

> Jemaco



WELCOME TO PCM COMBINATION



SPXFLOW®

WHAT IS PCM COMBINATION?

Demand Controlled PCM Air Dryer



MOISTURE
75%



Demand Controlled Heated Purge Desiccant Air Dryer



MOISTURE
25%



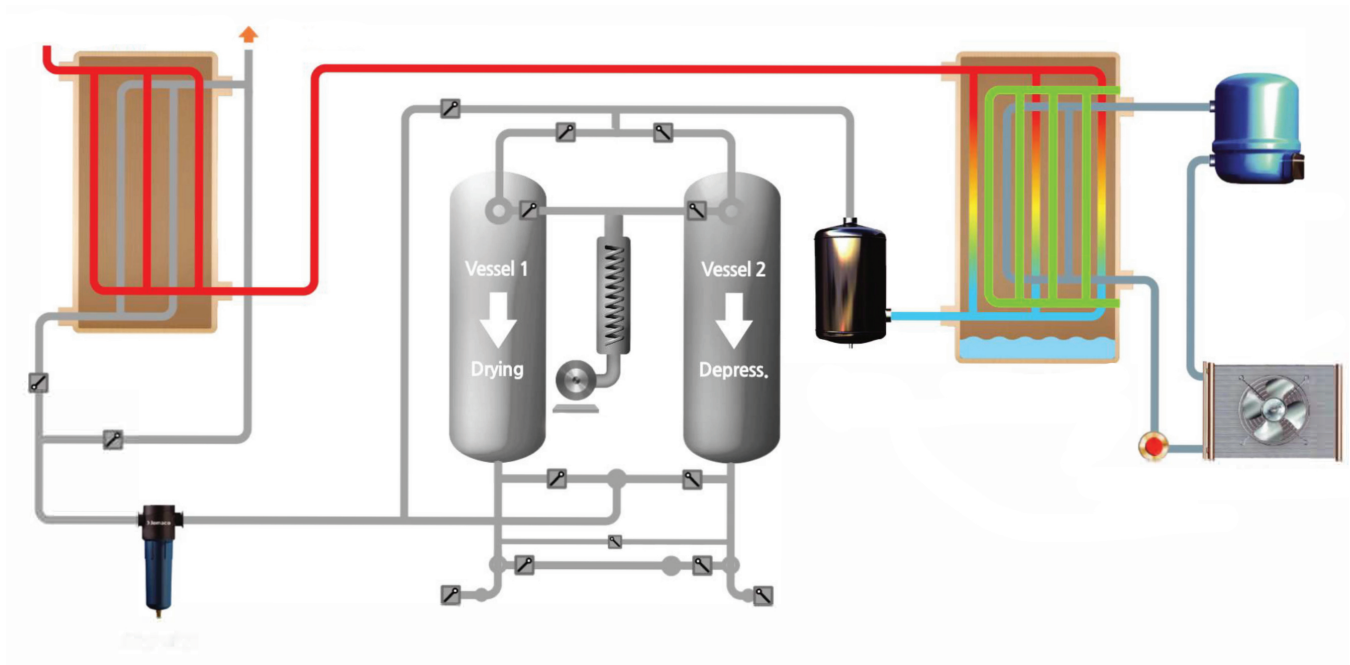
WHEN COMBINED

- Optimum discharge air temperature without the use of after cooler.
- Achieves a super dry dew point, as low as -100°C .
- Minimizes dew point spike during vessel switch over.
- Energy savings up to 86%

STEPS

1	Drastically reduces energy consumption by pre-removing up to 75% of moisture by using the PCM air dryer.
2	PCM air dryer, cycles (On Off) are controlled automatically according to inlet load : e.g. lunch time, season change.
3	Reduces total energy consumption by operating PCM air dryer alone if necessary. (except winter)
4	Reduces energy consumption by controlling the desiccant air dryer cycle time according to outlet dew point, which corresponds to inlet moisture load.
5	Integrated high efficiency blower, which regenerates with ambient air. Zero loss purge.
Total	86%

HOW IT WORKS?



DESICCANT AIR DRYER VS PCM COMBINATION

Heated Purge Desiccant Air Dryer

PCM COMBINATION (PCM+ Zero loss blower purge)



Purge Cost:
USO 0014 NM3/HR

Energy Savings by PCM

Energy Savings on Refrigeration

Power consumption :
Desiccant 120kWh (Heater 120kWh)

Use purge air heated by external heater for regeneration, cooling and heating mode

Power consumption :
PCM 15.9kWh (35.5%@45kWh)
Desiccant 25.9kWh (30%@81.5kWh)

Energy savings in 5 steps

POWER CONSUMPTION	2,160 kWh/day
CYCLE TIME	4 hr
PURGE LOSS	15%
ENERGY FOR PURGING	5,880 kWh/day

POWER CONSUMPTION	1,779 kWh/day
CYCLE TIME	32 hr
PURGE LOSS	0%
ENERGY FOR PURGING	0

0 Loss Purge

Flow Rate : 14,000 Nm³/hr | Air Inlet Temp. : 38°C | Air Inlet Pressure: 7kg/cm² [-40°C@PDP]

DESICCANT AIR DRYER VS PCM COMBINATION

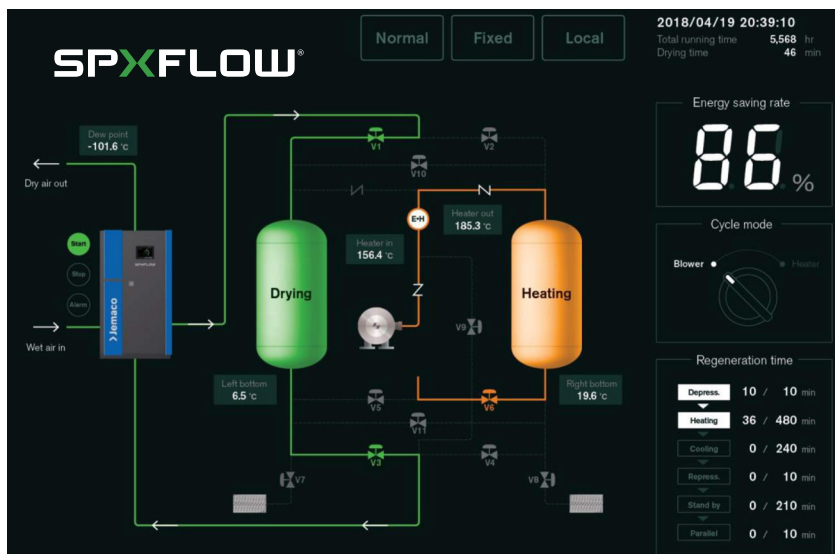
AIR DRYER TYPE	FLOW CAPACITY [NM ³ /HR]	POWER CONSUMPTION	PURGE AIR (&)	REGENERATION TIME	DAILY POWER CONSUMPTION [kW]	DAILY ENERGY FOR PURGING [kW]	ANNUAL POWER CONSUMPTION [USO]	ENERGY SAVING [%]
Heated Purge	14,000	120 (Heater 120)	15	4 (Heating 3 + Cooling 1)	2,160	5,880	352,152	
Combination Heated Purge		96 (Heater 42 + PCM air dryer 54)	5	16 (Heating 10 + Cooling 3 + Standby 3)	1,019	1,593	114,375	68%
Blower Purge	14,000	197 (Heater 179 + Blower 18)	15	4 (Heating 3 + Cooling 1)	3,546	1,470	219,700	
Combination Blower Purge		111 (Heater 46 + Blower 11 + PCM air dryer 54)	5	16 (Heating 10 + Cooling 3 + Standby 3)	1,244	368	70,575	68%
Zero Loss Blower Purge	14,000	250 (Heater 230 + Blower 20)	0	6 (Heating 4.25 + Cooling 1.25 + Parallel 0.5)	4,350	0	190,530	
Combination Zero Loss Blower Purge		135.5 (Heater 74 + Blower 7.5 + PCM air dryer 54)	0	16 (Heating 11 + Cooling 4 + Standby 1)	1,779	0	77,900	59%

- Purge cost USO 0.014 per 1 Nm³/hr 0 Power cost USO 0.12 per kW/hr 0 PCM air dryer energy saving of 70% 0 Daily energy for purge air [kW] : (purge flow rate x purge cost)+ power cost 0
- Following figures varies on customer's environment

Above table shows an energy savings comparison rate between a desiccant air dryer and a PCM COMBINATION without changing the dryer type.

User Friendly Interface - HMI

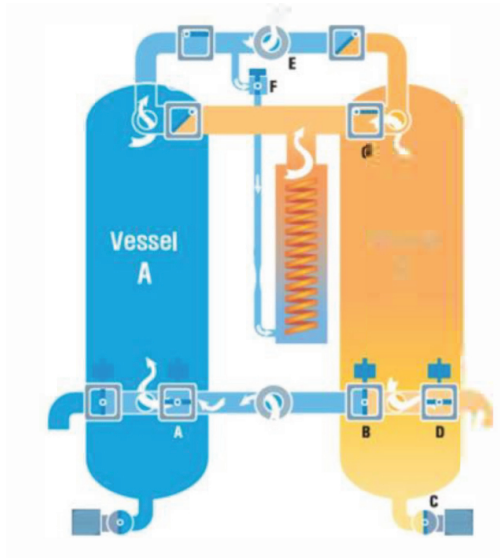
- Air Dryer Start / Stop
- Regeneration status
- Input / Output status
- Temperature & Power consumption
- Regeneration log
- Alarm history
- Energy saving monitoring
- Others



CASE A : POSCO - STEEL MILL COMPANY

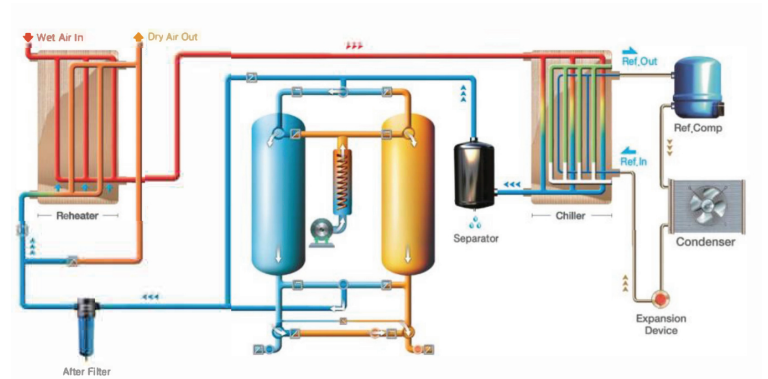
BEFORE

Heated Purge Desiccant Air Dryer



AFTER

PCM COMBINATION



	HEATED PURGE DESICCANT AIR DRYER	PCM COMBINATION
FLOW RATE	14,000 Nm ³ /hr	
ACTUAL RATE (AVERAGE)	10,632 Nm ³ /hr	
POWER CONSUMPTION	189 kW	135.5 kW / Incl. PCM Air Dryer
PURGE LOSS	2,632 Nm ³ /hr	0 Nm ³ /hr
PURGE LOSS RATE	20 %	0 %



HEATED PURGE

1

ELECTRIC HEATER

USD \$124,173

$189\text{kW} \times (2.5\text{hr} + 4\text{hr}) \times 24\text{hr}$
 $\times 365\text{day} \times 0.12\$/\text{kW}$

2

PURGE AIR

USD \$343,392

$(14,000\text{Nm}^3/\text{hr} \times 20\%) \times (24\text{hr} \times 0.014\$ +$
 $0.12\$/\text{kW}) \times 365\text{day} \times 0.12\$/\text{kW}$

TOTAL (\$124,173 + \$343,392)

USD \$467,565

PCM COMBINATION (PCM + ZERO LOSS BLOWER PURGE)

1

ELECTRIC HEATER

USD \$53,480

$(7.4\text{kW} \times (11\text{hr} + 16\text{hr}) \times 24\text{hr}$
 $\times 365\text{day} \times 0.12\$/\text{kW}$

2

BLOWER

USD \$7,391

$(7.5\text{kW} \times (11 + 4)\text{hr} + 16\text{hr})$
 $\times 24\text{hr} \times 365\text{day} \times 0.12\$/\text{kW}$

3

PCM AIR DRYER

USD \$17,029

$(54\text{kW} \times \text{Average utilization rate } 30\%$
 $\times 24\text{hr} \times 365\text{day} \times 0.12\$/\text{kW}$

TOTAL (\$53,480 + \$7,391 + \$17,029)

USD \$77,900

83% ENERGY COST SAVINGS

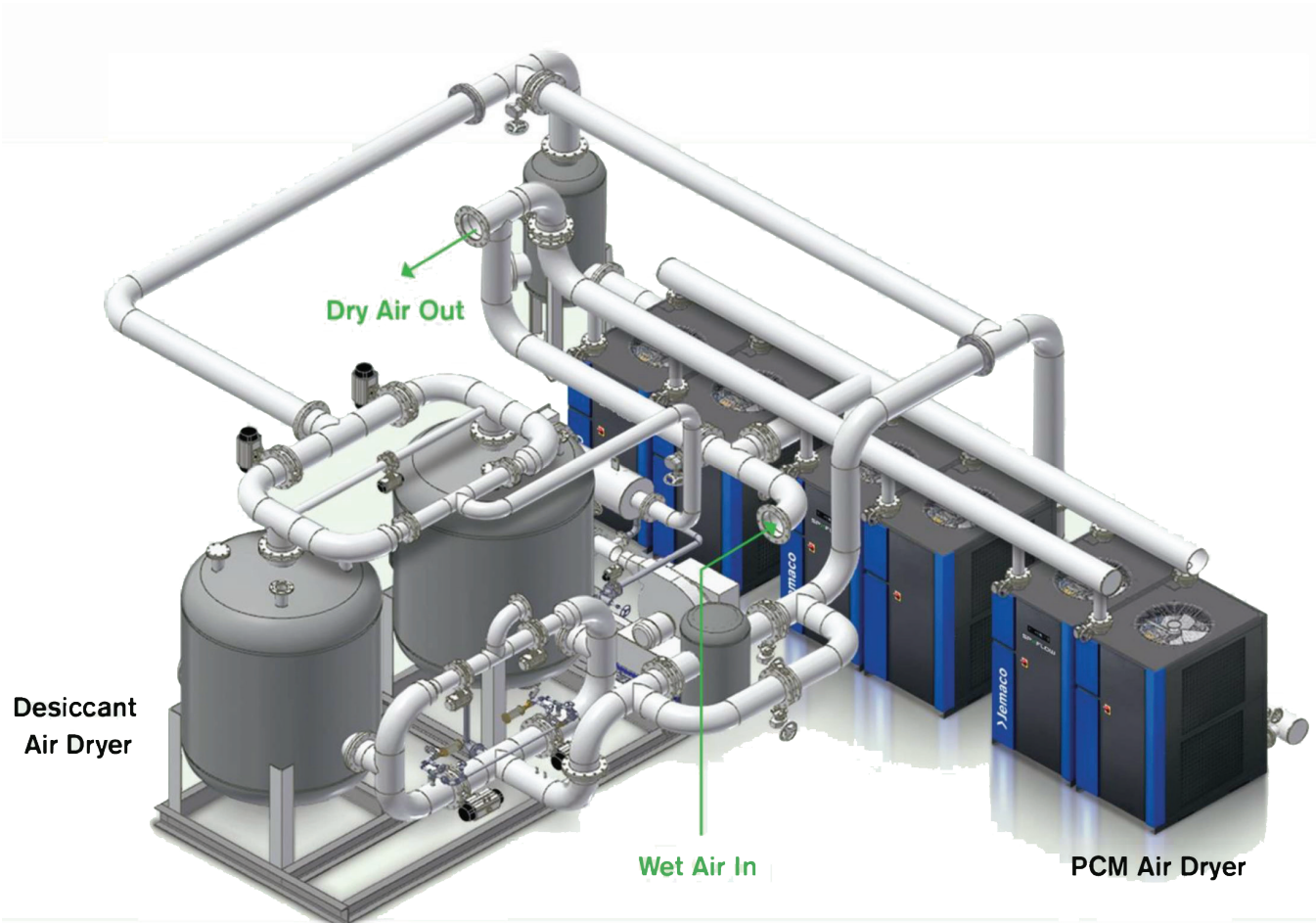
ENERGY COST SAVINGS

USD \$389,664

RETURN OF INVESTMENT (R.O.I) :

LESS THAN 1 YEAR

CASE A : POSCO - STEEL MILL COMPANY





Before

Heated purge desiccant air dryer front/back.



Installation

PCM air dryer.



Conversion

Zero loss blower purge.



Installation

Hot air exhaust duct



Perspective



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