Plant / Crushing Automation
Charles Hillman

QUARRY ACADEMY

Agenda

- **Program Overview / Agenda**

- **Discuss crushing station automation**
  - ✓ **Automation needs**
  - ✓ **Automation benefits**

- **Show some examples & results**
  - ✓ **Pay backs**
  - ✓ **Data evaluation**

QUARRY ACADEMY

Automation

Audience Survey

- **How many of you have some form of automation in your plants today?**
- **How many of you have some form of automation on your cone crushers today?**
- **How many of you really understand how the automation works and the importance of it in your plants today?**

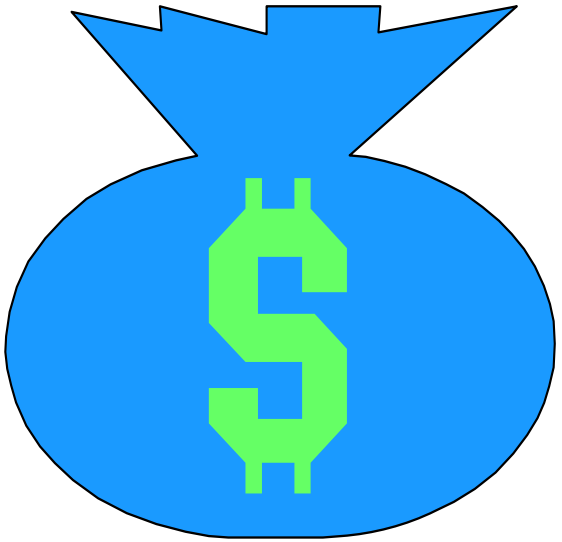
QUARRY ACADEMY

QUARRY ACADEMY

QUARRY ACADEMY

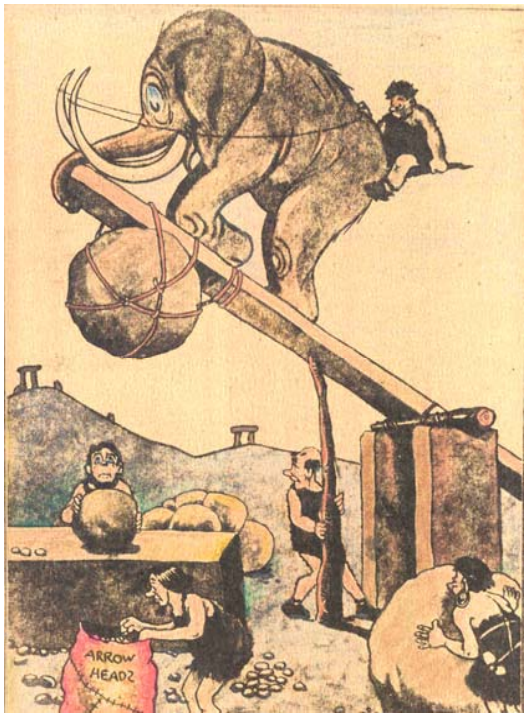
Why Automation

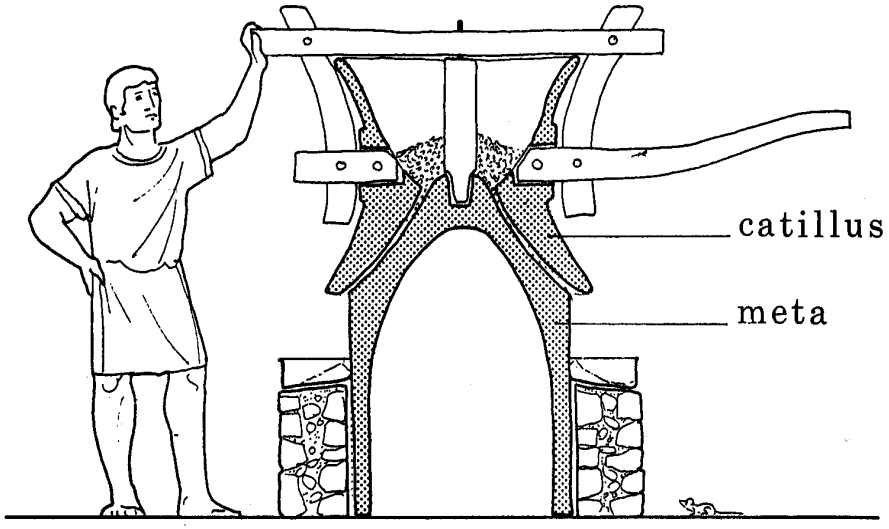
- Repetitive conditions
- Free up man power
- Increase reaction time
- Control a system remotely
- Increase efficiency of a system
- Maximize efficiency of a piece of equipment
- Increase product quality
- Protect capital investment
- Optimize a particular product
- Monitoring operation
- Data gathering

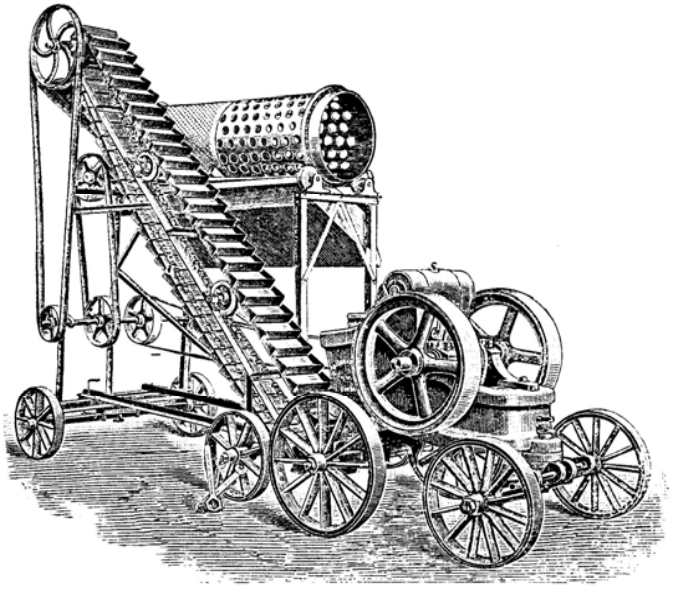


QUARRY ACADEMY

From early dawn







QUARRY ACADEMY

QUARRY ACADEMY

WHY AUTOMATE YOUR CONE CRUSHER ?

- **Realize a higher return on your investment.**
  - ✓ **Higher net production of desired products**
  - ✓ **Optimum power utilization**
  - ✓ **Continuous generation of quality products**

- **Protection of your investment**
  - ✓ **Constant overload protection**
  - ✓ **Continuous adjustment compensating for changes in material characteristics**
  - ✓ **Ability to analyze operational data**

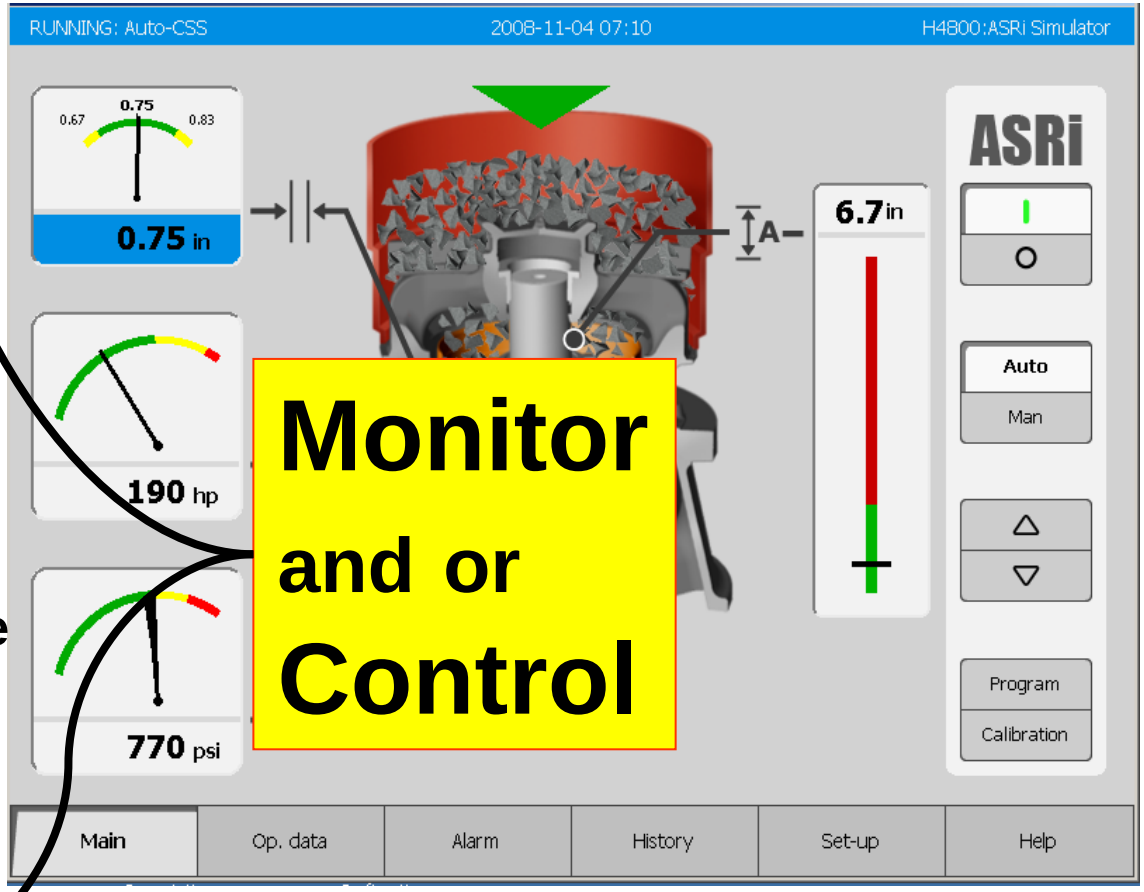
QUARRY ACADEMY

Monitor and Control
Available at the push of a button

QUARRY ACADEMY

Monitor and Control
Available at the push of a button

- **Closed Side Setting**
- **Horsepower in use**
- **Power consumption**
- **Load Time**
- **Operating time**
- **Hydraulic Pressure**
- **Lubrication Oil temperature**
- **Liner Wear**
- **Recorded data**
- **Graphing data**

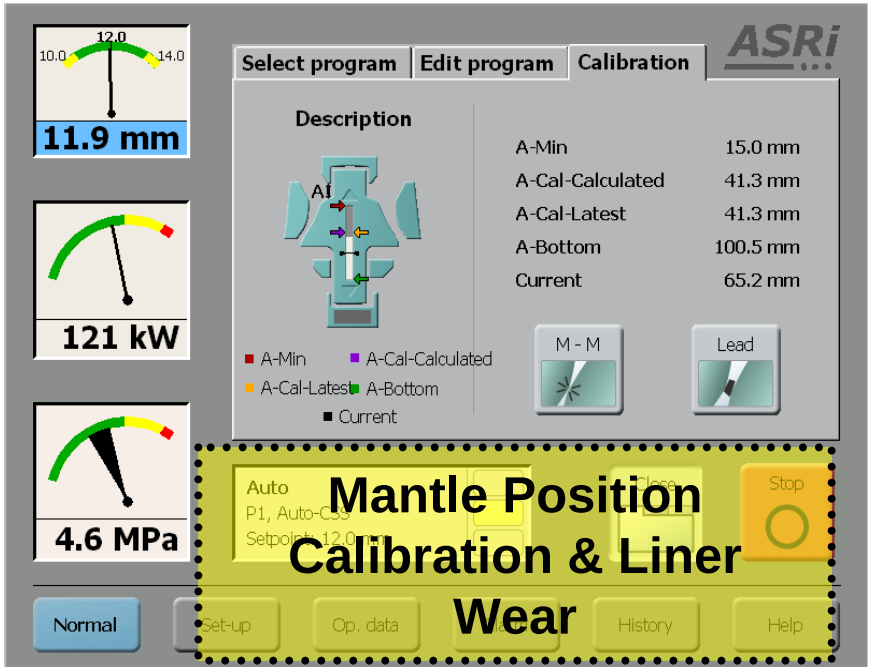


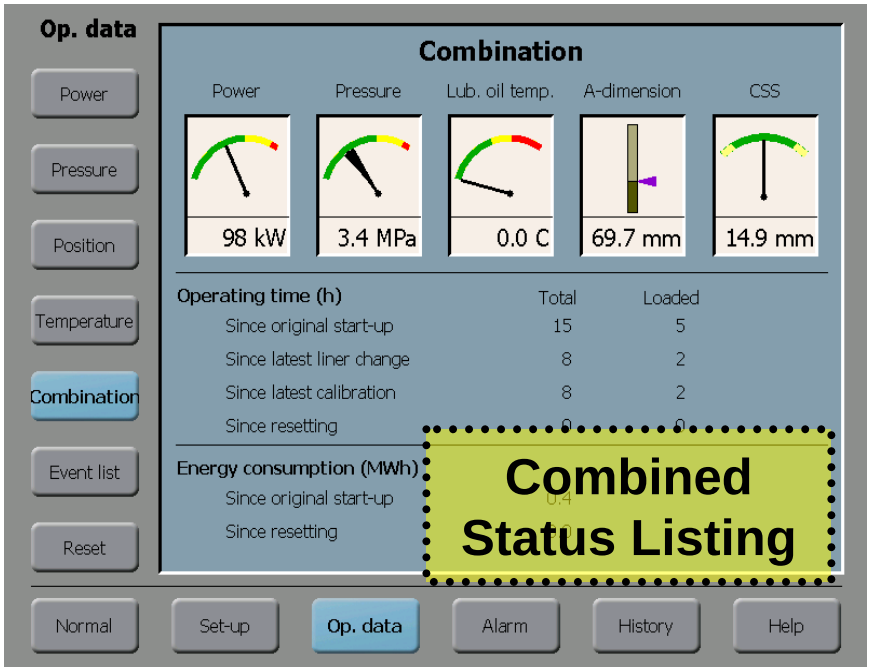
QUARRY ACADEMY

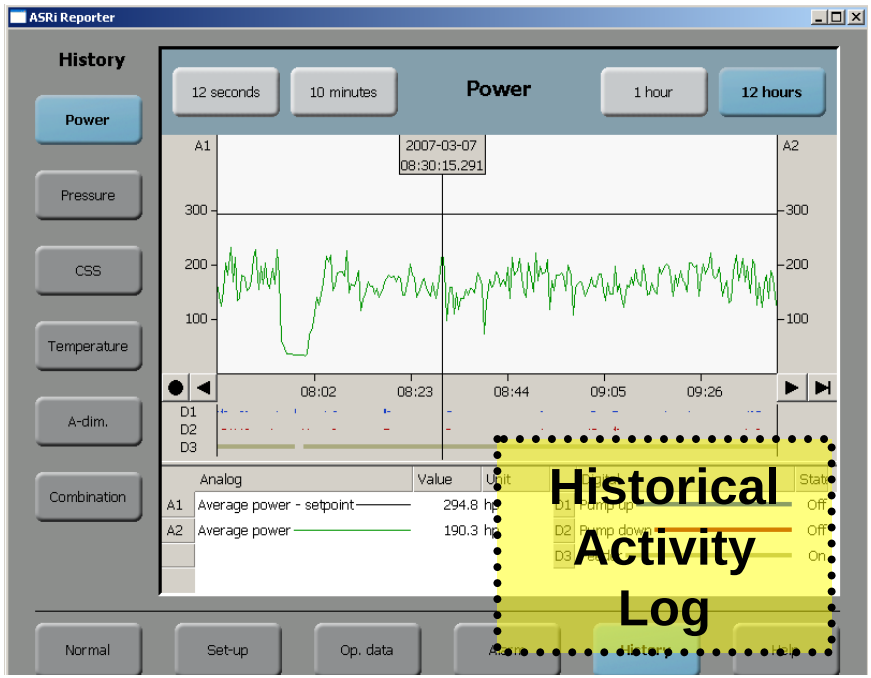
Automation

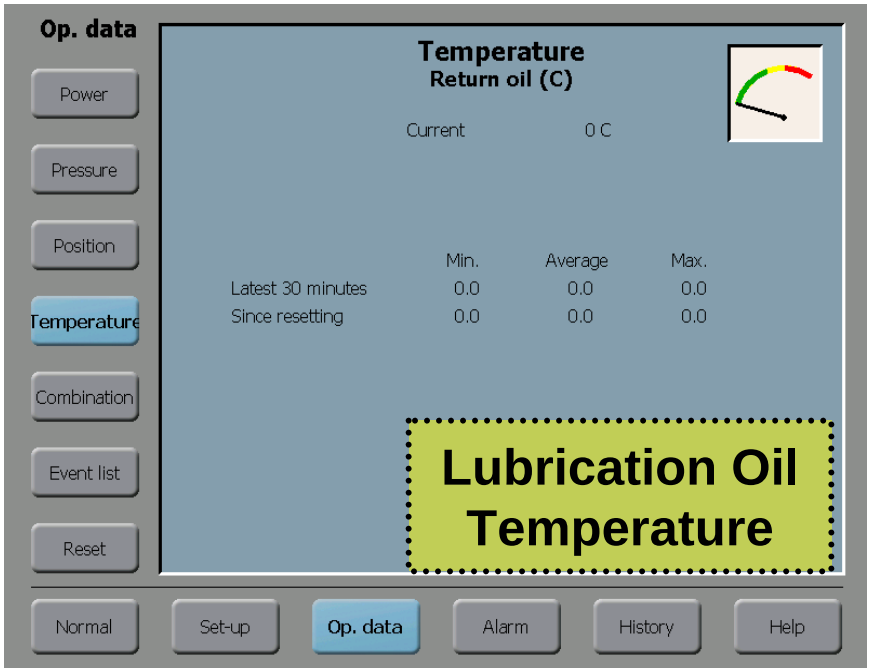
- **Other things to consider**
  - ✓ **Automation mode vs Manual mode**
  - ✓ **Durability of use**
  - ✓ **Is the tool easily used**

QUARRY ACADEMY









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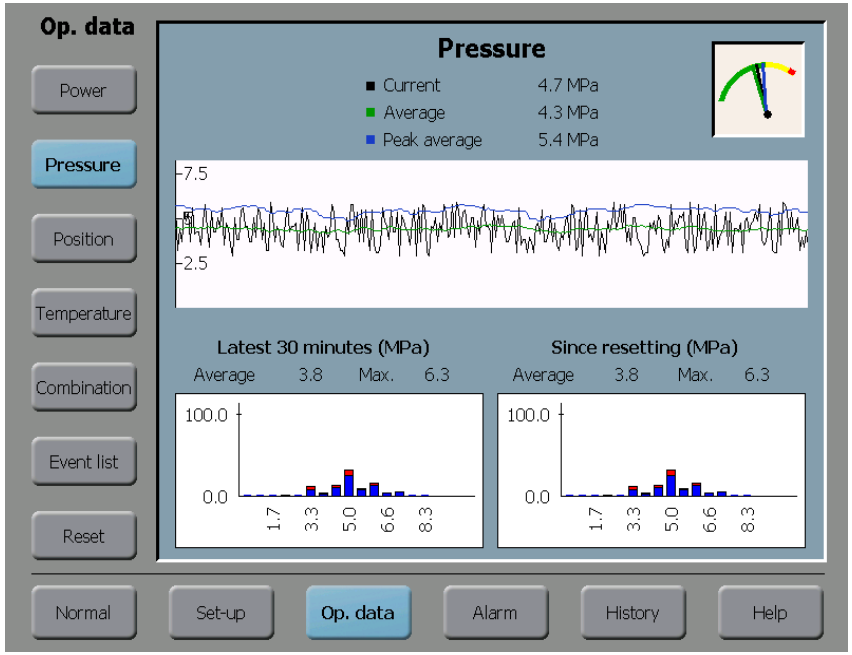
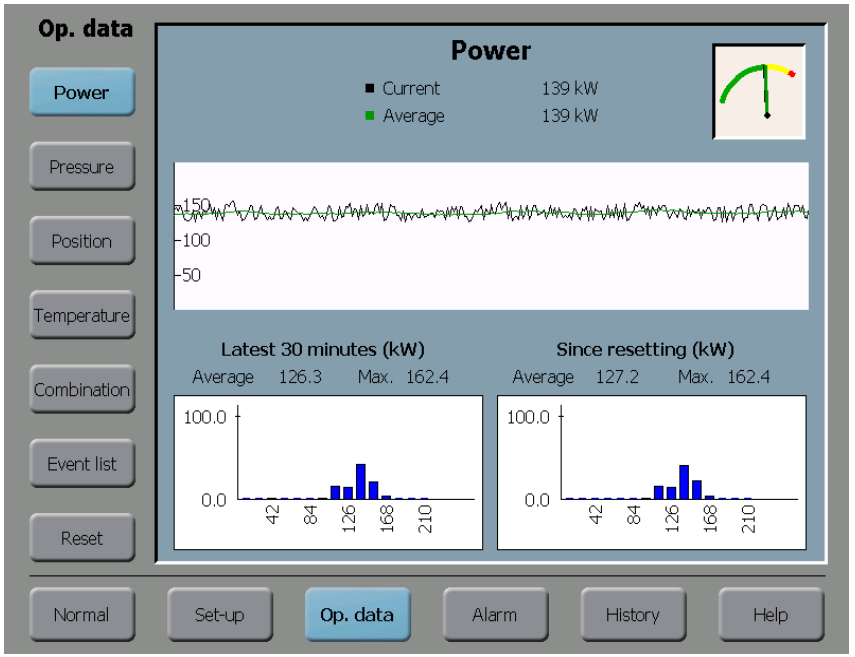
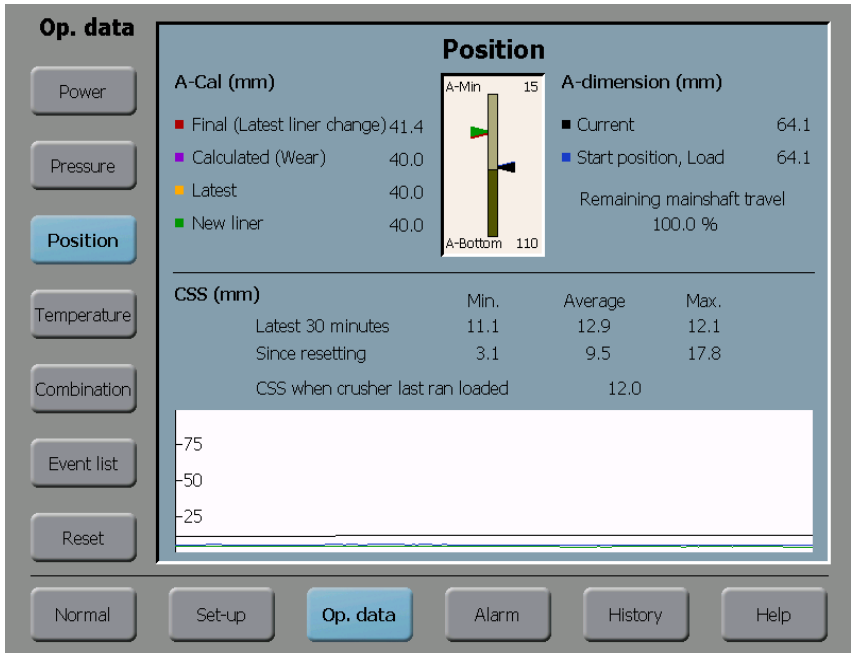
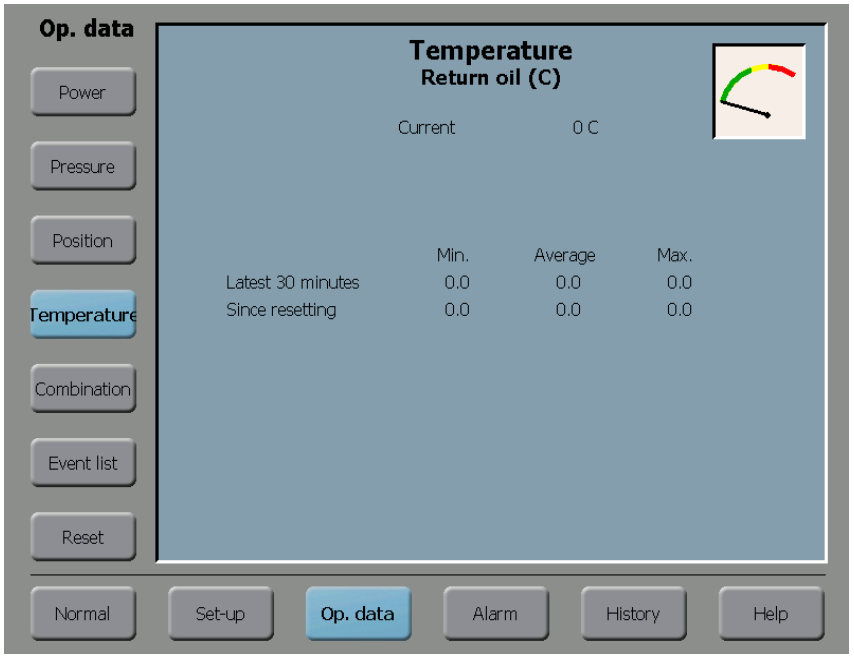
Historical Activity Logs



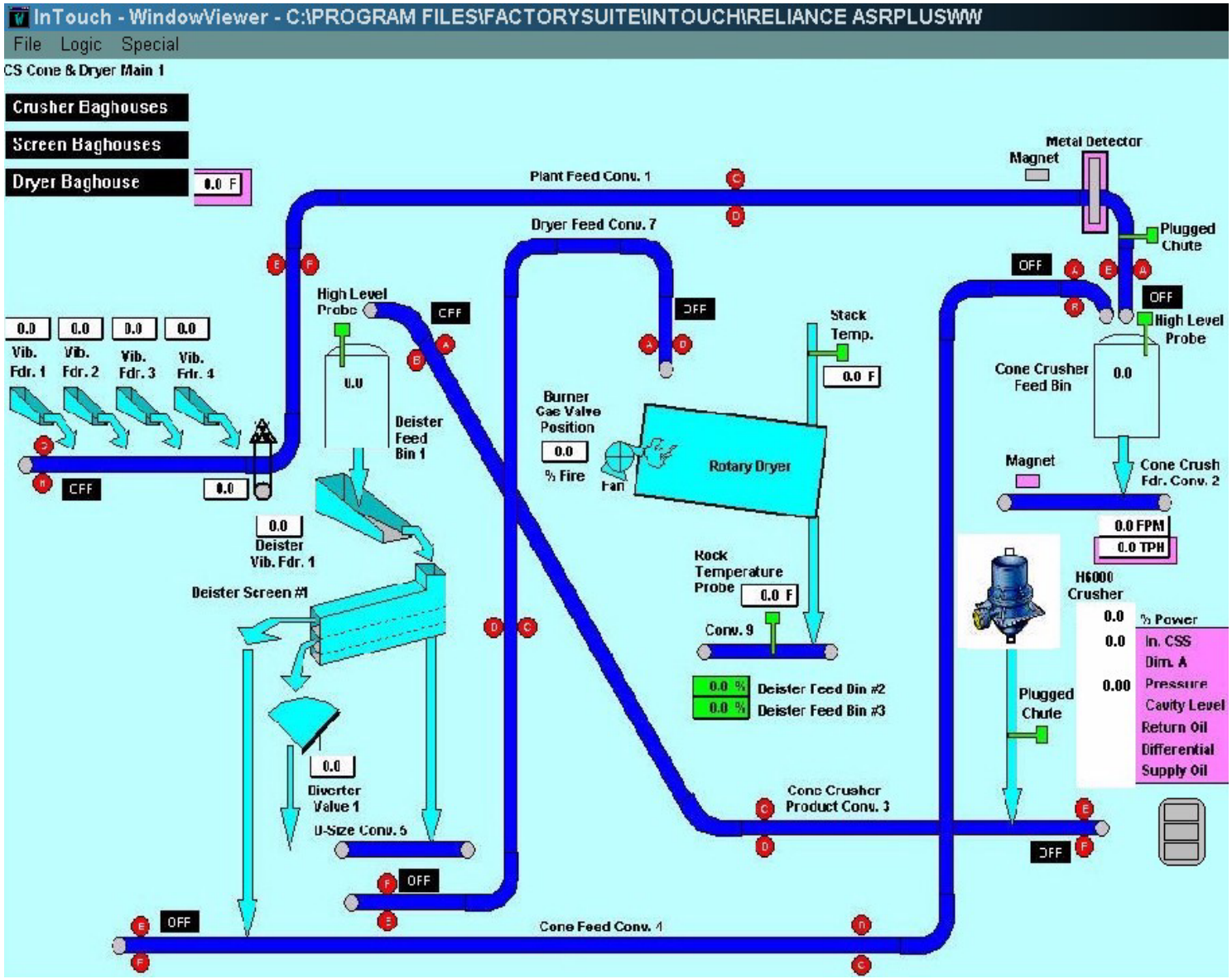




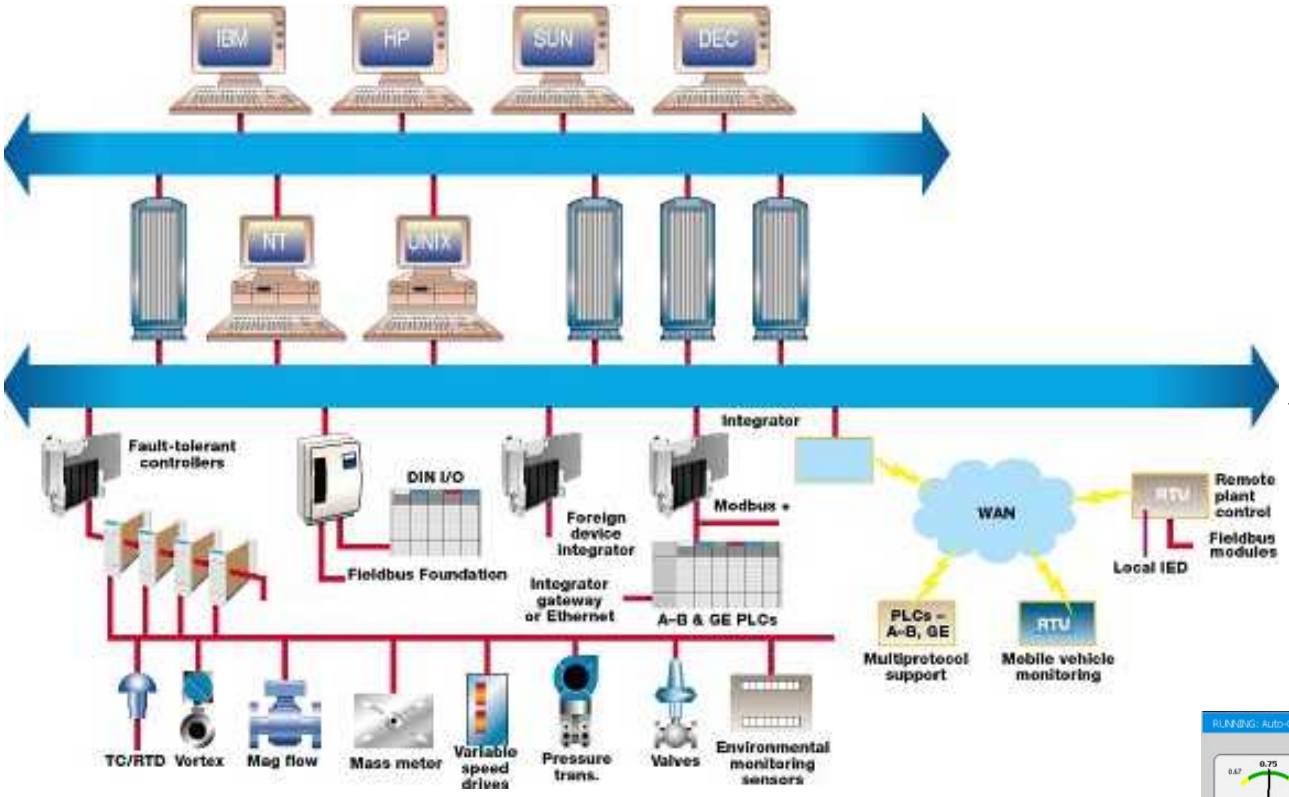


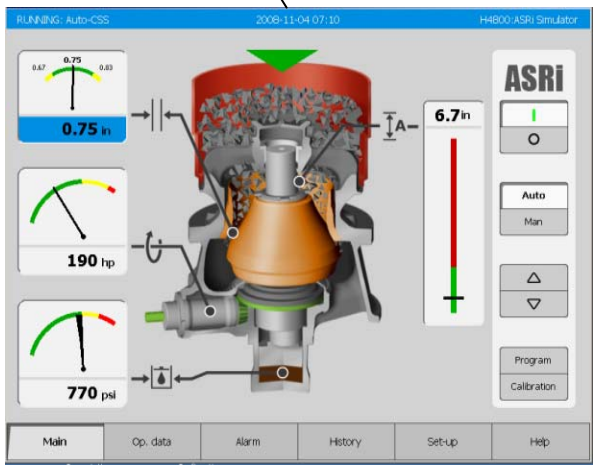
QUARRY ACADEMY

Detailed and comprehensive crusher data is easily available with a click of the mouse.



QUARRY ACADEMY

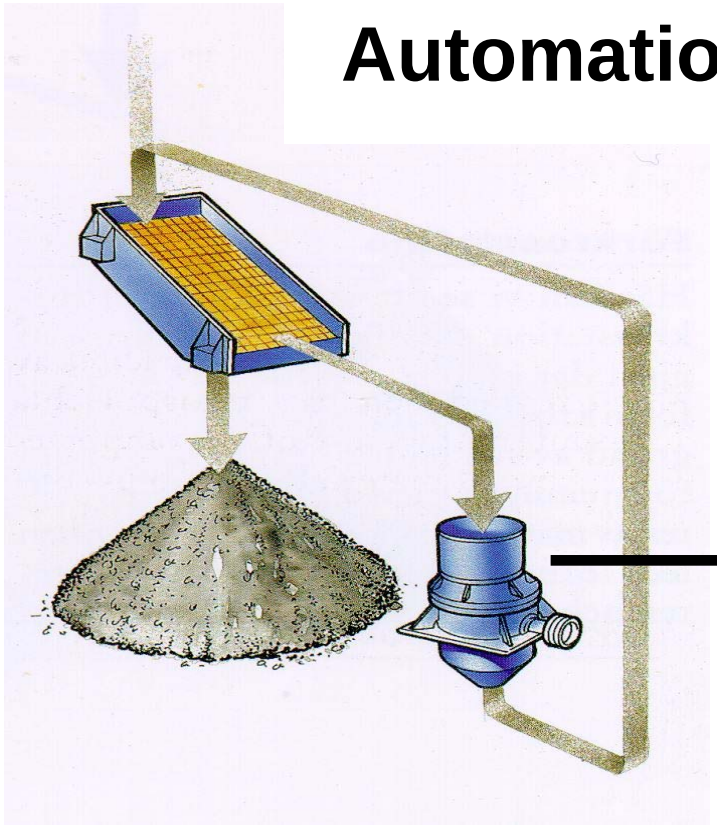


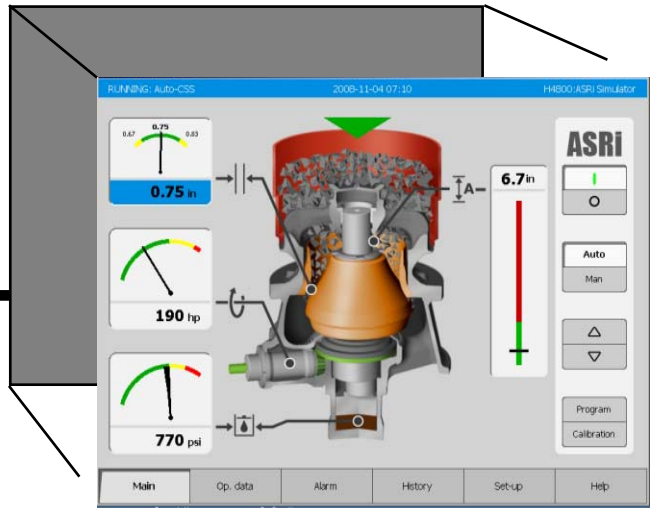


Crusher Automation and PLC System

QUARRY ACADEMY

Continuous Control with Automation





QUARRY ACADEMY

1. Switch gear unit

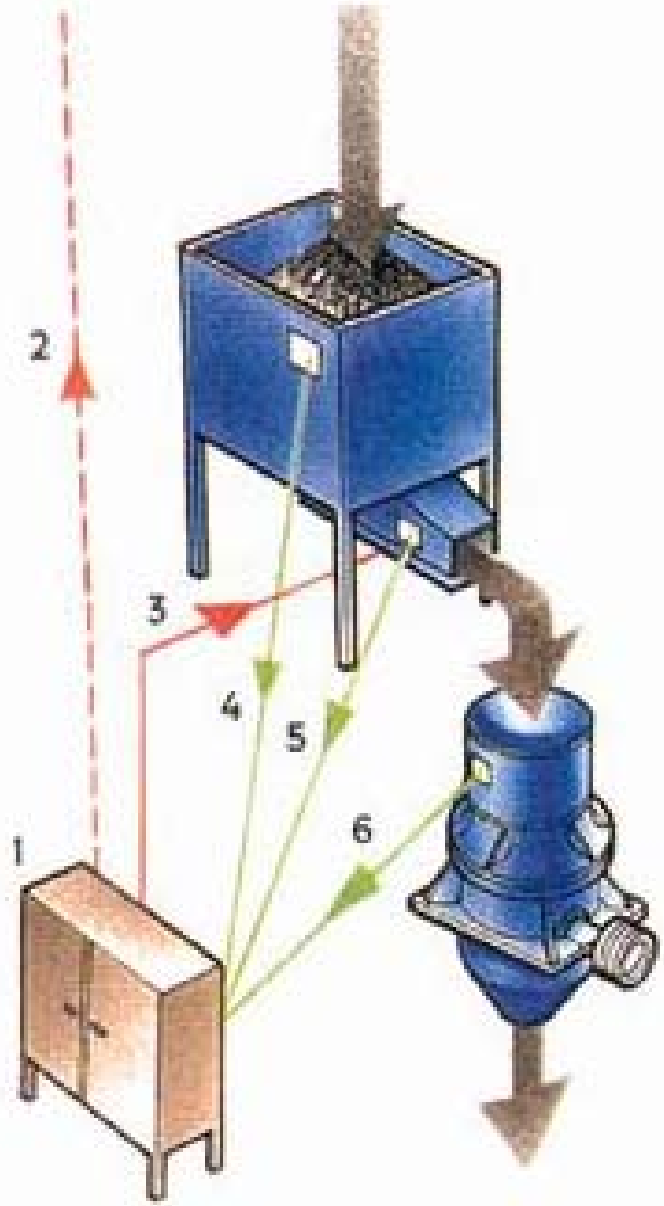
2. Stop signal to feeder

3. Control signal to feeder

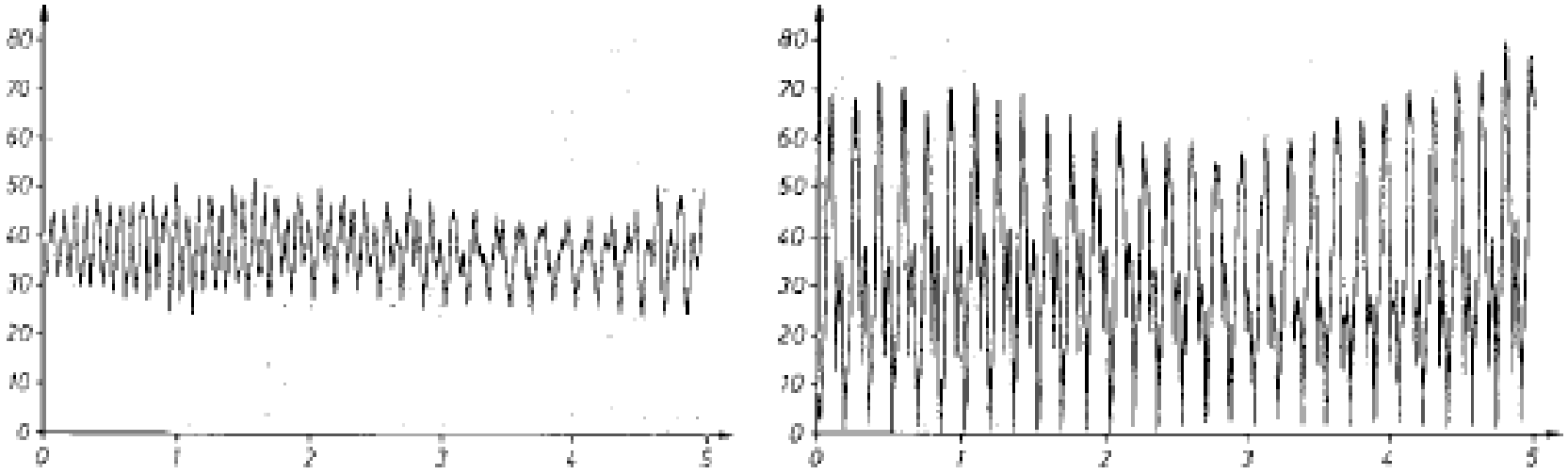
4. Max. level in surge bin

5. Min. level in surge bin

6. Max. level in crusher feed hopper



QUARRY ACADEMY



Hydroset pressure (bar)
Time (seconde)

Crushing force –
Choke-fed chamber

Crushing force-
Starve-fed chamber

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Poor Feed

QUARRY ACADEMY

Better Feed

QUARRY ACADEMY

Quality = $

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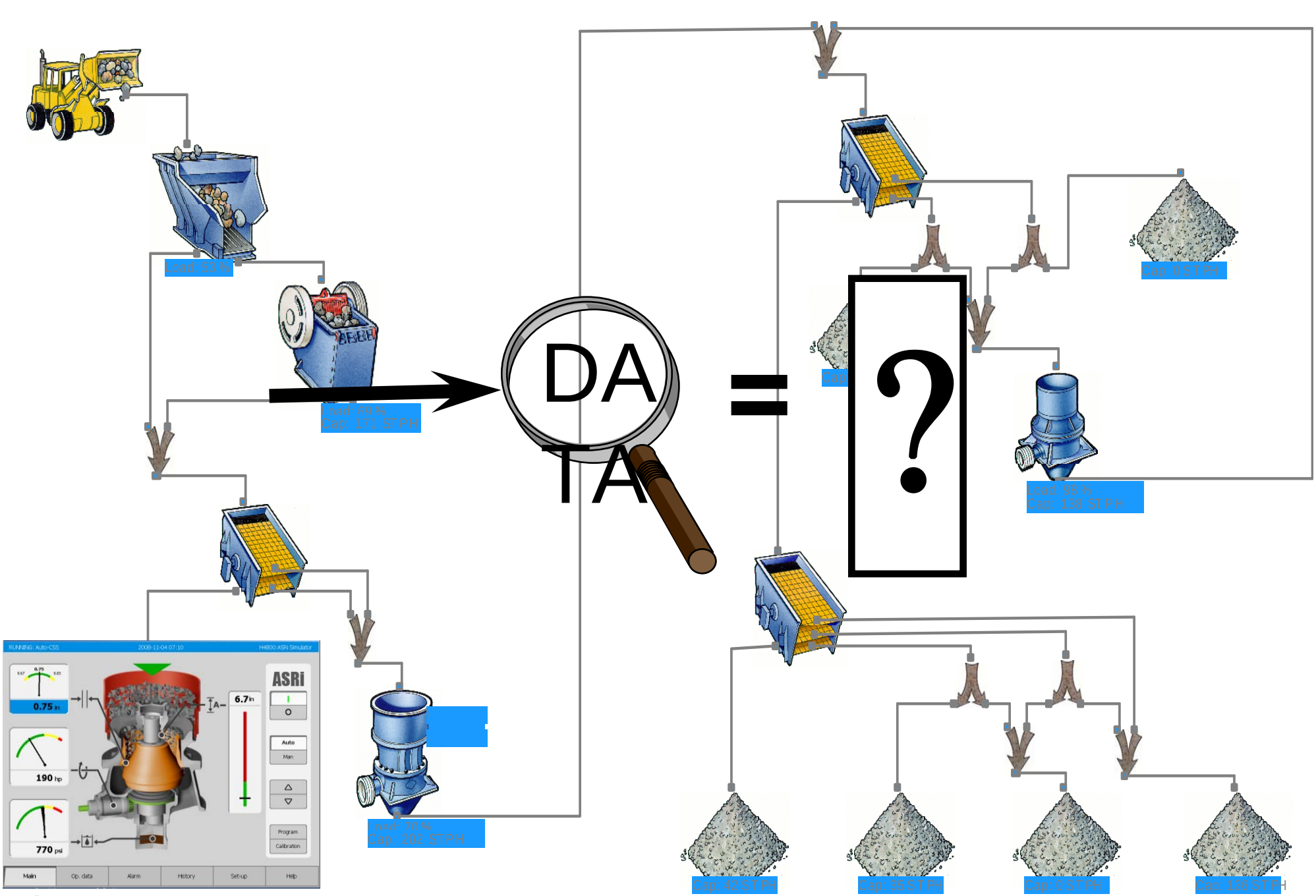

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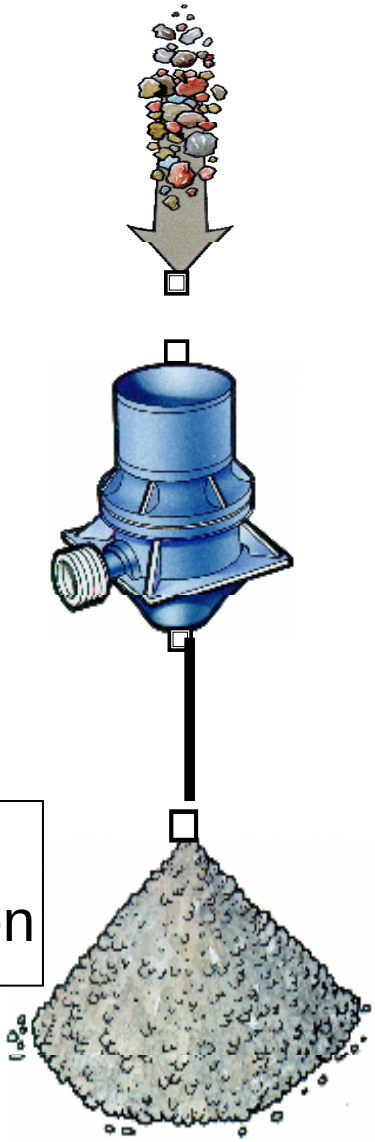
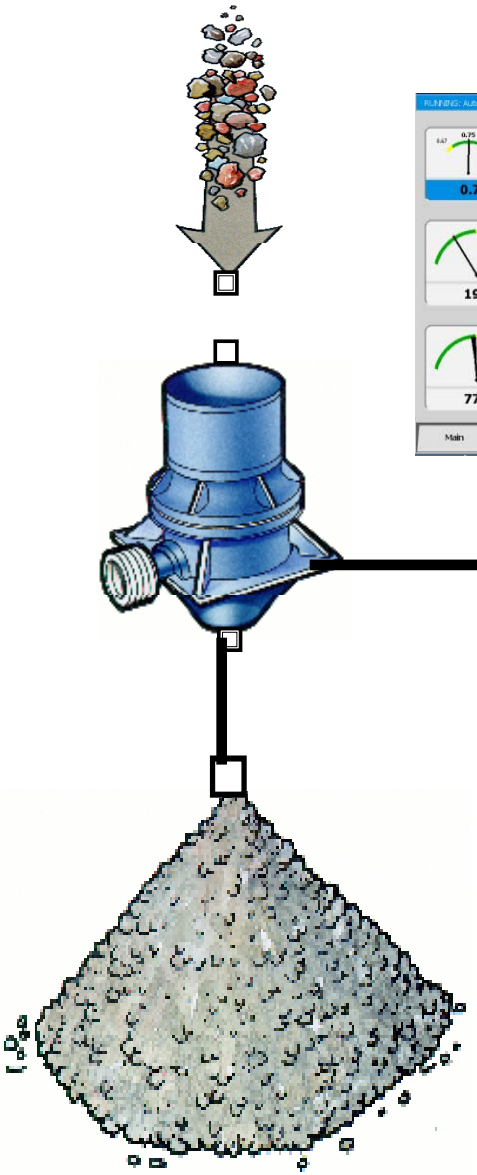
Automation can work for you



Without Automation

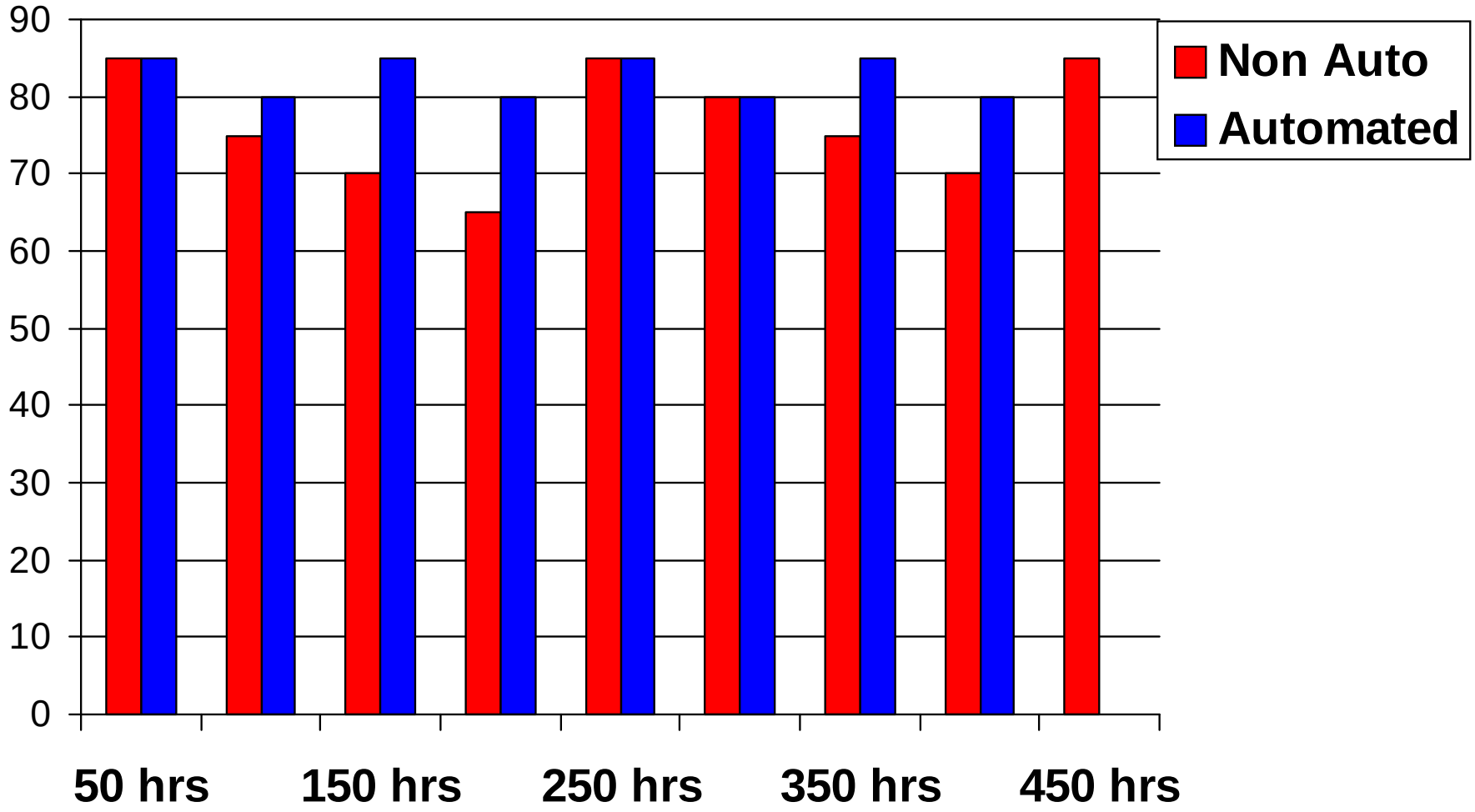
Case study



With Automation

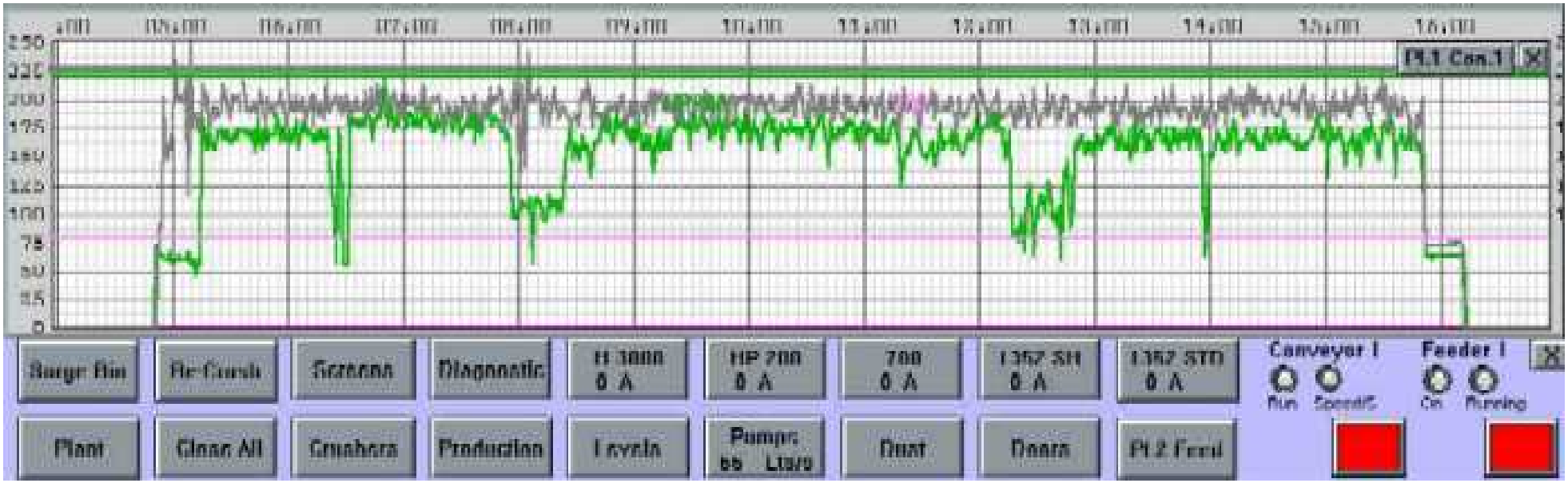
QUARRY ACADEMY

Crusher Discharge
% available minus 1/2 "



QUARRY ACADEMY

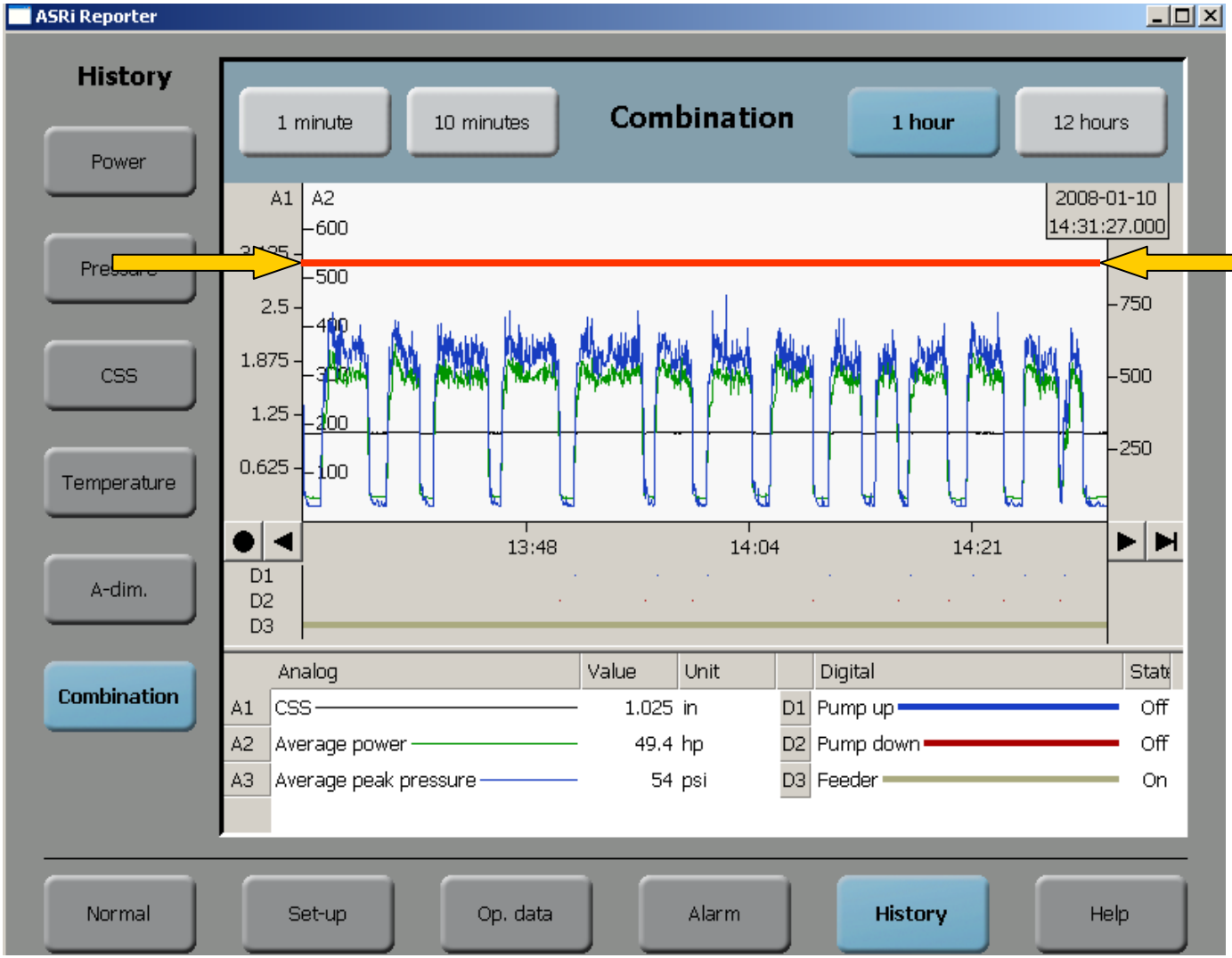
The advantages



- **Can operate choke-fed and utilize the maximum motor power.**
- **The reduction increases.**
- **The product shape gets better**
- **The liner life increase**
- **Mechanical life of components & machine increase**
- **Overloading protections**
- **An automated crusher looks after it self**

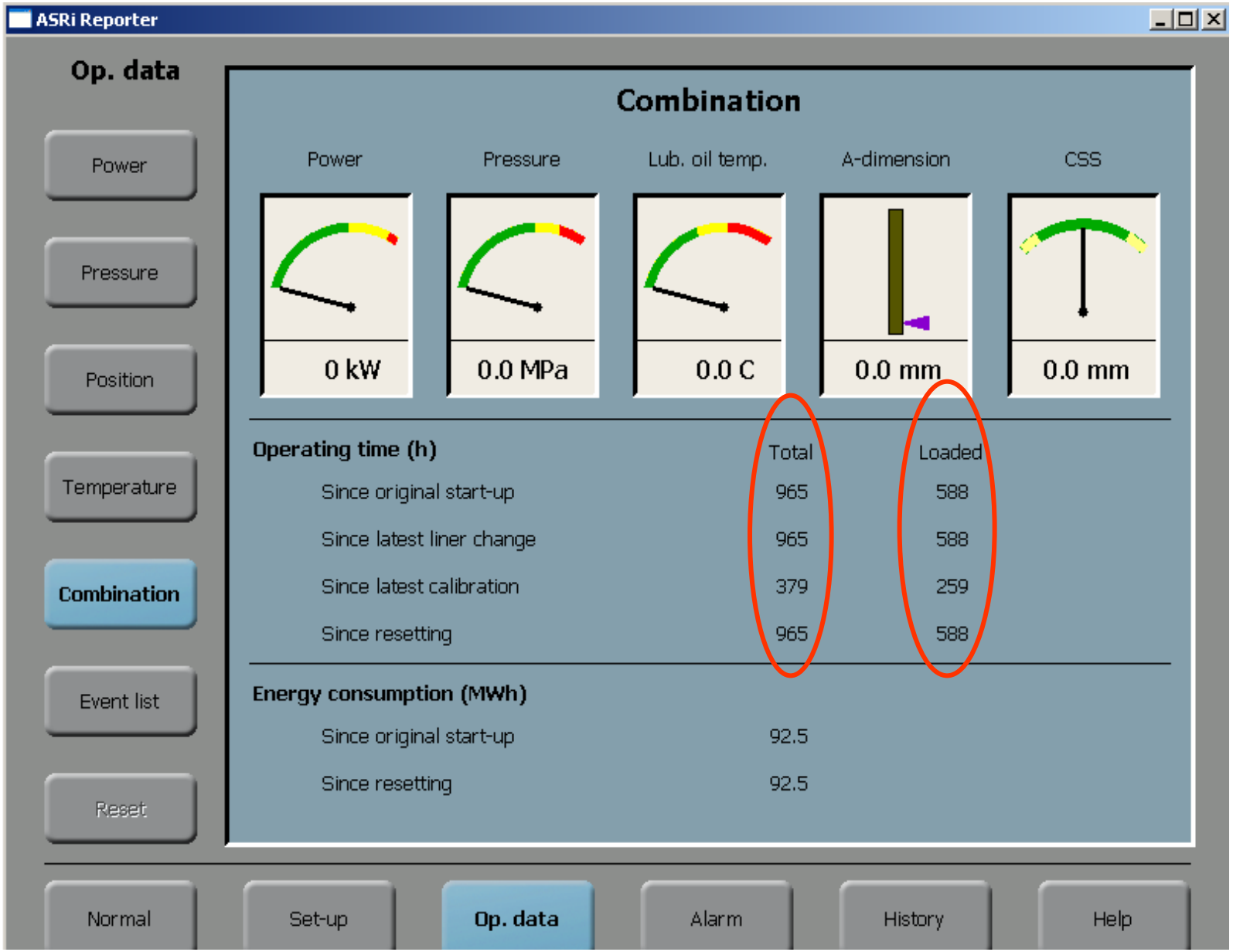
Automation crusher produces
10 tons more of desired produ
and 33 tons less over size

QUARRY ACADEMY



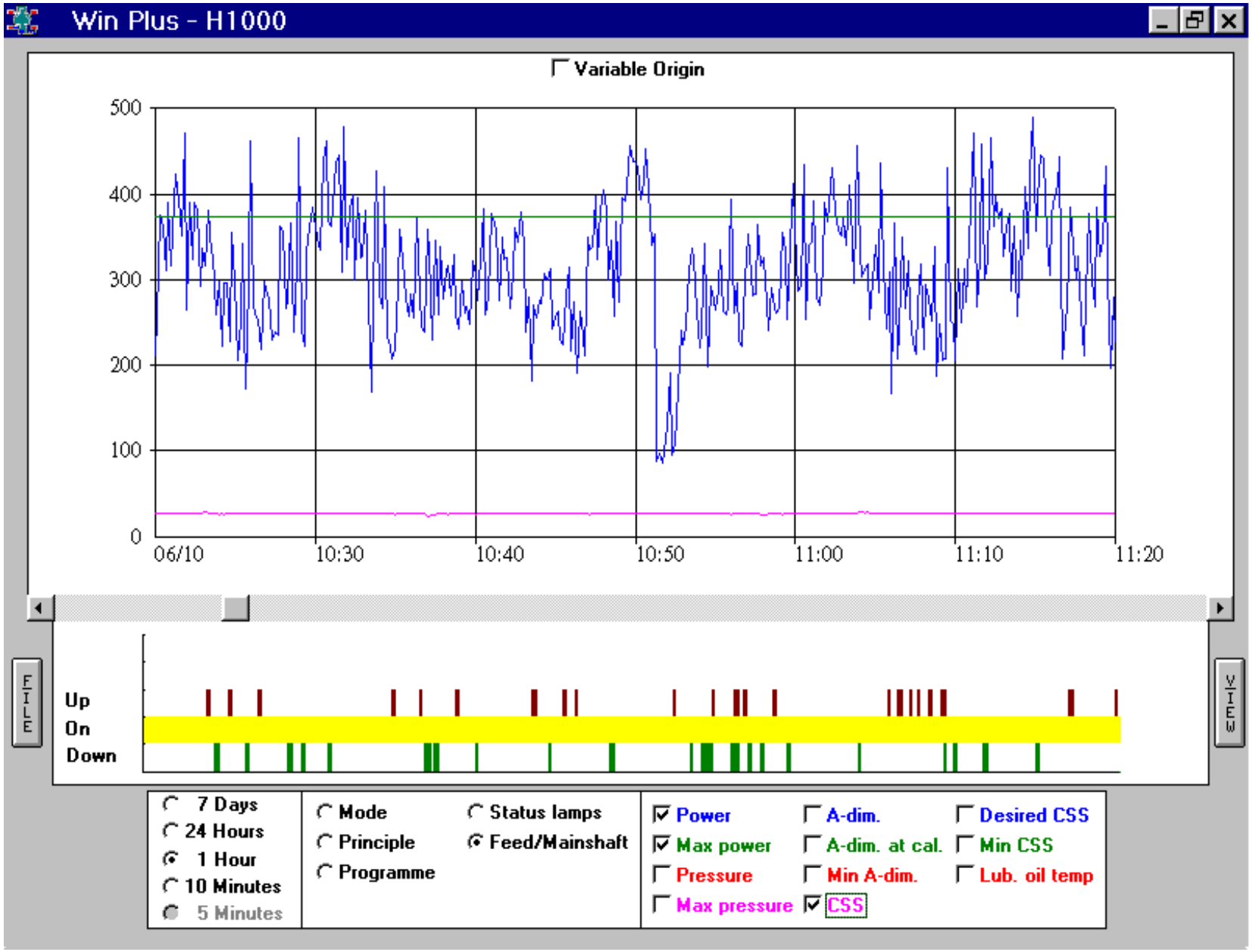
One Hour time span

QUARRY ACADEMY

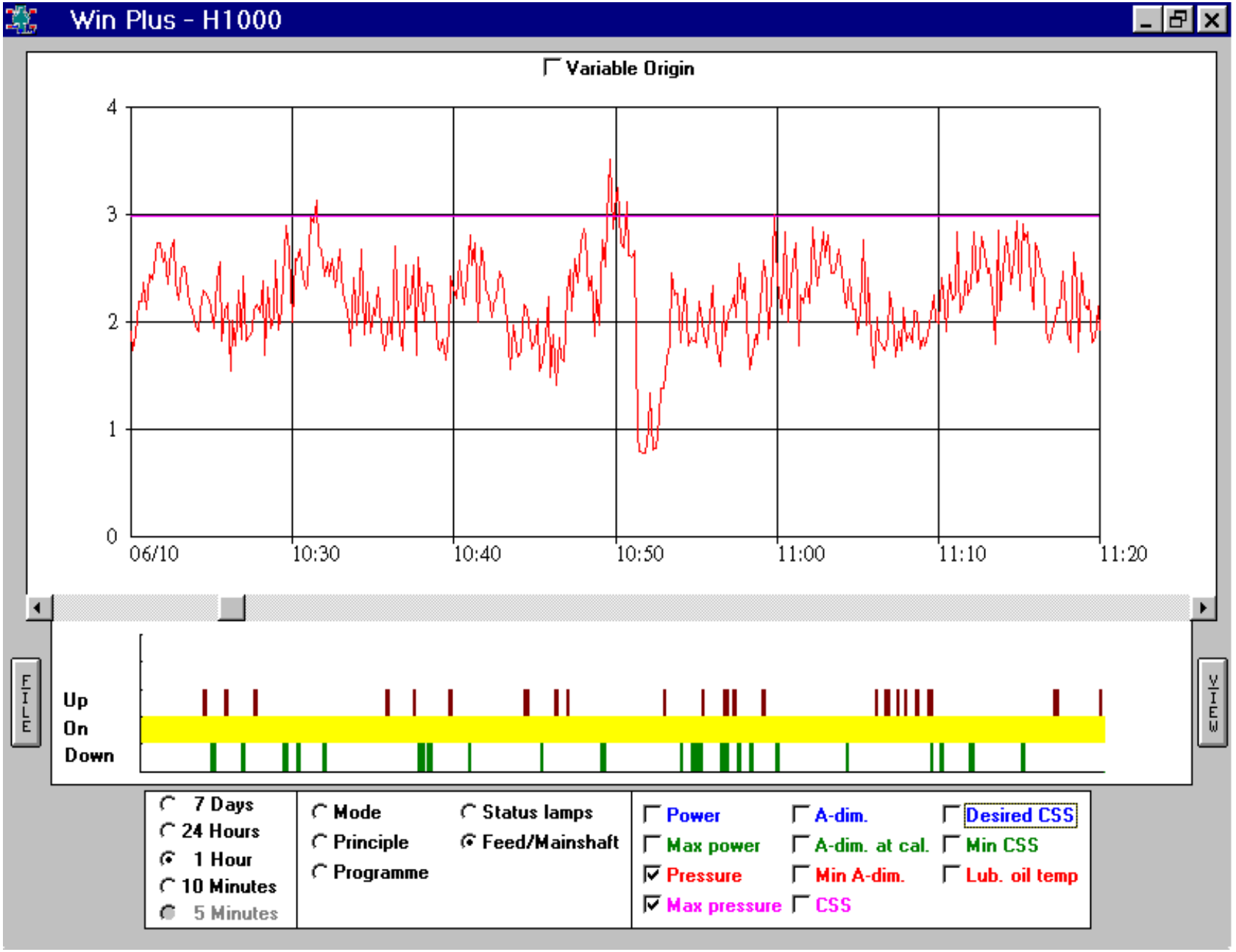


Loaded 66% of each hour

QUARRY ACADEMY



QUARRY ACADEMY



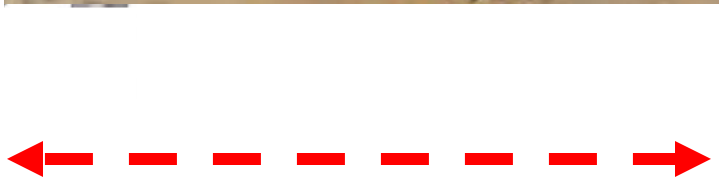
Summary

- In summary automation of a compression crusher will provide:
- Higher net production of desired products
- Optimum utilization of motor power
- Continuous adjustment of setting to compensate for feed conditions.
- Full utilization of the units capacity
- Constant overload protection
- The ability to analyze operating data
- The opportunity to monitor the unit from remote location.

QUARRY ACADEMY

FUTURE DEVELOPMENTS

The new handheld, high performance computers will give remote access and allow distant control through mobile phones and Internet. It may be possible to for example to control an automated mobile cone crusher from an office, using a hand held computer, on the other side of the globe. (Bill Malone)



Future of Automation

There are many on-line size sampling systems avaiable today.
Whether by mechanical means, or by photo thechnology.

With this ability to sample it is possible to use a control loop in conjuction with and automated crusher station to complete the system and become closer to full automation.

Service in a box.....?

Automatic wear indication.....?

Automatic Parts Re-Order.....?

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Thanks

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