Automation of Cone Crushers

Alex Scott
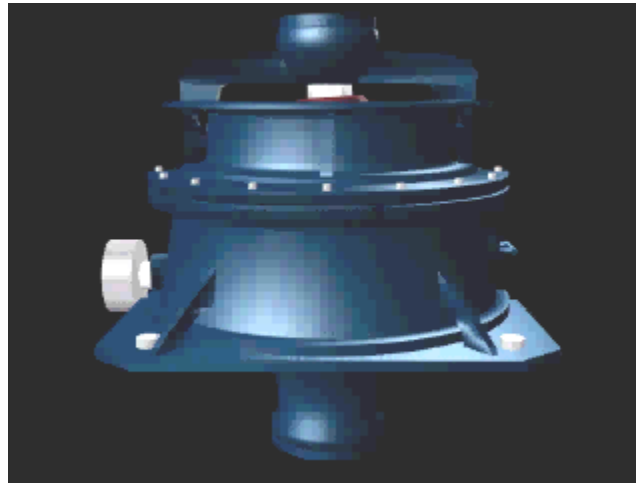
Sandvik Rock Processing

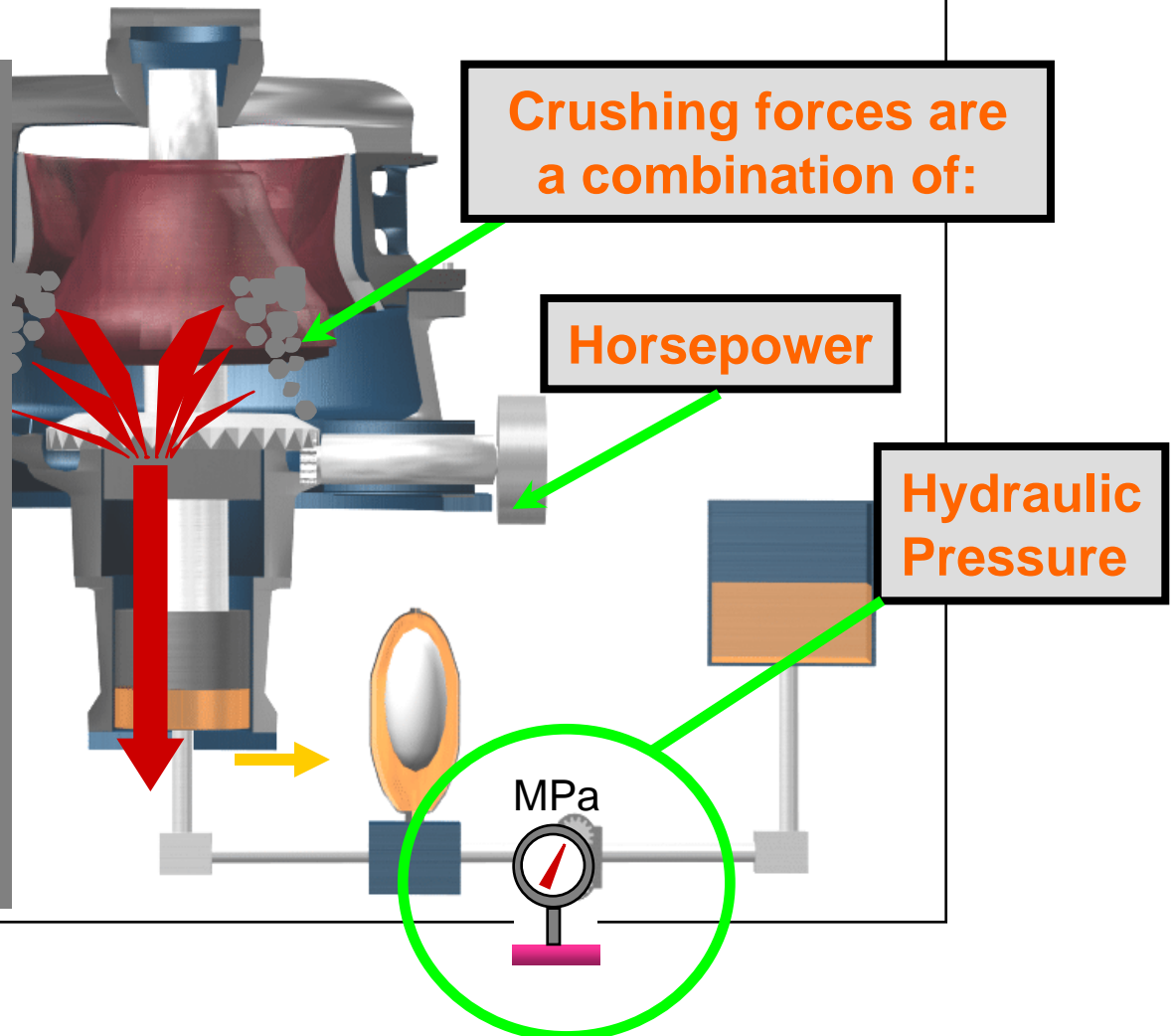# Intro - ASR

Principle of operation

SANDVIK

Hydraulic Supported Design

SINGLE SYSTEM

- **Maintaining and adjusting CSS**
- **Tramp release**
- **Chamber clearing**
- **True automation**
- **Crushing force**

Crushing forces are a combination of:

Horsepower

Hydraulic Pressure

MPa

The H8800 utilizes a pilot controlled dump valve

SANDVIK

DynoConsult

Factors affecting crusher load

- **Material toughness**
- **Material feedanalysis**
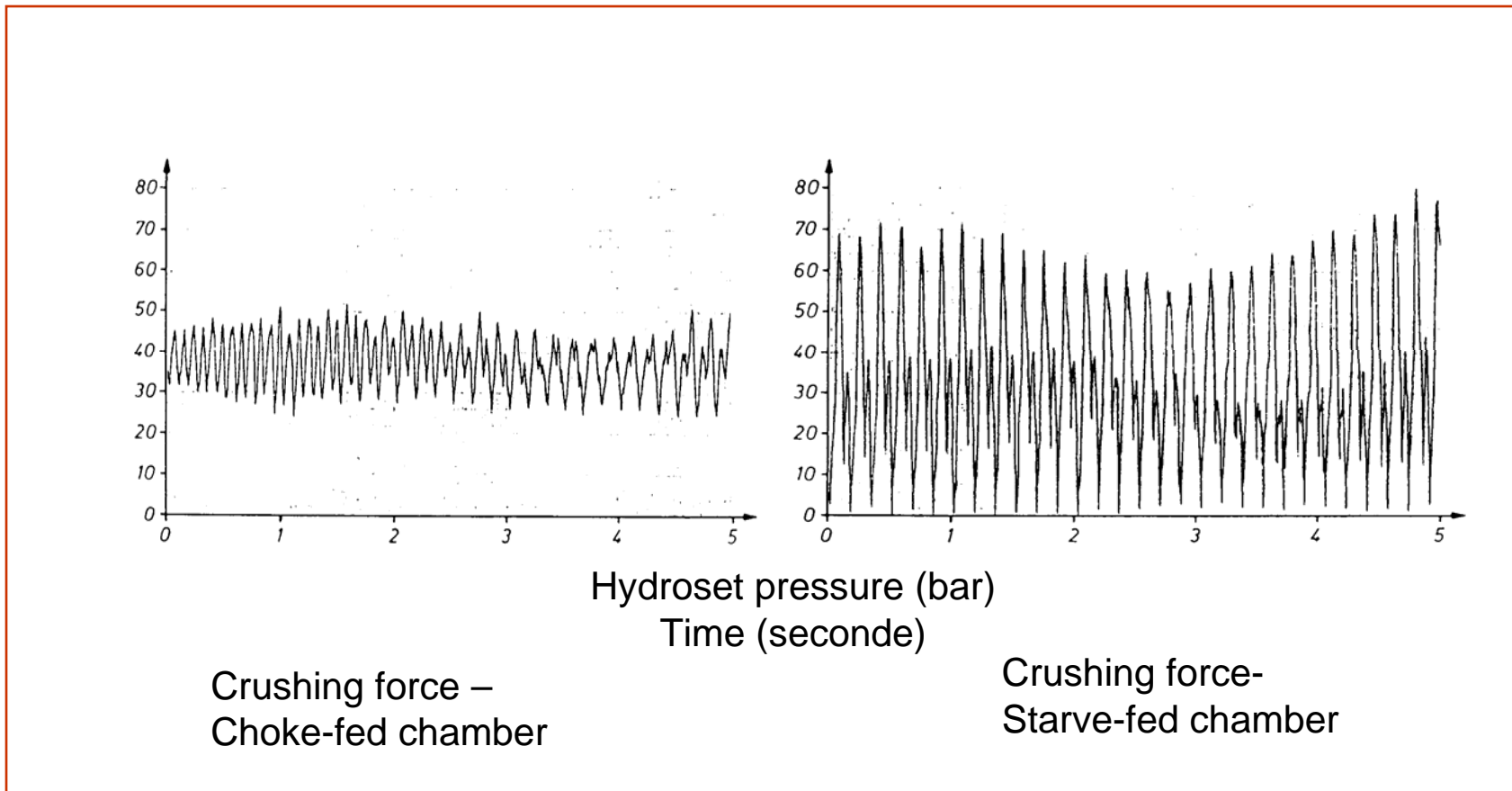- **Reduction – CSS**
- **Volume – Throw**
- **Moisture**

History

- **60´s research**

- **Manually controlled crushers – 65% - 70% utilised**

- **Why – to prevent motor stalls**

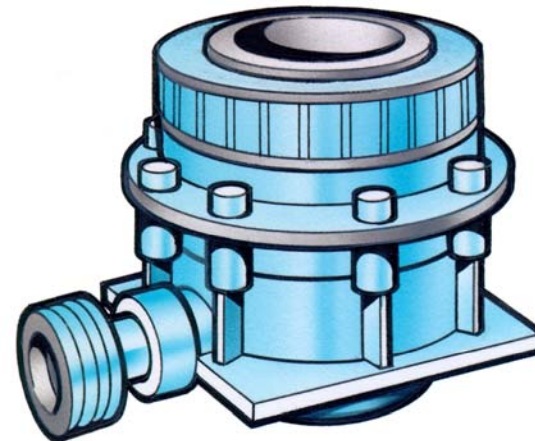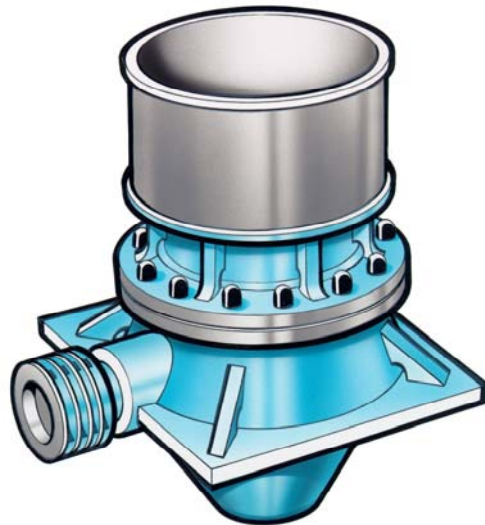SANDVIK

Underfeeding results in:

- **Increased capital costs – additional machines**

- **Throughput reduction to reduce load downstream**

- **Increased revenge cost – greater power to crush – convey oversize**

- **Wear on screens, conveyor belts chutes, crusher liners**

- **Reduced product quality**

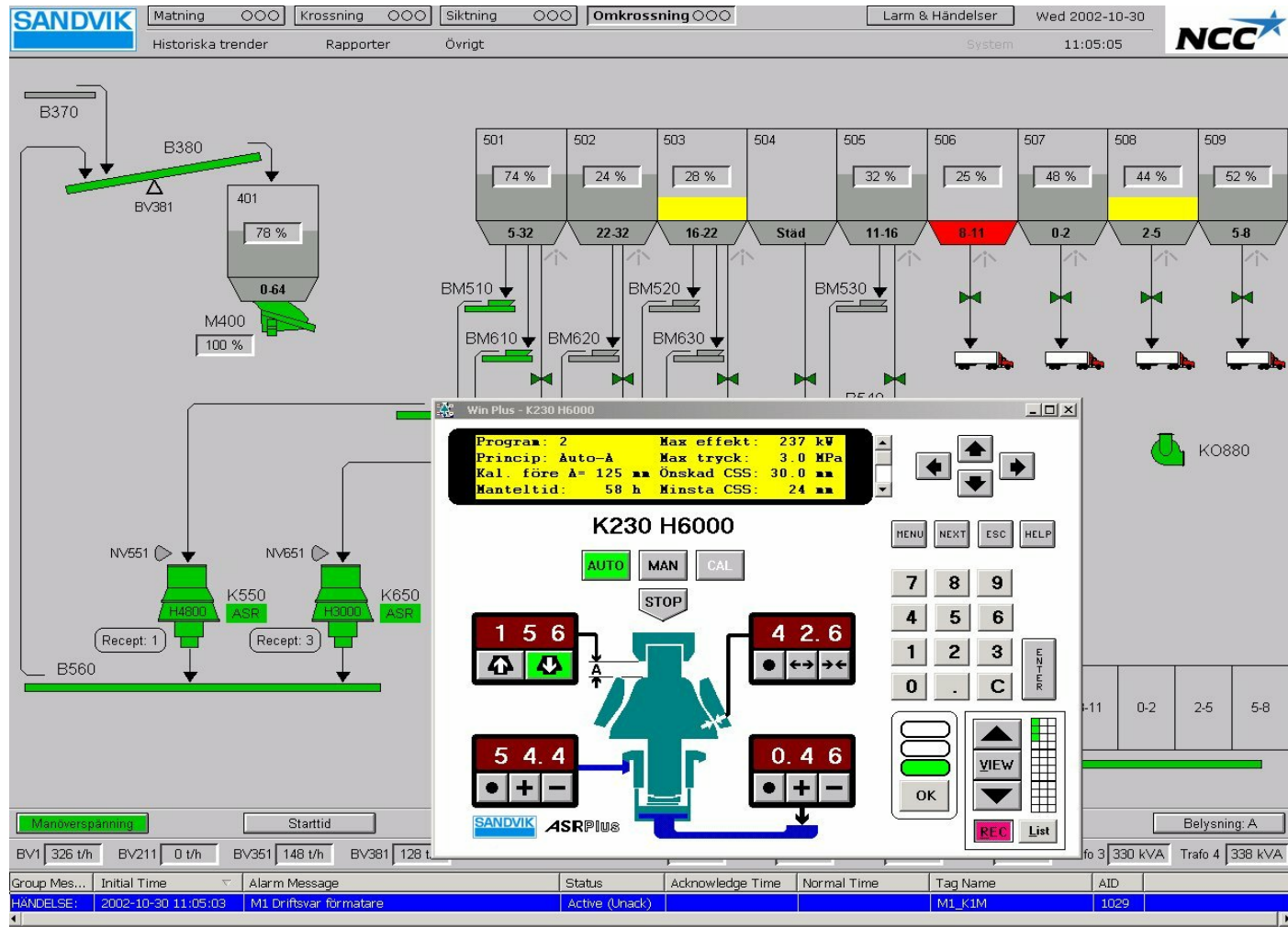# Starved-fed crusher means high and uneven load

Hydroset pressure (bar)
Time (seconde)

Crushing force –
Choke-fed chamber

Crushing force-
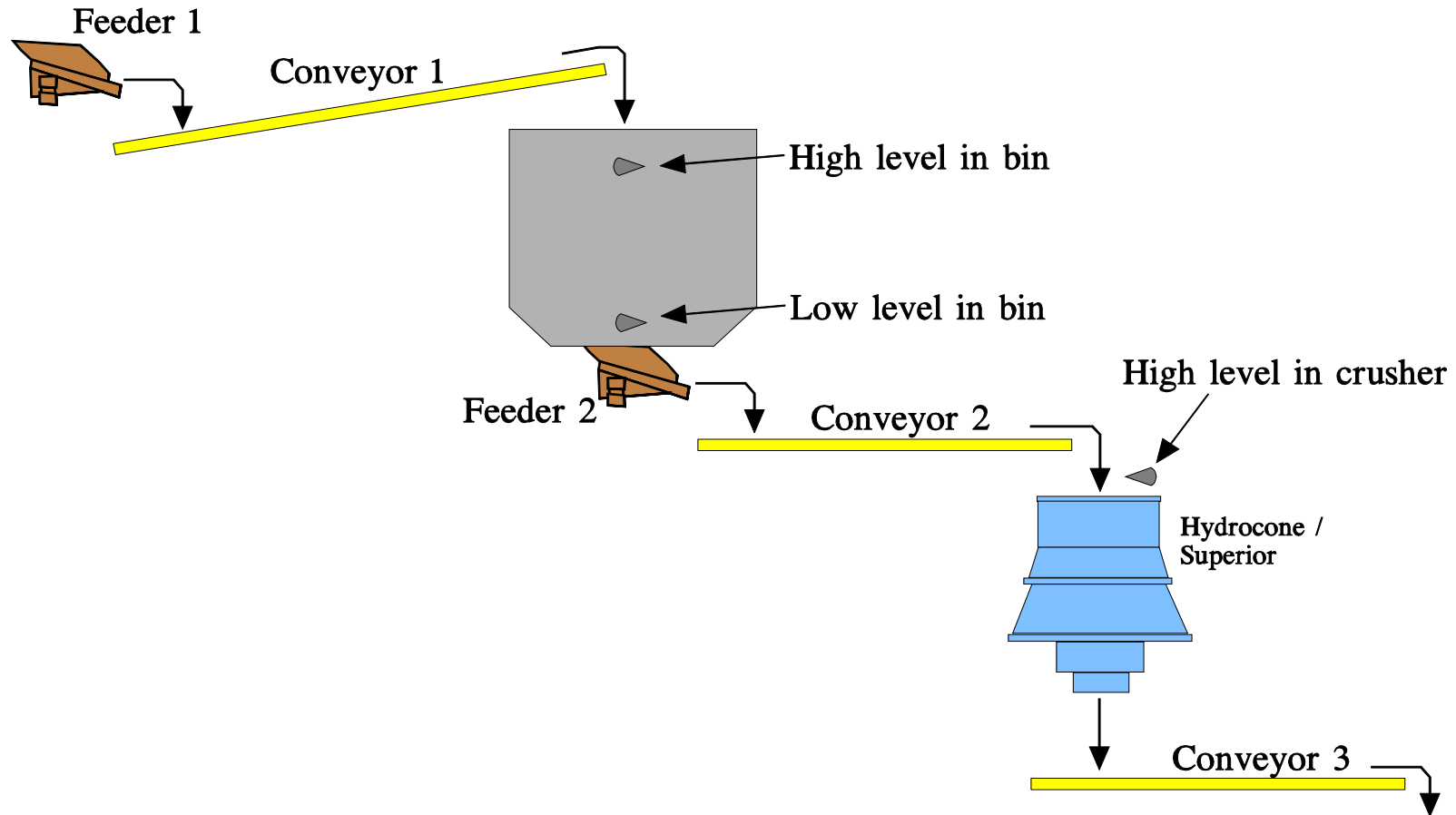Starve-fed chamber

Automation of Cone Crushers

➢ Internal Automation
➢ External Automation

Joint Venture

External automation systems

The Harry Up System
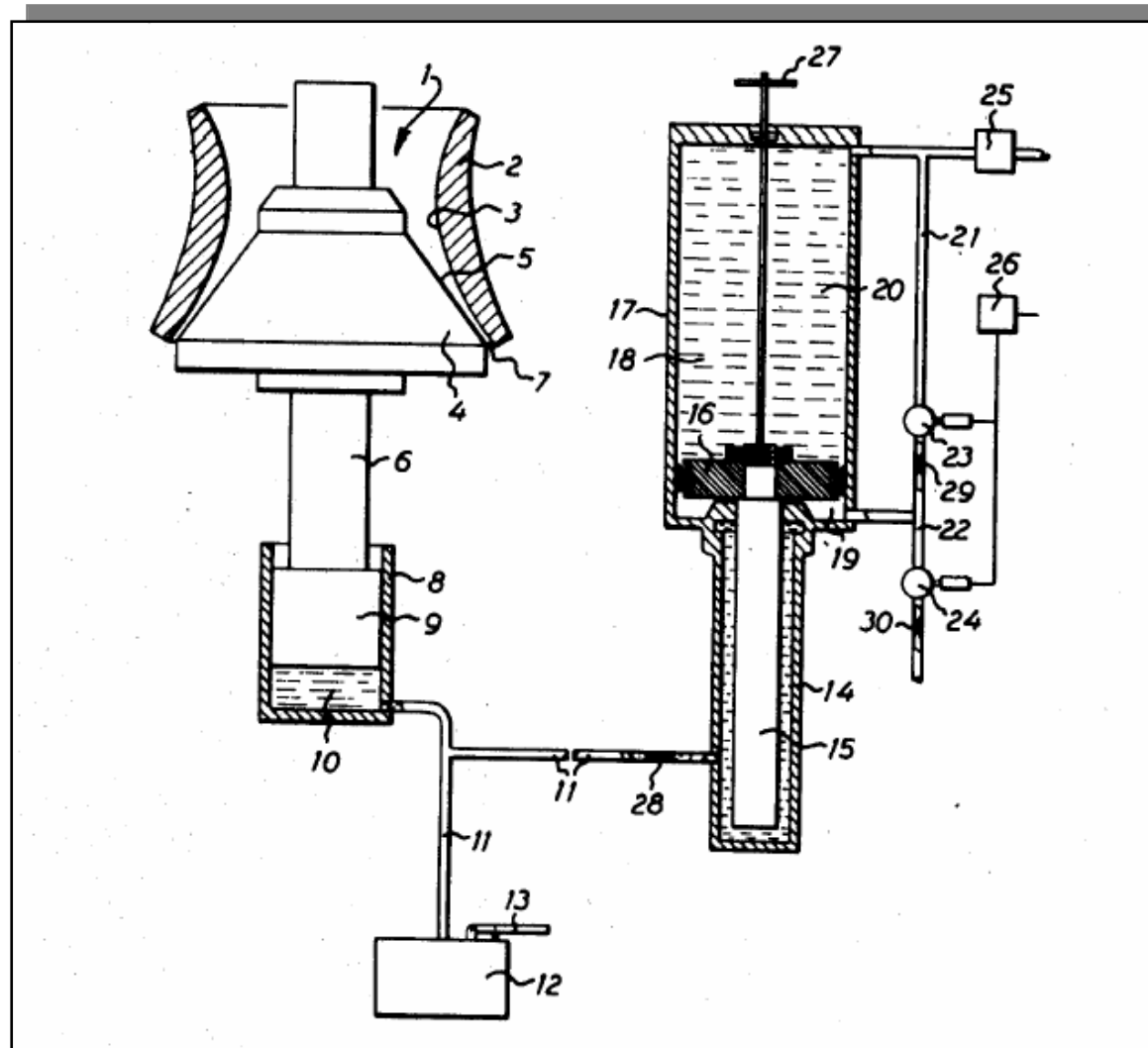
Multi Interparticle Pressure

Fitted function vs tests

$$p\left(s_{\aleph},\sigma_{\aleph}\right)=a_1 s_{\aleph}^2\sigma_{\aleph}^2+a_2 s_{\aleph}^2\sigma_{\aleph}+a_3 s_{\aleph}^2+a_4 s_{\aleph}\sigma_{\aleph}^2+a_5 s_{\aleph}\sigma_{\aleph}+a_6 s_{\aleph}$$
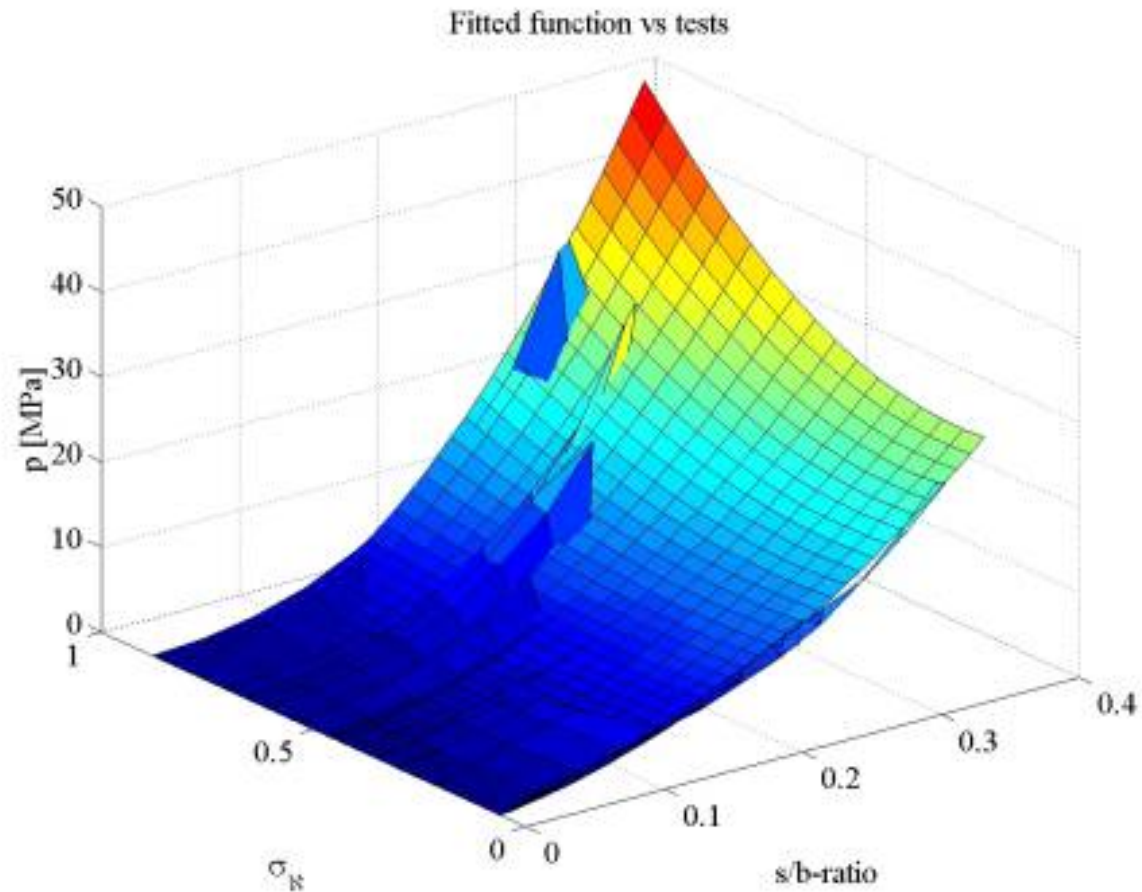
$\sigma_{\aleph}=$ *size distribution width*

The advantages

➢ Can operate choke-fed and utilize the maximum motor power.

➢ The reduction increases.

➢ The product shape gets better

➢ The liner life increase

➢ Overloading protections

➢ An automated crusher looks after it self

SANDVIK

Today

- ➢ Intelligent automatic regulation system.
- ➢ The system have highly flexible and will improve the crushing results.
- ➢ Regulate the crusher and protects it from underload/overload.
- ➢ Advanced sensors.
- ➢ Automated rapid wear compensations.
- ➢ Simpler fully automated calibration modes.
- ➢ Easier and faster information access ways.
- ➢ Different and adopted regulation modes.
- ➢ Integrated approach towards process control computers.
- ➢ Comfortable connecting to the Internet.

SANDVIK

DynoConsult

ASRi

GPS and Remote control