumping to
Cold Tank

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Temporary Salt Storage Tents

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TES Commissioning: Unloading of salt bags

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- Two parallel lines with working stations for:
- Big Bag Transportation
 - Big Bag Crushing and Opening
 - Salt Transportation on Conveyor Belts
 - Salt Milling to desired grain size
 - Dosing Station to Salt Furnace
 - Air Filter on working stations

Salt Handling Equipment

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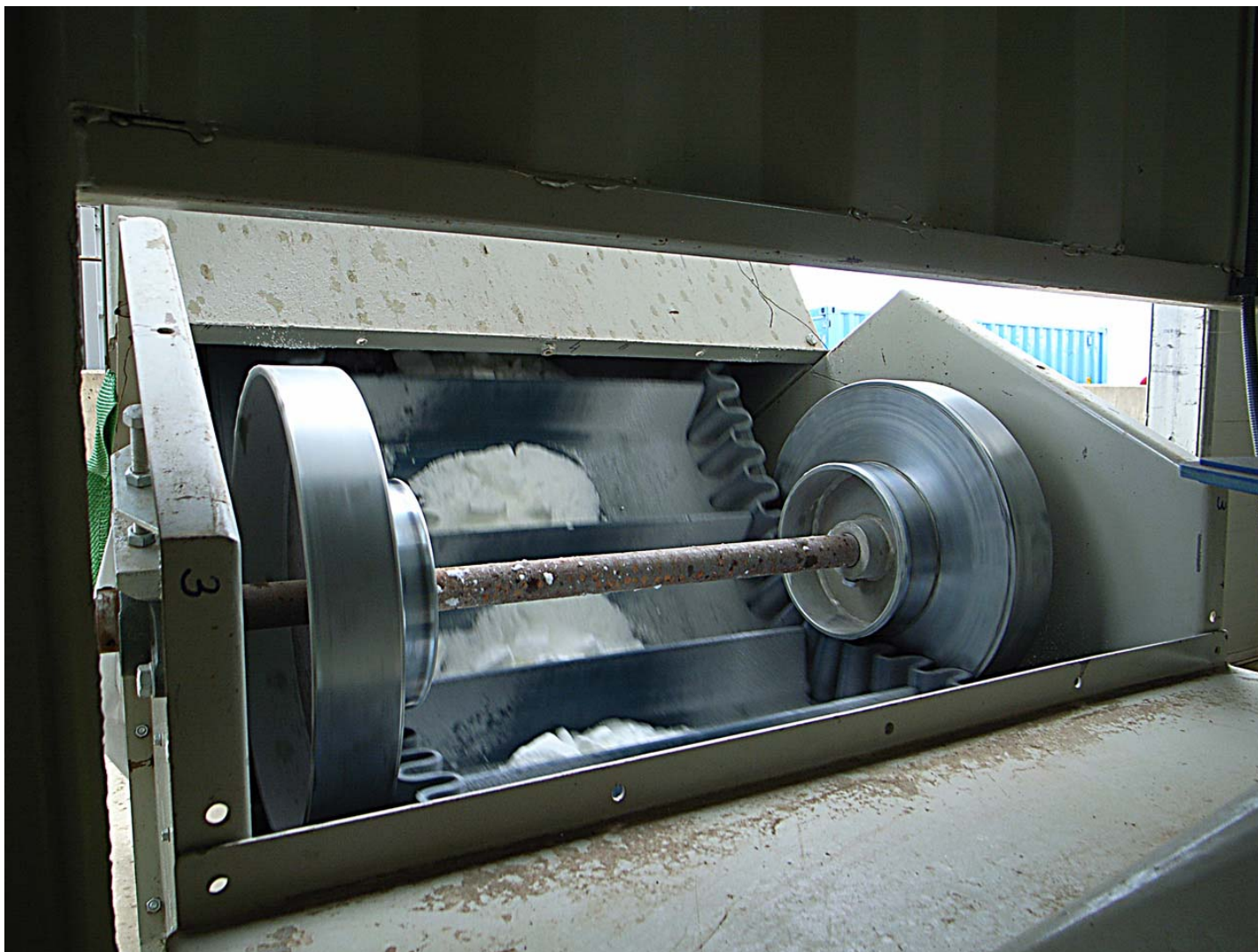
Salt Handling Equipment

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Crushing of Salt

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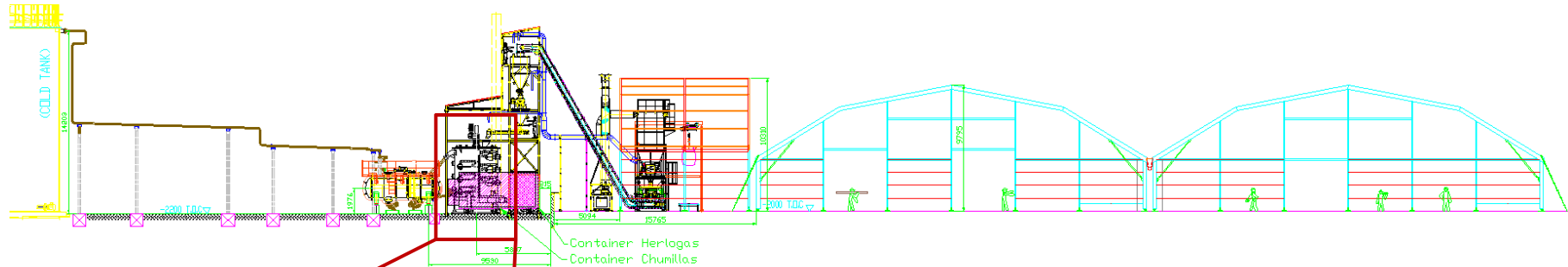
Salt of the crushing process

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TES Commissioning: Melting Furnace

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Gas fired Furnace with Stack

- 20t/h Melting capacity
- 5,4MW thermal capacity
- 12 Burners
- Ca. 570 Nm³/h Gas Consumption
- Ca. 28t weight ; 70 t weight filled with salt

TES Commissioning: Melting Furnace

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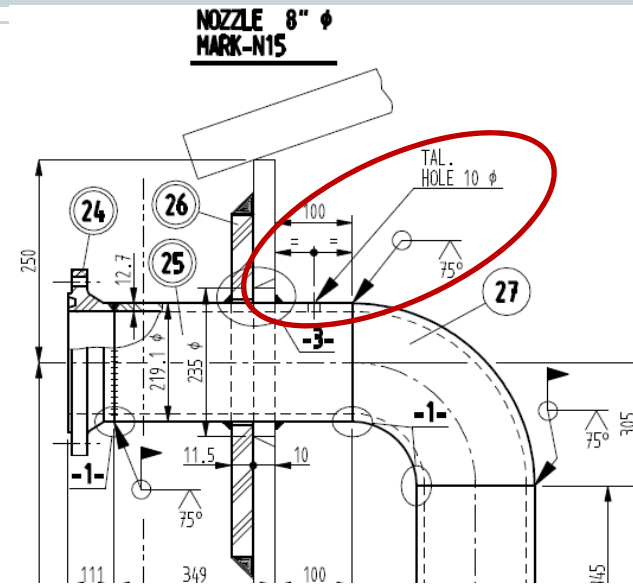
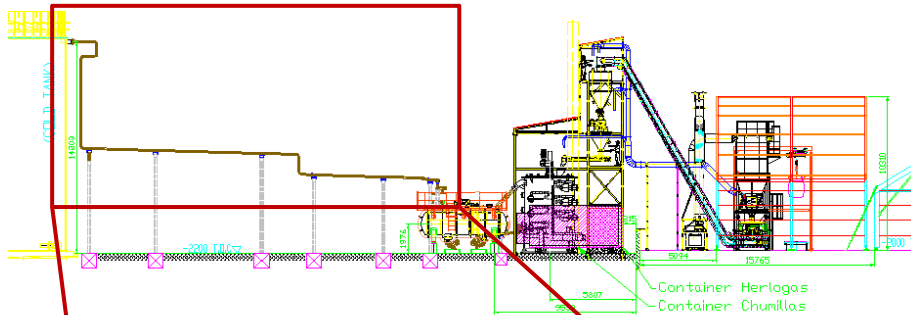
- 8,8m³
- Internals for Salt impurity separation
- Carbon Steel
- Heat traced
- Trays for drainage of tank and furnace

- 14,3 m³/h; 7,5kW
- Vertical suspended Pump to transmit salt to Cold Salt Tank

**I&C for control of
process (L, P, T)
located on Buffer Tank**

TES Commissioning: Connection Line to Cold Salt Tank

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Pipeline

- Carbon Steel
- 8" Line
- Fully heat traced
- Inlet to Salt Tank with Vent Hole

TES Commissioning: Personal for Salt Melting



- 1 Operation Manager available 24hours
- 3 Operation Teams working in 12h shifts
 - 2 Operators
 - 1 Shift Responsible.
 - 2 Drivers for Forklift
 - 4 Workers
- 1 Shift for Salt Unloading 8.00h – 20.00h
 - 3 Driver
 - 1 Worker
- UTE Commissioning Personnel

Commissioning Milestone: **Steamblow**

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Commissioning Milestone: **Steamblow**

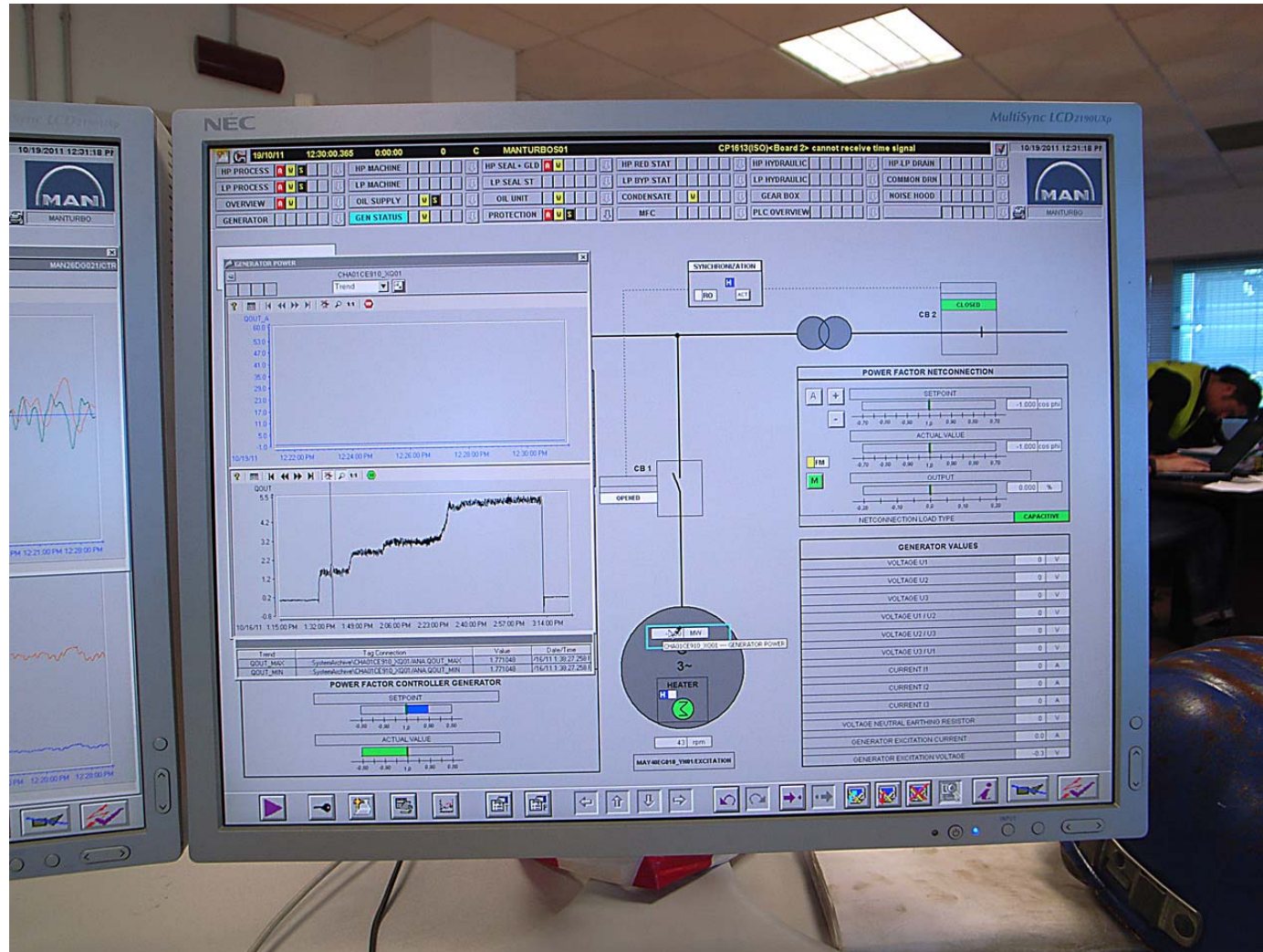


Video

[2013_06_12_SonnenkolloquiumK_öln_Vers 2 .3GP](#)

Commissioning Milestone: 1st synchronization

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- 10 day “Dispatchability Test”
- PAC Performance Test
- Commercial Operation
 - Interim Performance Test
 - Final Performance Test

Thanks for your attention

