# OSIsoft® UC2010

**Real Time Information** — Currency of the New Decade

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# PI System Evolution at Magnelec

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Magnelec S.A. de C.V.
Grupo Peñoles

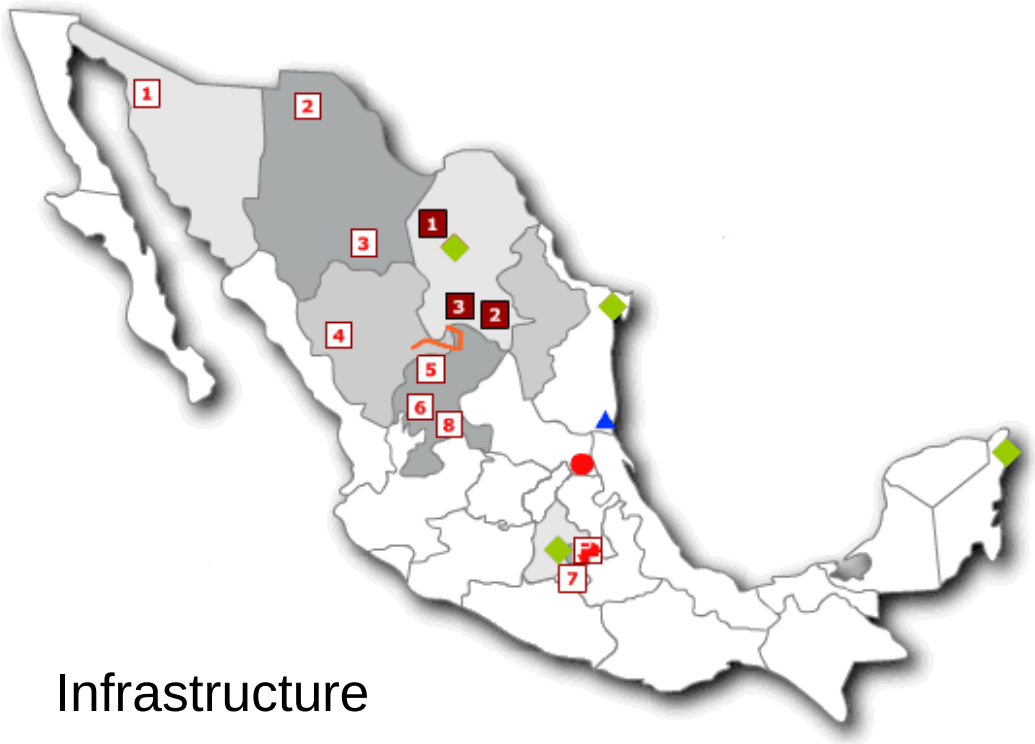
# Agenda

- About Magnelec – Grupo Peñoles
- PI System at Magnelec
  - Initial Challenge
  - Timeline of PI at Magnelec
- Using PI Server Information
  - Value Creation
  - PI in Work Systems & 6 Sigma Projects
  - PI as an Everyday Tool
    - Energy Consumption Totalizers
    - Maintenance Planning
    - Efficiency Monitoring
- Benefits of PI at Magnelec

# MAGNELEC S.A. DE C.V.

- **Grupo Peñoles Corporate Structure**
  - Exploration,Infrastructure, Mining, Metals – Chemicals.
- **Products**
  - Magnesium oxide, sodium sulfate.
- **Markets Served**
  - Asia, America, Europe.

# About Magnelec:
# Geographic Locations




## Mining Operations

| | |
|---|---|
| 1 | La Herradura |
| 2 | Bismark |
| 3 | Naica |
| 4 | La Ciénega |
| 5 | Sabinas |
| 6 | Fresnillo |
| 7 | Tizapa |
| 8 | Fco. I. Madero |

## Infrastructure

- Coahuila-Durango Railway Line
- Water Utility
- Peñoles Thermoelectric
- Termimar Marine Terminal

## Metal-Chemical Operations

| | |
|---|---|
| 1 | Magnelec |
| 2 | Fertirey |
| 3 | Met-Mex |

# About Magnelec:
# Production

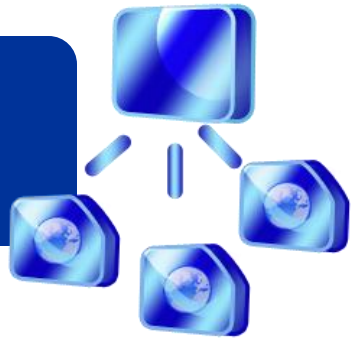

**Sodium Sulfate**
**620,000 ton/yr**

**Magnesium Oxide**
**90,000 ton/yr**

**Boiler & Utilities**
**Steam: 805,920 ton/yr**
**Electricity: 142,768 MW/yr**

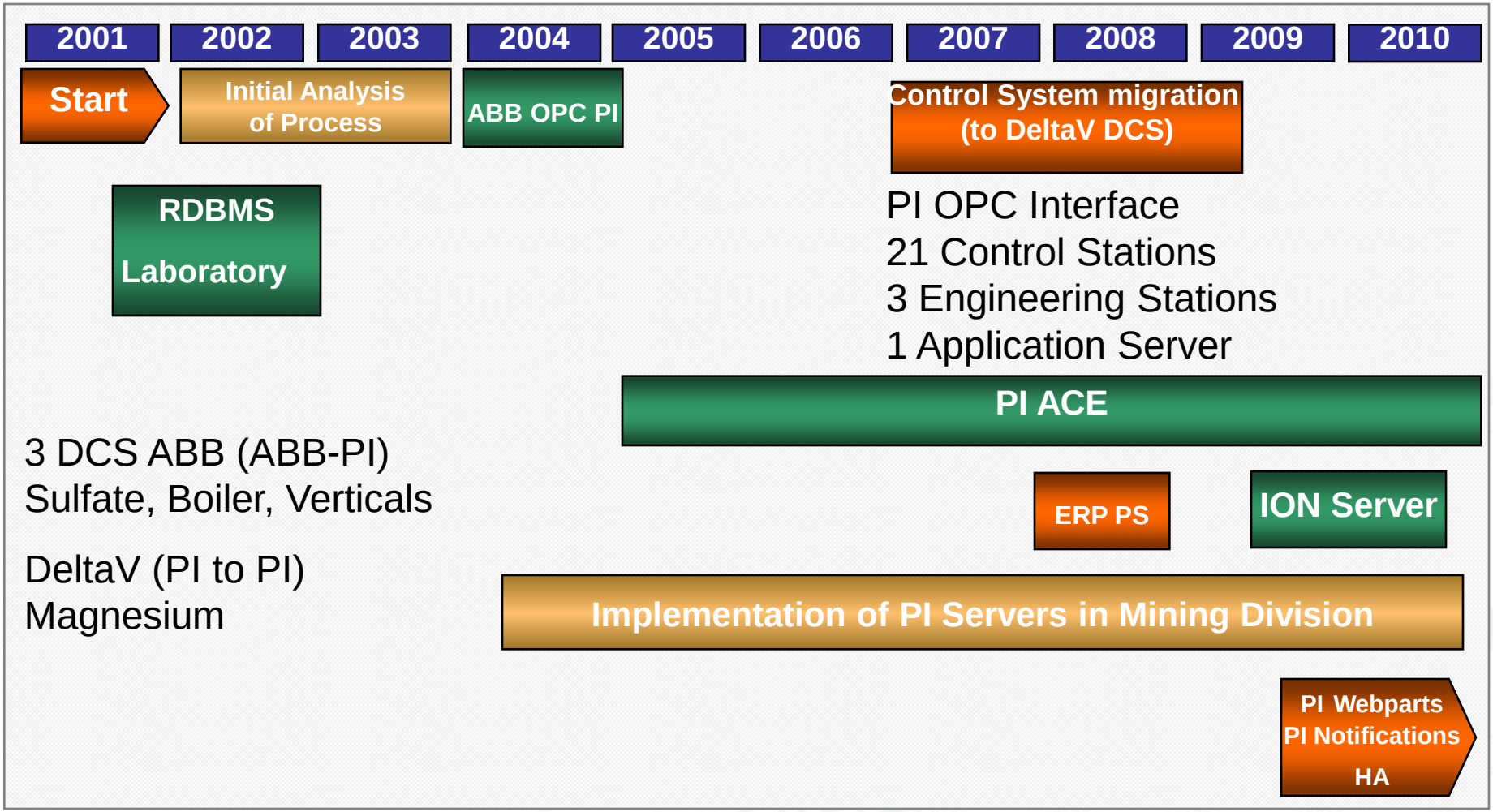
# About Magnelec:
# Business Challenge

**Obtain strategic information for decision making**

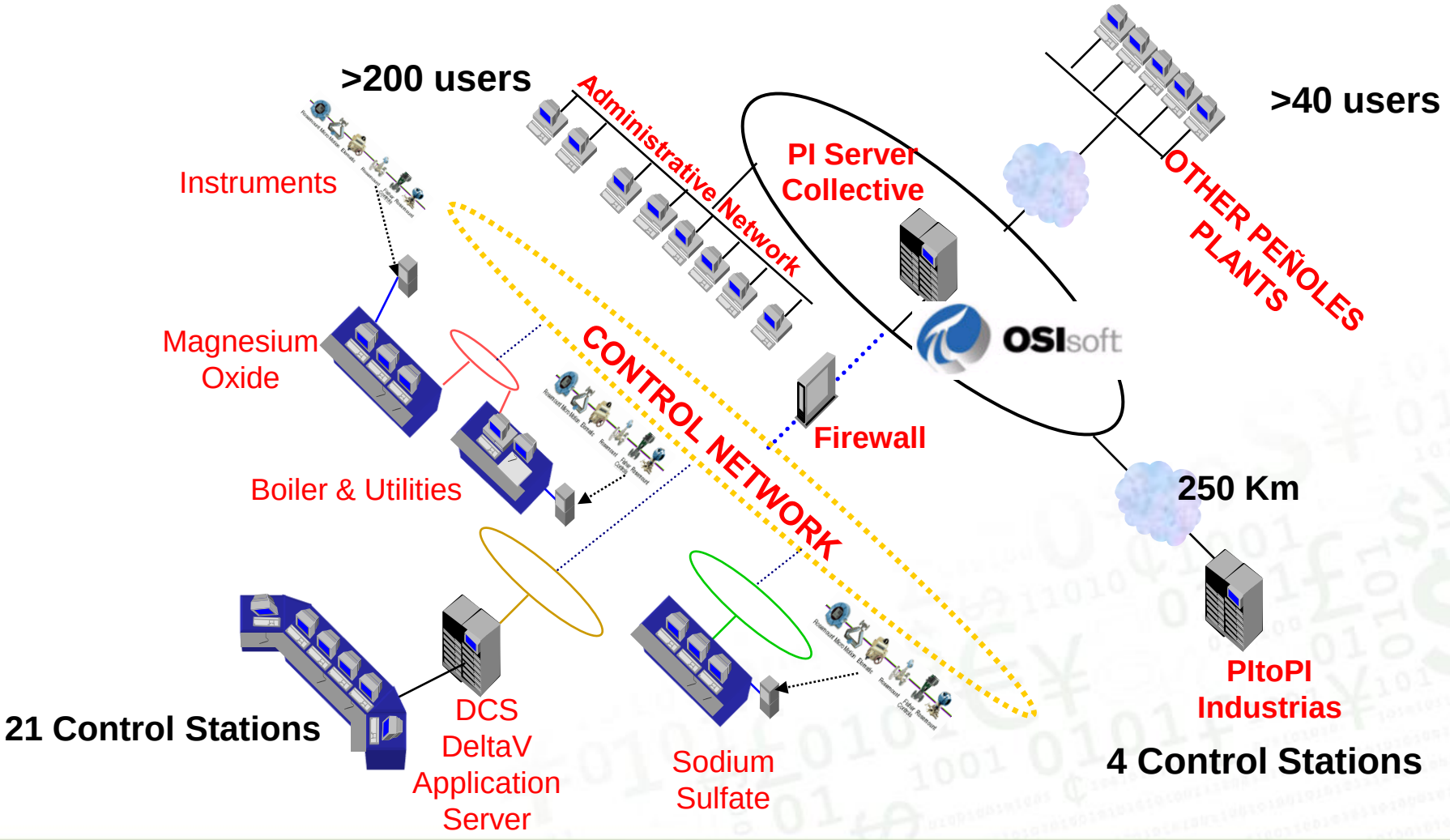


**Increase productivity in all organizational areas**

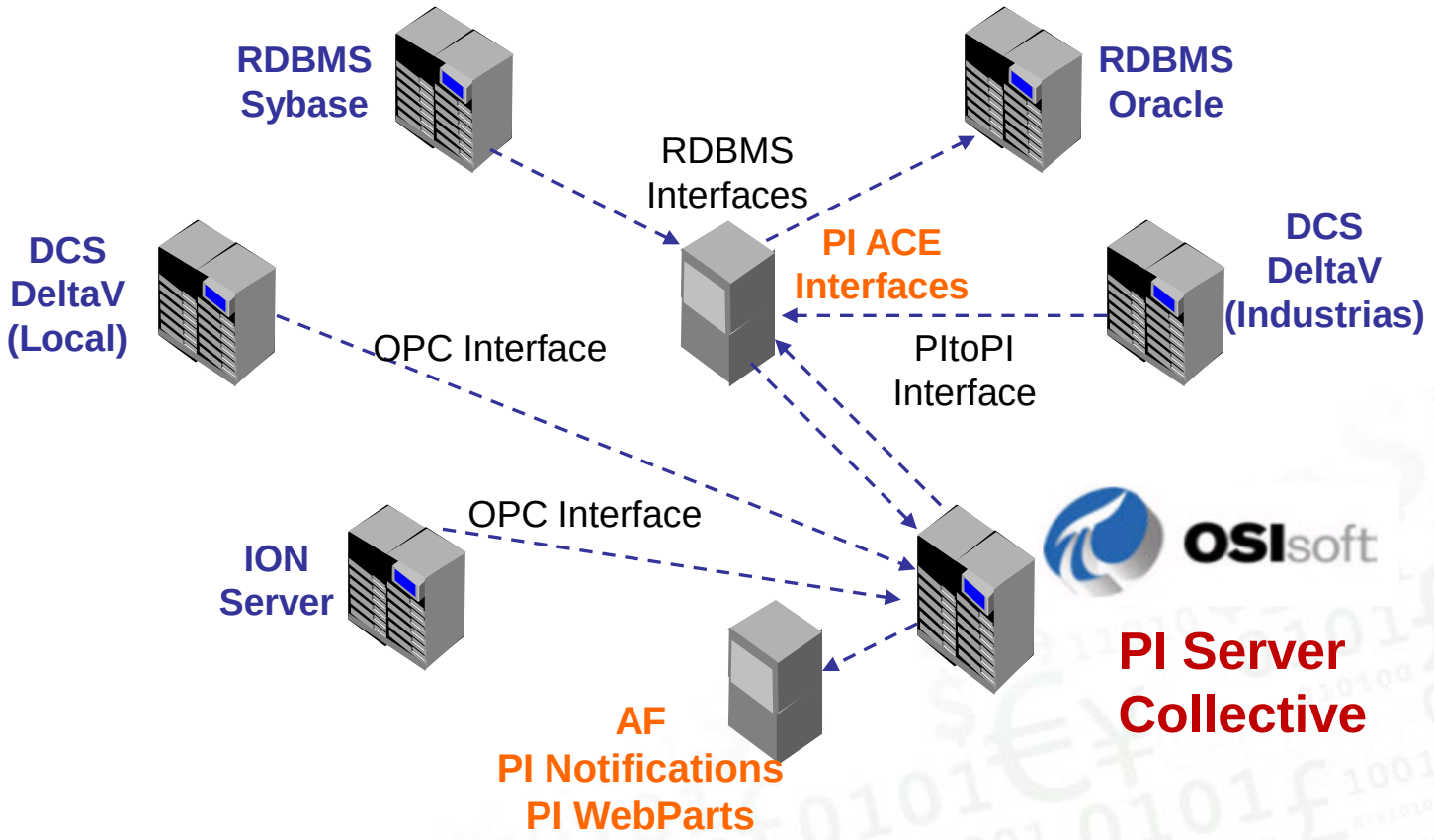
# About Magnelec:
# Timeline of PI



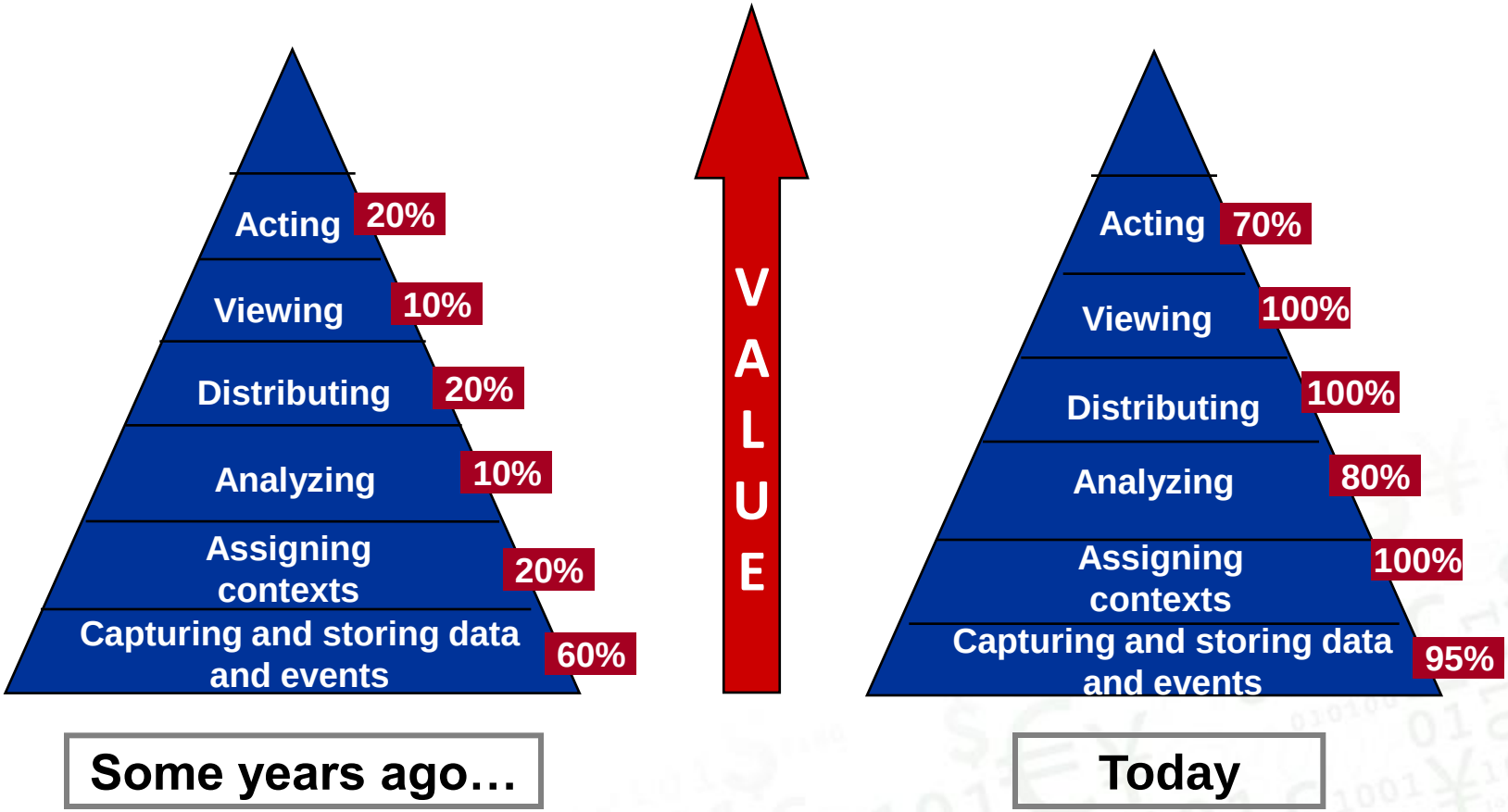
# About Magnelec:
# System Architecture



# About Magnelec:
# Site Configuration



# Value Creation with PI:
# Then & Now




**Some years ago…**

**Today**

# Value Creation with PI:
# A Systemic Approach

**Rapid response to operation problems**

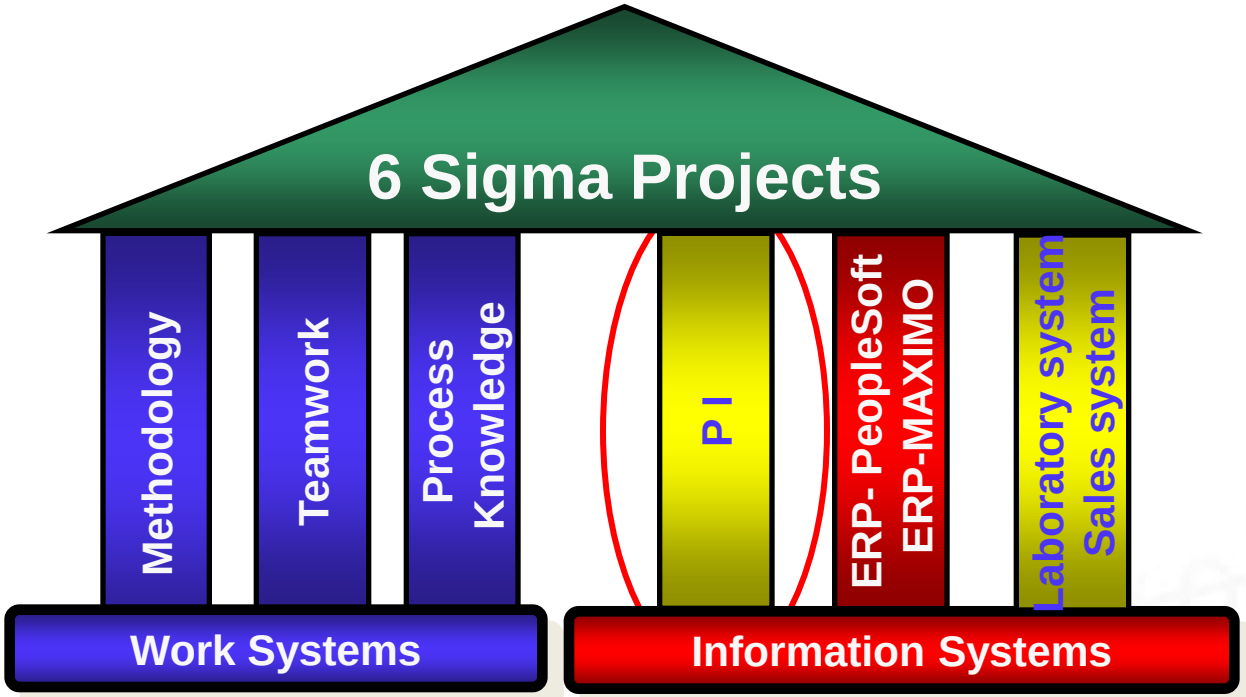
**Adjustments in operational process**


**~3% of TOC**

**Projects and work systems**

**Budget, projections**

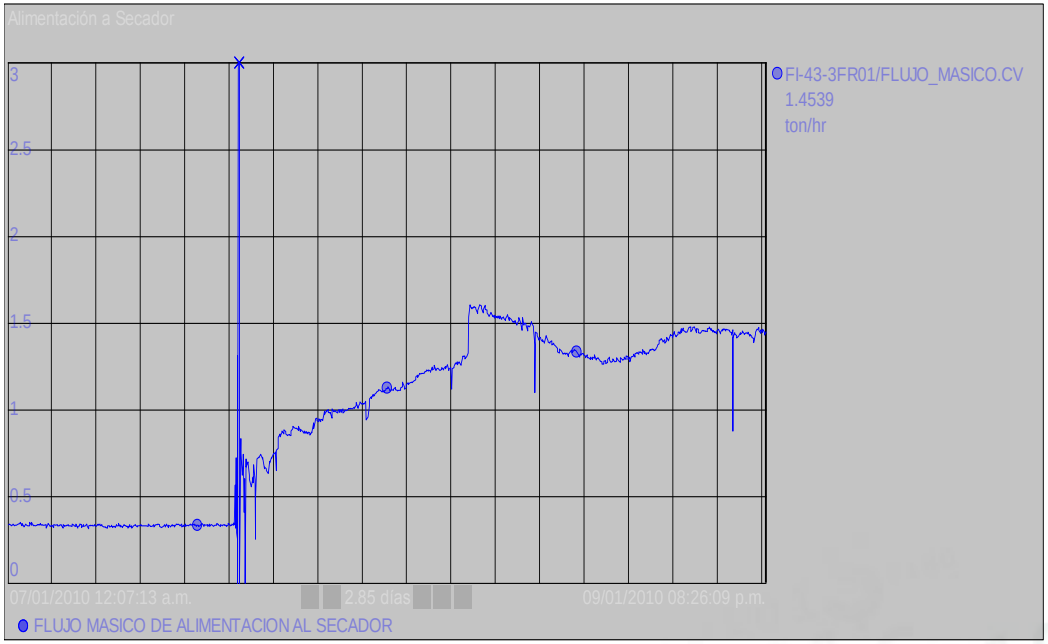
# PI and Six Sigma:
# Pillar of Real Time Data




PI is an essential pillar of the 6 Sigma approach. Components of the PI System are leveraged in each phase of this methodology.

# PI and Six Sigma:
# Consistency in a Specialty Plant

**Define** | **Measure** | **Analyze** | **Improve** | **Control**




PI tools are used to identify critical process parameters and quantify their overall importance

# PI and Six Sigma:
# Readily Available Data

**Define** | **Measure** | **Analyze** | **Improve** | **Control**

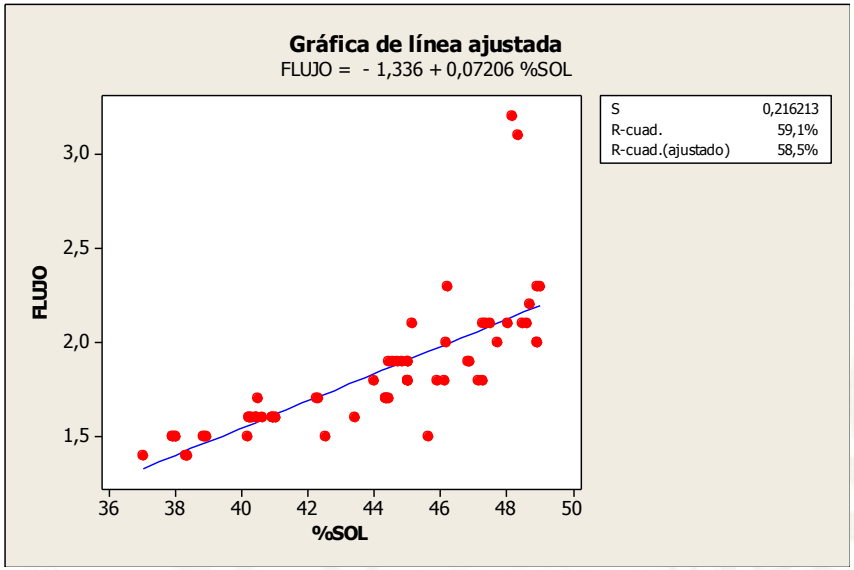
| | | HQ2001 | | | | |
|---|---|---|---|---|---|---|
| Etapa del Proceso | Métrico | Unidades | Definicion Operativa | Punto de muestreo | Equipo de medición | Base de Datos |
| Dilución | Densidad | gr/lt | línea | Avance de tanque de dilución. | Coriolis | SCD / PI |
| Dilución | Nivel | metros | línea | Tanque de dilución | Transisor de nivel radar | SCD / PI |
| Dilución | Flujo de avance a cribas | lt/min | línea | Avance de tanque de dilución. | Coriolis | SCD / PI |
| Sedimentación | Densidad | gr/lt | línea | Avance de asentador Lamella | Coriolis | SCD / PI |
| Almacenamiento de Materia Prima | Nivel | metros | línea | Tanque de Balance 1 | Transisor de nivel radar. | SCD / PI |
| Almacenamiento 2 | Nivel | metros | línea | Tanque de balance 2 | Transisor de nivel radar. | SCD / PI |

PI information is the database for our 6 Sigma projects.

# PI and Six Sigma:
# Meaningful Data Analysis

**Define** | **Measure** | **Analyze** | **Improve** | **Control**

| | A | B | C | D | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | Fecha | 14/08/2009 | | Limpiar | | | | | | | | |
| 22 | | 14/08/2009 | 15/08/2009 | | Actualizar | | | | | | | | |
| 23 | | | Air Heater | | Air | Fuel | DMR | DMR | | | | | |
| 24 | Turno | | Process | | Heater | Capacity | Temp | Skin | Class. | Rotor | Blower | Fan | Airflow |
| 25 | | | Inlet Air | | Outlet, °C | m3/h | Outlet, °C | Temp. °C | Amps | Amps | Amps | Hz. | CFM |
| 26 | | Optimal | | | | | Maintain | | | | Operate at | | Advise |
| 27 | | Conditions | >100°C | Star time | | | ≈165° | | FLA = 60 | FLA=327 | FLA=381 | 60 Hz Min. | >26,500 |
| 58 | 1 | | | 14-Ago-09 07:30:00 | | 105.3626 | 164.79512 | | 21.55172 | 101.2349 | 333.5899 | 51 | 19354.44 |
| 59 | 1 | | | 14-Ago-09 07:45:00 | | 100.9672 | 161.36249 | | 21.40431 | 100.3402 | 336.9365 | 51 | 19719.1 |
| 60 | 1 | | | 14-Ago-09 08:00:00 | | 101.0305 | 158.16637 | | 21.2569 | 98.85505 | 342.324 | 51 | 20257.93 |
| 61 | 1 | | | 14-Ago-09 08:15:00 | | 101.5293 | 147.4594 | | 22.01961 | 109.5937 | 335.2094 | 51 | 19681.47 |
| 62 | 1 | | | 14-Ago-09 08:30:00 | | 124.6012 | 157.06776 | | 22.61539 | 113.4477 | 346.8853 | 52 | 20420.15 |
| 63 | 1 | | | 14-Ago-09 08:45:00 | | 123.2635 | 160.69971 | | 22.17169 | 110.8704 | 337.3357 | 52 | 19857.37 |
| 64 | 1 | | | 14-Ago-09 09:00:00 | | 118.1049 | 165.57524 | | 22.04031 | 112.3493 | 350.1756 | 52.21086 | 20199.79 |
| 65 | 1 | | | 14-Ago-09 09:15:00 | | 119.5343 | 157.25142 | | 23.41693 | 113.6304 | 358.4484 | 53.34713 | 20354.93 |
| 66 | 1 | | | 14-Ago-09 09:30:00 | | 123.6544 | 157.18747 | | 22.2682 | 114.7286 | 356.083 | 53.51806 | 20100.99 |
| 67 | 1 | | | 14-Ago-09 09:45:00 | | 125.3323 | 162.68562 | | 21.07555 | 101.6333 | 360.5403 | 53.6 | 20735.87 |
| 68 | 1 | | | 14-Ago-09 10:00:00 | | 122.326 | 161.98483 | | 22.26688 | 112.3382 | 353.9456 | 53.6 | 20421.29 |
| 69 | 1 | | | 14-Ago-09 10:15:00 | | 124.6633 | 154.97769 | | 22.03299 | 115.2 | 353.5167 | 53.6 | 20460.01 |
| 70 | 1 | | | 14-Ago-09 10:30:00 | | 129.7715 | 154.31061 | | 22.22079 | 118.3832 | 356.47 | 53.6 | 20579.67 |
| 71 | 1 | | | 14-Ago-09 10:45:00 | | 139.4578 | 157.86832 | | 21.57779 | 119.2627 | 355.5088 | 53.66109 | 20362.28 |
| 72 | 1 | | | 14-Ago-09 11:00:00 | | 137.6805 | 164.56479 | | 22.10329 | 114.9097 | 357.825 | 53.70942 | 20368.26 |
| 73 | 1 | | | 14-Ago-09 11:15:00 | | 153.4434 | 161.9169 | | 21.63541 | 115.2975 | 349.8763 | 53.8 | 19938.79 |
| 74 | 1 | | | 14-Ago-09 11:30:00 | | 162.8605 | 161.63037 | | 21.25091 | 113.9429 | 351.2936 | 54.0365 | 20262.12 |
| 75 | 1 | | | 14-Ago-09 11:45:00 | | 159.836 | 163.60631 | | 21.54424 | 111.9658 | 362.5311 | 54.86602 | 20554.54 |
| 76 | 1 | | | 14-Ago-09 12:00:00 | | 164.4878 | 159.31839 | | 21.58053 | 114.6571 | 360.7445 | 55 | 20639.67 |
| 77 | 1 | | | 14-Ago-09 12:15:00 | | 164.491 | 159.3096 | | 21.64039 | 116.1859 | 361.0463 | 55 | 20862.47 |
| 78 | 1 | | | 14-Ago-09 12:30:00 | | 161.0931 | 157.89337 | | 21.71515 | 116.7593 | 359.3192 | 55 | 20460.25 |
| 79 | 1 | | | 14-Ago-09 12:45:00 | | 164.5746 | 160.08173 | | 21.44785 | 112.4383 | 363.774 | 55.04775 | 21077.8 |
| 80 | 1 | | | 14-Ago-09 13:00:00 | | 164.644 | 160.35799 | | 21.11923 | 114.665 | 365.3727 | 55.1 | 20637.43 |
| 81 | 1 | | | 14-Ago-09 13:15:00 | | 163.0715 | 158.65431 | | 21.31816 | 118.0819 | 364.5315 | 55.1 | 20467.58 |
| 82 | 1 | | | 14-Ago-09 13:30:00 | | 165.1445 | 153.95007 | | 21.39613 | 111.2386 | 371.7386 | 55.1 | 20839.9 |
| 83 | 1 | | | 14-Ago-09 13:45:00 | | 163.5608 | 157.12018 | | 21.03056 | 114.9276 | 364.5222 | 55.14275 | 20837.94 |
| 84 | 1 | | | 14-Ago-09 14:00:00 | | 161.889 | 156.68025 | | 26.73971 | 234.961 | 352.7493 | 55.2 | 19941.7 |
| 85 | 1 | | | 14-Ago-09 14:15:00 | | 165.7355 | 158.05507 | | 21.49681 | 115.8358 | 369.7517 | 55.2 | 20873.31 |
| 86 | 1 | | | 14-Ago-09 14:30:00 | | 167.6286 | 158.57358 | | 21.3756 | 118.378 | 365.0753 | 55.2 | 20719.92 |
| 87 | 1 | | | 14-Ago-09 14:45:00 | | 169.317 | 160.22784 | | 21.15648 | 115.325 | 366.9625 | 55.2 | 21048.99 |




PI Data is more reliable and detailed than manually captured data. This information, accessed via DataLink, is analyzed in specialized statistical tools.

# PI and Six Sigma:
# Justified & Measured Improvements

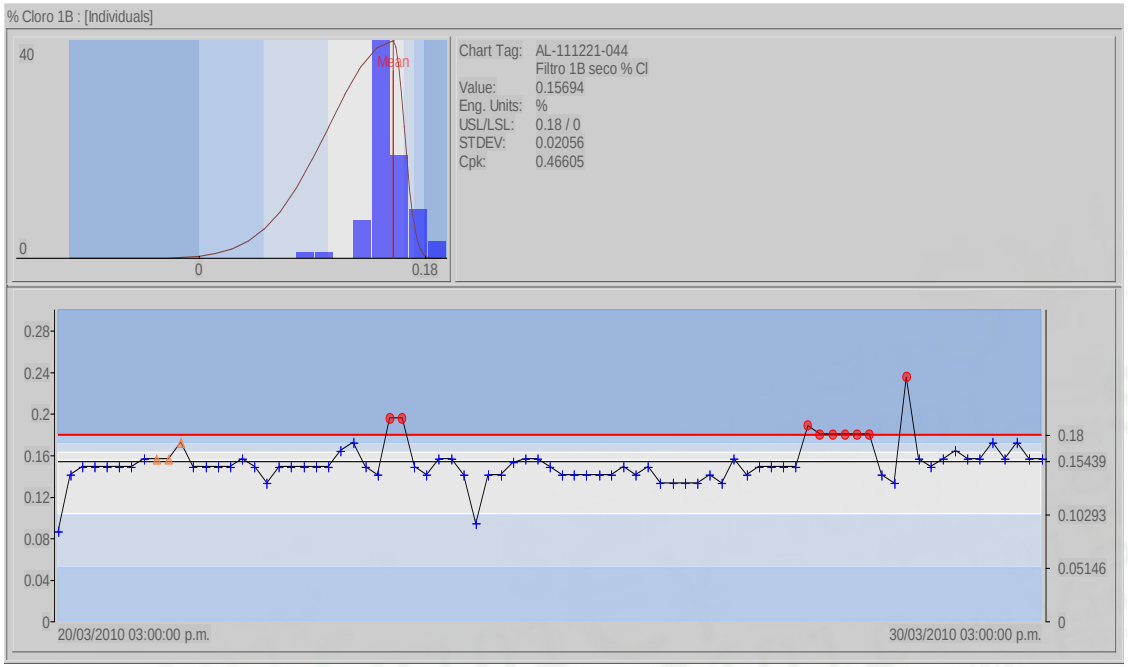
**Define** | **Measure** | **Analyze** | **Improve** | **Control**

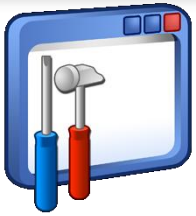
PI allows us to monitor the succes of the previous 6 Sigma phases and see their benefits graphically.

# PI and Six Sigma:
# Lasting Achievements

Define | Measure | Analyze | Improve | Control

With PI SQC, we verify and track our processes, ensuring lasting success of our improvement projects

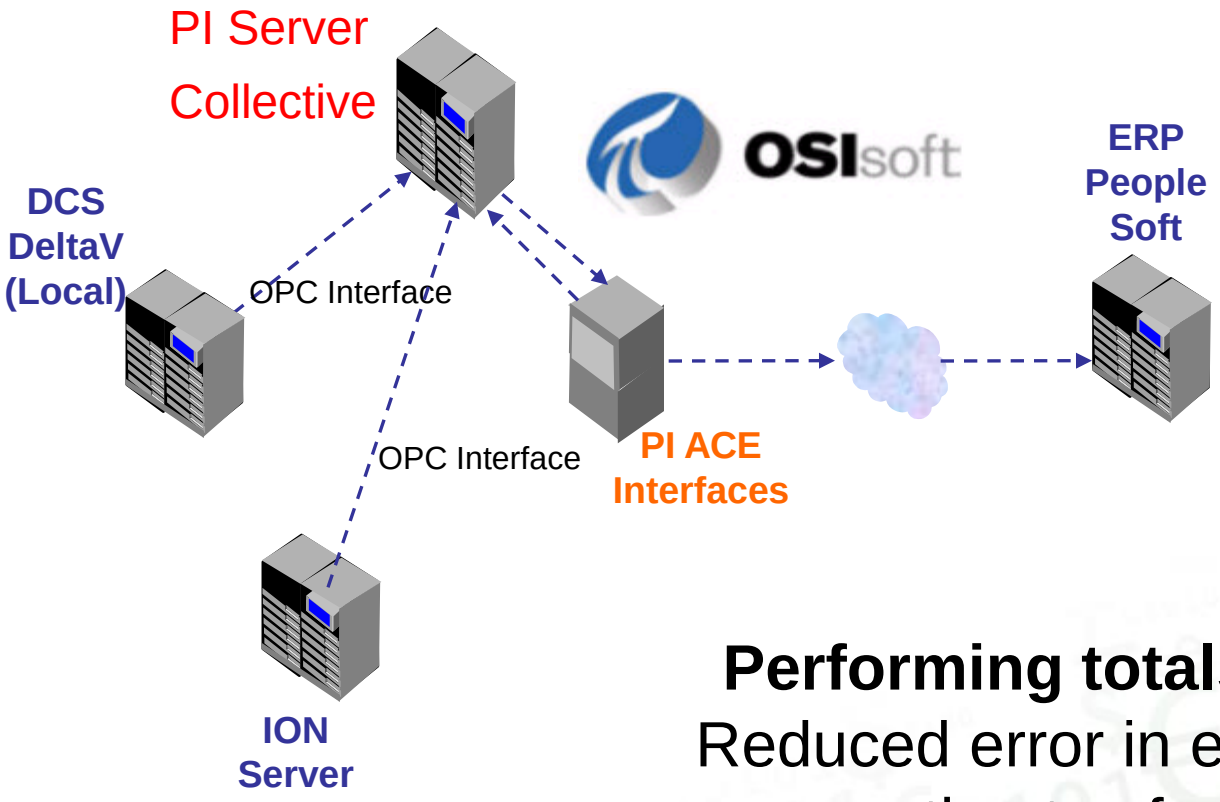




# PI as an Everyday Tool:
# Energy Consumption Totalizers

- Cost of energy accounts is 45% of TOC
- Prior to PI, energy consumption recorded at end-of-day
- Greater resolution allows more accurate estimates

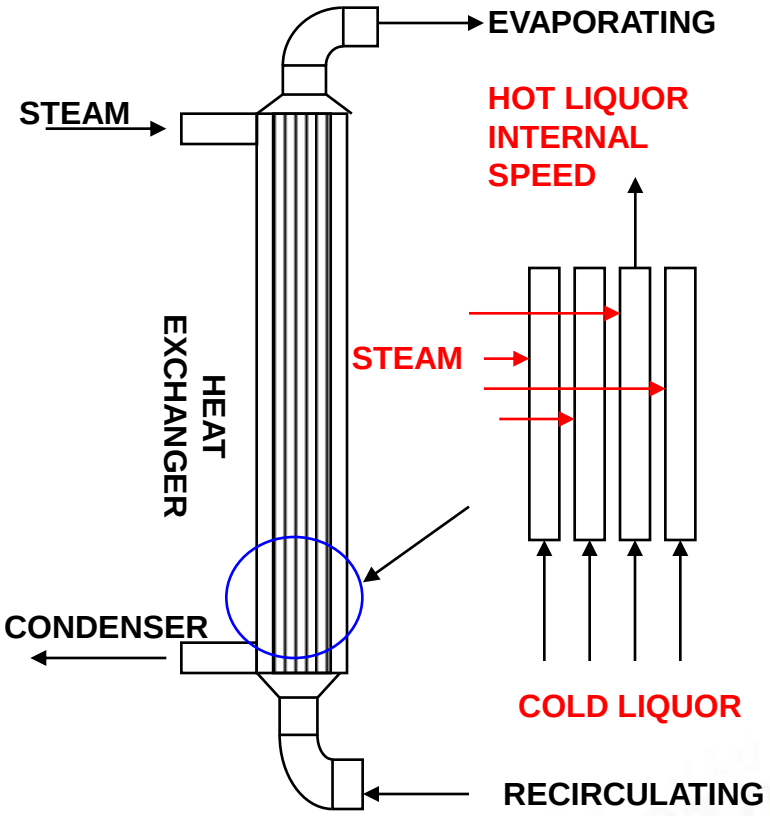
# PI as an Everyday Tool:
# Energy Consumption Totalizers



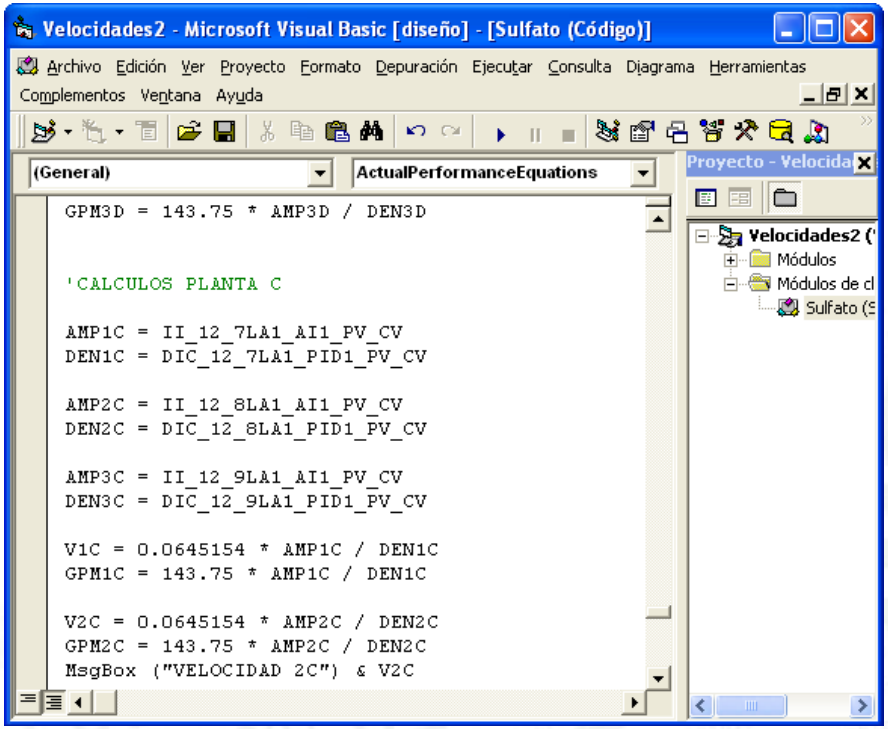

**Performing totals & analysis in PI**

Reduced error in energy consumption estimates from **30% to 4%**

# PI as an Everyday Tool:
# Maintenance Planning



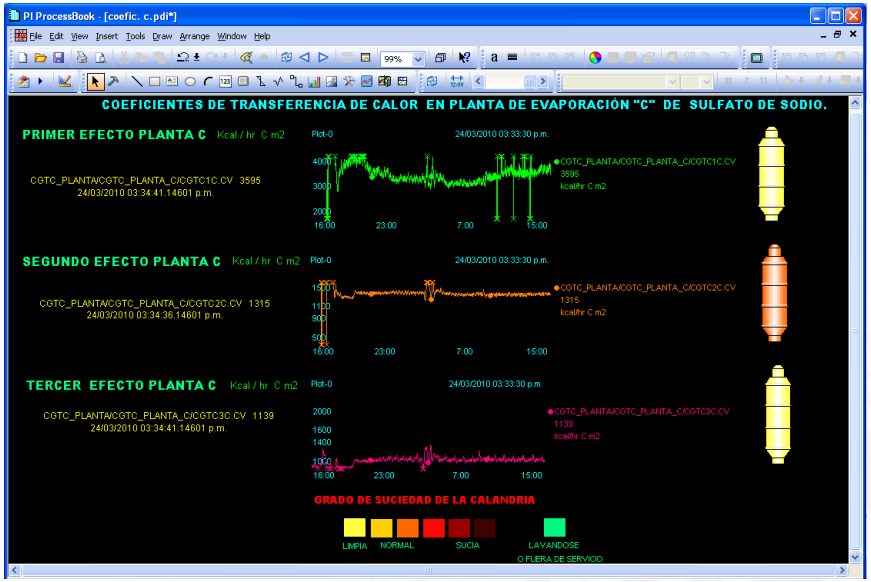

Calculations involving process values & constants



# PI as an Everyday Tool:
# Maintenance Planning

**Tangible Benefits:**

- Equipment uptime extended
- Operational certainty increased
- Total equipment wash cycle time decreased



# PI as an Everyday Tool:
# Efficiency Monitoring

**Shutdown**

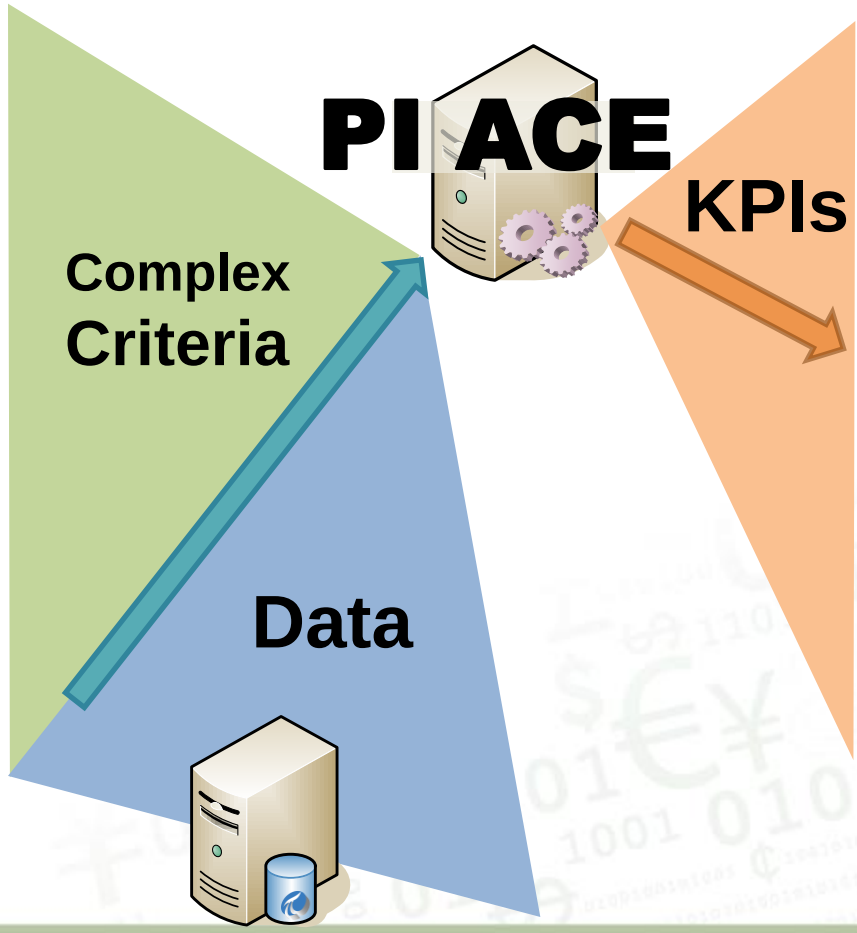
- Equipment failure
- Equipment adjustments
- Equipment starts

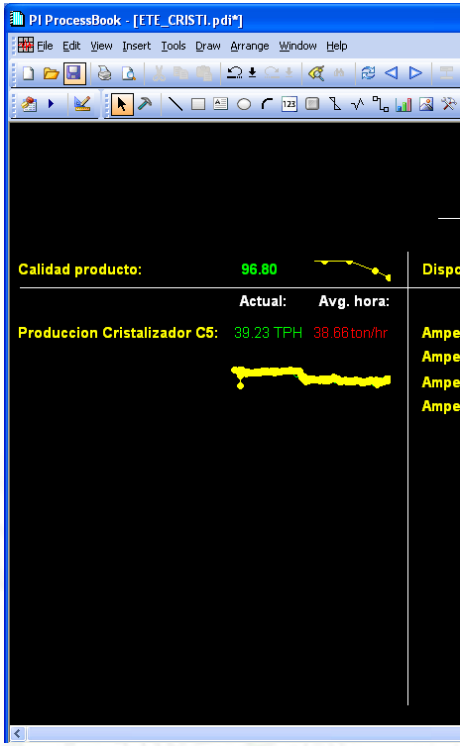
**Velocity**

- Empty equipment
- Mechanical issues

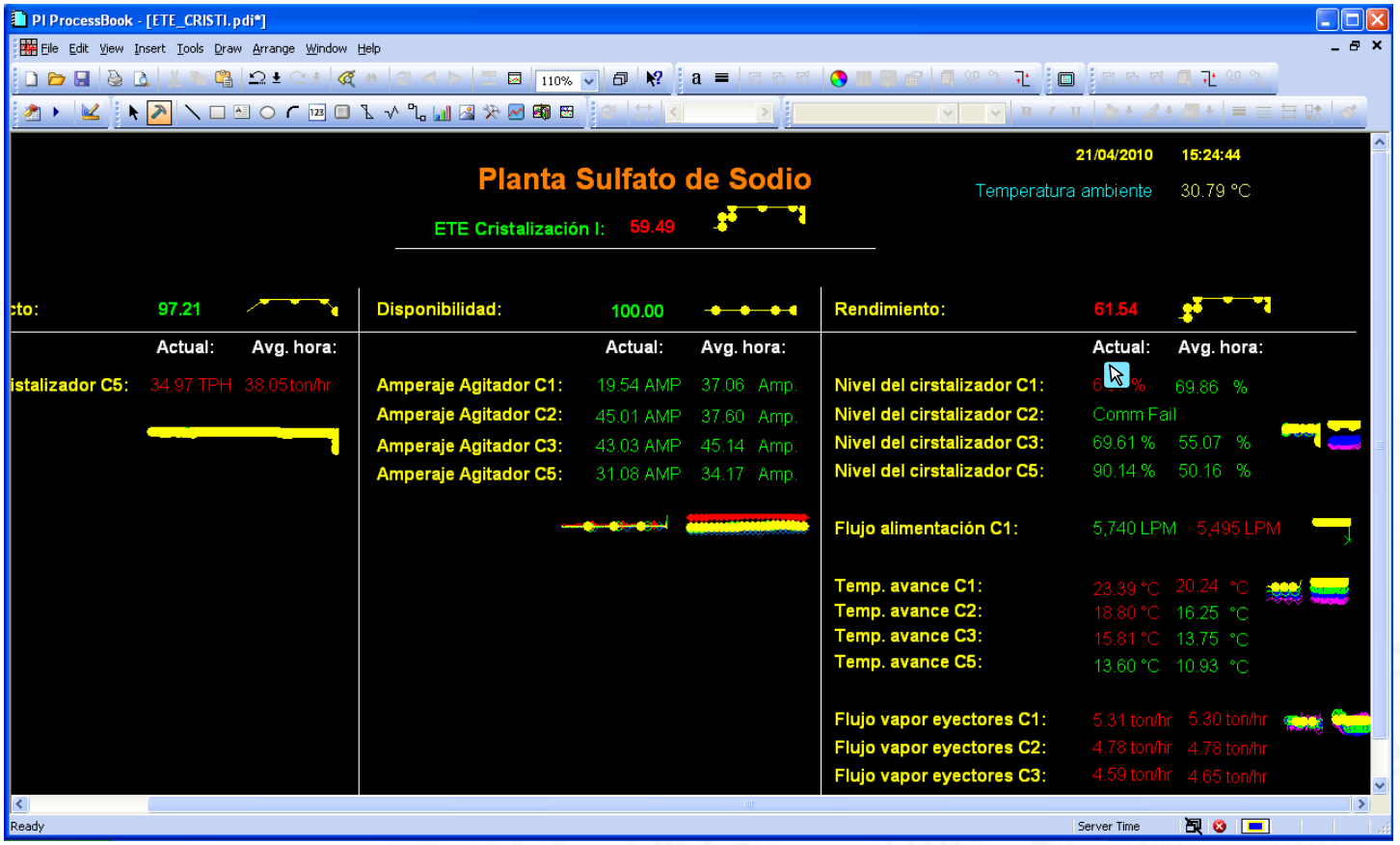
**Defects**

- Cause
- Effect



# PI as an Everyday Tool:
# Efficiency Monitoring



# Summary: Benefits of PI at Magnelec

## A Cycle of Enterprise Information Integration


Catalyst:
**Real Time Information**

OSIsoft® UC 2010

Real Time Information — Currency of the New Decade

# Thank you