

# TABAS COAL PREPARATION PLANT

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## TABAS PROJECT MINE & CPP

PRESENTED BY:

MEHRDAD GHAFARI - IRITEC  
(CPP engineering coordinator)

# IRITEC

IRAN INTERNATIONAL ENGINEERING  
COMPANY



## IMPLEMENTATION OF TURN KEY PROJECTS



### MINING INDUSTRIES



### OIL, GAS & PETROCHEMICAL



### METALLURGICAL PROJECTS

# IRITEC

IRAN INTERNATIONAL ENGINEERING  
COMPANY



## MINING AND MINING INDUSTRIAL BUSINESS UNIT

COAL , IRON ORE, COPPER ,  
TITANIUM, GOLD ,.....



**E**NGINEERING **P**ROCUREMENT **C**ONSTRUCTION **M**ANAGEMENT

November 26<sup>th</sup>, 2008

Minerals Industry Joint Seminar

University of Nottingham

# IRITEC

IRAN INTERNATIONAL ENGINEERING  
COMPANY



## The First Mechanized Coal Mining Project in IRAN

# TABAS COAL MINE





## Project History

- 1991 - Detailed Exploration Completed**
- 1991 - Feasibility Study Completed**
- 1992 - Tender documents prepared**
- 1999 - International tender for turn key project**
- 2000 - Project Engineering study started**
- 2001 - Supplementary exploration completed**
- 2008 – Project handed over to Client**



**TABAS Mine Project is one of the biggest mining projects in IRAN . Consortium IRITEC/IRASCO won international tender in 1999 as a Turn Key Project.**

**Scope of work of the project covered wide range activities in Engineering services Procurement and Construction in underground and surface. All have been done under supervision of the IRITEC management.**

# SCOPE OF WORKS

- ◆ **Supplementary Exploration**
- ◆ **Mine Design**
- ◆ **Mine construction up to first long wall**
- ◆ **Coal Preparation Plant and material handling Design**
- ◆ **Industrial and Infrastructure Design**
- ◆ **Installation of Equipment / Systems**
- ◆ **Commissioning and Training of the personnel**



## Geology of Coal Seam

- ◆ Coal seam (C1) thickness vary between 1.8m to 2.2m.
- ◆ Roof Conditions -Well Laminated. Very weak mudstone becoming stronger away from the seam. In the R.O.M average dilution from roof is 20cm.
- ◆ Floor Condition - between 1 m to 1.3 m of weak seat . Earth/mudstone underlies by stronger siltstones/sandstones. During the extraction of coal 10 cm of floor is being cut in average .
- ◆ Hard grove Grind ability 96 ( the coal is friable)

## Utilized Mining methods and Production

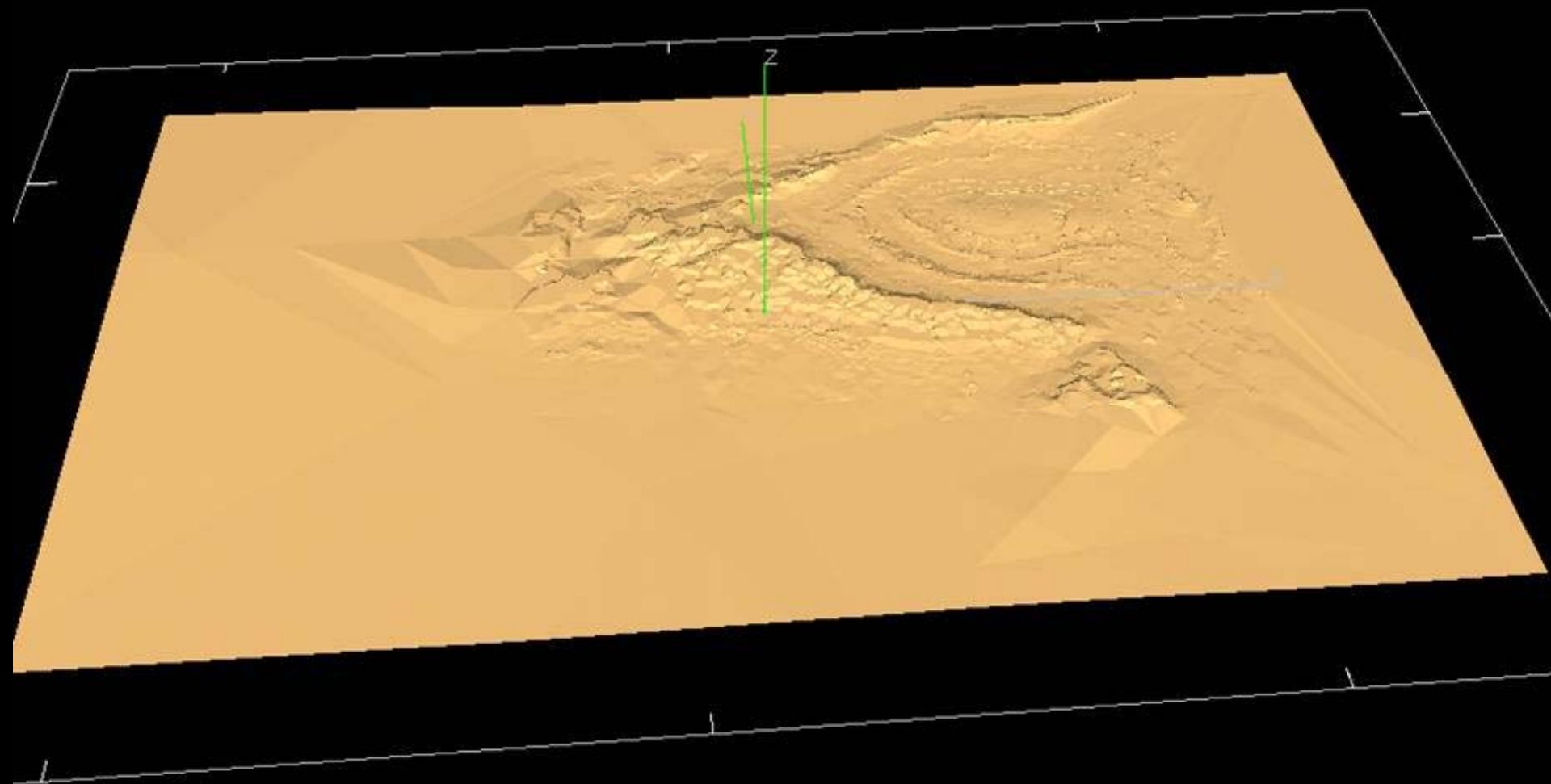
- ◆ **Long wall 215 m width** **1.1 Mt/y**

  - Power Roof Support
  - Shearer Machine
  - Beam Stage Loader (BSL)
  - Armoured Flexible Conveyor (AFC)
- ◆ **Room and Pillar** **0.3 Mt/y**

  - Continuous Miner
  - Heavy Duty Loader
- ◆ **Drill and Blast and Road Header Machine** **0.1 Mt/y**

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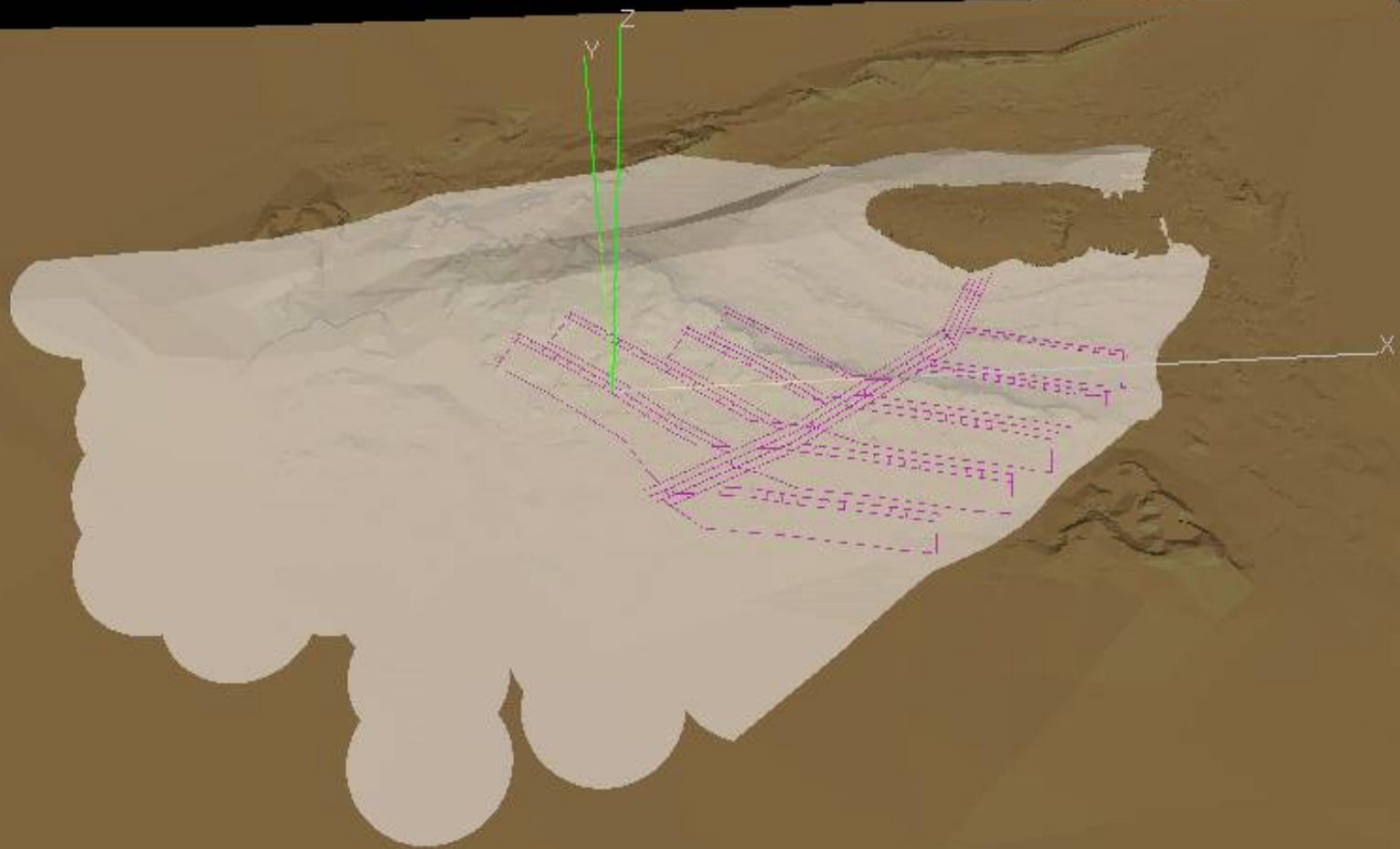


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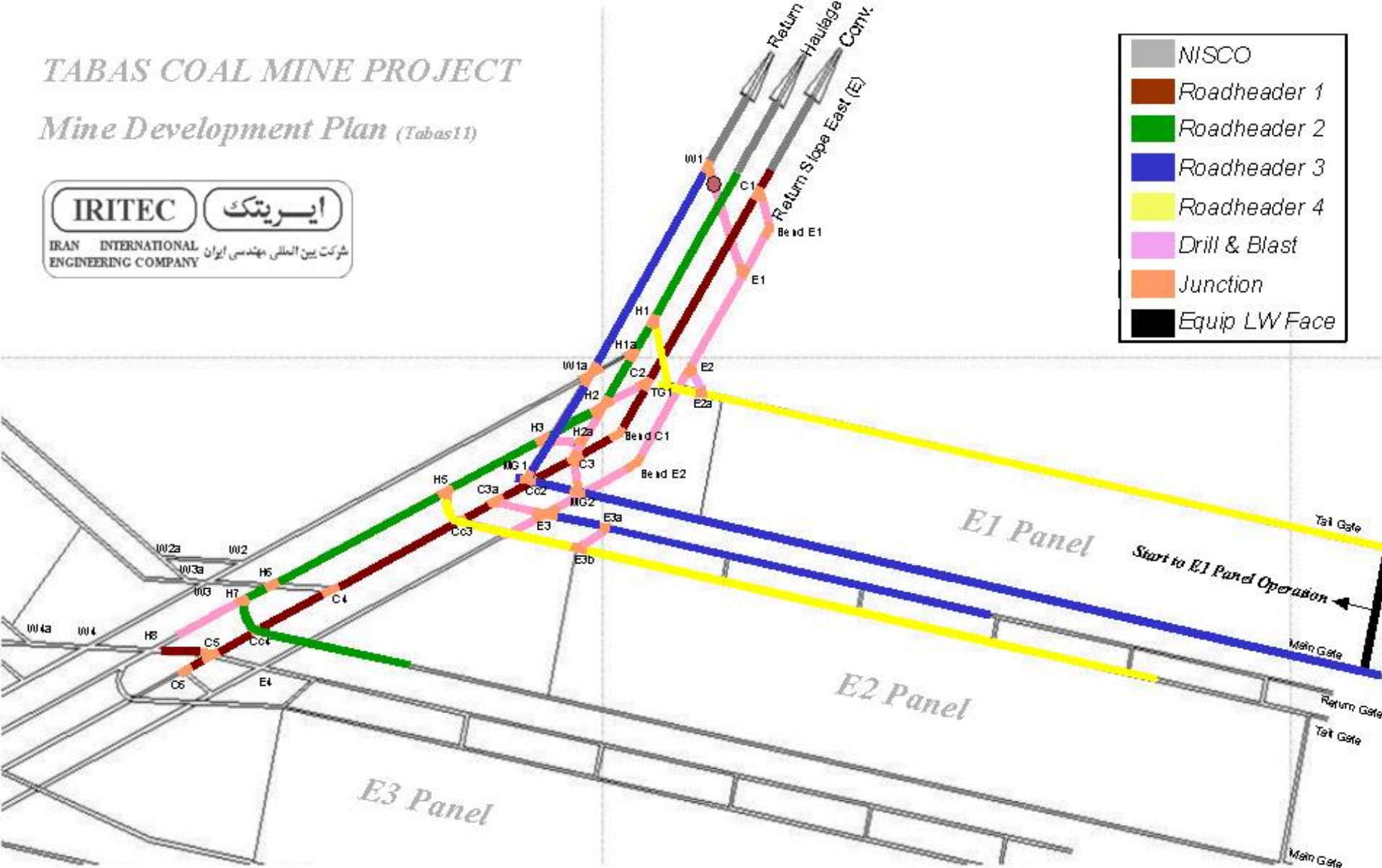
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# TABAS COAL MINE PROJECT

## Mine Development Plan (Tabas11)



## Revised Mine Layout

# TUNNEL STARTING





# FIRST ARCS



# ROADHEADER STARTING



# FIRST MECHANIZED COAL





# FIRST JUNCTION



## For Equipment Supply Contract signed with more than 100 Company

### UNDERGROUND

System / Equipment	Manufacturer	Country
Road Header	DOSCO	UK
Long Wall	KOPEX	POLAND
Continuous Miner	VOEST ALPINE	AUSTRIA
U/G Conveyors	ANTEC	ITALY
Ventilation	ZITRON	SPAIN
Haulage	Quarter Hall	UK
Electrical Equipment	ALLENWEST	UK
Control and Monitoring	DAVIS DERBY	UK
Telephone	FHF	Germany



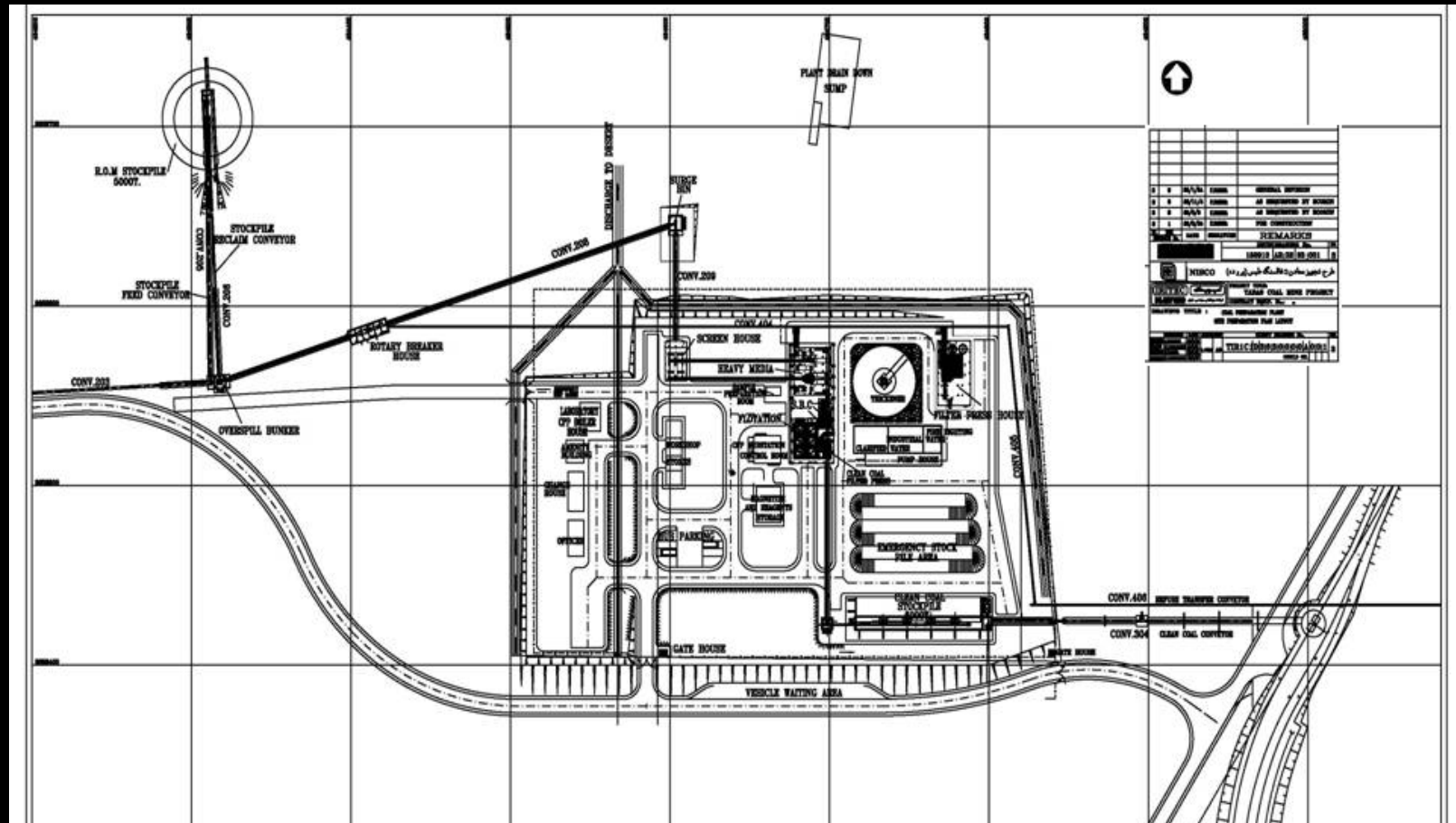
## For Equipment Supply Contract signed with more than 100 Company

### Coal Preparation and Handling Plant

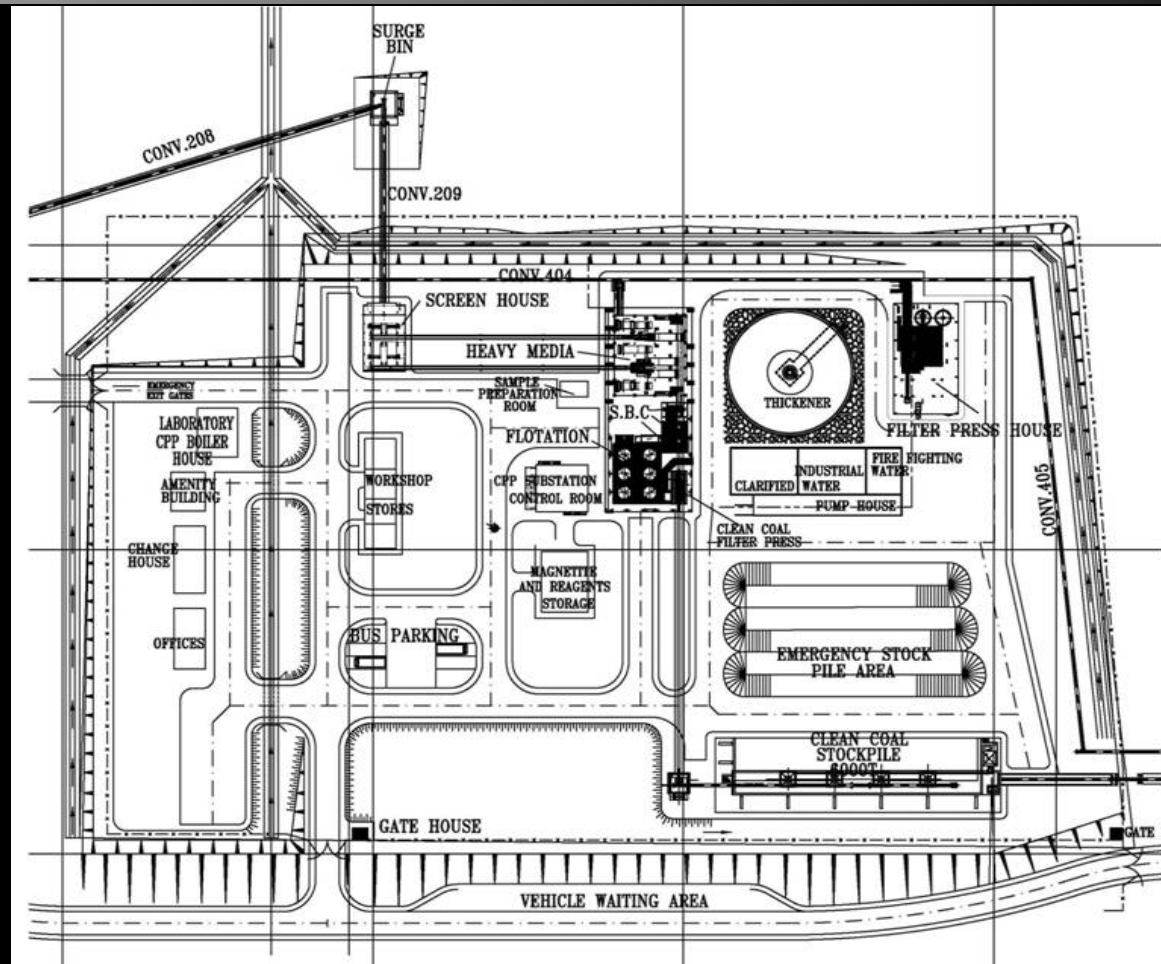
System / Equipment	Manufacturer	Country
TRI-Flo Separators	ECOMIN	ITALY
Column Flotation	CPT	CANADA
Screens	LINATEX	SOUTH AFRICA
Slurry Pumps	KREBS	AUSTRIA
Cage Mill	MAGCO	UK
Thickener	DORR-OLIVER	GERMANY
Filter Presses	TECNICAS HYDLAULICAS	SPAIN
Magnet Separators	PREMAX	SOUTH AFRICA
Screen Bowl Centrifuge	ANDRITZ	GERMANY



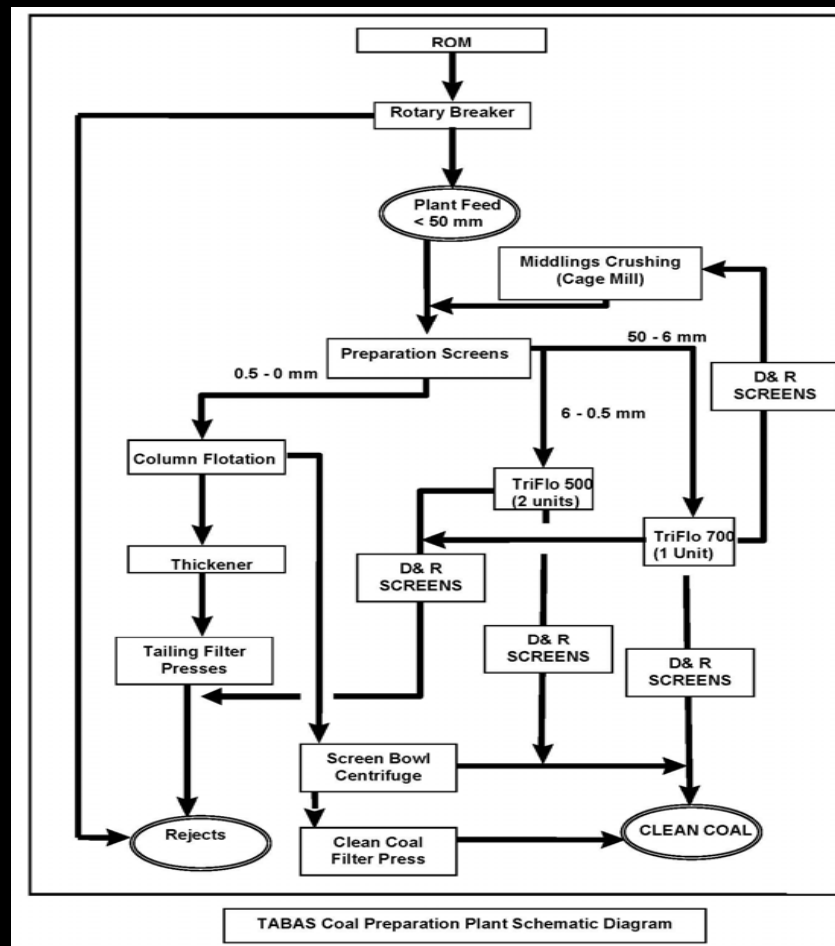
# CPP GENERAL LAYOUT 1



# CPP GENERAL LAYOUT 2



# CPP BLOCK DIAGRAM





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# SCREEN HOUSE UNDER CONSTRUCTION



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# HEAVY MEDIA UNDER CONSTRUCTION



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# TABAS COAL PREPARATION PLANT

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## DESIGN

PRESENTED BY:

PAOLO BOZZATO - ECOMIN  
(process engineer)





# INTRODUCTION

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- CLEAN COAL REQUIREMENTS
- COAL WASHABILITY
- LABORATORY AND PILOT TESTS
- PROBLEMS DURING BASIC DESIGN
- FINAL EQUIPMENT LIST



# CLEAN COAL CHARACTERISTICS

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- CLEAN COAL ASH 10.5-11.0 %
- CLEAN COAL MOISTURE 9.0 %
- Max -3 mm IN CLEN COAL 78 %
- CLEAN COAL PRODUCTION 750,000 t/yr



# COAL WASHABILITY 1

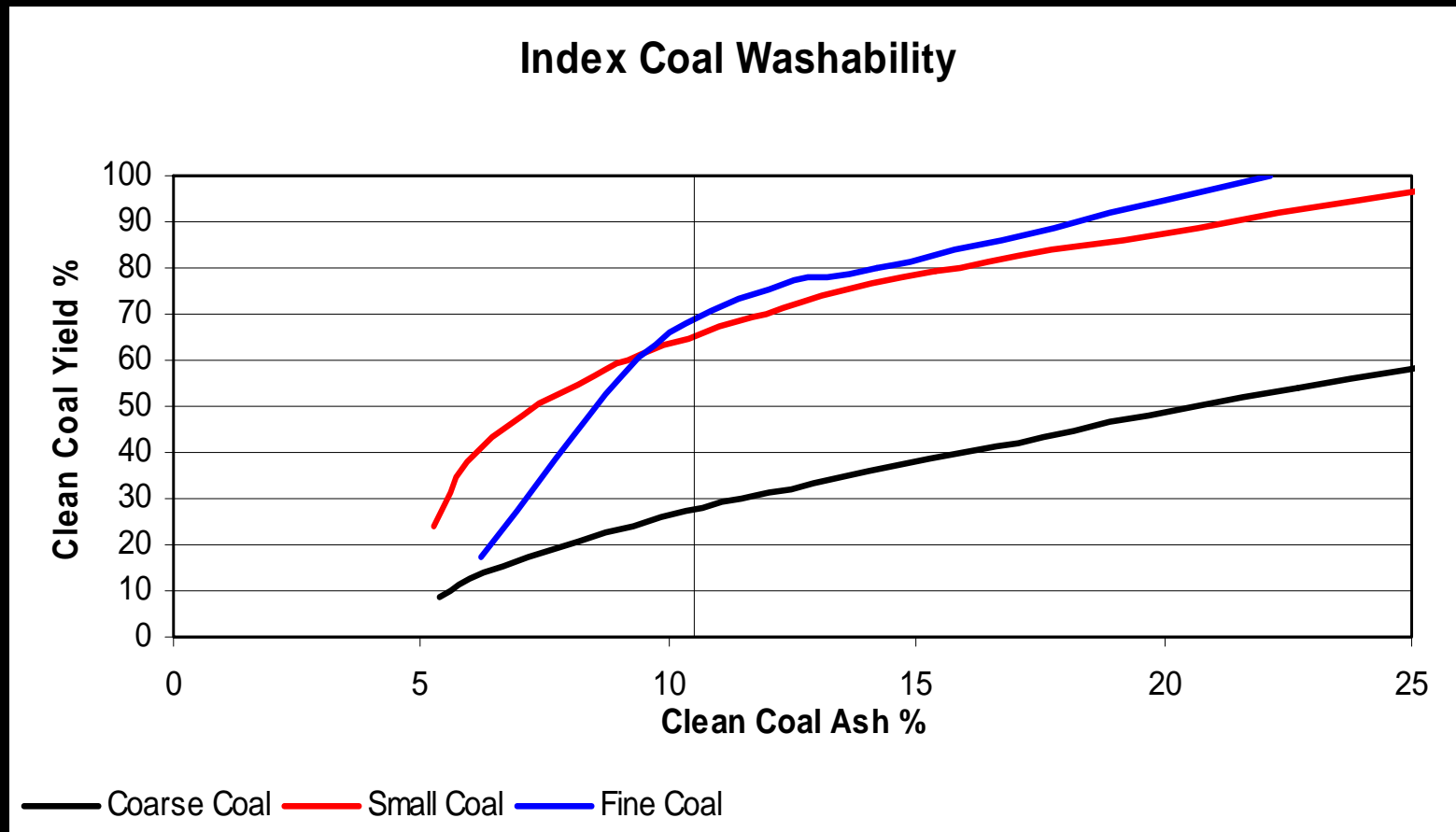
Coarse Coal + 6 mm (HL)				Small Coal - 6 mm + 0.5 mm (HL)				Fine Coal - 0.5 mm (Release Analysis)			
Wt %	Ash %	Cum Wt %	Cum Ash %	Wt %	Ash %	Cum Wt %	Cum Ash %	Wt %	Ash %	Cum Wt %	Cum Ash %
2,5	5,4	2,5	5,4	8,3	5,3	8,3	5,3	6,3	6,2	6,3	6,2
1,5	7,9	4,0	6,3	4,8	7,0	13,2	5,9	14,0	10,2	20,3	9,0
2,1	11,6	6,1	8,1	3,5	11,2	16,7	7,0	4,2	17,1	24,5	10,4
1,8	17,9	7,9	10,3	3,0	16,6	19,7	8,5	3,3	28,5	27,8	12,5
1,3	22,5	9,2	12,0	1,6	21,4	21,3	9,5	1,2	53,8	29,0	14,2
3,0	30,7	12,1	16,6	2,7	29,6	24,0	11,7	7,1	54,5	36,1	22,2
3,6	43,3	15,8	22,7	3,4	41,3	27,4	15,4				
13,5	76,8	29,2	47,6	7,2	71,4	34,6	27,0				
29,2				34,6				36,1			

HARDGROVE INDEX OF COAL: 96 – very friable

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# COAL WASHABILITY 2





# LABORATORY TESTS

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- SIZE & ASH DISTRIBUTION
- HEAVY LIQUIDS
- RELEASE ANALYSIS
- MIDDLINGS CRUSHING AND HL
- DROP TEST (FOR ROTARY BREAKER DESIGN)
- WET ATTRITION TEST
- SEDIMENTATION TEST



# PILOT TESTS

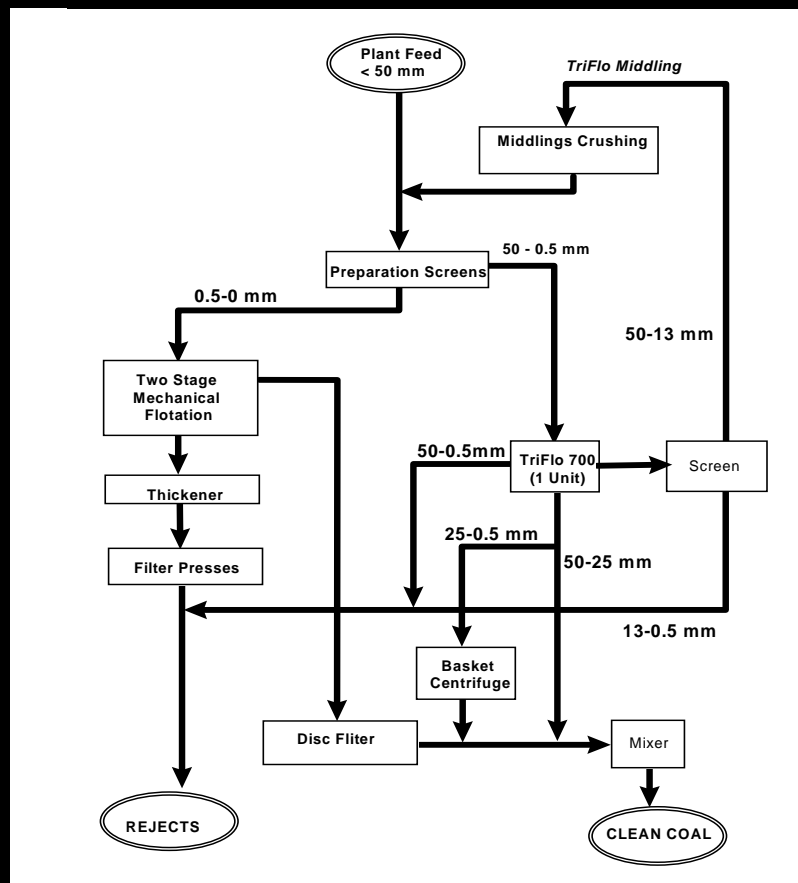
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- TRI-FLO TEST
- FLOTATION TEST (6-in ID column)
- SPIRAL TEST
- SCREEN BOWL CENTRIFUGE TEST
- FILTER PRESS TEST
- HORIZONTAL FILTER TEST
- DISK FILTER & DRUM FILTER TEST

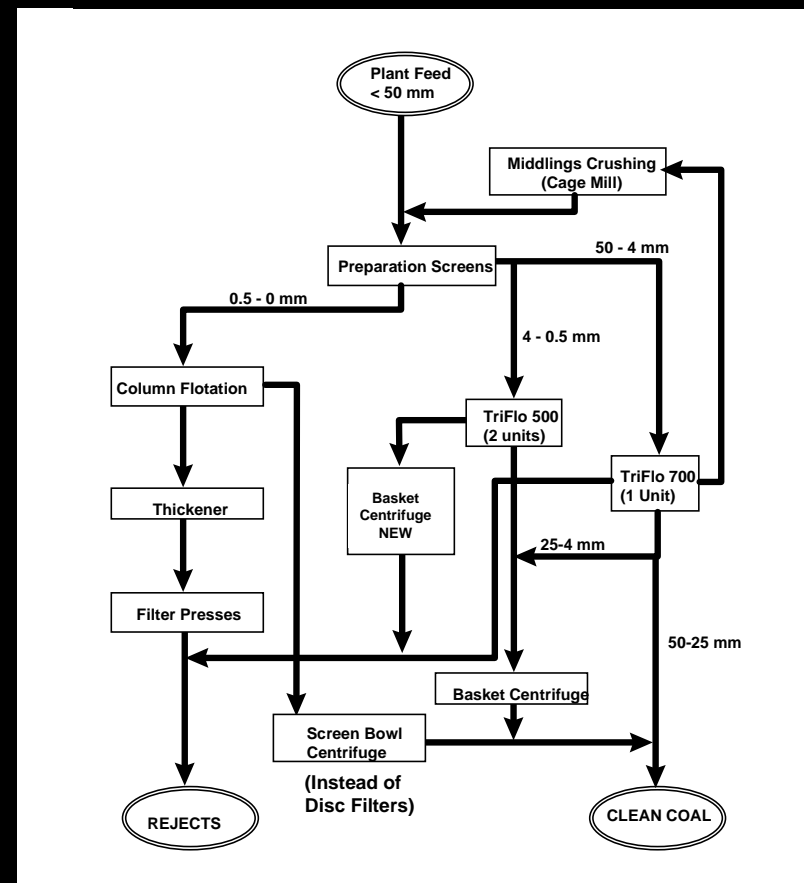


# CONCEPTUAL DESIGN 1

## FEASIBILITY



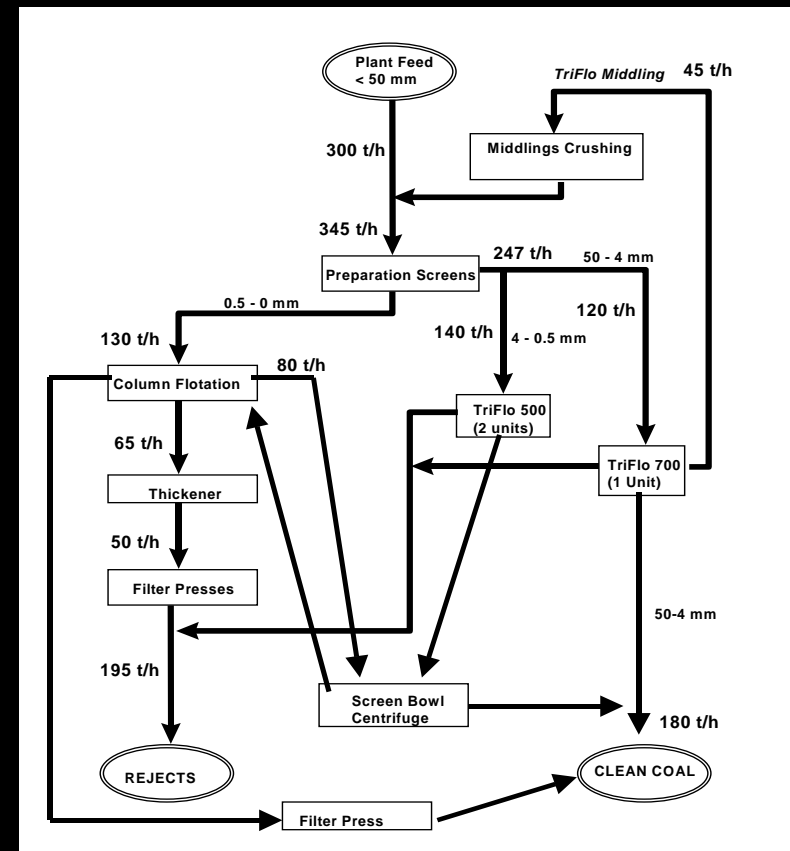
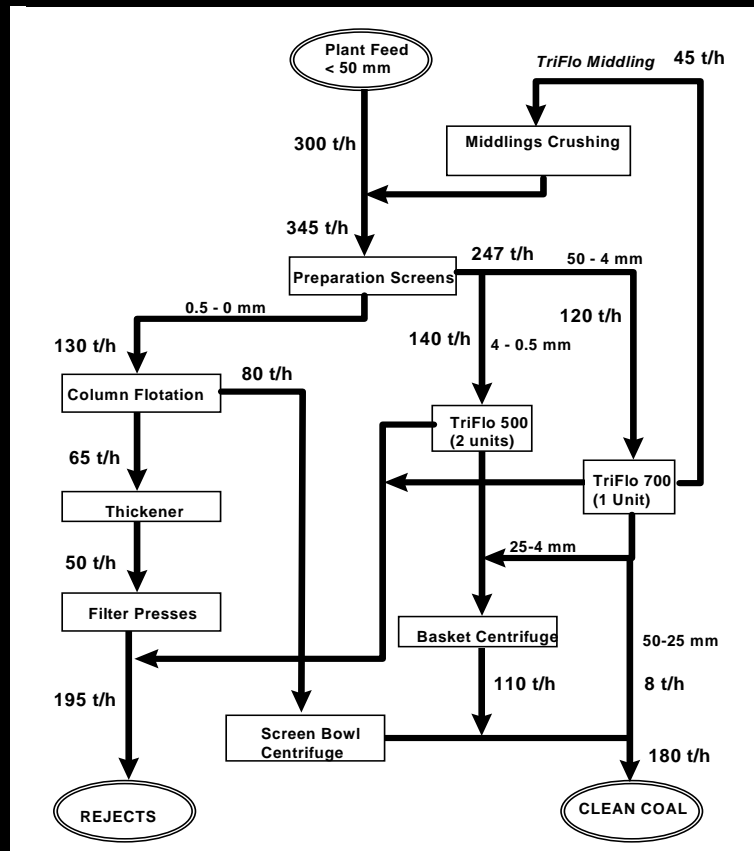
## ALTERNATIVE



# CONCEPTUAL DESIGN 2

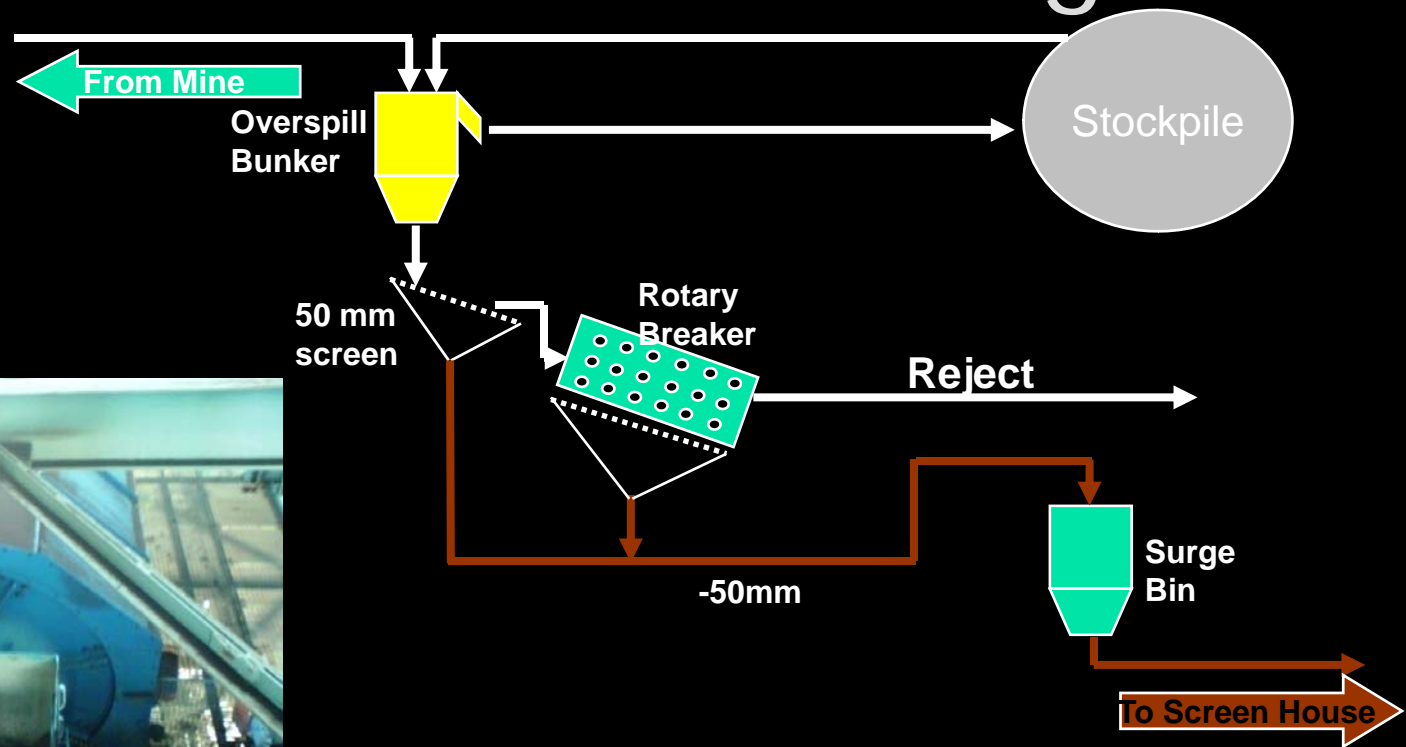
(ALMOST) FINAL

ACCEPTED



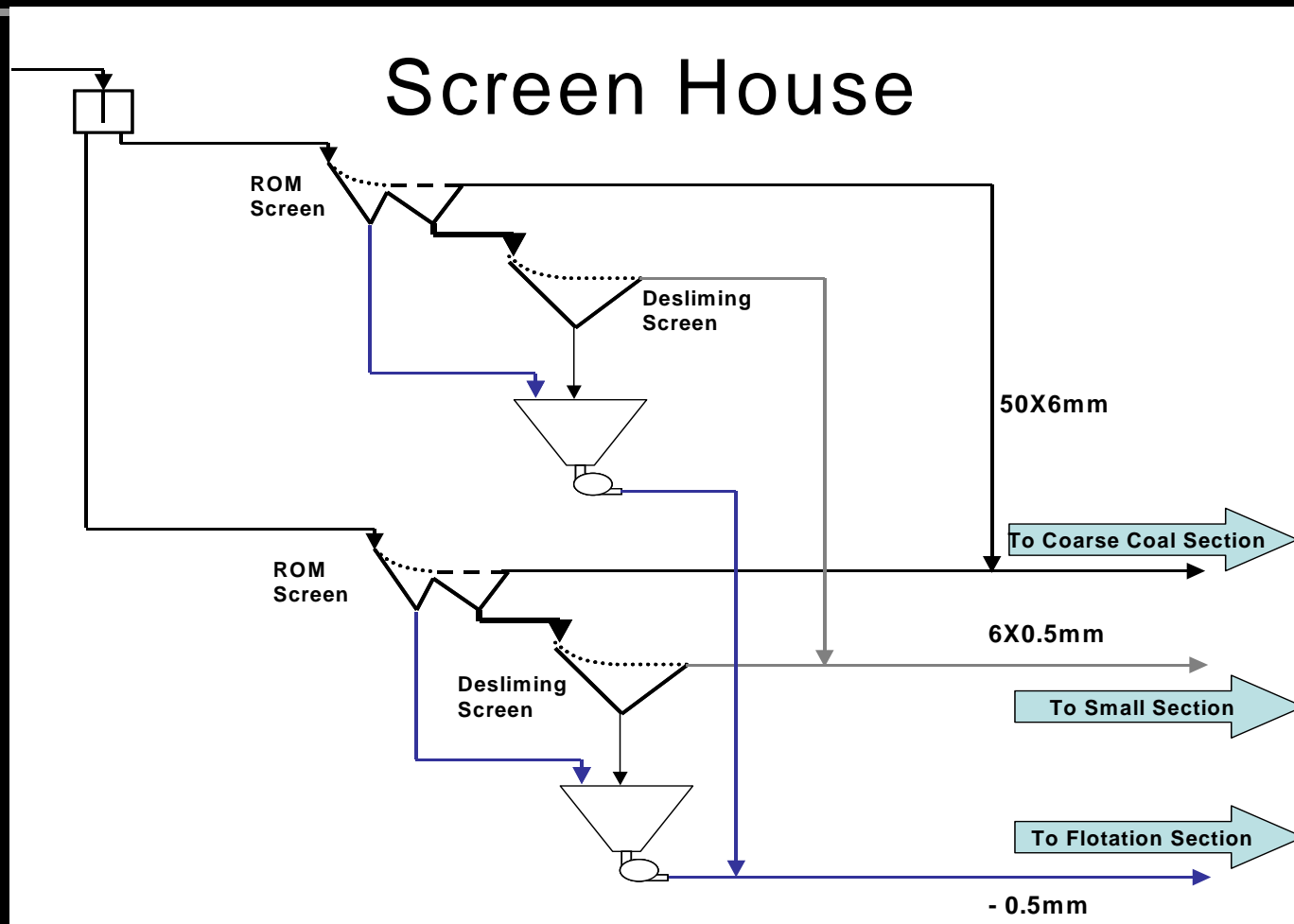
# FINAL DESIGN 1

## CHP – Feed Handling





# FINAL DESIGN 2



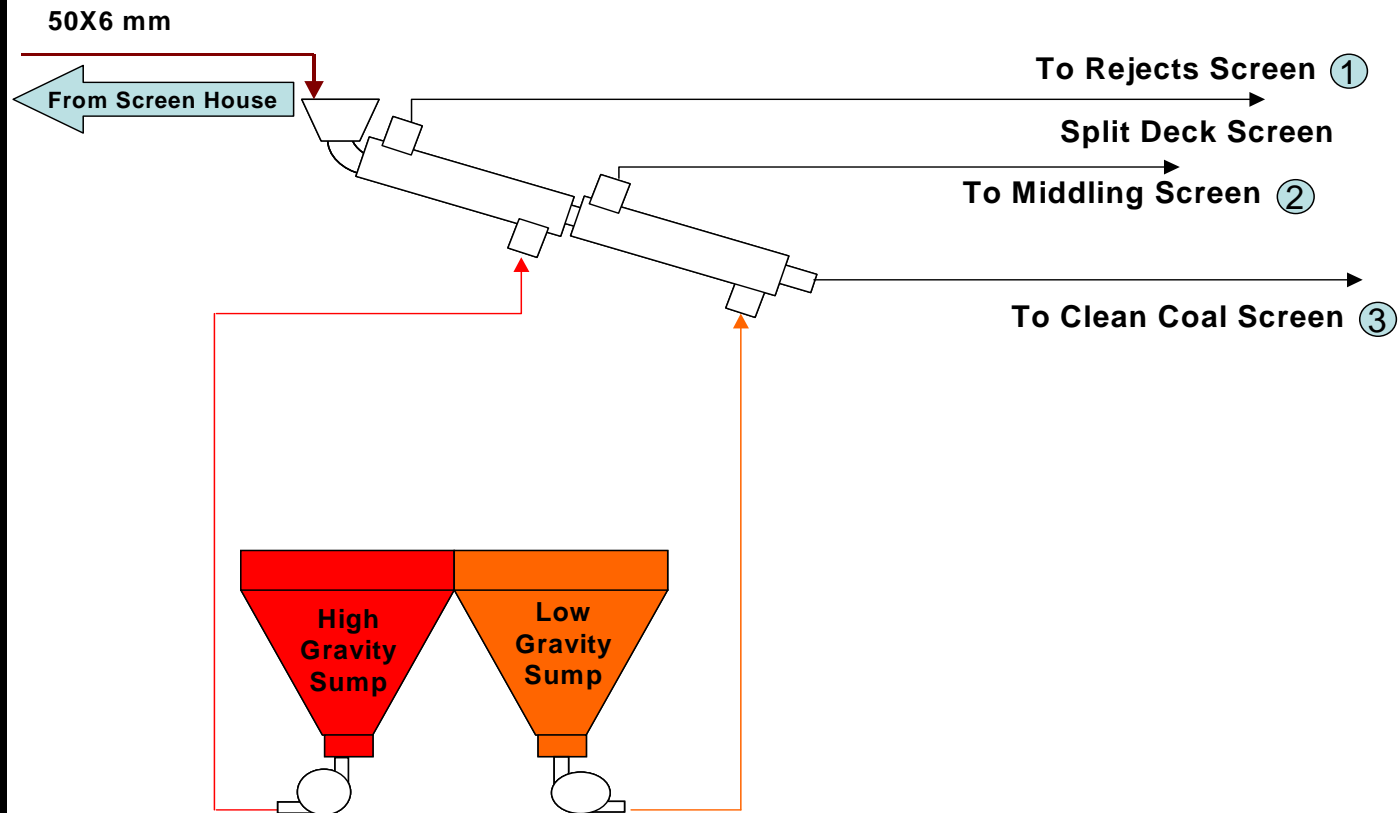
# EQUIP 1 - PREP SCREENS

Banana screens 4 off 9 x 3 m — Manuf. LINATEX (SA) Supplier SCAMAC (I)



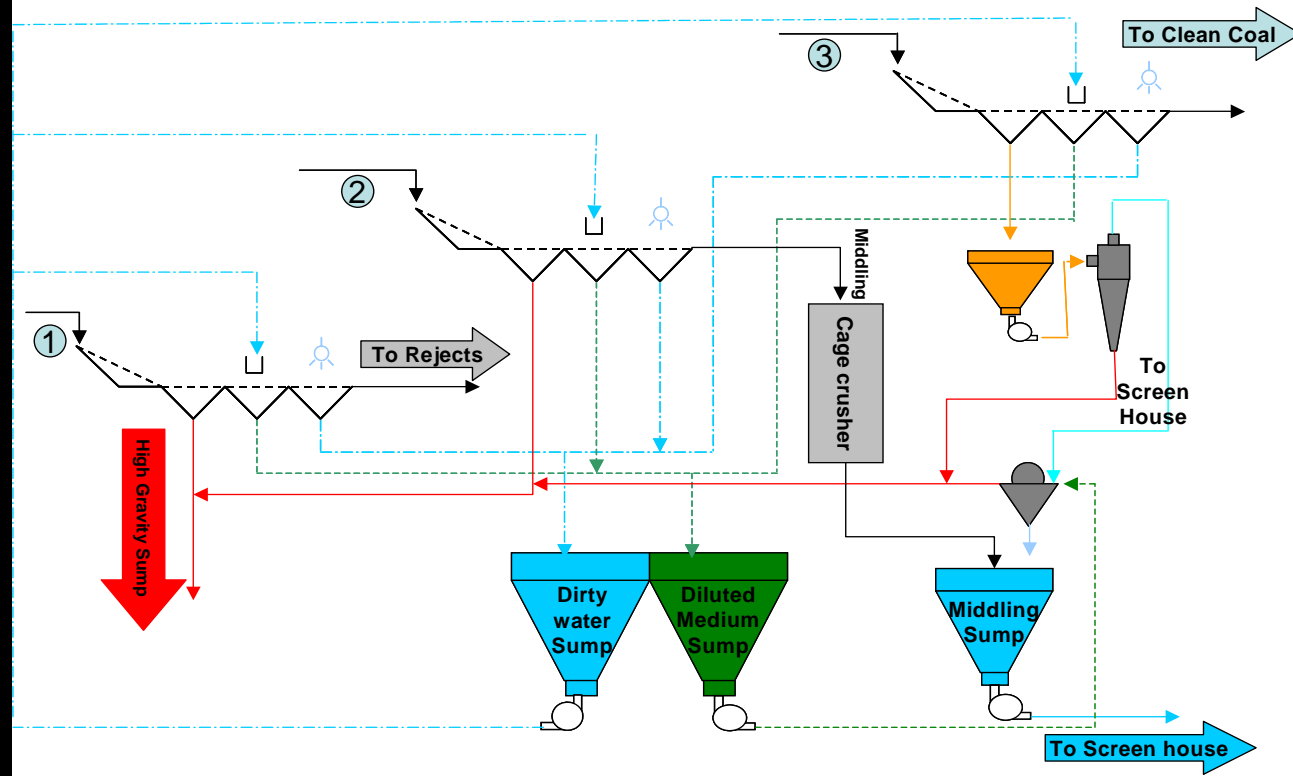
# FINAL DESIGN 3

## Coarse Coal Preparation



# FINAL DESIGN 4

## Coarse Coal Preparation





# EQUIP 2 - HM TRI-FLO

1 off 700 ID – 2 off 500 ID - Ecomin (I)



# Tri-Flo Problems?



# EQUIP 2 - HM TRI-FLO





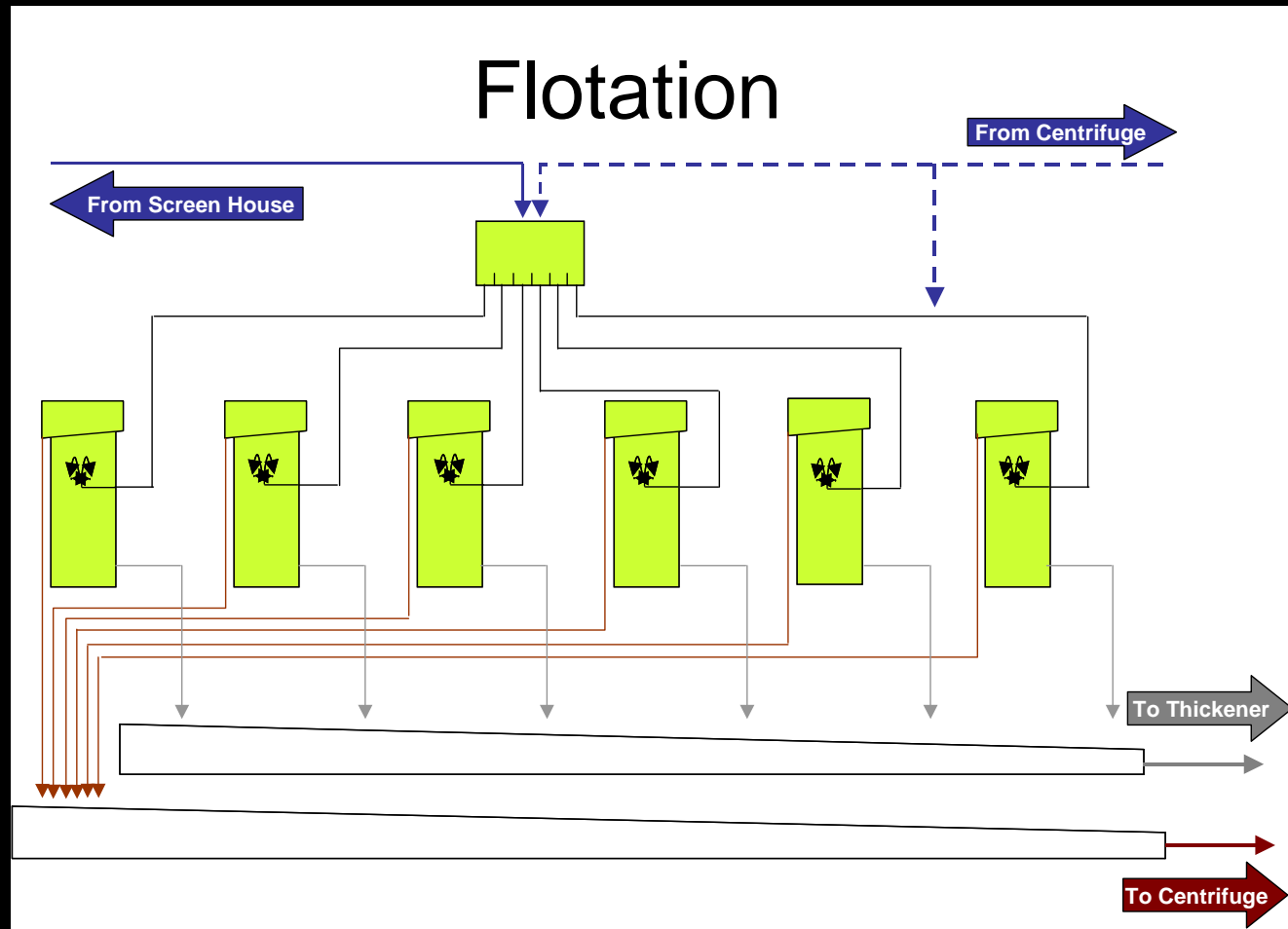
# EQUIP 3 - MIDDLEINGS CRUSHER

CAGE MILL TYPE - MAGCO (UK)





# FINAL DESIGN 5



# EQUIP 4 - COLUMN FLOTATION

6 OFF 14 FT ID X 8 m - Manuf. CPT (Canada) and Ecomin (I)

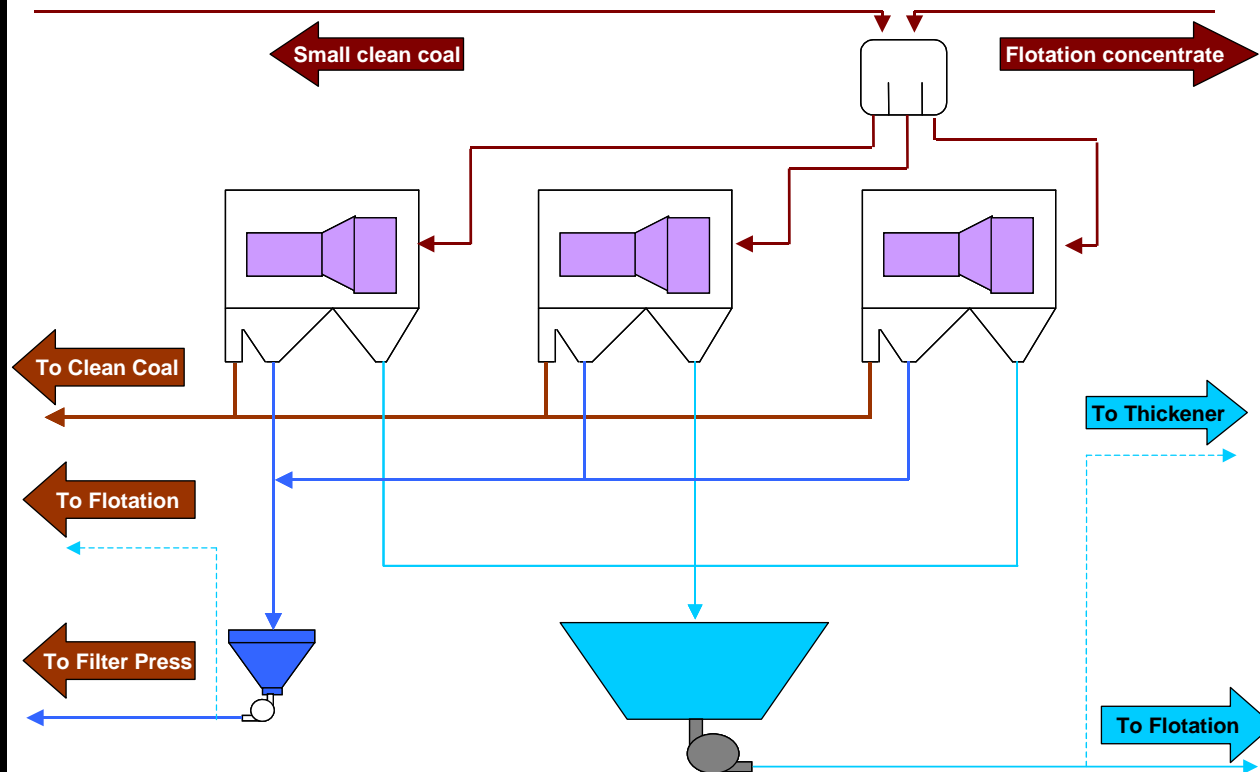


SlamJet®



# FINAL DESIGN 6

## Clean Coal Dewatering (Centrifuge)



# EQUIP 5 - CC DEWATERING

Screen Bowl Centrifuges — Manuf. Andritz (D)

Filter Press — Manuf Tecnicas Hidraulicas (E)





# EQUIP 6 - TAILS THICKENER

40 m thickener — Manuf Dorr Oliver Eimco



# Thickener Problem?!

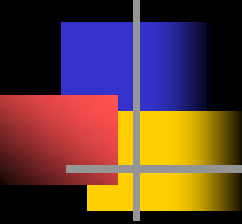




# EQUIP 7 - TAILS FILTER

Filter Press – Manuf Tecnicas Hidraulicas (E)





# EQUIP 8 – CONT'

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- SLURRY PUMPS – Krebs & Ecomin (I)
- WATER PUMPS – KSB (D)
- MAGNETIC SEPARATOR HM – Magnapower (SA)
- AIR COMPRESSORS – BOGE (D)
- FIXED SIEVES – Ecomin (I)
- AUTOMATION – SAET (I)
- ASH MONITOR & DENSITY METERS – RGI (D)



# Handling Problems?!





# TABAS COAL PREPARATION PLANT

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## OPERATION

BY:

HASSAN NOORI - IMPASCO

(process engineer)

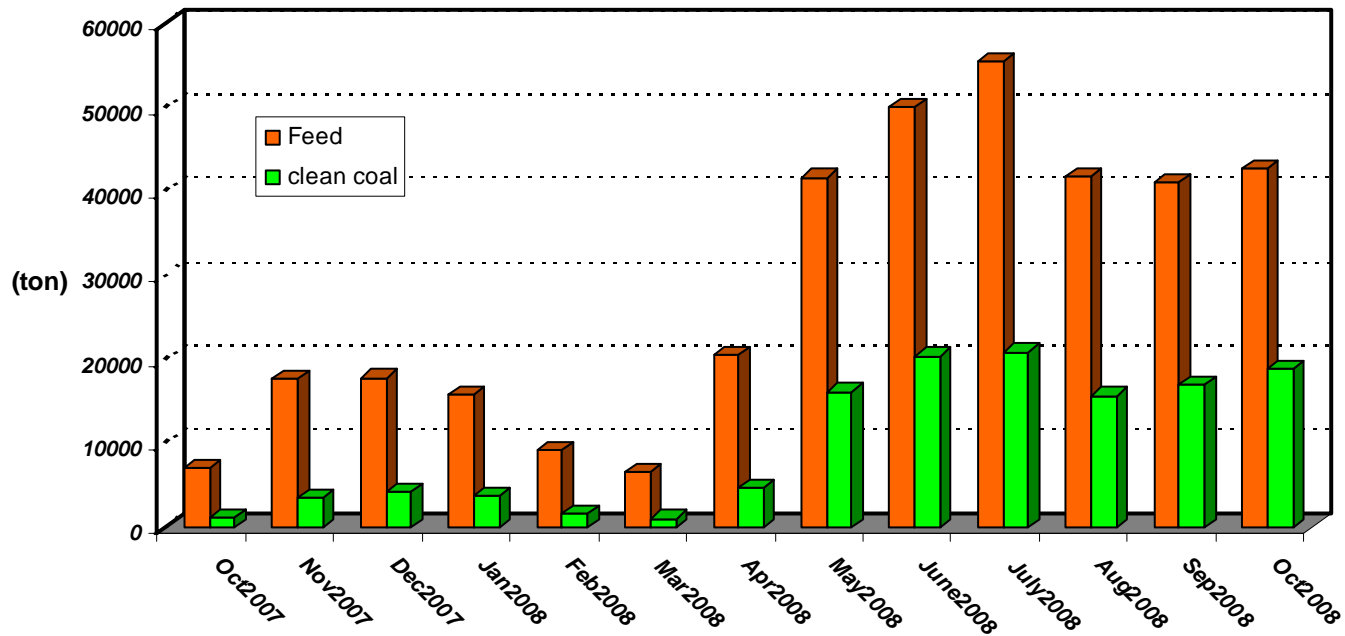


# TABAS COAL PREPARATION PLANT

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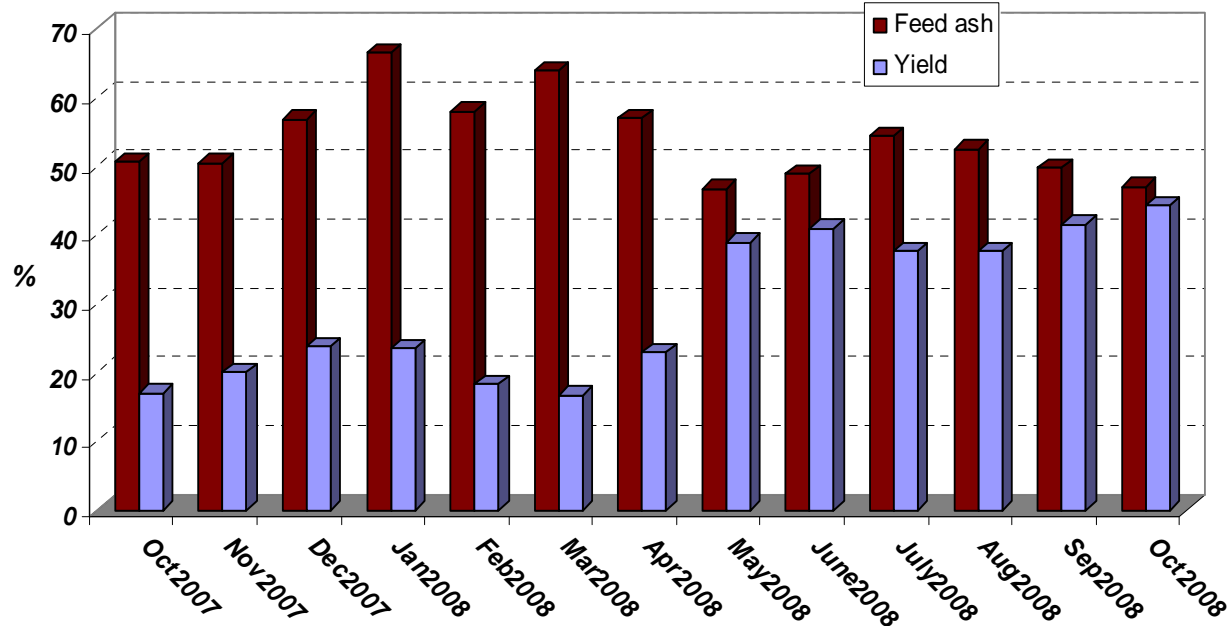
- INTRODUCTION
- RESULTS
- PROBLEMS

# Monthly Tonnage Feed & Clean Coal





# Monthly Feed Ash & Clean Coal Yield



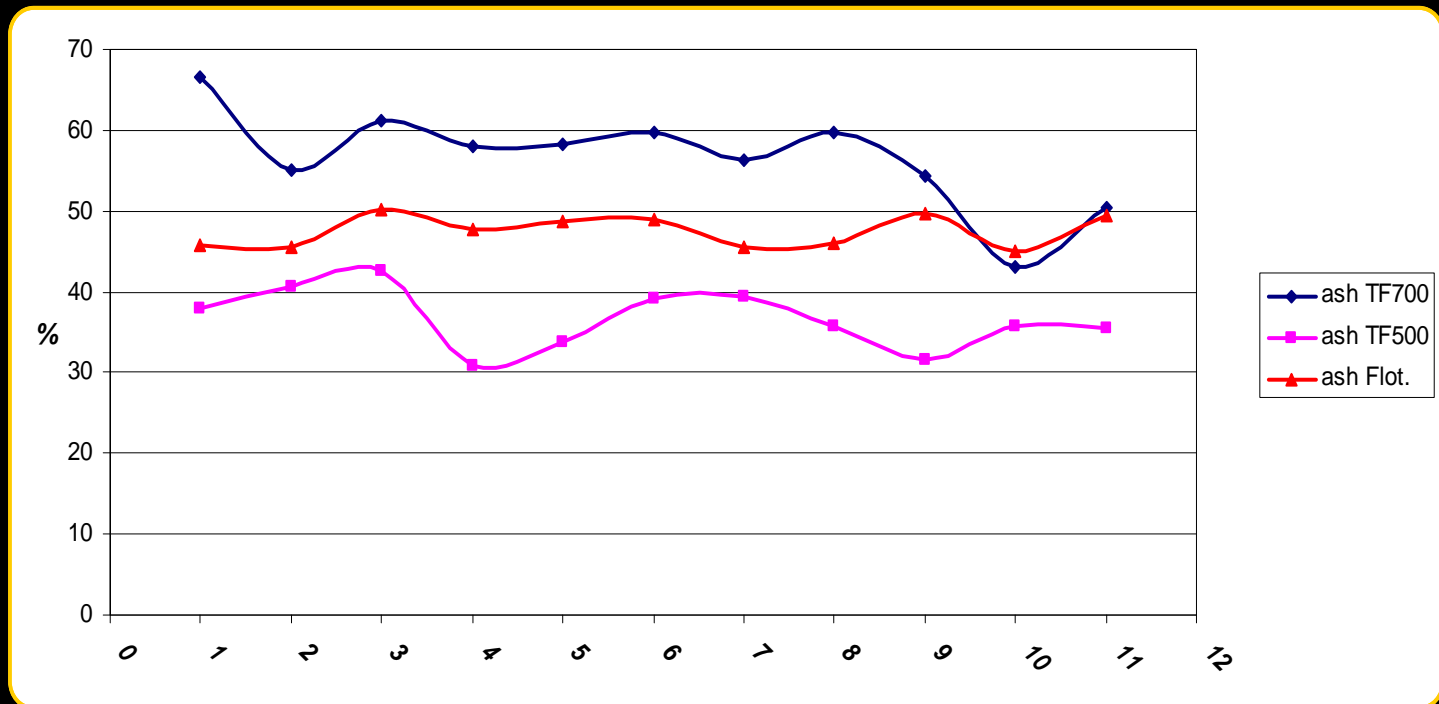


# Total CPP Feed & Production

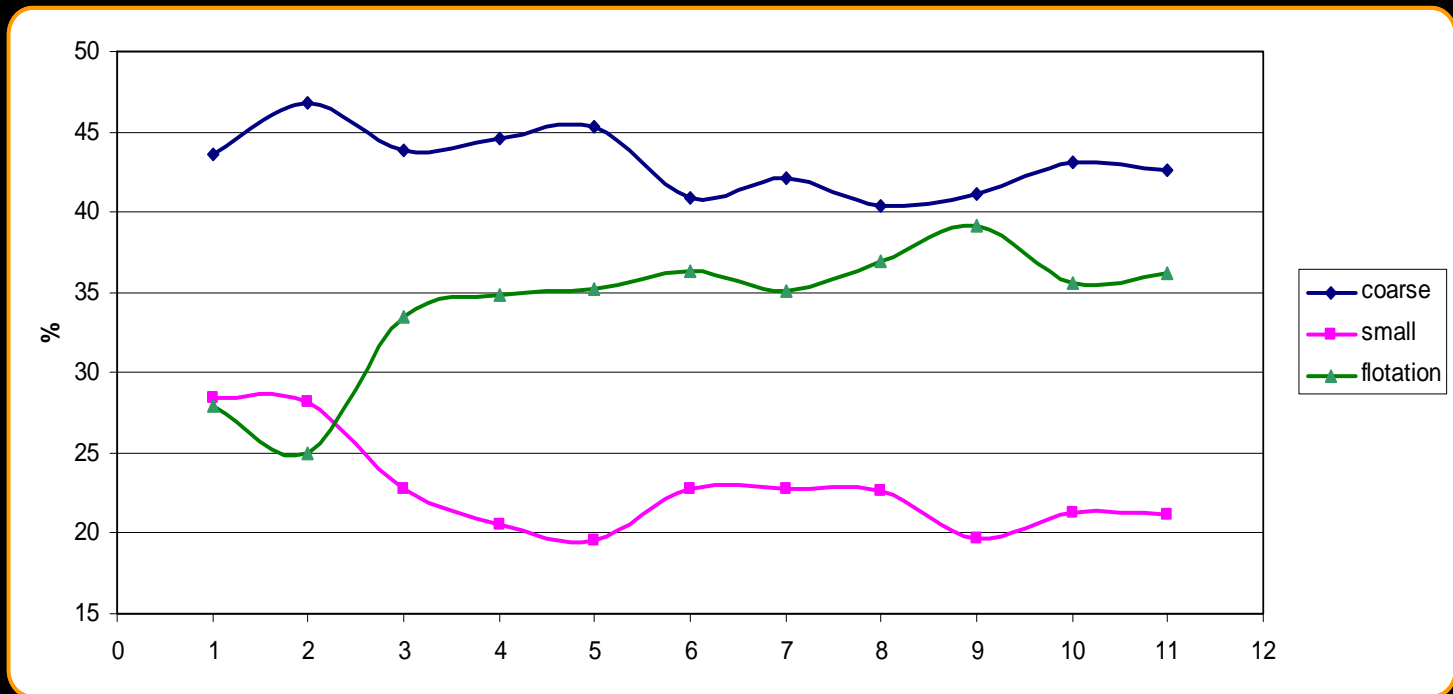
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- Total Feed: 400,000 t
- Average Clean Coal Yield: 36.5 %
- Total Clean Coal: 145,000 t
- Average Feed Ash: 51.9 %
- Average Clean Coal Ash 11.5 %
- Average Moisture (total): 10.3 %

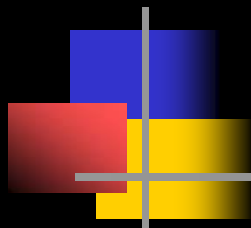
# Ash of Each Circuit (OCT 2008)



# Material Split of Feed







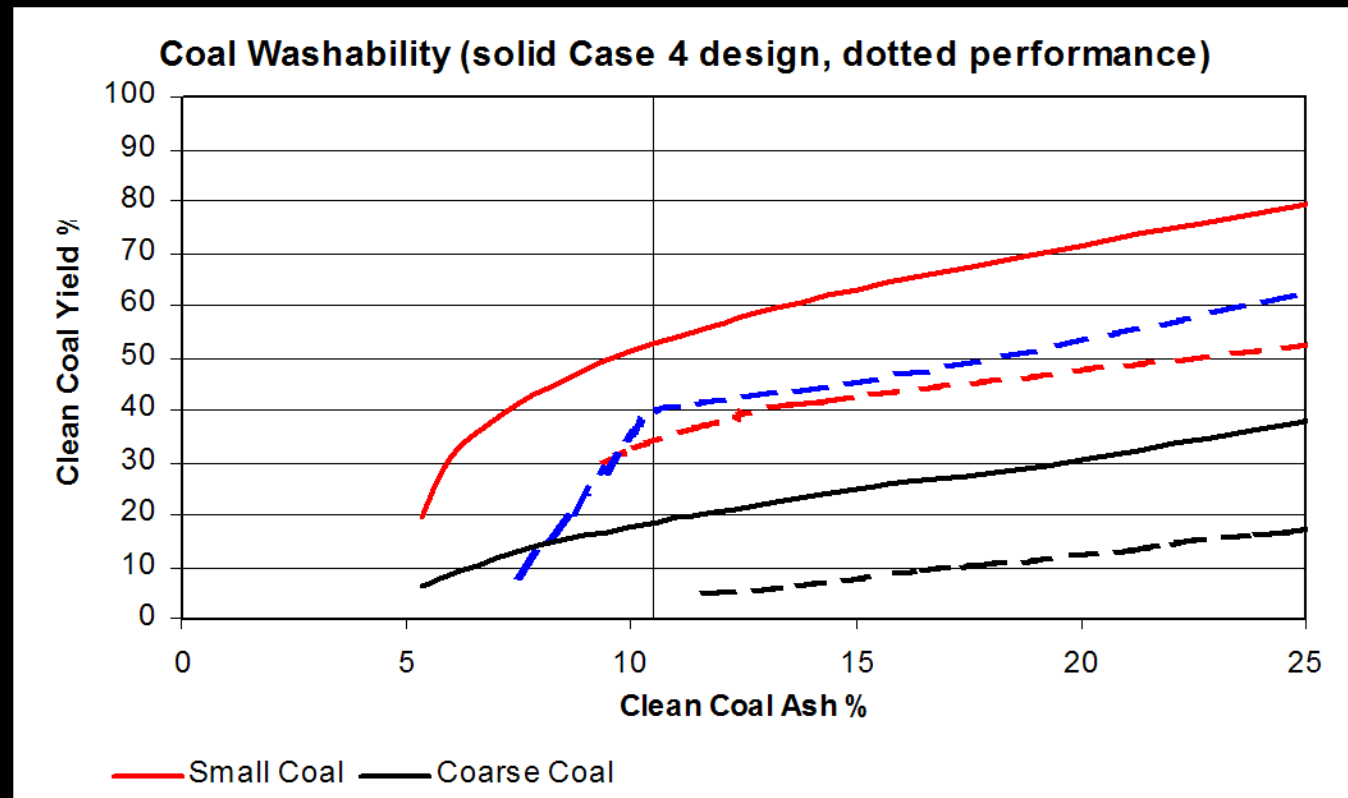
# Performance Test Feed

Size	Wt	Ash
mm	%	%
+ 50	3,32	81,90
- 50 + 25	9,29	79,20
- 25 + 12	14,06	75,80
-12 + 6	14,98	71,10
- 6 + 3	12,45	63,90
- 3 + 1	14,29	51,70
- 1 + 0.5	12,15	47,10
- 0.5	19,47	46,00
Total	100,00	61,40

# Washability

## March 2008 – Performance Test

Plant Result 8.35% Ash & 13.8% Yield



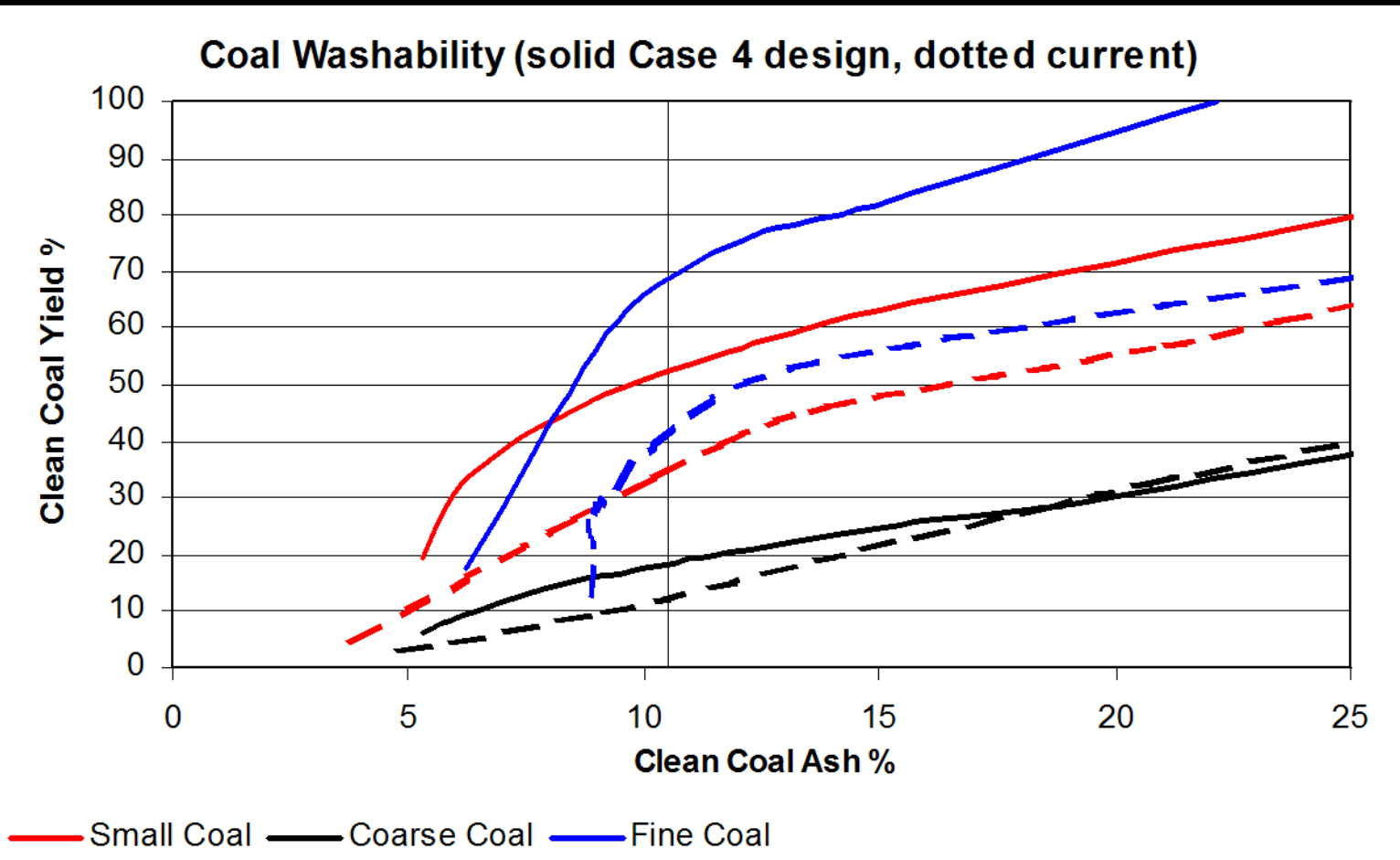


# PLANT FEED – CURRENT

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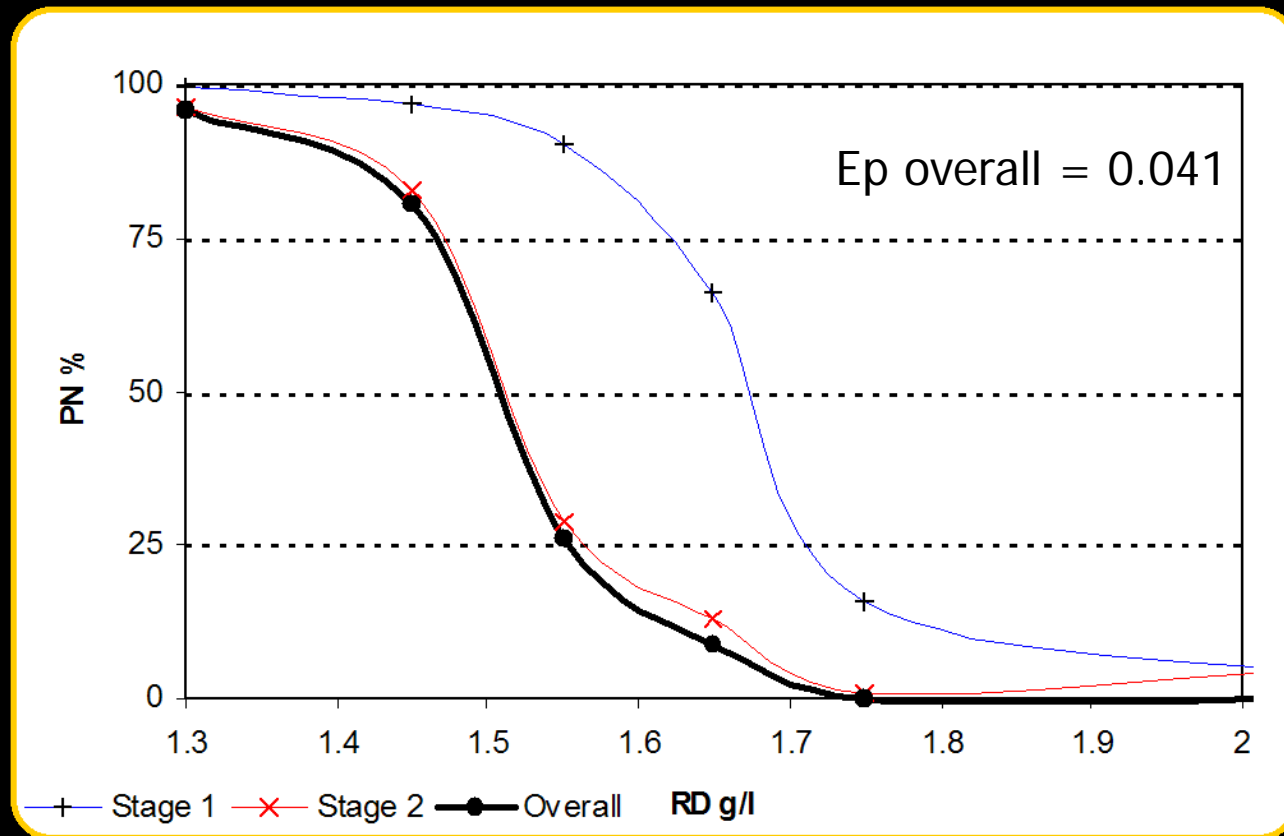
SIZE	Weight %	Ash %
Total	100	45,4
+ 6 mm	39,4	54,6
- 6+0,5 mm	40,3	39,2
- 0,5 mm	20,3	40,0

# Current Washability



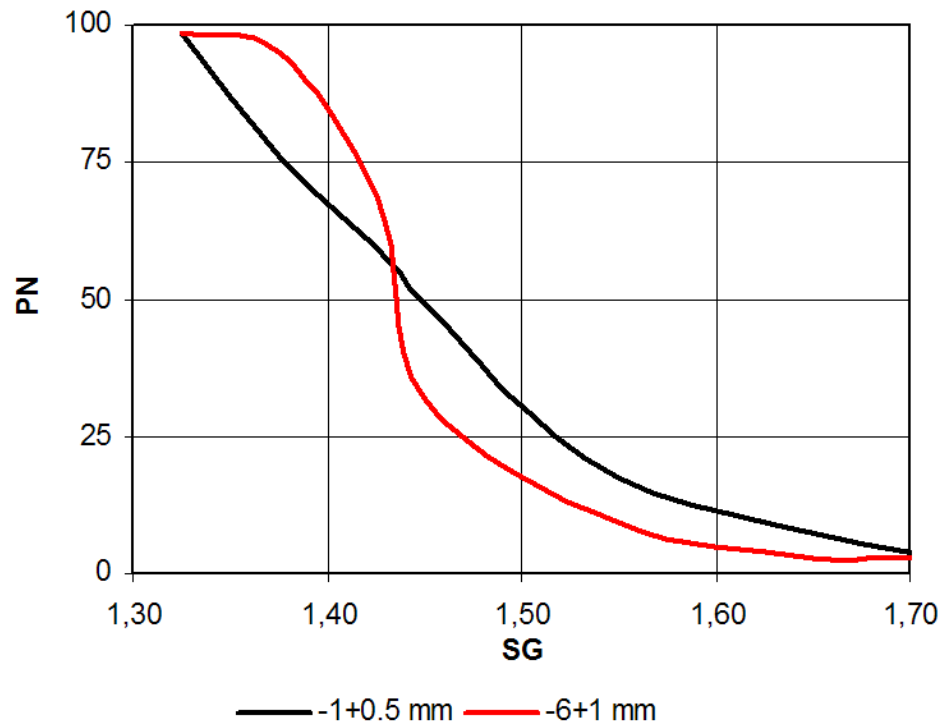


# Partition curve & Ep TF 700

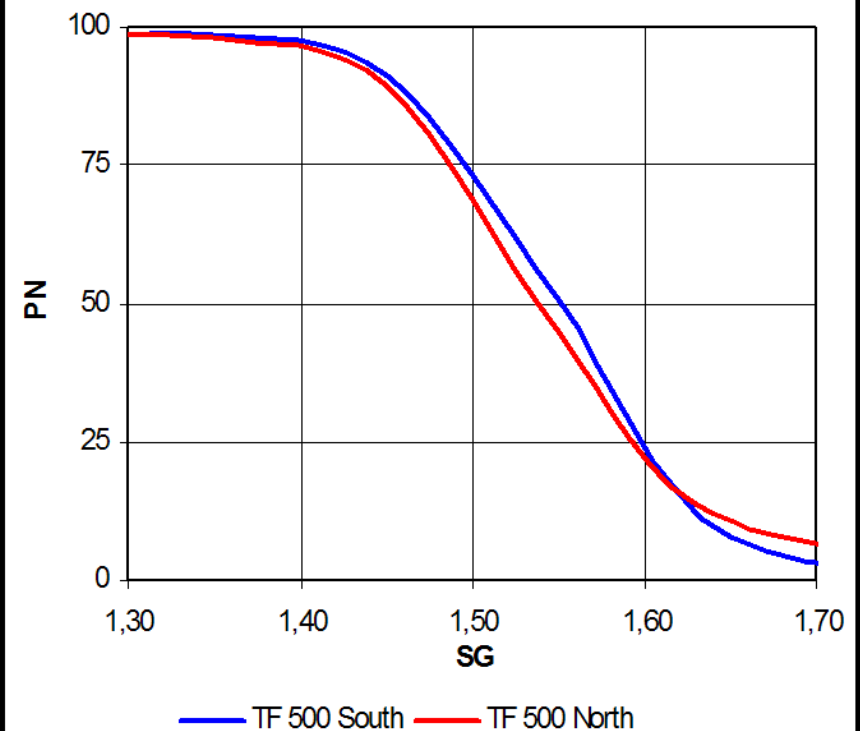


# Partition curve & Ep TF 500

TF 500 North - Performance Test



TF 500

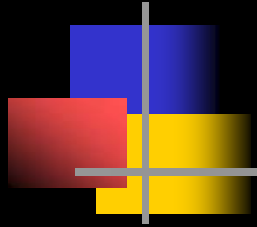




# Problems

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- Commissioning?!
- Design



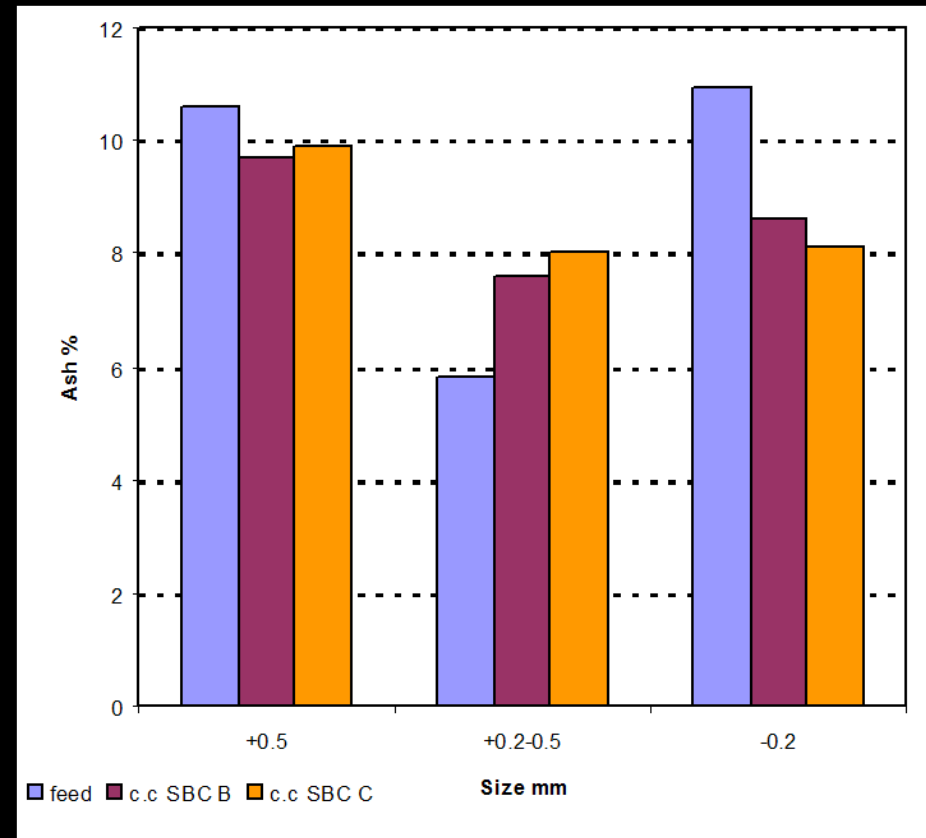
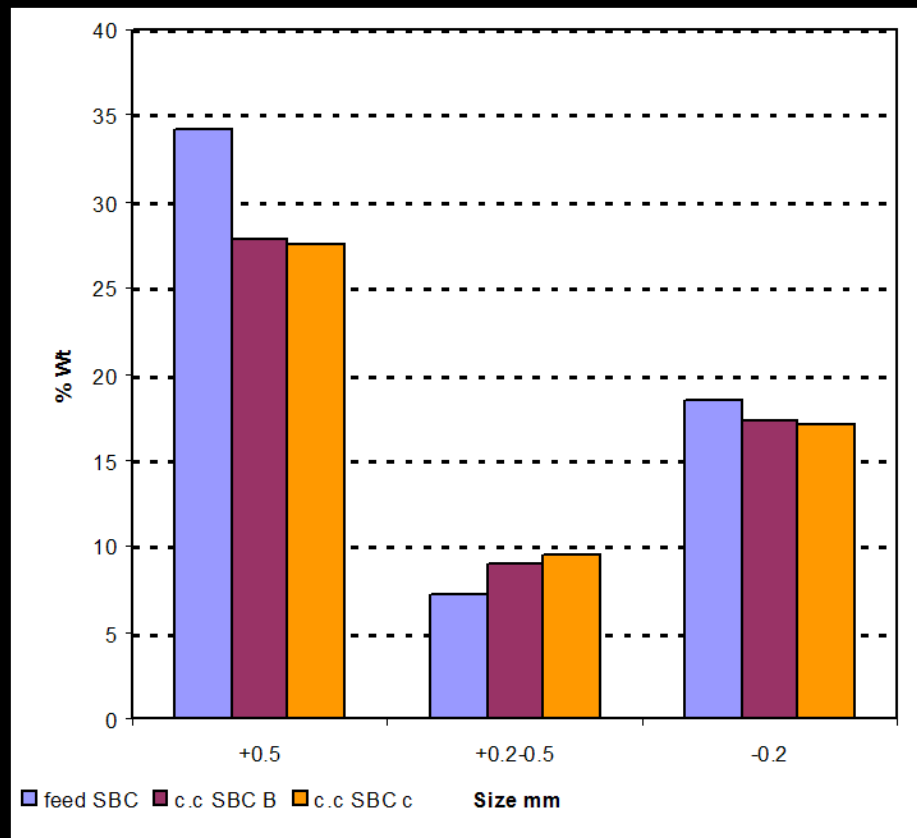
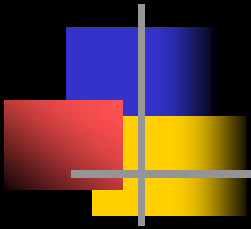
# Design problems 1

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1. Direct feeding from the mine (no blending)
2. Stock pile ROM
3. Coarse coal flow sheet
4. Crusher protection
5. Small clean coal dewatering
6. Centrifuge or crusher!?

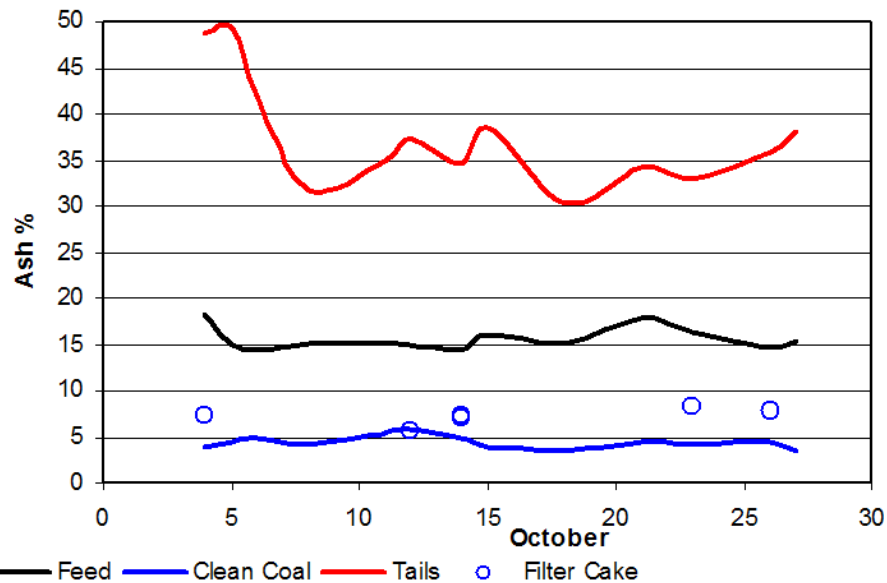


# SBC Feed & Cake

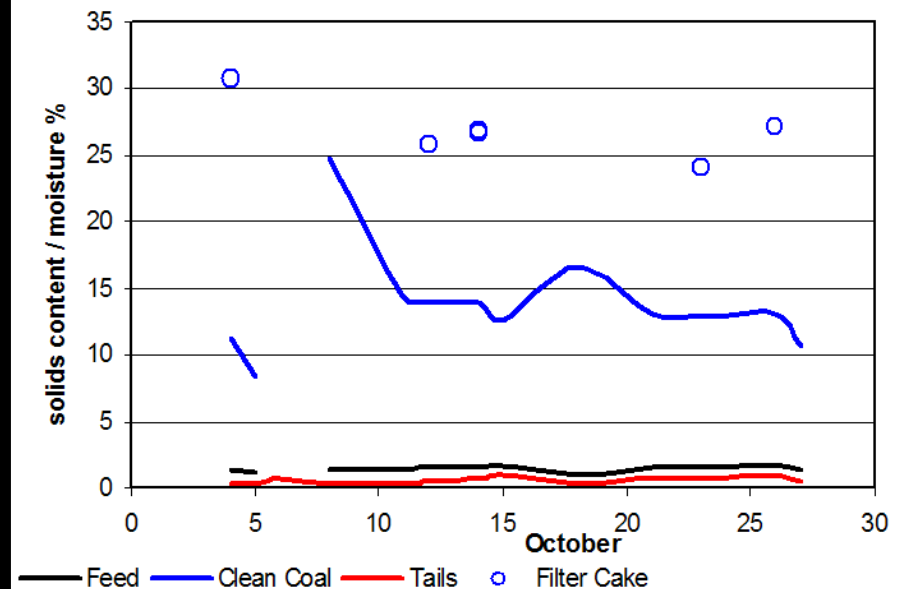


# Ultrafine Coal Washing

Ultrafine Flotation



Ultrafine Flotation



# Design problems 2

- 7. Size of columns
- 8. Clean coal Filter press inside the main building
- 9. Handling?!

How do you  
design for this?



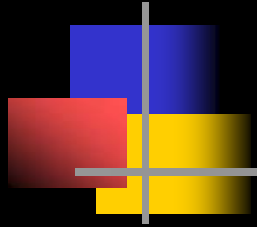
# GENERAL PROBLEMS?!

## THREE EXAMPLES

1. Piping
2. Vibration
3. Staff Experience



Easy ones: don't do it like this



# Questions?





# Did you get enough for today?

