

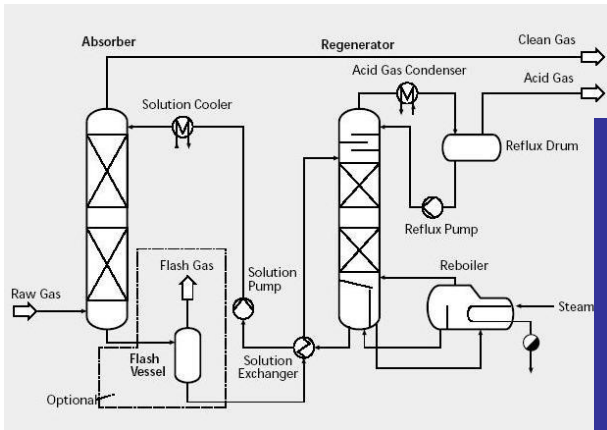
Case Study

The CQM System in Refineries in Amine Treatment Plant



maximum flow for maximum efficiency





In the average refinery has many installations plant to sweetening the gas

Installations of sweetening gas are based on special fluid, this fluid AMIN, has an ability of filtration and annexation.

The amine absorption process removes hydrogen sulfide or carbon dioxide from a gaseous mixture.

MEA

MONOETHANOLAMINE

$\text{H}_2\text{NCH}_2\text{CH}_2\text{OH}$

This heat exchanger is located in area B, in the Amine Unit, serving to condense the remainder water vapor in the H₂S gas. Originally, the heat exchanger would get clogged by scale and silt and the heat exchange capacity diminished to the point where external cooling, in the form of water spray over the condenser case, had to be used. The external water was only a partial remedy, however it added corrosion and mudded all surroundings.



The C.Q.M Automatic Tube Cleaning System (ATCS) was presented to Ashdod Refineries technical personnel (managers and maintenance) in a special conference on site

The Refineries management then decided to install one system as a pilot.

The management decided to install the ATCS on a very problematic heat exchanger (151 – C5) which is critical in the MEA Amine gas cleaning process



The H₂S condenser was blocked with mud and scale, and required cleaning twice a year.

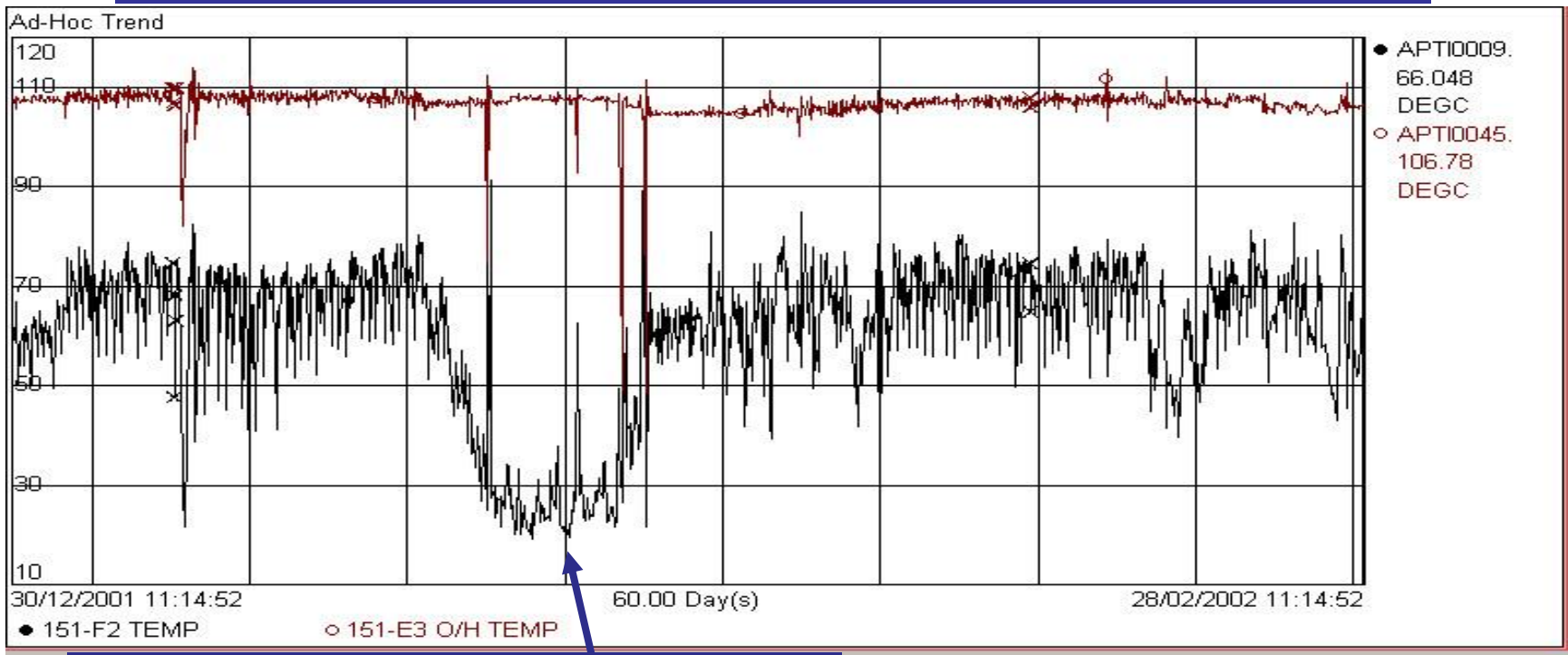
As a result of poor heat transfer, water would reach the sulfur recovery plant and cause serious clogging and corrosion problems.



Sometimes on hot days additional external cooling was required, and water was sprayed onto the condenser case.



C5 In the amine plant: average temperature of 63° C between 30 Dec. 2001 – 29 Feb. 2002



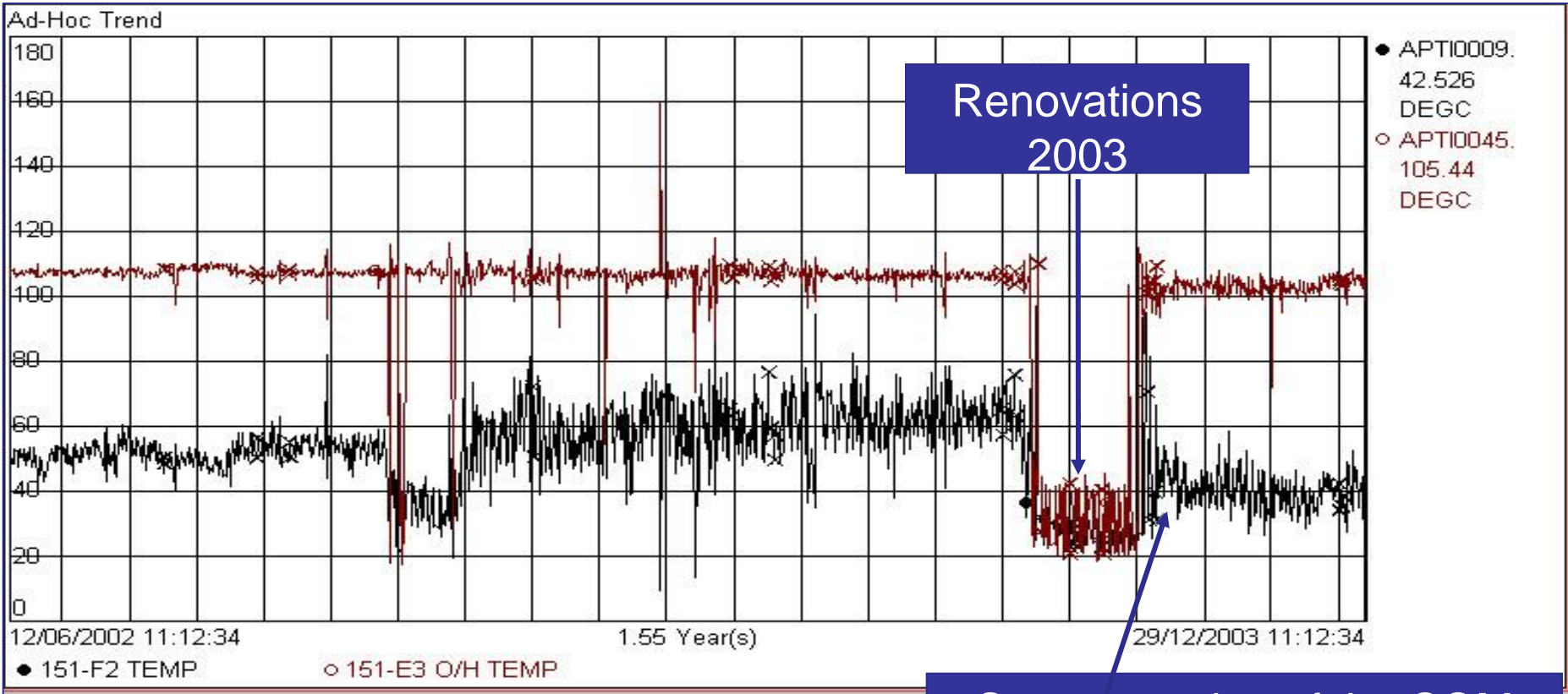
the condenser was cleaned in January





The C.Q.M ATCS system was installed in October 2003, during a period of renovation. At this time, the condenser was cleaned with acid and high-pressure water, as well as undergoing localized cleaning.





Renovations
2003

Start operation of the CQM

After CQM ATCS Installation the C5 In the amine plant average temperature is 45° C



Energy	157%
Operating – cleaning the condenser	2,500
Sealing	600
continual operation of the Sulfur Retrieval Plant	50,000
spray water	8,845
Total Savings US \$ per year	61,945



Paz Ashdod Refinery



RE: CQM Automatic Tube Cleaning System in Ashdod Refinery, Israel.

On August 2003 CQM has installed its system in our Amine generator plant, in the H₂S condenser tube and shell Heat exchanger.

Prior to the installation the heat exchanger was constantly clogged by scale and mud, causing us the following problems:

1. Cleaning 1-2 times per year (half - full day per cleaning session)
2. Lost of capacity due to process problem in the Sulfur recovery plant.
This plant is installed after the Amine Unit. When the H₂S condenser was tend to clogged, which cause some operational difficulties in the Sulfur recovery plant. That has cause more clogging by corrosion particles and discontinuation of the process. Disruption of the Sulfur retrieval Plant costs thousands of US \$ per day. This cost is amplified when the crude oil is of high sulfur content.
3. Water consumption – before the installation we used to constantly spray water on the heat exchanger in order to cool it down.
4. Maintenance and managerial attention to the system which was a bottle neck at the time.

Since the installation of CQM technology, our production is running smoothly with no interruptions, we do not need stop the heat exchanger for maintenance, and no more malfunctions were registered in the Sulfur Recovery plant.

A study that was conducted by our external engineering company to evaluate the benefits of CQM'S technology shows direct cost savings of more then \$50,000 per year / per heat exchanger and in addition shows improvement of 157% in heat transfer.

Following the above results and full satisfaction from CQM's technical ability and customer service, we plan to continue and install these systems throughout our plant.

Regards

Ido Rosolio
Refinery Manager

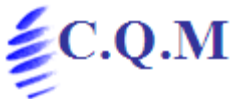
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Efficiency Solutions



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals

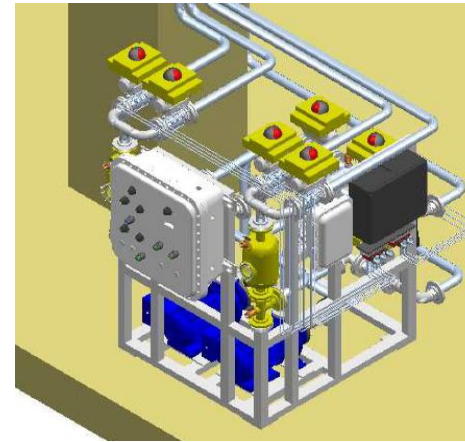
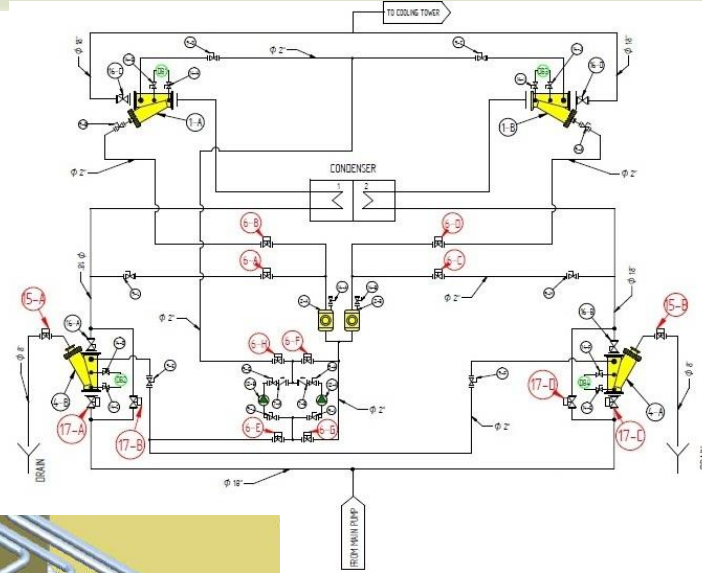
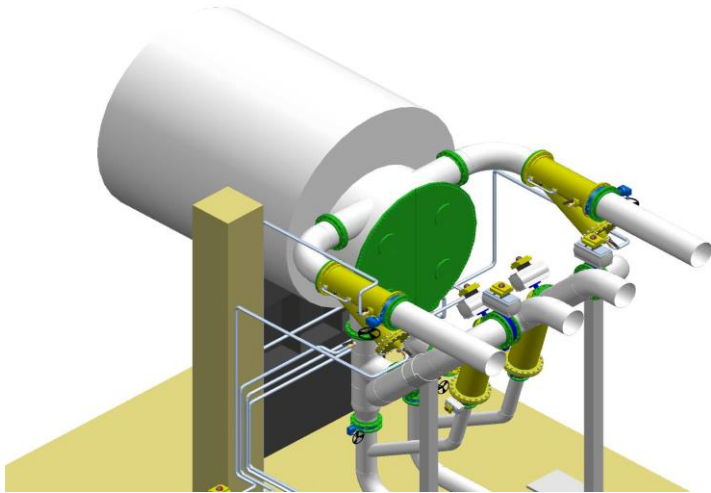
factory name			Plant type		
Nuevo Pemex Gas Processing Plant Pemex Gas and Basic Petrochemicals			Gas processing, fractioning and sweetening plant		
ATCS size		Date of first installation	Number of systems	Bundle & tubes size	Regulation and Zone No
2 x 18" with 2 x 18" filters		12-2010	1		
plant	Explanation on the installation				
Gryogenic-1 EA-2121-AX	<p>Gas compression plant –steam condenser Tubes - Cooling tower water. Shell –H2O steam (in vacuum) The problem –fouling in the tubes reduces the condensing capacity and the vacuum in the shell is reduced, which affects the turbocompressor efficiency. The plant needs to use more power to compress the gas. ATCS with two pump (one redundant) 2 collectors and 2 inline ball-traps and valves with 2 x 18"s filter with automatic backwash.</p>				<p>Straight tubes. Carbon steel tubes. Tubes size 14.6mm.</p>
	34°C	55°C	2.0m/s	Cool by cooling tower	



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals

The controller operates 10 solenoid valves, each solenoid valve commands pneumatic valves that work together:



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals

2 filter with automatic
backwash control by ΔP
With automatic bypass

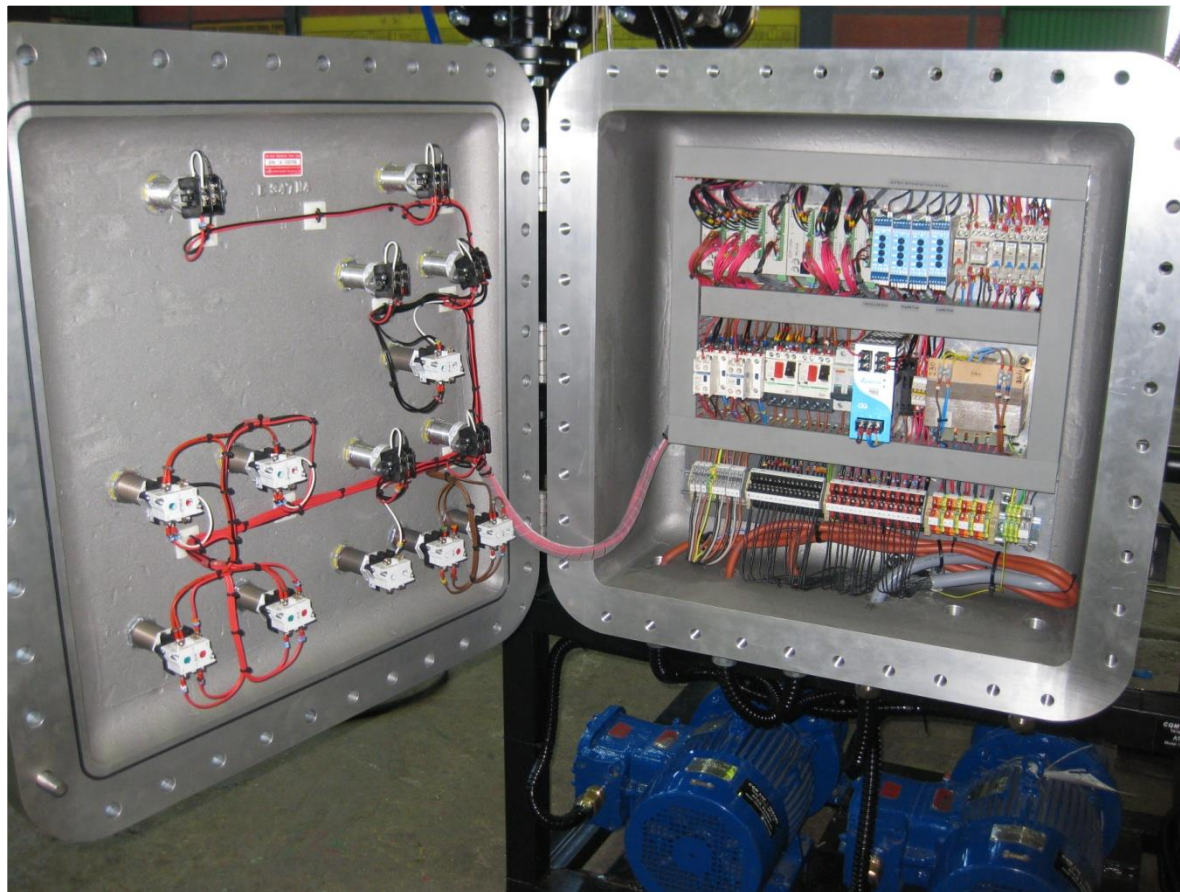


2 Ball-traps with warning
on ΔP increase



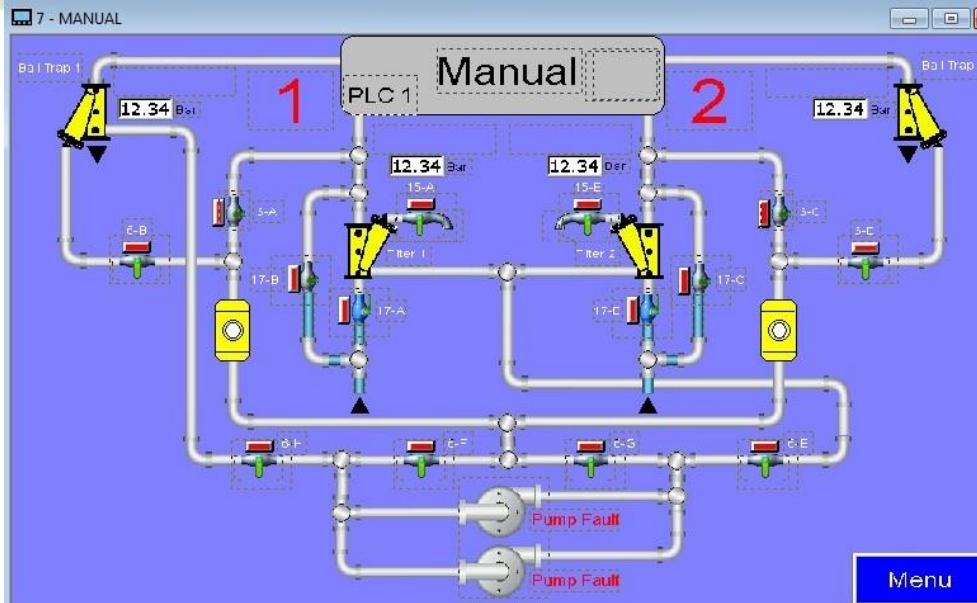
Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals

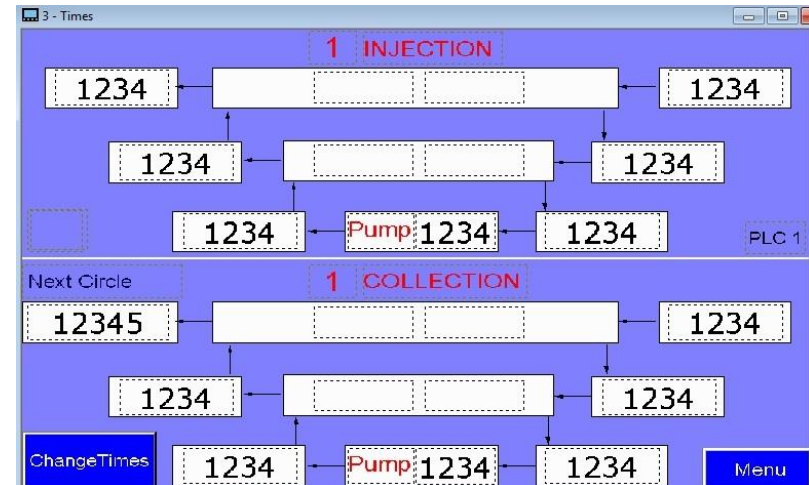
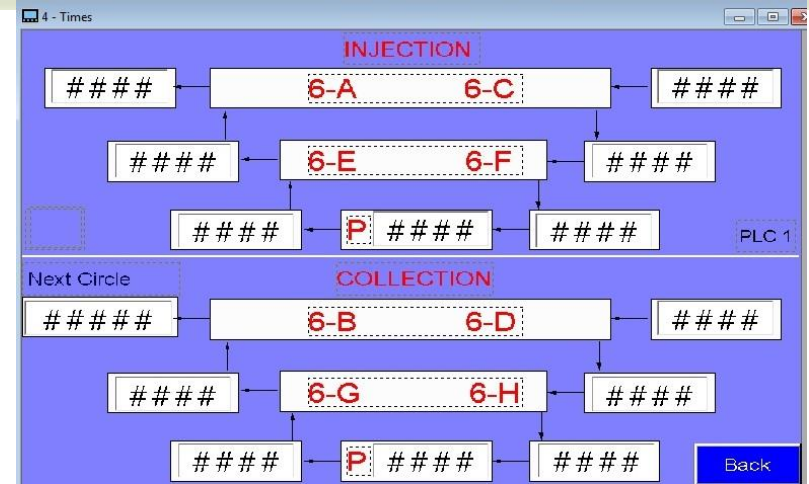


Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals



Control Panel in the Control Room



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals

6 - Menu

PLC 1

Menu

Main	Manual
Timers	Pressure
Faults	Counters

Stop Automate Display Mode 1

9 - setting faults

PLC 1

Setting

Valves	Open Time sec	Close Time sec	Valves	Open Time sec	Close Time sec
6A E147E	###.#	###.#	6P E147E	###.#	###.#
6B E147E	###.#	###.#	6Q E147E	###.#	###.#
6C E147E	###.#	###.#	6R E147E	###.#	###.#
6D E147E	###.#	###.#	6T E147E	###.#	###.#
6E E147E	###.#	###.#	6U E147E	###.#	###.#
6F E147E	###.#	###.#	6V E147E	###.#	###.#
6G E147E	###.#	###.#	6W E147E	###.#	###.#

Back

10 - PRESSURE

PLC 1

Pressure

	Δ P Filter 1	Δ P Filter 2	Δ P Ball Trap 1	Δ P Ball Trap 2
Present (bar)	12.34	12.34	12.34	12.34
Delay Time (sec)	###.#	###.#	###.#	###.#
Alarm (bar)	###.#	###.#	###.#	###.#
Start BackWash (bar)	###.#	###.#		
Stop BackWash (bar)	###.#	###.#		
BackWash Actions	##	##		
BackWash Time (sec)	###.#	###.#		

Setting Menu

12 - counters

PLC 1

Counters

Cycles	1234567891	Reset
RePower	1234567891	Reset
Bypass 1	1234567891	Reset
Bypass 2	1234567891	Reset
Drain 1	1234567891	Reset
Drain 2	1234567891	Reset

Menu

8 - Faults

PLC 1

FAULTS

12

Menu Setting Reset Clear

11 - setting

PLC 1

Setting

	Δ P Filter 1	Δ P Filter 2	Δ P Ball Trap 1	Δ P Ball Trap 2
Present (bar)	12.34	12.34	12.34	12.34
Maximum (bar)	###.#	###.#	###.#	###.#
Minimum (bar)	###.#	###.#	###.#	###.#

Filter 1 Enable Filter 2 Enable Ball Trap 1 Enable Ball Trap 2 Enable

Back



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals



Nuevo Pemex Gas Processing Plant

Pemex Gas and Basic Petrochemicals



Carmel Olefins Ltd - petrochemical

factory name				Plant type			
Carmel Olefins Ltd				petrochemical			
ATCS size		Date of first installation		Number of systems	Bundle & tubes size	Regulation and Zone No	
3" – 10"		2006		8			
plant	Explanation on the installation						
Polypropylene	Polypropylene plant on Pelletizer circulating water cooler cooling water in the shell and process water in the tubes.						
	32	38°C	1.4m/s	Cool by cooling tower			
	Polypropylene plant on top of distillation tower (stripper tower) on the shell steam with hydrocarbons in the tubes cooling water.						
	32	36°C	1.5m/s	Cool by cooling tower			
Ethylene	Ethylene plant stripper overhead condenser on the shell-side Note-4 in the tubes cooling water.						
	32	37°C	1.5ms	Cool by cooling tower			
	Ethylene plant propylene reflux cooler on the shell-side propylene in the tubes cooling water.						
	32	38°C	1.2m/s	Cool by cooling tower			
	Ethylene plant split-ovhd trim condenser on the shell-side split-ovhd in the tubes cooling water.						
	32°C	38°C	1.2m/s	Cool by cooling tower			
Polyethylene	Polyethylene plant extruder flake cooler on shell-side chiller water in the tubes close process water						
	40°C	60°C	1.7m/s	close process water			



Gadiv Petrochemical Industries Ltd

factory name					Plant type				
Gadiv Petrochemical Industries Ltd					petrochemical				
ATCS size			Date of first installation		Number of systems		Bundle & tubes size		Regulation and Zone No
4"			12-2007		1				
plant	Explanation on the installation								
B.T.X	CQM system treat the extractor feed cooler, the cooler cool "Prefractionator Bottoms" on the shell with cooling water in the tubes				Straight bundles. Carbon steel tubes. Tubes size 13.4mm.			class 1 division 1	
34°C		55°C		1.4m/s	Cool by cooling tower				
factory name					Plant type				
Nuevo Pemex Gas Processing Plant Pemex Gas and Basic Petrochemicals					Gas processing, fractioning and sweetening plant				
ATCS size			Date of first installation		Number of systems		Bundle & tubes size		Regulation and Zone No
2 x 18" with 2 x 18" filters			12-2010		1				
plant	Explanation on the installation								
Gryogenic-1 EA-2121-AX	Gas compression plant –steam condenser Tubes - Cooling tower water. Shell –H2O steam (in vacuum) The problem –fouling in the tubes reduces the condensing capacity and the vacuum in the shell is reduced, which affects the turbocompressor efficiency. The plant needs to use more power to compress the gas. ATCS with two pump (one redundant) 2 collectors and 2 inline ball-traps and valves with 2 x 18"s filter with automatic backwash.				Straight tubes. Carbon steel tubes. Tubes size 14.6mm.			class 1 division 2	
34°C		55°C		2.0m/s	Cool by cooling tower				



Cactus Gas Processing Plant

Pemex Gas and Basic Petrochemicals

factory name			Plant type			
Cactus Gas Processing Plant Pemex Gas and Basic Petrochemicals			Gas processing, fractioning and sweetening plant			
ATCS size		Date of first installation	Number of systems	Bundle & tubes size		Regulation and Zone No
2 x 18"		12-2011	1			
plant	Explanation on the installation					
CRIOGENICA N-1 EA-121-AX	<p>Gas compression plant –steam condenser Tubes - Cooling tower water. Shell –H2O steam (in vacuum) The problem –fouling in the tubes reduces the condensing capacity and the vacuum in the shell is reduced, which affects the turbocompressor efficiency. The plant needs to use more power to compress the gas. ATCS with two pump (one redundant) 2 collectors and 2 inline ball-traps and valves.</p>					<p>Straight tubes. Carbon steel tubes. Tubes size 14.4mm.</p> <p>class 1 division 2</p>
	32°C	42°C	1.8m/s	Cool by cooling tower		





C.Q.M



maximum flow for maximum efficiency



THANK YOU