

INTRODUCTION

- ✱ Company incorporated in 2002
- ✱ Collaboration with Fouress Co. LLC. USA
- ✱ Patented Technology (US Patent No. 6860103)
- ✱ More than 100 energy audits done
- ✱ Six major projects implemented
- ✱ Six more under implementation
- ✱ Some are repeat orders.
- ✱ At least 12 planned for this year.

Energy Saving Potential in Compressors

- * U.S.A. energy consumption on compressors in 2002-100 billion Kwhs
- * 20% energy saving @ 0.35\$ per Kwh - \$0.7 billion.
- * Assuming India consumes only 8% of US Consumption
- * Energy consumption on compressors in India – 8 billions Kwhs
- * 20% saving @ Rs.4.50 per kwh
 = Rs.7.2 billion
 =Rs.720 crores

Importance of Energy saving Potential in compressors

- ✱ 100 H P compressor – Rs.6 To 8 lakh.
- ✱ Annual running cost – 300 days @Rs.4.50 per unit = Rs.25 lakh.
- ✱ 25% saving – Rs.6.25 lakh
- ✱ Equal to cost of the compressor itself!
- ✱ Energy cost of running a compressor is quite significant!

Who is running your compressed air system?

“Our compressed air system is running itself -----

-----and we are chasing it!”

-Tom Taranto-

Energy Loss in compressed air system

- ✦ Energy loss in compressors
- ✦ Waste of compressed air in use
- ✦ Losses in driers, pipelines, etc
- ✦ Losses due to improper point of use applications

Energy Loss in Compressors

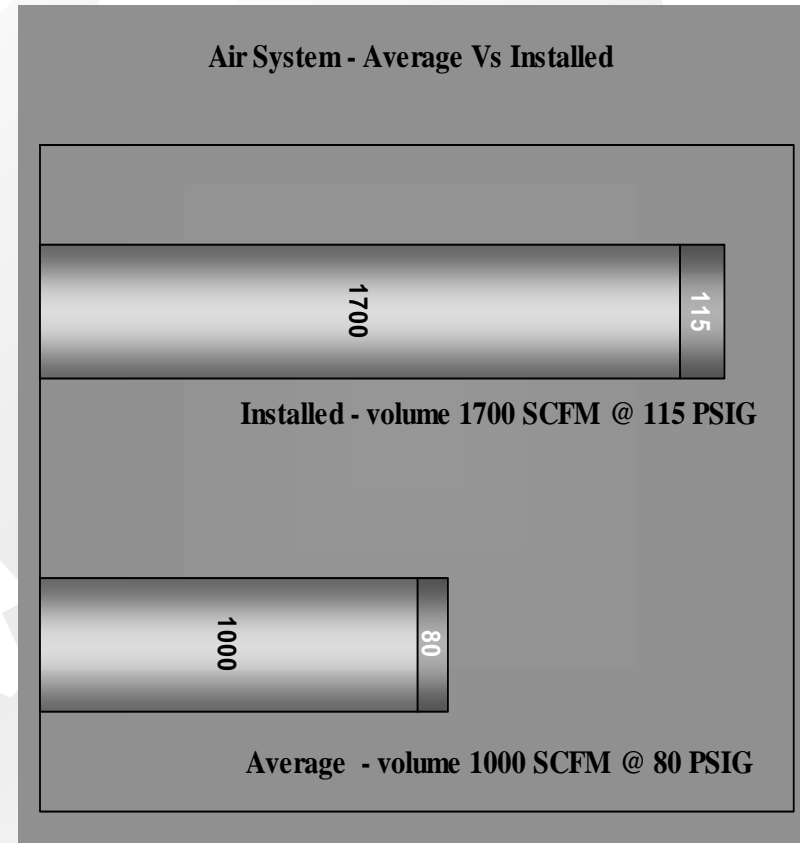
- ✱ Unloading costs money
- ✱ A compressor consumes energy while unloading!
- ✱ Reciprocating compressor – 15% to 20%
- ✱ Screw compressor – 25% to 40%

Waste of Compressed air in use!

- ☀ Artificial Demand costs money!
- ☀ Difference between air flow at optimum operating pressure and actual pressure applied to the system is artificial demand
- ☀ Reduced pressure will consume less air quantity through the same pipe line
- ☀ Every two PSI reduction in pressure saves 1% energy!

Why Artificial Demand?

- ✦ To Compensate for Response Time - Compressors are Reactive
- ✦ To Overcome Imaginary Pipeline Losses
- ✦ To Overcome Equipment Resistance



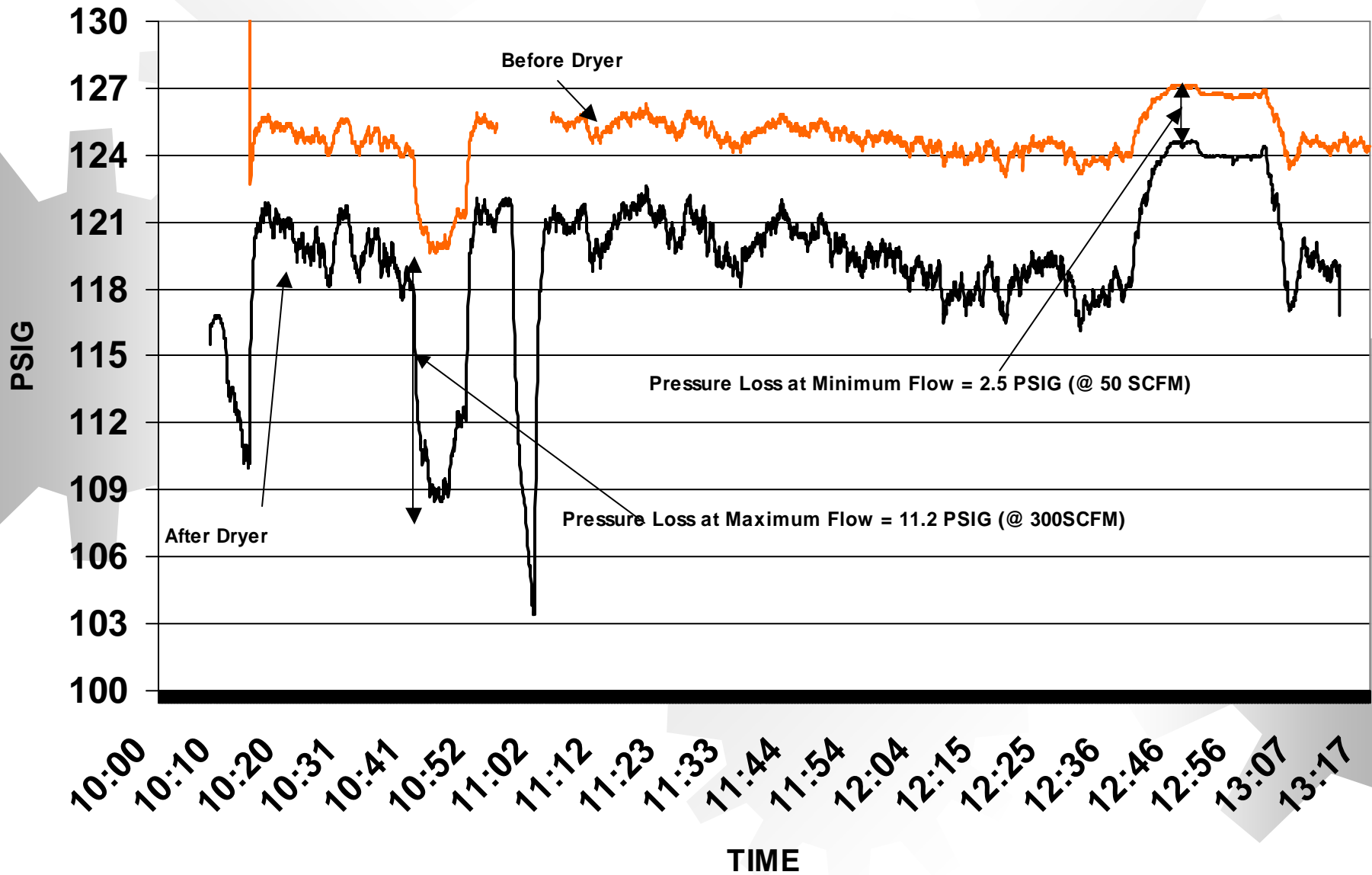
Losses Due to Improper Use!

- ✦ Air abuse costs money!
- ✦ How much does it cost to clean?
- ✦ A ¼" airline at 100 PSI in use for 2 hours a day
- ✦ Costs Rs.45,000/- per annum
- ✦ One can do it with a blower at 10% of the cost!
- ✦ Air abuse all includes other Unregulated demands.

Driers may add to Losses!

- ✱ There may be Pressure loss across drier if not maintained properly!
- ✱ Under capacity Driers may add to the problem of Condensate Drains.
- ✱ Selection of proper type/ capacity drier is another challenge!

Dryer - 500 SCFM - operating 10-60 % Capacity
 Pressure Loss Across Dryer - Data Taken on 04/06/2004



Pipe Lines may add to your woes!

- ✦ There is always Pressure drop as the air passes thro the pipe line.
- ✦ Longer the distance travelled, Larger the pressure drop!
- ✦ Smaller the Pipe Dia., Larger the Pressure Drop!

Pressure drop in pipe line

Pressure 100 PSI

Pipe Dia	Pressure drop in PSI
1/8 "	1.31
1 /4 "	0.285
3 /8 "	0.064
1 /2 "	0.020

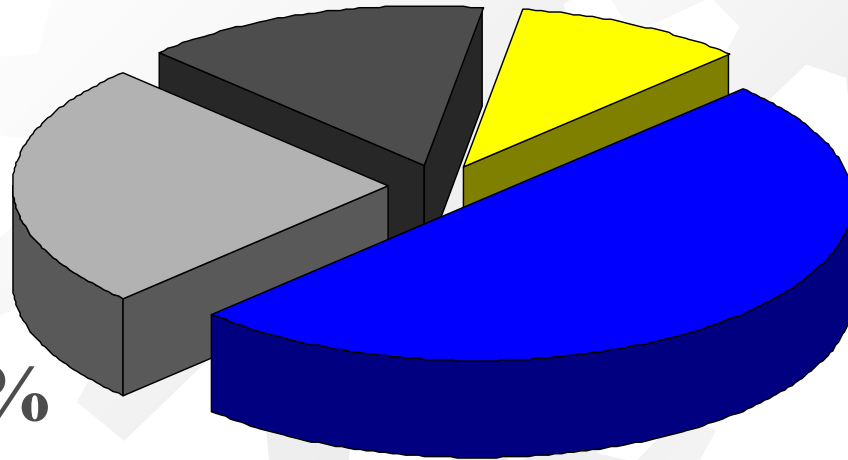
For a flow of 2 CFT per minute and a distance of 100 ft

IN THE REAL WORLD

Leaks 15%

Poor Practices 10%

**Artificial
Demand 25%**



Production 50%

Traditional Vs Optimair

- ☀ Plant production is – Number one Priority !
- ☀ Plant Air Demand must always be met !
- ☀ Over Supply is Acceptable – Under Supply is Not !
- ☀ Minimum Pressure must be maintained – Higher Pressure is acceptable !

- ☀ Plant productivity is Number one Priority !
- ☀ Plant Air Demand must always be Supplied!
- ☀ Supply must Balance Demand - Over supply and Under supply are Unacceptable !
- ☀ Pressure must be Consistent – Low pressure and High pressure are equally Unacceptable!

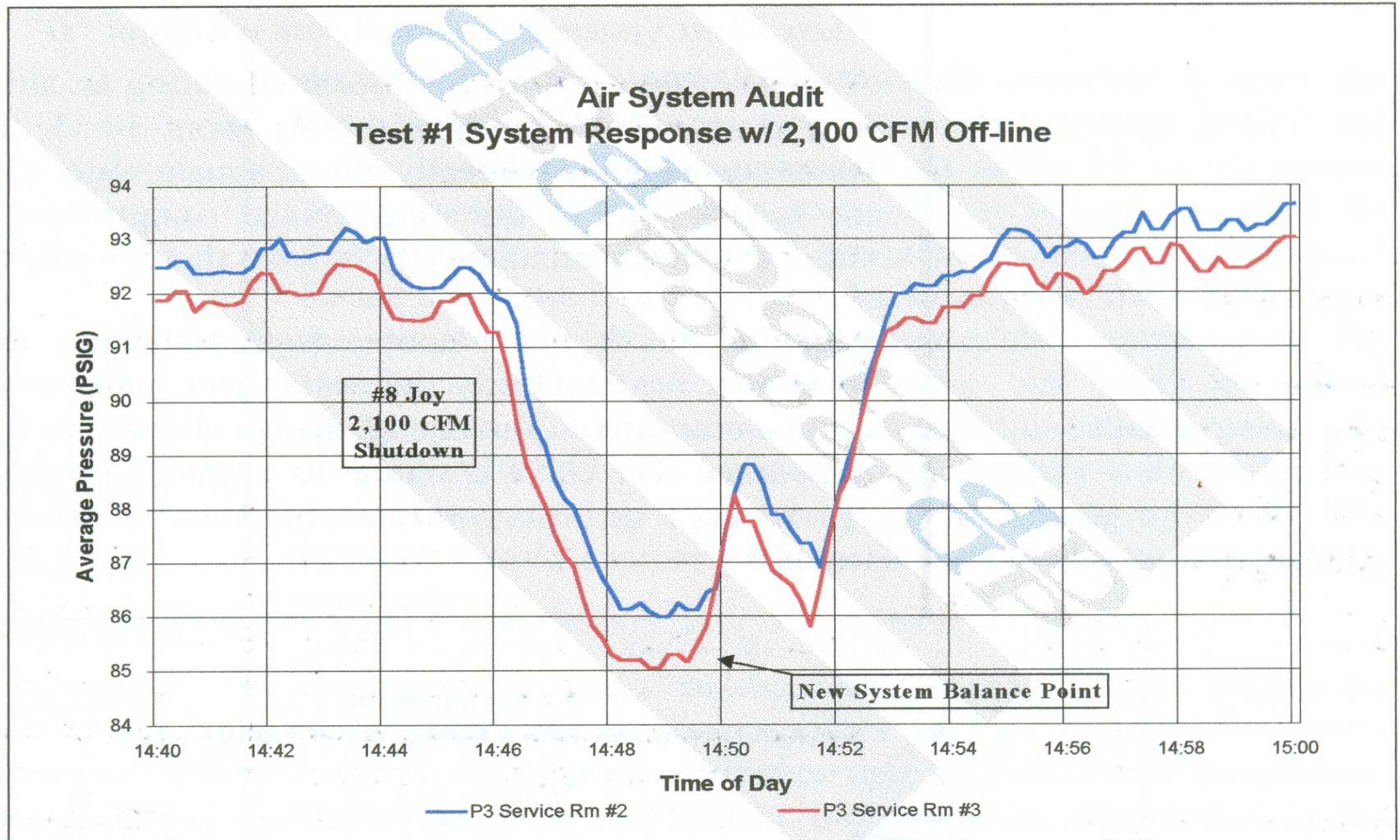
How savings achieved

- ✦ System can be optimized
 - a) By optimizing the operating pressure.
 - b) By reducing the No. of unloaded hours.
 - c) By controlling the unregulated demand.
 - d) By eliminating deficiencies in the System.

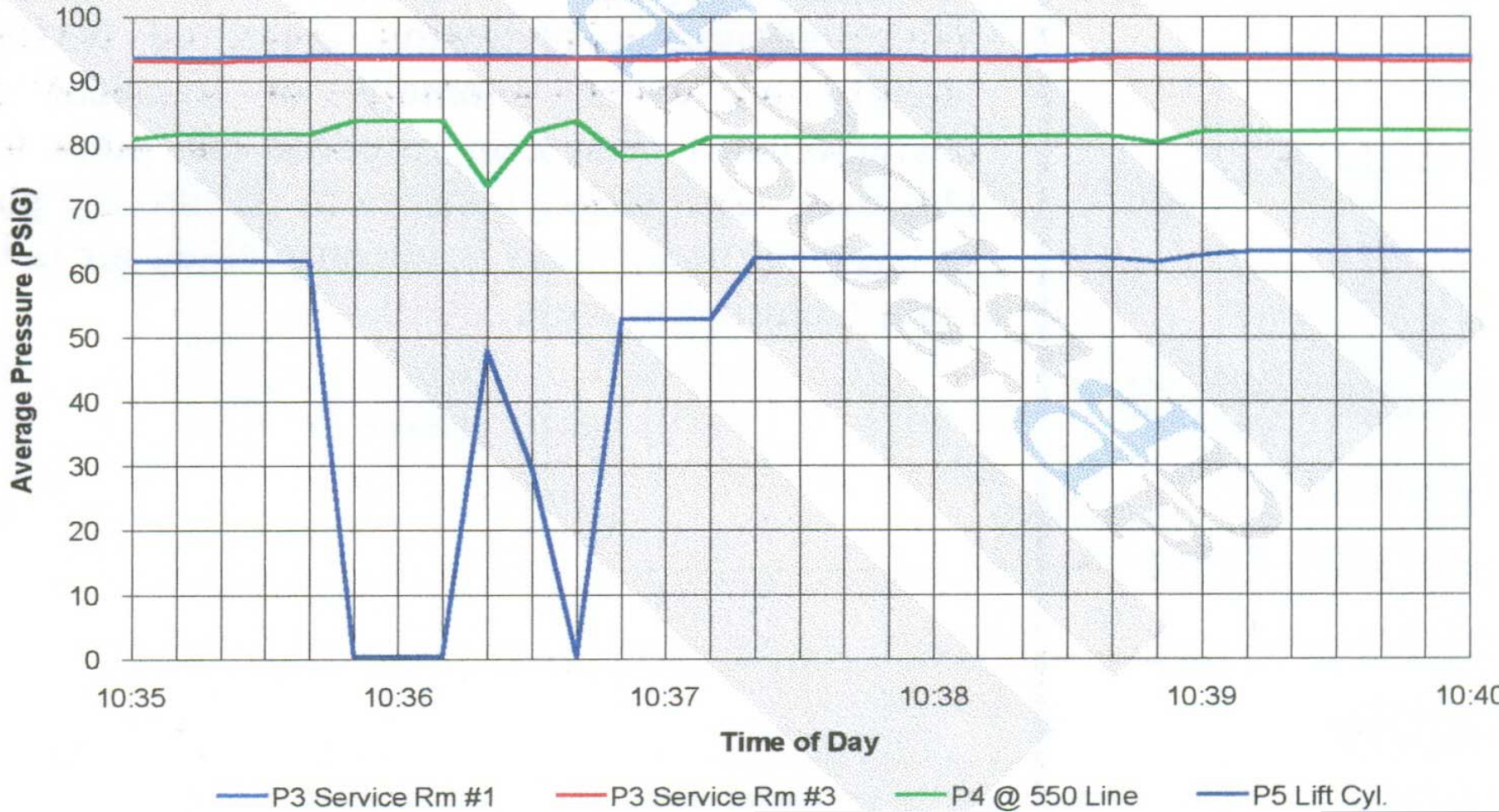
What Does Optimair Do?

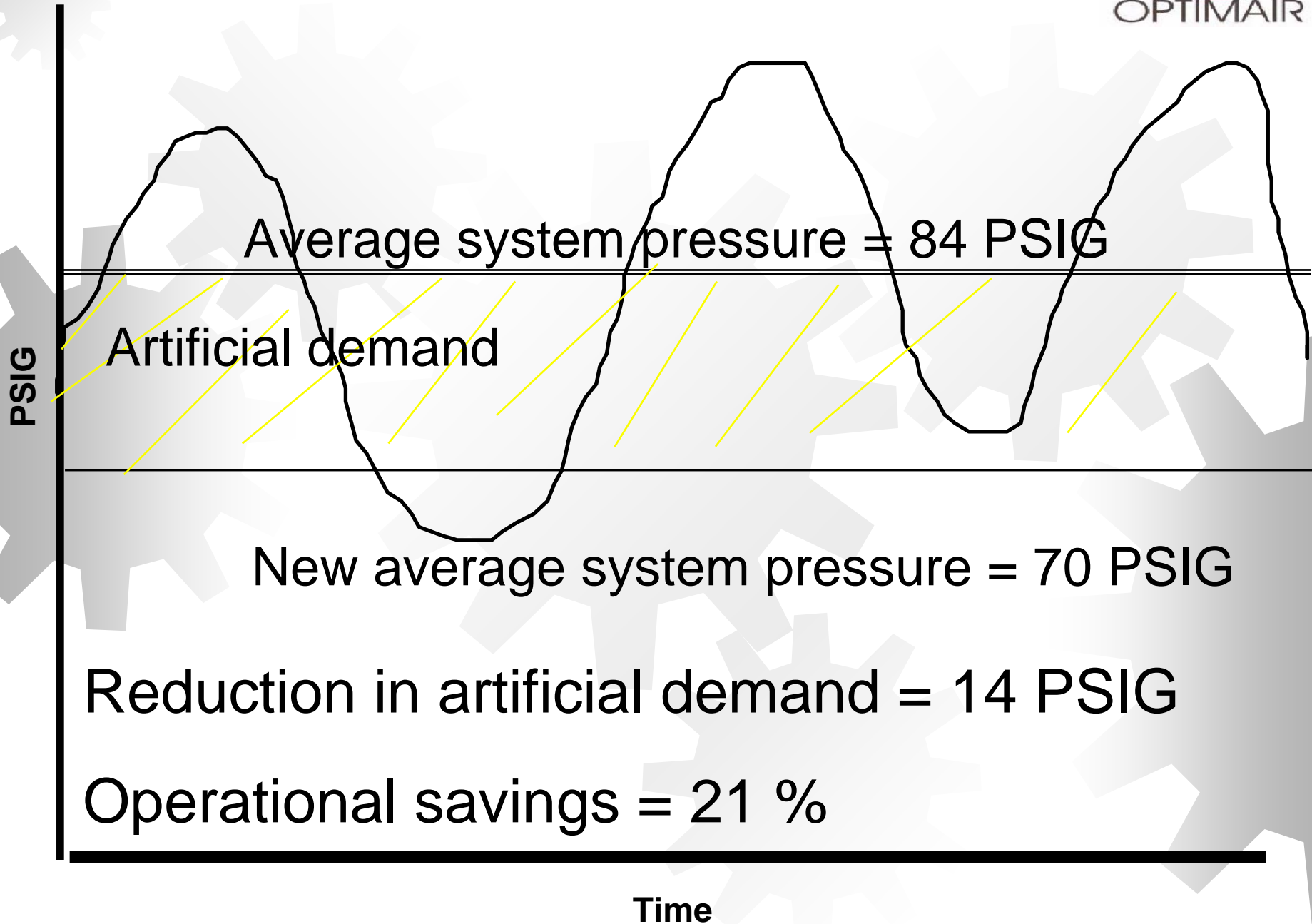
- Data logging of the System for 48 to 72 Hrs.
- Detailed Study of the System Components, their functions and inefficiencies, if any.
- Detailed Study of the Point of use applications and their pressure requirements.
- Present Health condition of the Compressors.
- Optimum Pressure and CFM requirements of the System – Present and Future.

Compressed Air Systems - Management



System Auditing & Performance





Optimair Approach

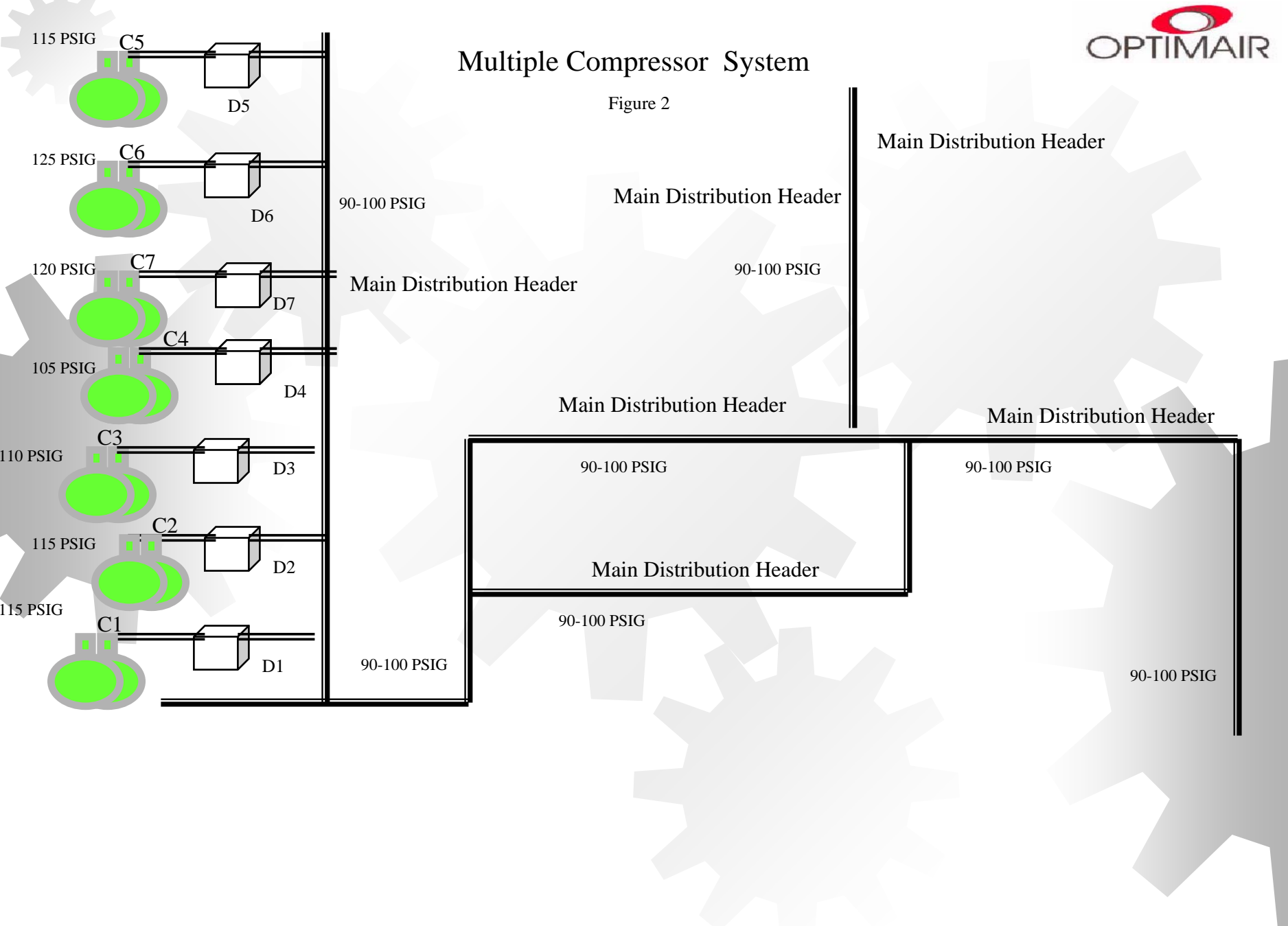
- ✦ Base Load With Minimum # of Machines
 - ✦ To Maximize Percentage of the Total Demand at Full Load Efficiency
- ✦ Trim with the Trim Station
 - ✦ To Remaining Percentage of the Total Demand
 - ✦ In Load/No Load Mode

Optimair Solution Highlights

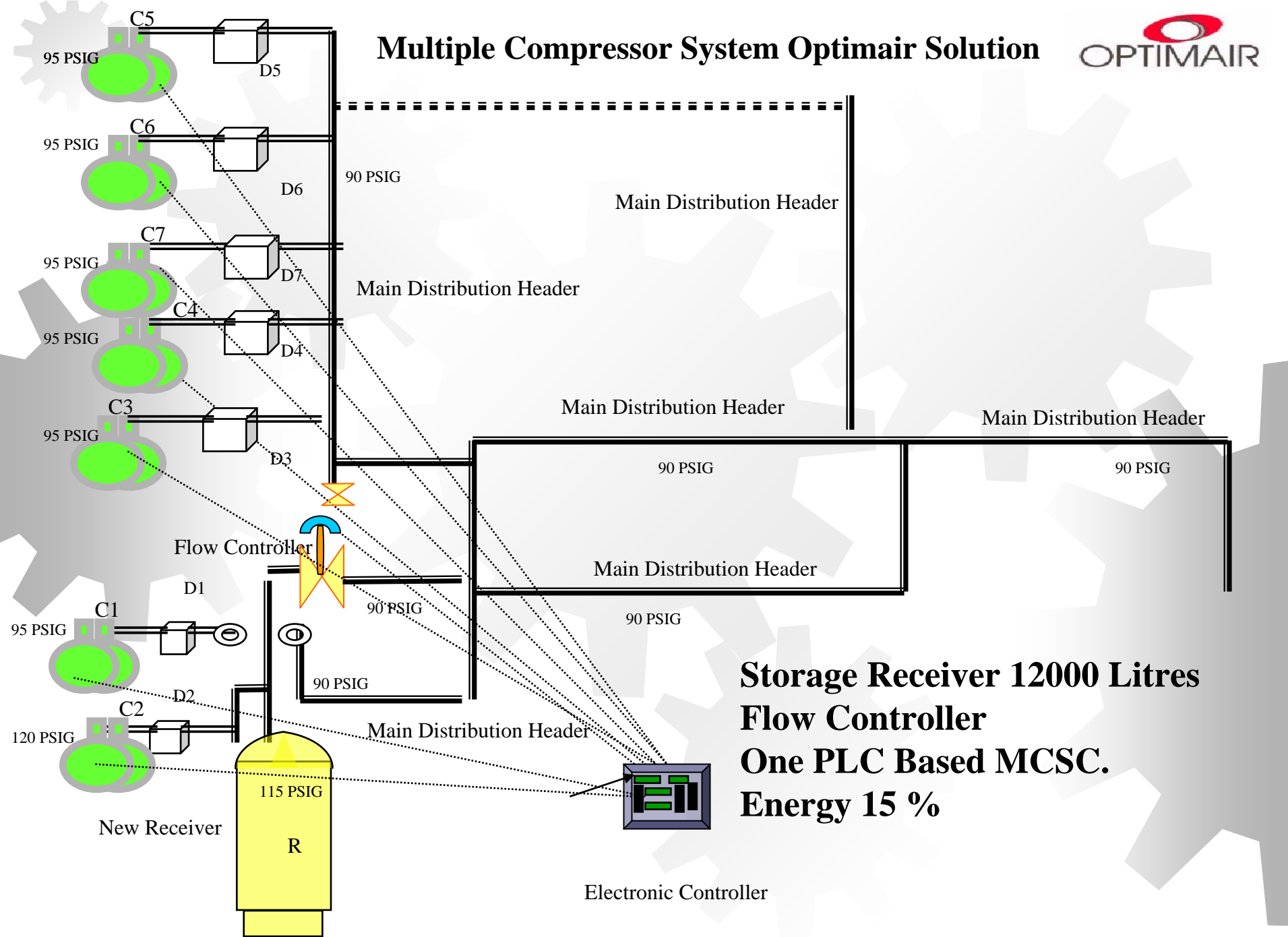
- ★ **One or more Receiver(s)**
- One or more Flow Controller(s)**
- One PLC Based control system.(MCSC)**
- A set of Compressor Interfaces**
- ★ **Installation and Commissioning by Optimair**
- ★ **Production Down Time None**
- ★ **Energy savings up to 40%**
- ★ **SIMPLE ROI - 8 months to 16 months**

Multiple Compressor System

Figure 2



Multiple Compressor System Optimair Solution



Storage Receiver 12000 Litres
Flow Controller
One PLC Based MCSC.
Energy 15 %

Electronic Controller

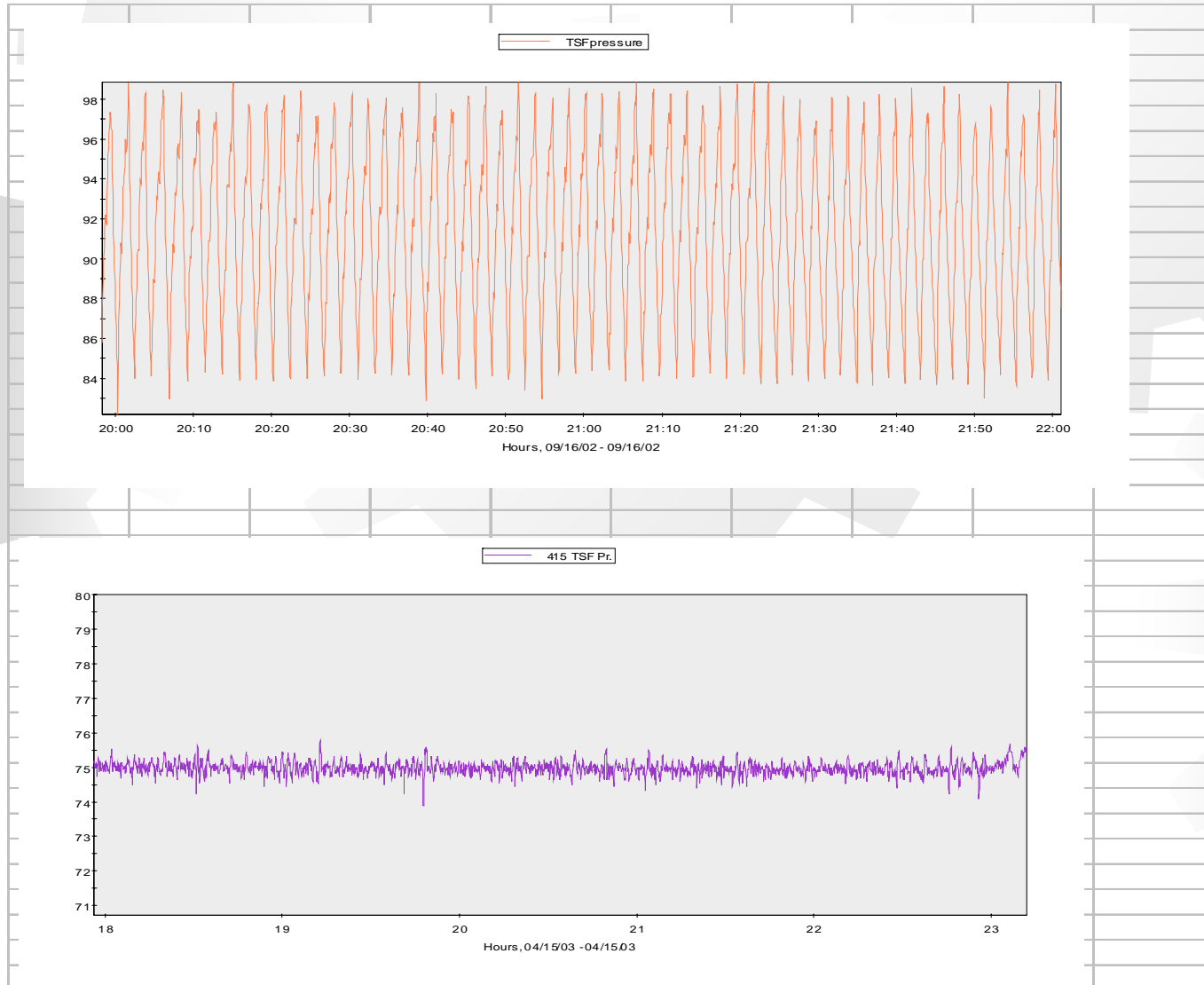
Additional benefits

- ✦ **Constant Pressure**
- ✦ **Reduction in No. of compressors in operation.**
- ✦ **Saving in labour.**
- ✦ **Improvement in quality of out put which improves productivity.**

Case Study – HLL Pondy

- ✦ No of Compressors in Operation reduced from 5 to 3. Two compressors removed.
- ✦ Average CFM Generated reduced from 820 to 600.
- ✦ Power consumption reduced from 3700 KWh. to 2400 KWh per day.
- ✦ Saving of 1300 units per day.
- ✦ Investment – Rs.1.60 Millions
- ✦ Pay Back period- 10 months.

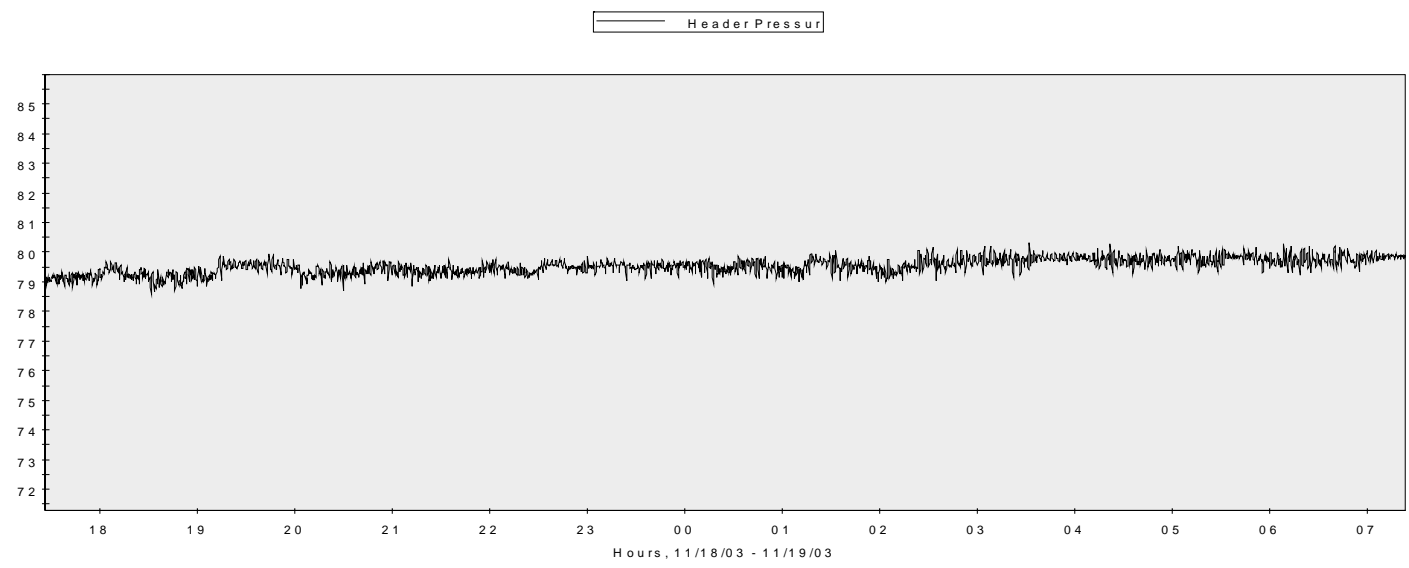
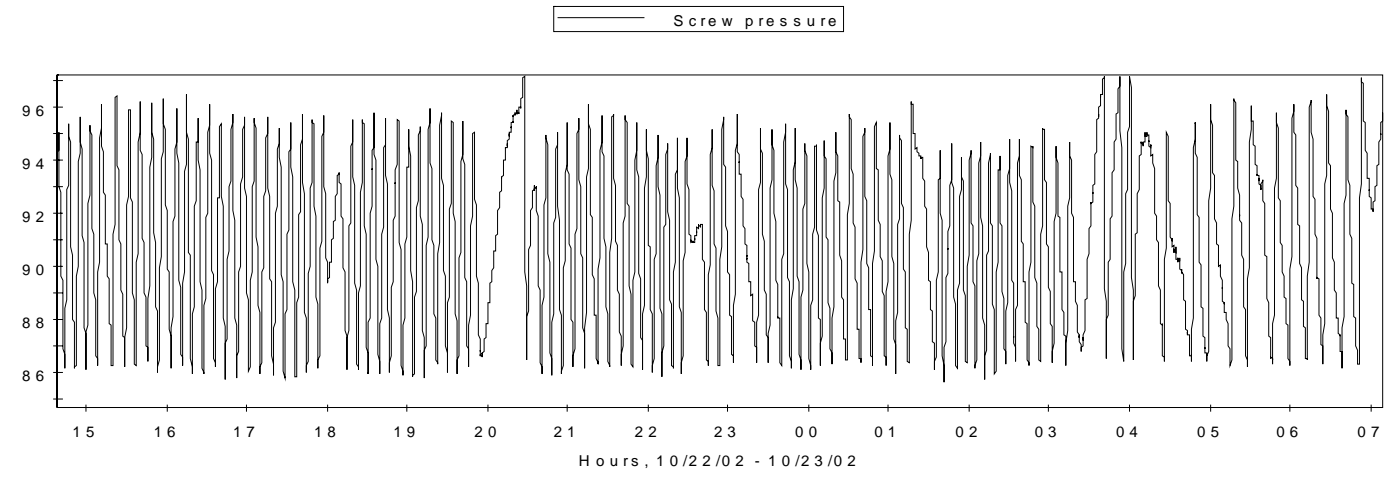
HLL GRAPH- BEFORE & AFTER MCSC IMPLEMENTATION



TVS Motor Company- Hosur

- ☀ No of Compressors in Operation reduced from 4 to 3.
- ☀ Average CFM Generated reduced from 990 to 900
- ☀ Power consumption reduced from 4700 KWh. to 4000 KWh. per day.
- ☀ Saving of 700 units per day.
- ☀ Investment – Rs.1.50 Millions
- ☀ Pay Back period- 18 months.

TVS Graph before & after the Installation of Optimair



Optimair System – Advantages



- ✦ Only one trim compressor operates at a higher pressure to create extra storage.
- ✦ 7 to 10% more energy saving than other systems.
- ✦ Smaller receiver capacity – (one third as compared to other systems.)
- ✦ Single system for all locations.
- ✦ Less number of flow controllers – only one in many cases.
- ✦ No downtime for installation



Major installations/orders received

- ☀ HLL – Pondicherry
- ☀ TVS Motors – Hosur
- ☀ Pricol I – Coimbatore
- ☀ Ucal – Chennai
- ☀ Ashok Leyland – Hosur
- ☀ MRF – Chennai
- ☀ TVS Motors – Mysore
- ☀ Pricol III – Coimbatore
- ☀ Premier Mills– Hosur
- ☀ HAL - Bangalore



Total Compressor Automation

A Case Study.

Automation Features

- Integration & Control of Compressors of all 3 Plants
- Integration of Intermediate Controller (IC1)
- Integration of VFD of one compressor if required at a later date
- Monitoring / alarm annunciation of compressor parameters
- Control & Monitoring of compressors auxiliaries
- Generation & User Pressure logging at 10 different locations
- Monitoring & control of main valves of Plant –I, II & Plant –III (RMB)

- Energy optimization using MCSC
- Time based sequencing of compressors & Priority based sequencing of compressors
- PC based operator interface for on-line monitoring, control, data logging, trending & history of alarms, report generation (SCADA)
- SCADA will have user security levels with passwords for monitoring & control
- Preventive maintenance schedules for various sub systems based on running hours
- PC based Monitoring Stations at multiple locations (Max. 4)
- Ethernet communication **using existing fiber optic cable** between SCADA PC & monitoring Station PCs
- Provision to changeover to old controls in case of failure

THANK YOU