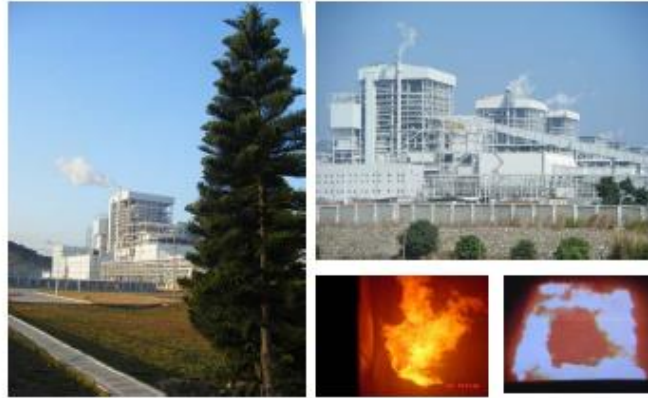


CP-5 & 6 Outages 660MW SC units

Summary:

- 1) Full outage support
- 2) Pressure parts inspection
- 3) Firing System inspections
- 4) Pulverizer system inspection
- 5) Airpreheater Inspections
- 6) Controls checks
- 7) Combustion adjusting
- 8) Performance testing
- 9) Spare Parts supply

Note: continue to support each outage

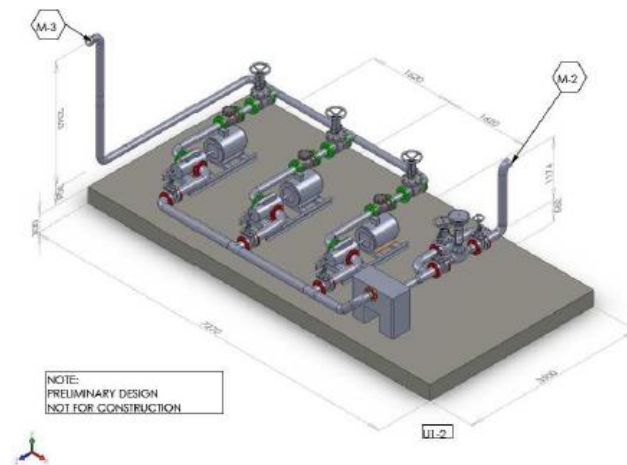


Hong Kong Electric Lamma Unit#2 Oil Conversion

Unit#2 Hong Kong Electric
Lamma Island
27February2010
First Re-Firing with Alstom's
Fuel Oil Conversion



AB-3



Note: All with in TFCN, design, installation, commissioning and testing

Burner Upgrade and material supply

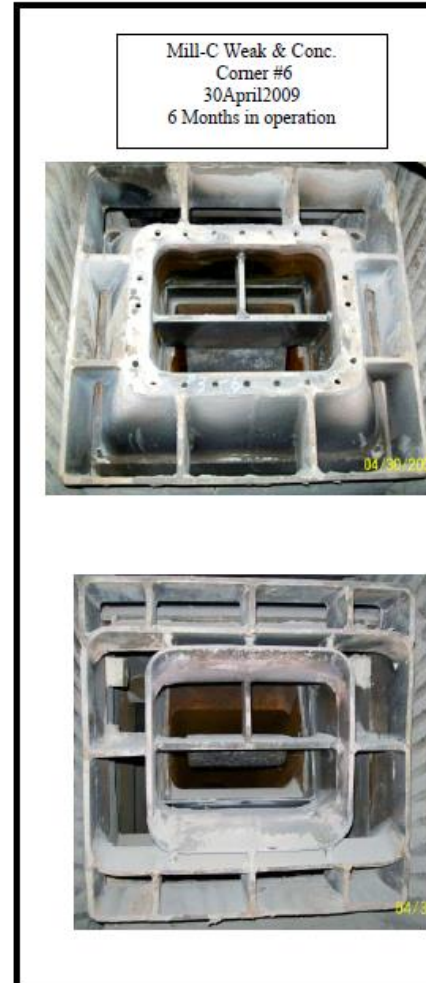
Received order to replace MHI's original design nozzles with Alstom's nozzles.

Note: Design and supplied 100% TFCN



The nozzle was position in the coal compartment as normal installation, position as shown in 0 degree horizontal

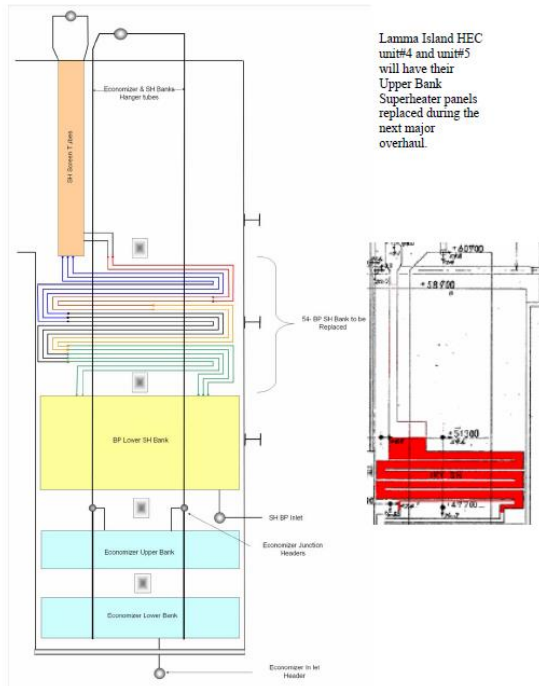
Tilt check to ensure bulbous back keep the proper clearance while tilting full up and down position.



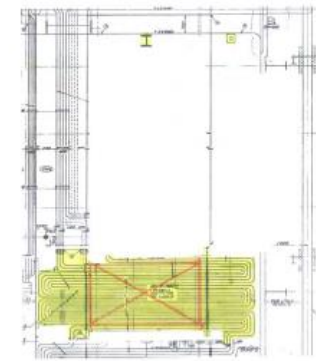
Hong Kong Electric Lamma Unit#5 Back Pass Superheater Replacement

- 1) Developed removal and installation procedure
- 2) Supervised the installation and removal

Note: Design 100% TFCN



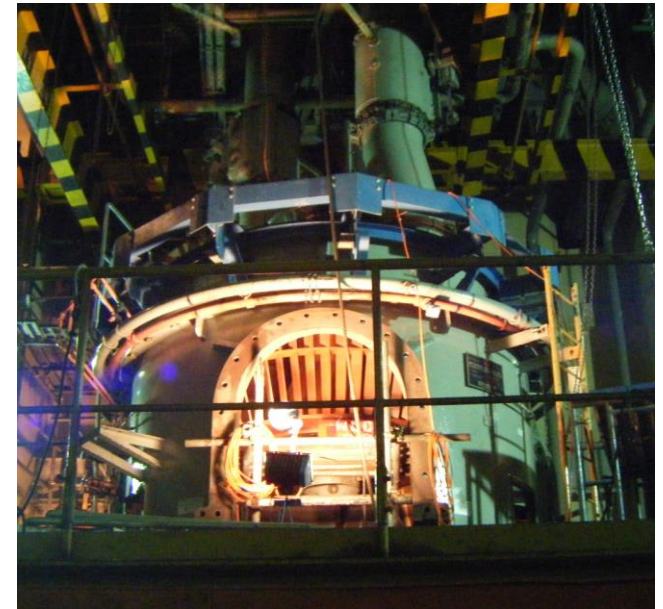
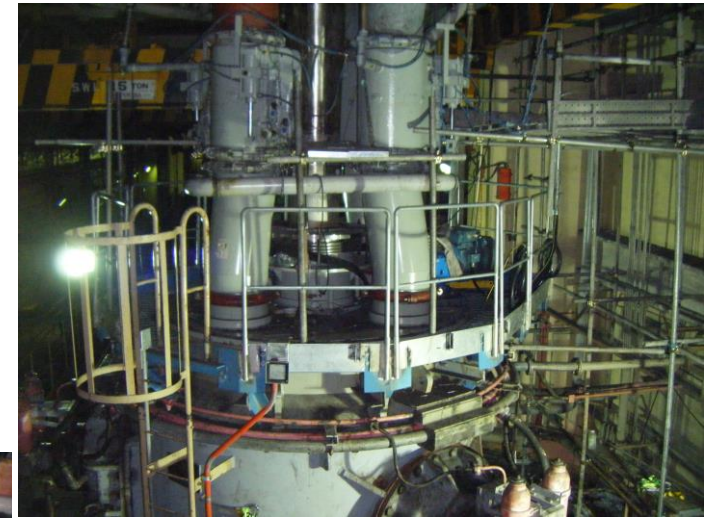
#8 New Panel at the horizontal position



#9 New Panel lowered down to position

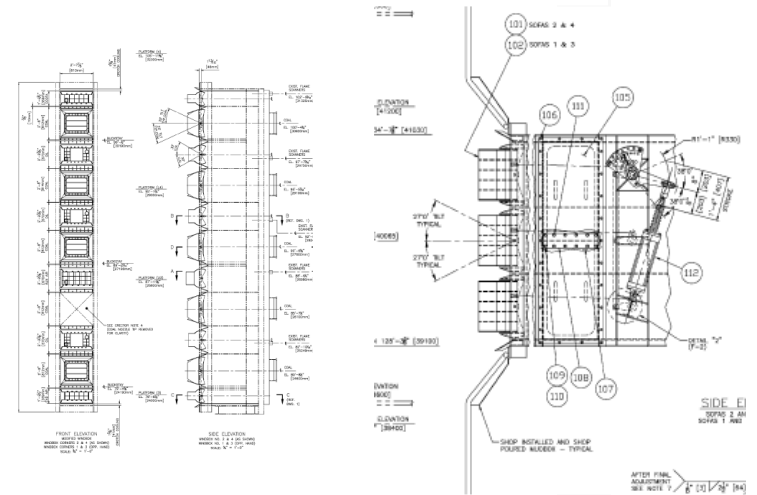
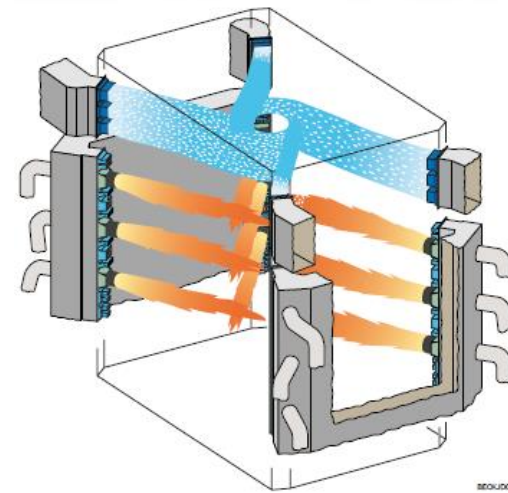
Hong Kong Electric Lamna Unit#5 Pulverizer Upgrades XRP-903

- 1) Material Supplied in conjunction with Milling Group
- 2) Site installation
- 3) Commissioning
- 4) Testing



Hong Kong Electric Lamna Unit#4 Low Nox Retrofit

- 1) Material supply
- 2) Site installation supervision
- 3) Site commissioning
- 4) Combustion tuning
- 5) Performance testing



Hong Kong Electric Lamna Unit#5 Low Nox Retrofit

- 1) Material supplied with retrofit group
- 2) Site installation supervision
- 3) Site commissioning
- 4) Combustion tuning
- 5) Performance testing



**L5 Low NOx System
Summary of Acceptance Test Results (Preliminary)**

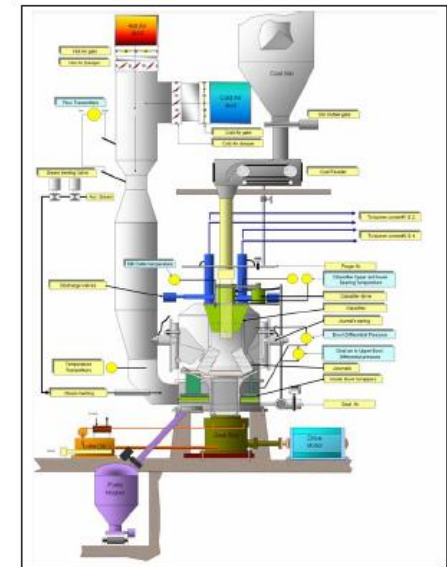
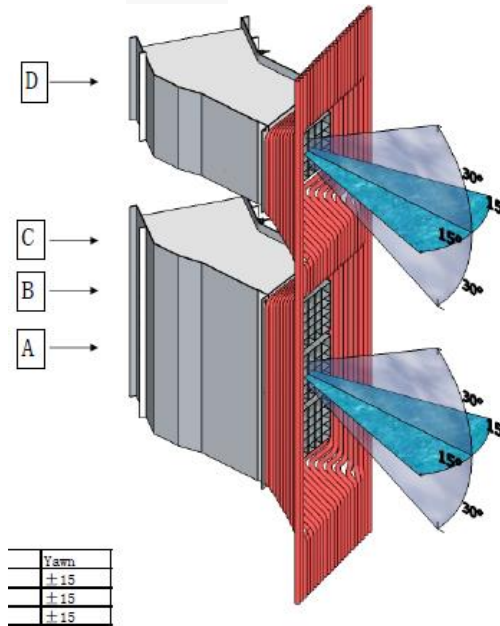
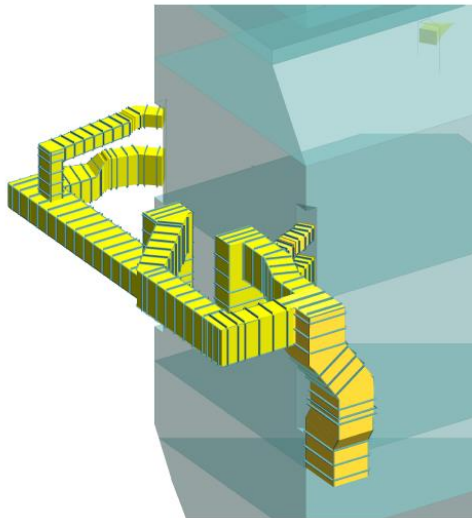
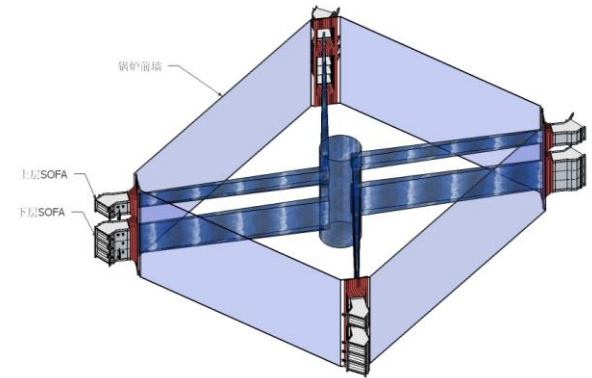
The final test results are pending coal analysis.

Loading	110 MW Min. Load	122 MW (35% BMCR)	158 MW (45% BMCR)	245 MW (70% BMCR)	350 MW (100% BMCR)
Test Date	11 Mar 09	17 Mar 09	17 Mar 09	19 Mar 09	18 Mar 09
Test Period	22:25 – 23:25	14:00 – 15:00	10:05 – 12:05	20:20 – 21:30	11:15 – 15:15
NOx Emission (at 12% CO₂), ppm					
Guarantee (after correction for coal/ash properties)	ppm	275 (for reference)	200	200	200
As-tested	ppm				
• Old Sensor (MHI / Shimadzu)		187.2	182.5	158.6	192.3
• New Sensor (Siemens / Ultramat)		169.8	162.4	141.3	174.5
Unburnt Carbon in Ash, %					
Guarantee (after correction for coal/ash properties)	%	---	5%	5%	5%
As-tested	%	0.53%	0.83%	1.06%	1.07%
Carbon Monoxide Emission (at 12% CO₂), ppm					
Guarantee	ppm	---	150	150	150
As-tested	ppm	5.8	6.3	6.2	7.9
Boiler Efficiency burning Sang Sang Coal at BMCR, %					
Guarantee	%	---	---	---	87.78%
As-tested	%	---	---	---	88.93%
Superheater Outlet Steam Temperature at BMCR, °C					
Guarantee	°C	---	---	---	569±5
As-tested (adjusted for calibration)	°C	---	---	---	564.3
Reheater Outlet Steam Temperature at BMCR, °C					
Guarantee	°C	---	---	---	541±5
As-tested (adjusted for calibration)	°C	---	---	---	539.5



Detail Proposal work for Mills and Low Nox Retrofits

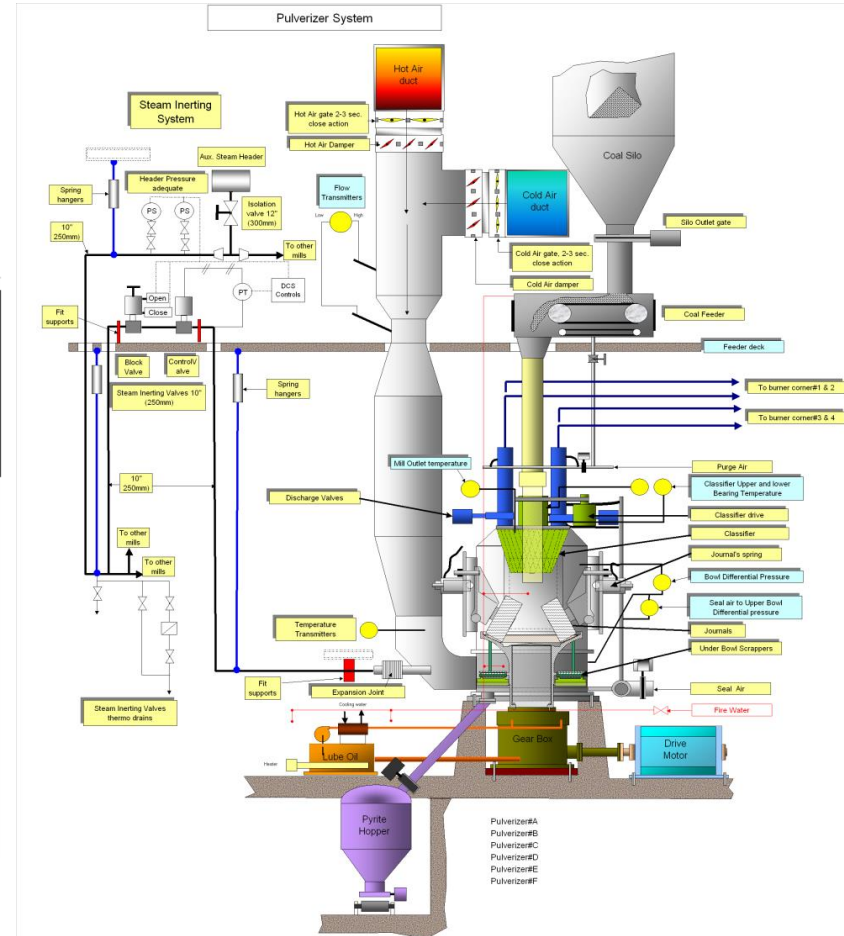
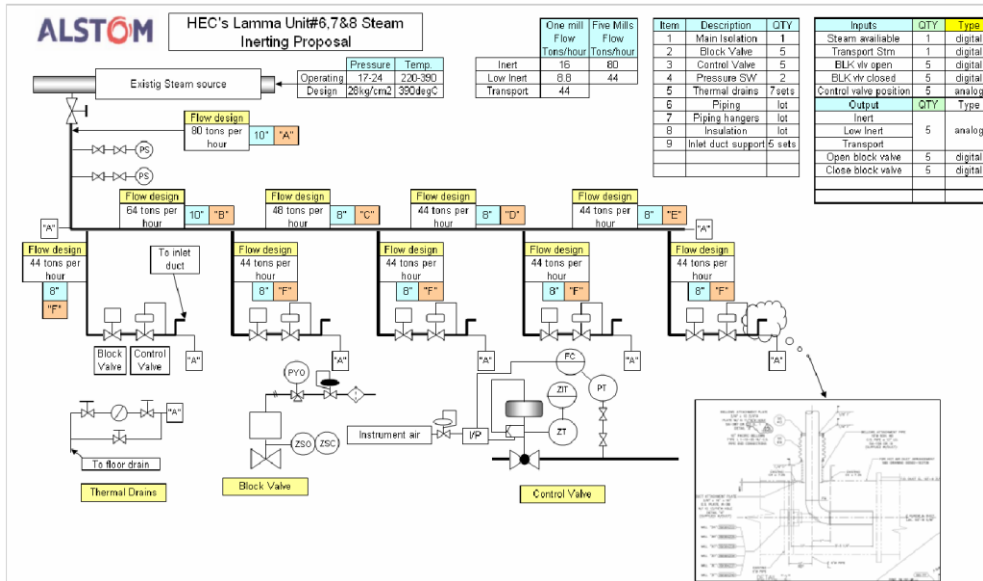
- 1) Low Nox proposals and Pricing
- 2) Pulverizer proposal and Pricing
- 3) Preliminary design developed
- 4) Illustrations developed



Hong Kong Electric Lamma Unit# 6 & 7 Pulverizer Steam Inerting

Summary:

- 1) Schedule to be installed in next outage at Lamma Station
- 2) Design and supplied by TSCN



China CP-5 Outage Service and Parts supplied

Coal Nozzles, Classifiers, Extension rings, Vanewheels, Grinding Rolls, Pressure parts ,service etc.supplied to CP-5 April-May 2010

ALSTOM	Alstom Power Corporation	Developed by: Annie Yang
Document Classification	Installation	Date: 4May2010
Subject	Cp-5 Alstom TSCN nozzles	Rev:0 Pages total = 1

CP-5 Coal nozzles replacements, 16 sets delivered directly to the unit for installation



TFCN supplied Classifiers Rotors



TFCN supplied Extension rings



Grinding Rolls



TFCN supplied Grinding rolls



TFCN supplied Vanewheel



Nice Packing of TFCN parts



TSCN parts being installed



EHS Checking



Checking gratings

Checking gratings

Check the tubes

Check the tubes

Check the tubes

Check the tubes



Staff going to the unit CP-5

ALSTOM	Alstom Power Corporation	Issued by: Annie Yang
Document Classification	CP-5 Outage	Date: 20/05/10
Subject	CP-5 Outage Inspections and support	Page: 1/01 = 1/1



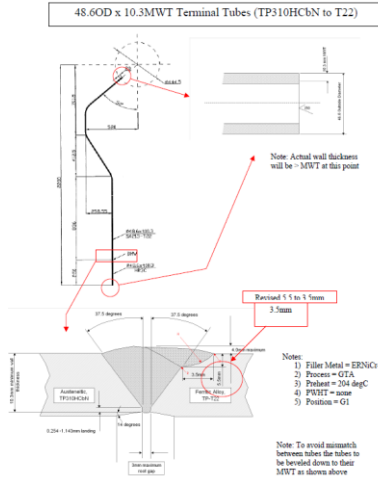
Our team starting the work on CP-5 Outage Operational



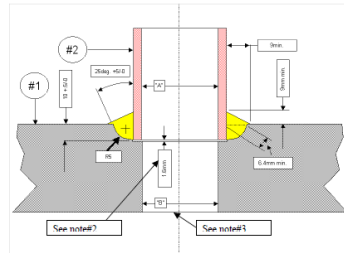
Check the tube hangers

Pressure Parts to Alstom's and MHI's Unit

Pressure parts supping to Alstom's and MHI's unit in China and Hong Kong



Recommended Welding of New Terminal Tube to Header detail:



Notes:

- 1) Re-use the existing socket profile.
 - 2) Keep 1.6mm gap between tube and socket bottom to allow the weld to shrink
- Note: if the 1.6mm required gap is 0mm then additional stresses to be placed on the welds when the shrinks during cooling, this extra stress can cause the weld to fail.

- 3) "B" > "A", hole through header to be greater than Tube ID
- 4) Preheat to 204degC
- 5) Weld with E9018-B3L electrode
- 6) PWHT 704-760degC for 30-minute minimum.

In addition to other products, Alstom is also capable of supplying boiler pressure parts with high quality for our customers, such as panels (waterwall, RH, SH etc.) , all loose tube materials (RH tube bends, SH tube bends, economizer tube bends...). We will try our best to satisfy all your requirements on boiler pressure parts. 除了其它产品以外, 阿尔斯通还可为客户提供各种优质的锅炉压力部件, 如: 水冷壁、过热、再热管屏等, 以及所有零星管材(再热管弯头、过热管弯头、省煤器弯头等...). 阿尔斯通将竭尽所能满足客户各种需求。



Fin panels 管片管屏



Final SH bends 未过弯头



Eco Bend 省煤器弯头



Positioning Tube Bends 定位管弯头



SBW Zhuhai Station Pulverizing and Combustion testing



ALSTOM	Alstom Thermal Service China	Department Power Plant
Document Classification	Service Work	Site / Contract Type
Subject	Zhuhai Power Station testing and adjustments	Page Size = 1

Zhuhai Station 2 x 600MW Supercritical unit

Activities:

- 1) Pulverizer airflow testing and adjustments
- 2) Pulverizer Coal Damper testing and adjustments
- 3) Combustion testing

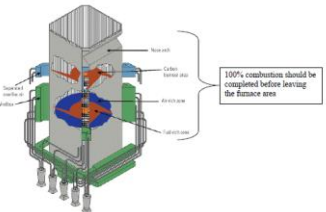
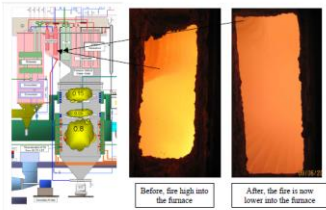
Alstom Team:

- 1) Mr. Peter Cui
- 2) Mr. Liu
- 3) Mr. Zhang
- 4) Alan Yang
- 5) David Pichana

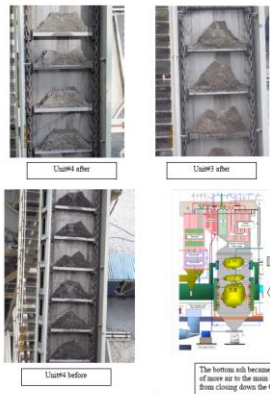
Status: On Going, in progress



The above allow the combustion to remain more in the furnace area.



Bottom ash and Fly ash:

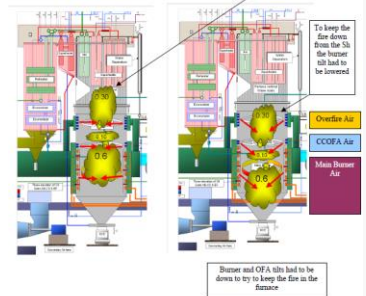


Burner and Overfire Air Tilting adjustments:

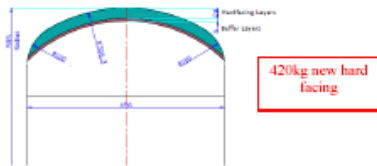
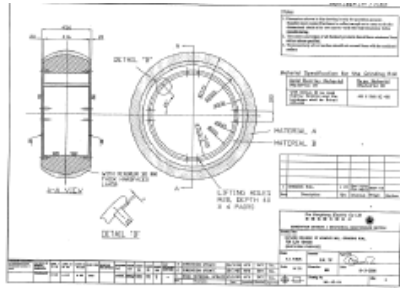
Before, especially on U4 the burner and OFA tilts were 30-35degree in the downward position

Reasons:

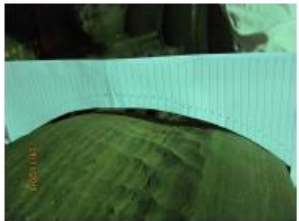
- ◆ High amount of Overfire air split as mentioned above
- ◆ Low Coal flames



HEC Grinding Rolls refurbishment



Sample #1 = 109kg (25% worn)
 Sample #2 = 74kg (18% worn)
 Sample #3 = 131kg (31% worn)
 Budget = 142kg each 33% worn



Roll Number	Weight (kg)	Worn (%)
Sample #1	109	25%
Sample #2	74	18%
Sample #3	131	31%
Budget	142	33%

Roll number of HEC Grinding Roll (Schematic) Roll Refurbishment - Detail 1

Input parameter System - Detail 1

Roll number = 21-2 (Roll No.)

Roll size = 1.0000 (Roll Size)

Roll length = 1.0000 (Roll Length)

Roll width = 1.0000 (Roll Width)

Roll weight = 1.0000 (Roll Weight)

Roll material = 1.0000 (Roll Material)

Roll diameter = 1.0000 (Roll Diameter)

Roll radius = 1.0000 (Roll Radius)

Roll thickness = 1.0000 (Roll Thickness)

Roll surface area = 1.0000 (Roll Surface Area)

Roll volume = 1.0000 (Roll Volume)

Roll mass = 1.0000 (Roll Mass)

Roll density = 1.0000 (Roll Density)

Roll specific gravity = 1.0000 (Roll Specific Gravity)

Roll thermal conductivity = 1.0000 (Roll Thermal Conductivity)

Roll thermal expansion coefficient = 1.0000 (Roll Thermal Expansion Coefficient)

Roll Poisson's ratio = 1.0000 (Roll Poisson's Ratio)

Roll Young's modulus = 1.0000 (Roll Young's Modulus)

Roll shear modulus = 1.0000 (Roll Shear Modulus)

Roll bulk modulus = 1.0000 (Roll Bulk Modulus)

Roll compressibility = 1.0000 (Roll Compressibility)

Roll coefficient of friction = 1.0000 (Roll Coefficient of Friction)

Roll coefficient of restitution = 1.0000 (Roll Coefficient of Restitution)

Roll coefficient of thermal conductivity = 1.0000 (Roll Coefficient of Thermal Conductivity)

Roll coefficient of thermal expansion = 1.0000 (Roll Coefficient of Thermal Expansion)

Roll coefficient of Poisson's ratio = 1.0000 (Roll Coefficient of Poisson's Ratio)

Roll coefficient of Young's modulus = 1.0000 (Roll Coefficient of Young's Modulus)

Roll coefficient of shear modulus = 1.0000 (Roll Coefficient of Shear Modulus)

Roll coefficient of bulk modulus = 1.0000 (Roll Coefficient of Bulk Modulus)

Roll coefficient of compressibility = 1.0000 (Roll Coefficient of Compressibility)

Roll coefficient of friction = 1.0000 (Roll Coefficient of Friction)

Roll coefficient of restitution = 1.0000 (Roll Coefficient of Restitution)

Roll coefficient of thermal conductivity = 1.0000 (Roll Coefficient of Thermal Conductivity)

Roll coefficient of thermal expansion = 1.0000 (Roll Coefficient of Thermal Expansion)

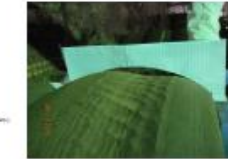
Roll coefficient of Poisson's ratio = 1.0000 (Roll Coefficient of Poisson's Ratio)

Roll coefficient of Young's modulus = 1.0000 (Roll Coefficient of Young's Modulus)

Roll coefficient of shear modulus = 1.0000 (Roll Coefficient of Shear Modulus)

Roll coefficient of bulk modulus = 1.0000 (Roll Coefficient of Bulk Modulus)

Roll coefficient of compressibility = 1.0000 (Roll Coefficient of Compressibility)



Roll Number	Weight (kg)	Worn (%)
Sample #1	109	25%
Sample #2	74	18%
Sample #3	131	31%
Budget	142	33%

Roll number of HEC Grinding Roll (Schematic) Roll Refurbishment - Detail 2

Input parameter System - Detail 2

Roll number = 21-2 (Roll No.)

Roll size = 1.0000 (Roll Size)

Roll length = 1.0000 (Roll Length)

Roll width = 1.0000 (Roll Width)

Roll weight = 1.0000 (Roll Weight)

Roll material = 1.0000 (Roll Material)

Roll diameter = 1.0000 (Roll Diameter)

Roll radius = 1.0000 (Roll Radius)

Roll thickness = 1.0000 (Roll Thickness)

Roll surface area = 1.0000 (Roll Surface Area)

Roll volume = 1.0000 (Roll Volume)

Roll mass = 1.0000 (Roll Mass)

Roll density = 1.0000 (Roll Density)

Roll specific gravity = 1.0000 (Roll Specific Gravity)

Roll thermal conductivity = 1.0000 (Roll Thermal Conductivity)

Roll thermal expansion coefficient = 1.0000 (Roll Thermal Expansion Coefficient)

Roll Poisson's ratio = 1.0000 (Roll Poisson's Ratio)

Roll Young's modulus = 1.0000 (Roll Young's Modulus)

Roll shear modulus = 1.0000 (Roll Shear Modulus)

Roll bulk modulus = 1.0000 (Roll Bulk Modulus)

Roll compressibility = 1.0000 (Roll Compressibility)

Roll coefficient of friction = 1.0000 (Roll Coefficient of Friction)

Roll coefficient of restitution = 1.0000 (Roll Coefficient of Restitution)

Roll coefficient of thermal conductivity = 1.0000 (Roll Coefficient of Thermal Conductivity)

Roll coefficient of thermal expansion = 1.0000 (Roll Coefficient of Thermal Expansion)

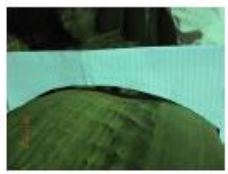
Roll coefficient of Poisson's ratio = 1.0000 (Roll Coefficient of Poisson's Ratio)

Roll coefficient of Young's modulus = 1.0000 (Roll Coefficient of Young's Modulus)

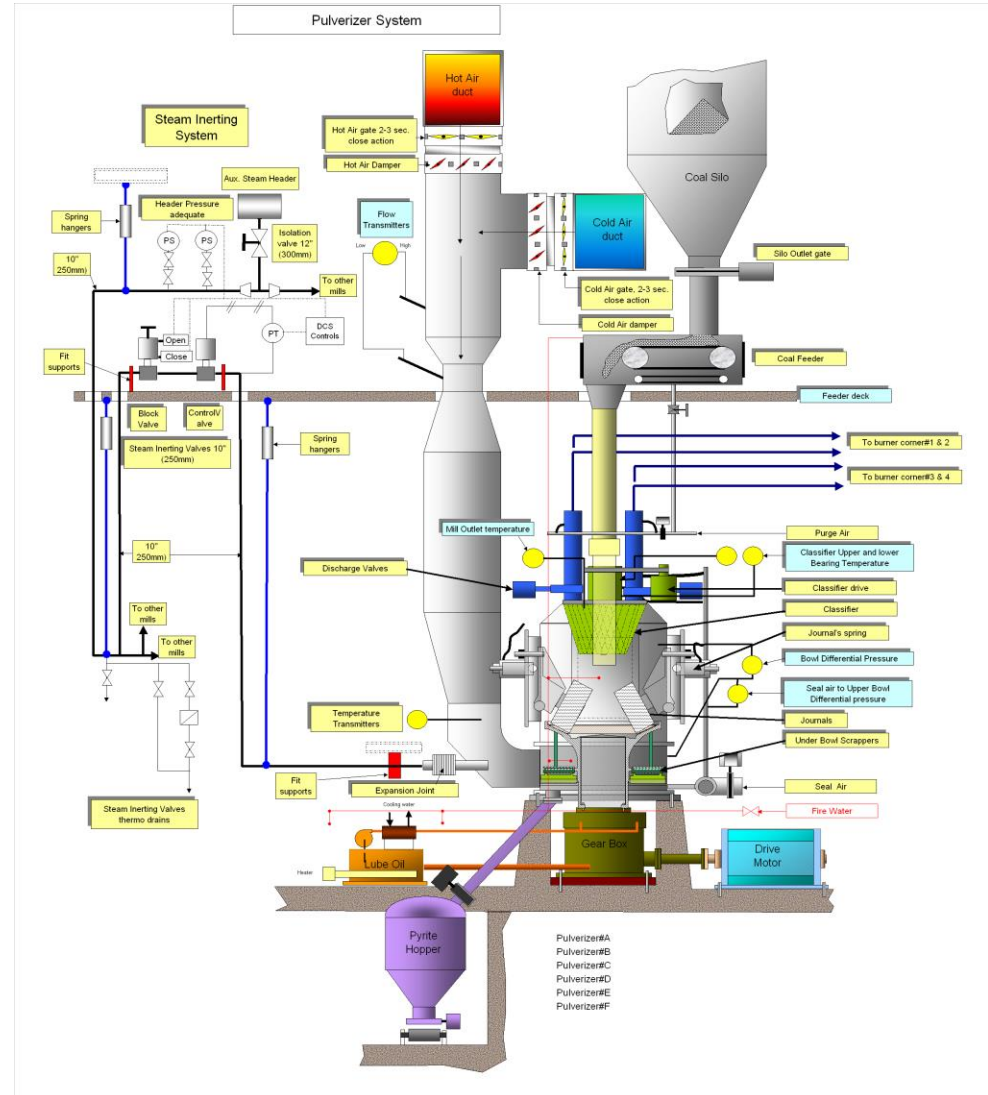
Roll coefficient of shear modulus = 1.0000 (Roll Coefficient of Shear Modulus)

Roll coefficient of bulk modulus = 1.0000 (Roll Coefficient of Bulk Modulus)

Roll coefficient of compressibility = 1.0000 (Roll Coefficient of Compressibility)



Use CMM Measure Extention Ring & Seal Ring at Zhuhai Power plant 22Feb2011



MHI Units #1 & 2, Performance Survey

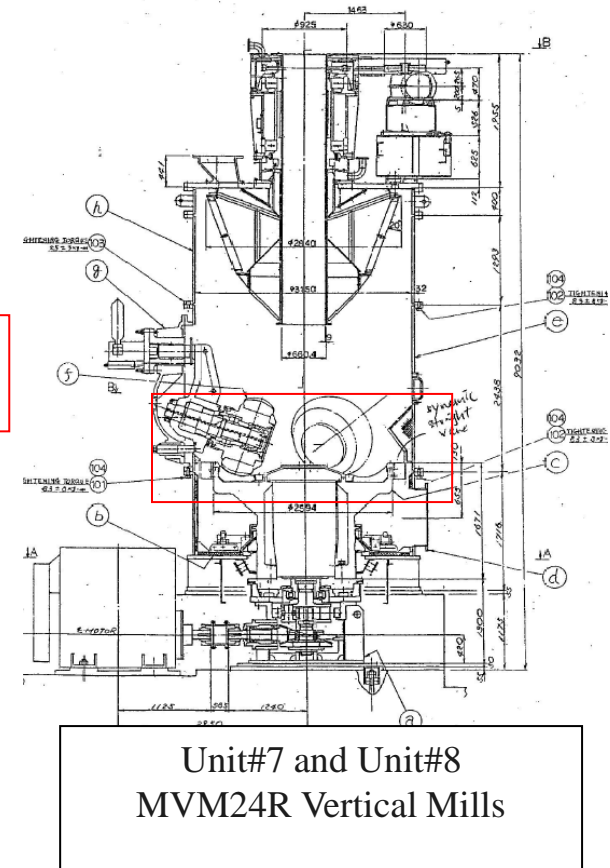
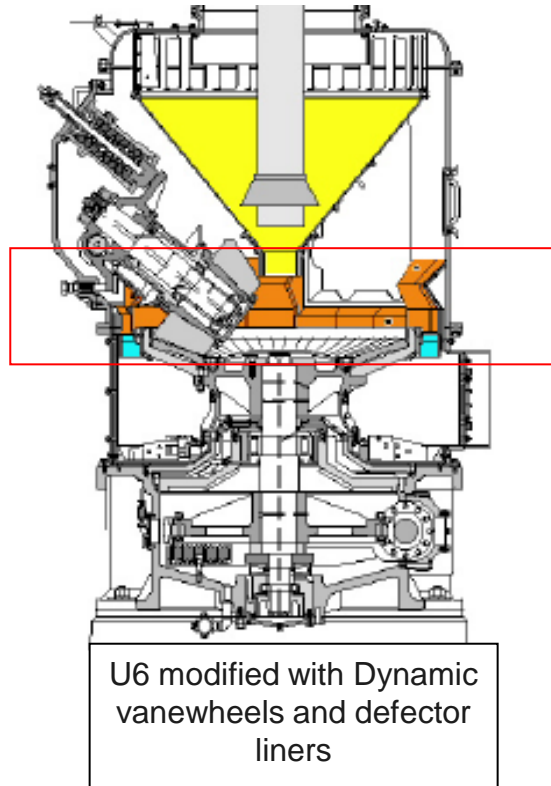
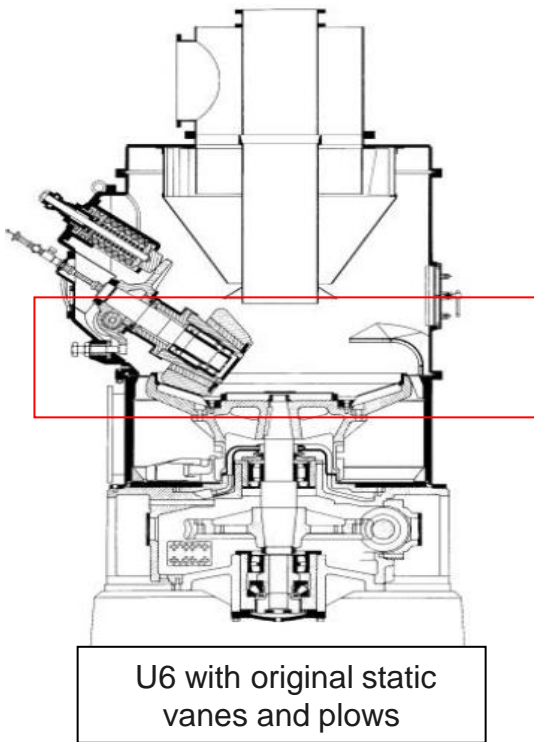


Pulverizer Upgrade

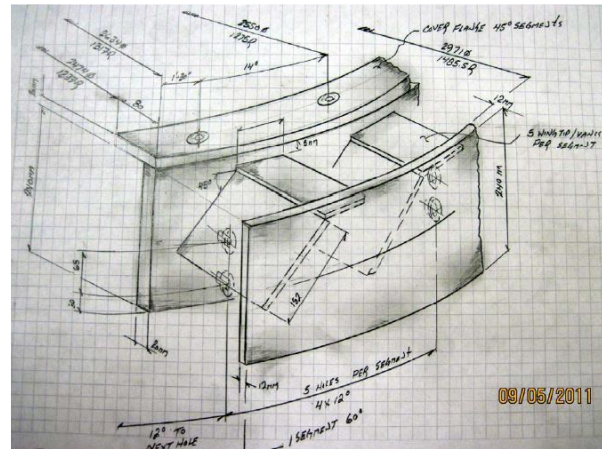


CONTRACT NO. 10/2203
LAMMA POWER STATION - COAL FIRED GENERATING UNITS
SUPPLY WITH PROVISION OF
TECHNICAL ADVISORY SERVICES FOR
ERECTION, TESTING AND COMMISSIONING OF MILL UPGRADING WORK FOR
BURNING OF LOW GRADE COAL

25 MAR 2011



Lamma Unit#7 E mill first testing after Alstom Upgrade, “Coal Spillage undetectable”



Mill	Coal flow T/hr	Test time minutes	Total coal flow kg per test time	Total spillage Kg	Total spillage per hour kg	Total spillage%	comments
				weight the coal			Guarantee
7E	38	30	19,000	0.01595	0.0319	0.000001	<0.03
7E	32	30	16,000	0.03024	0.06048	0.000002	<0.03
7E	21	30	10,500	0.06532	0.13064	0.000006	<0.03
7E	18	30	9,000	0.1672	0.3344	0.000019	<0.03