

RYCO Hydraulics

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Longwall Hydraulic Hazards Workshop

Presentation

Identifying the Hazards

Please Note.

There are twelve movies associated with this power point presentation. To play movies please place cursor over movie frame and 'click' to start.

Some computer configurations will not automatically display the movies when 'clicked'. If this happens, a white screen will appear. To continue the presentation please press 'Enter'.

The movies can be played independently by Windows Media Player. To play movies during the presentation; right 'click' frame, select 'screen'; select 'switch programs'; open Windows Media Player; open Movie file and play.

Longwall Hydraulic Hazards Workshop

- **Quantify the Hazards**
With reference to Hydraulic Hose Assemblies and Fittings
- **Visual Audits**
Improving Hose Inspection Standards
- **Factor of Safety - FOS**
Hose Assemblies & Terminations

Quantify the H A Z A R D S

- **Risk Identification and Management.
(Hose Assemblies and Fittings)**
- **We operate in a hazardous environment.**
- **We are working system pressures often in the region of 350 bar to 420 bar.**
- **We must learn to identify risk and quantify it.**
- **Once we have identified the risk – we can design solutions to manage it.**

What are the H A Z A R D S

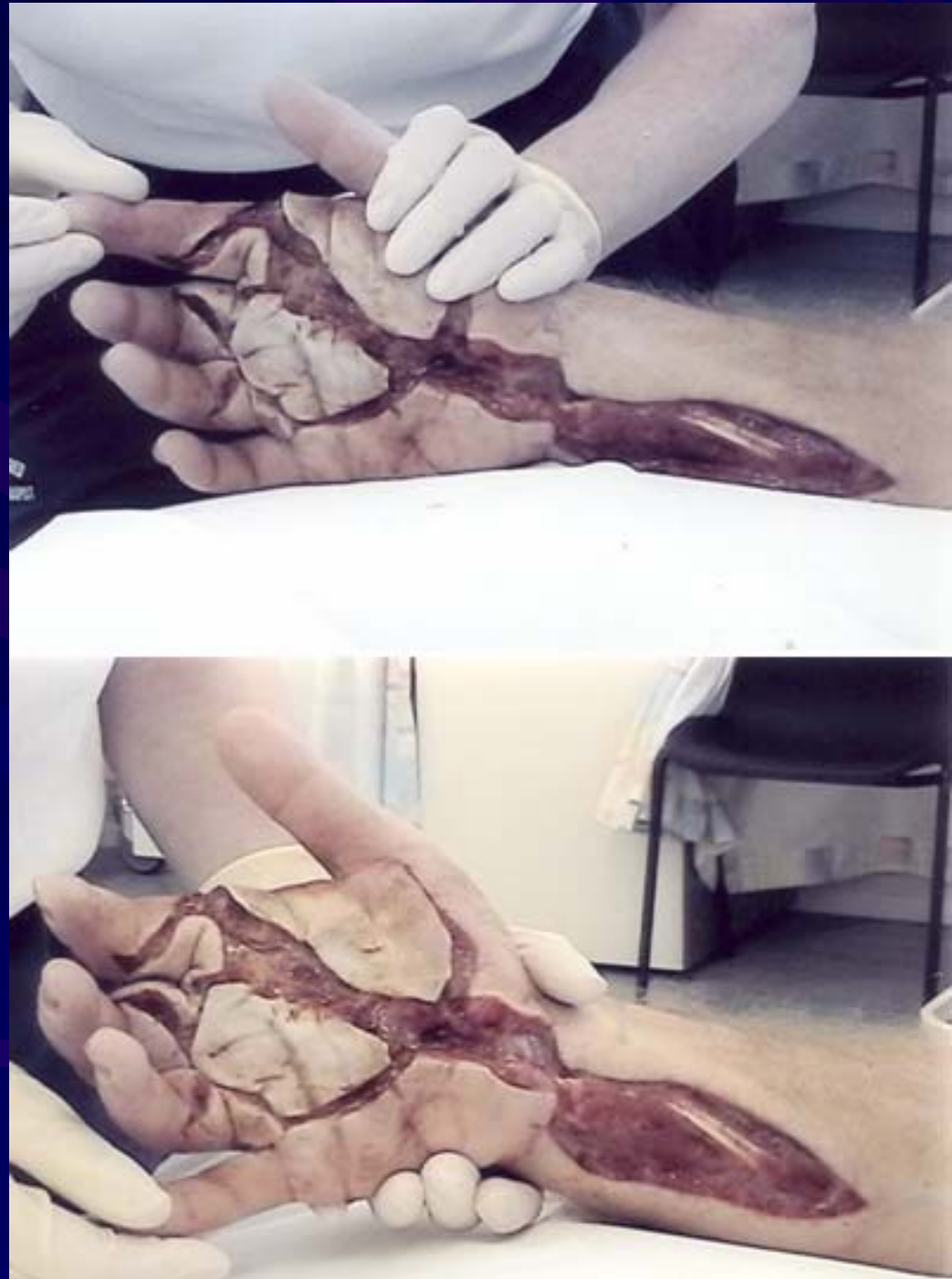
- Ejection of high pressure fluid
Oil Injection.
- Whipping Hose
Being violently struck.



Oil injection of Finger

**Oil injection
of Hand.**

**Showing
Surgeon's work
to relieve
Fluid.**



What are the **C A U S E S** of Accidents

There are two main Groups of Causes:

➤ **Human Interface**

- Training
- Operational
- Error

➤ **Hose and Fitting Failure**

- Ageing (General Deterioration)
- Abrasion
- Corrosion
- Mechanical Abuse
- Others

Hose and Fitting Failure / Injury

- **There is an under lying problem.**
- **In the past, many companies and personnel have viewed hydraulic hose and fittings as “low tech; consumable product that should be fixed only when it fails – for whatever reason”.**
- **This can be a FATAL Mistake.**
- **Be Pro-active with Inspections and MANAGE your ASSETS!**

Hose Management – VISUAL AUDITS

- **Visual Audit - Grade Hose Assembly Record 1, 2 or 3 and Action.**
- **Grade 1 – Fit for Purpose Maintain**
- **Grade 2 – Suspect Replace at next Opportunity**
- **Grade 3 – Unfit for Purpose DANGER! Replace NOW!**

Visual Audit is a proven method for determining Fit of Purpose.

1SN-DN19 Hose Burst – MBP 420bar 6000psi



Click on Movie to Start. If white screen appears, then play [M01-1SN-DN19 Hose Burst - MBP 420bar 6000psi.wmv](#) with Windows Media Player.

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**1SN-DN19 Hose Burst MBP 420bar
6000psi Frames 0-4
(40 milliseconds per frame)**



1SN-DN19 Simulated End Blow Out



Click on Movie to Start. If white screen appears, then play [M02-1SN-DN19 Simulated End Blow Out.wmv](#) with Windows Media Player.

1SN-DN19 Hose Blow Out – Frames 1-4 (40 milliseconds per frame)



**1SN-DN19 Hose Burst (28mmOD)
RH56mm (2xOD) + Crimp Ring**



Click on Movie to Start. If white screen appears, then play [M03-1SN-DN19 Hose Burst RH56mm+Crimp Ring.wmv](#) with Windows Media Player.

**1SN-DN19 + RH56mm + Crimp Ring Frames 1-4
(40 milliseconds per frame)**



**1SN-DN19 Hose Burst (28mm OD)
RH46mm + RH67mm**



Click on Movie to Start. If white screen appears, then play [M04-1SN-DN19 Hose Burst RH46mm+RH67mm.wmv](#) with Windows Media Player.

**1SN-DN19 Hose Burst (28mm OD)
RH46mm + RH67mm (40 milliseconds per frame)**



1SN-DN19 Hose Burst (28mm OD) Kevlar Sleeve



Click on Movie to Start. If white screen appears, then play M05-1SN-DN19 Hose Burst Kevlar Sleeve.wmv with Windows Media Player

**1SN-DN19 Hose Burst (28mm OD)
TX44mm with Cable Tie**



Click on Movie to Start. If white screen appears, then play [M06-1SN-DN19 Hose Burst TX44+ Cable Tie.wmv](#) with Windows Media Player

1SN-DN19 Simulated Blow Out (28mm OD) RH46mm + Cable Tie



Click on Movie to Start. If white screen appears, play M07-1SN-DN19 Simulated End Blow Out RH46mm+Cable Tie.wmv with Media Player

**1SN-DN19 Simulated End Blow Out (28mm OD)
RH46mm + Crimp Ring**



Click on Movie to Start. If white screen appears, play [M08-1SN-DN19 Simulated End Blow Out RH46mm+Crimp Ring.wmv](#) with Media Player

**2SN-DN51 Hose Burst (67mm OD)
RH93mm + TX127mm**



Click on Movie to Start. If white screen appears, then play M09-2SN-DN51 Hose Burst RH93mm+RH127.wmv with Windows Media Player

2SN-DN51 Hose Burst (67mm OD) RH93mm + TX127mm – Frames 1-4 (40 milliseconds per frame)



Simulated Pin Hole – 650 bar 9000 psi – RH36mm



Simulated Pin Hole – 650bar 9000 psi – TX31mm



Click on Movie to Start. If white screen appears, play M11 Simulated Pinhole - 650 bar 9000 psi - TX 31.wmv with Windows Media Player

**Simulated Pin Hole – 650 bar 9000 psi –
RH31mm+RH46mm**



**Simulated Pin Hole – 650 bar 9000 psi RH31mm +
RH46mm – Frames 1-4 (40 milliseconds per frame)**



What are the **C O N C L U S I O N S**

- **One Layer of Nylon Sleeving is not sufficient for all sizes: Burst and Pin Holes.**
- **Two Layers are sufficient for small to medium hose sizes: Burst and Pin Holes.**
- **Kevlar Weave Sleeving does not work.**
- **Suitable Technology needs to be developed for the larger size hoses.**
- **Crimp Rings are required to prevent Whipping.**
- **Use Visual Audits where possible.**

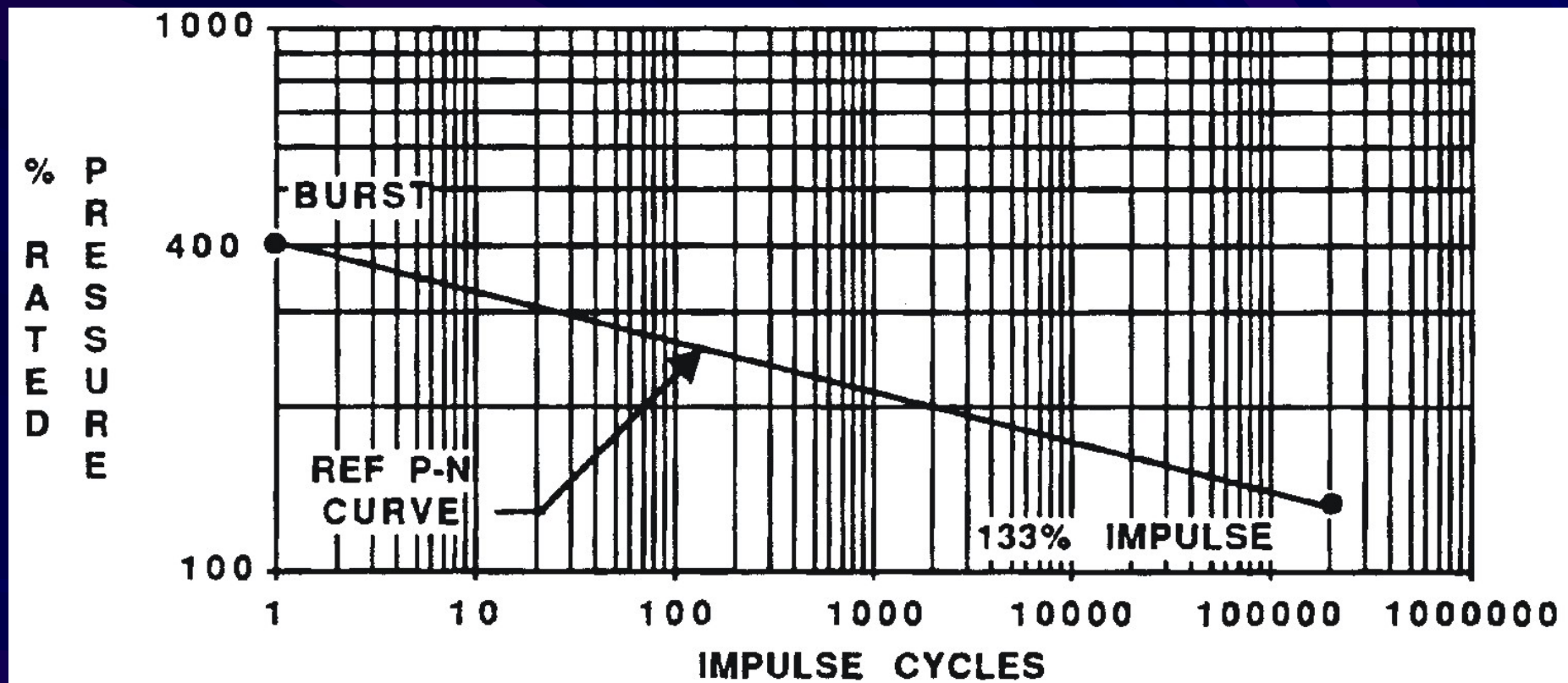
Accident P R E V E N T I O N

- **Improve Human Interface** by increasing awareness of the dangers; increasing training; and improved system designs to reduce error and injury. (Risk Management and MDG 41).
- **Reduce Hose and Fitting Failure** by adopting Hose Protection Technology; Pro-active Visual Inspection; and Enhanced Hose Design to reduce error and injury. (Risk Management and MDG 41).

Factor of Safety (FOS)

- What is FOS?
- Why do we have one?
- Hydraulic Hose Assemblies are usually 4:1
- Hydraulic Circuits are usually <2.5:1
- Where do we require 4:1 and where do we require <2.5:1?

Two requirements of hose assemblies are:
(i) minimum burst and (ii) impulse life (fatigue)

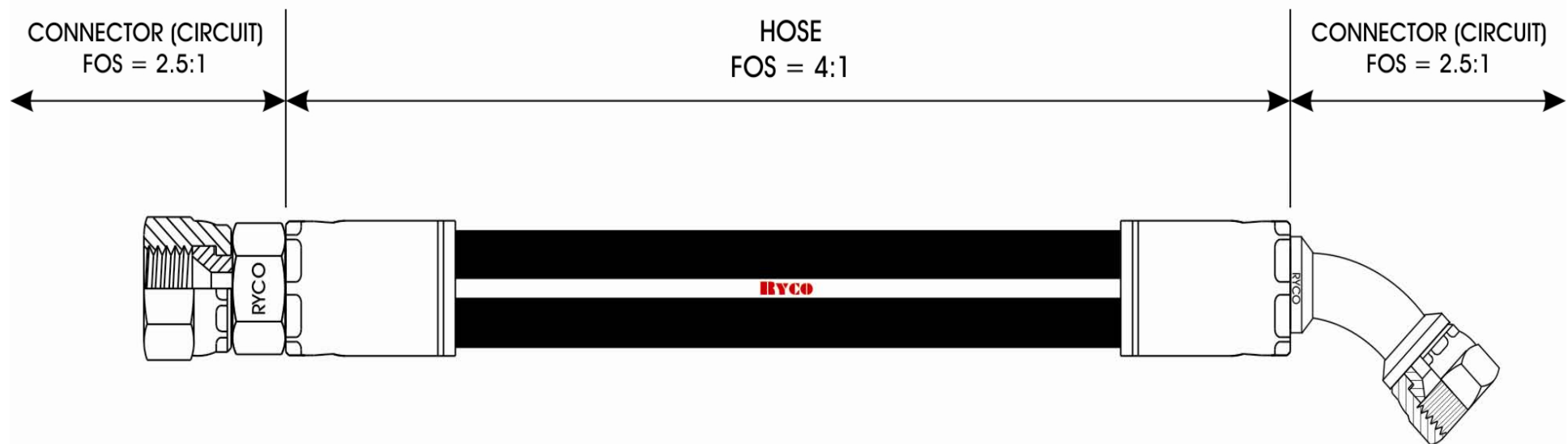


➤ 1 Pulse = 400% x WP (Min Burst Pressure)

➤ 200,000 pulses = 133% x MWP (EN 856 2SN)

We need to apply the 4:1 FOS to the hose assembly; not the terminations.

FACTOR OF SAFETY (FOS) OF HOSE ASSEMBLY



The terminations require of FOS of:

- **2.5:1 to Minimum Yield Strength (YS)**
- **4:1 to Ultimate Tensile Strength (UTS)**

**Should you have any questions please
direct them to**

techinfo@ryco.com.au

**We sincerely wish that this presentation
may assist you with your safety and
application of product in the Mining
Industry.**