

# Hydraulic Safety Program

Reduction of Risk and Elimination of Incident Associated with Hydraulics

**International Hydraulic Safety Authority**



## Preface

The use of Hydraulic operated equipment has increased. Automation of many functions has made processes faster and more efficient, lowering costs and reducing risk. Hydraulics is simply a means of transmitting energy and like all other forms of energy there are associated hazards. Hydraulic hazards can cause injury, equipment damage and environmental damage. Eliminating risk will require a process and will mainly focus around engineered controls, and administrative controls. Investing in a comprehensive hydraulic safety program prevents loss and insures long-term success for the company.

## Getting Started

IHSA begins by conducting assessments; the assessment is to collect information about hazards, risk and at risk behavior. Assessments will also reveal deficiencies and where integration of safety devices, additional engineered and administrative controls maybe necessary. IHSA is only part of the overall participation group. A consensus is required that does not rely on single sources of information.

- ◆ Orientation of safety and facility
- ◆ Review of Occupational Health and Safety manuals, policies, procedures, and near miss reports as they relates to hydraulic equipment hazards
- ◆ Review facility equipment's Prestart Health and Safety Review
- ◆ Review of Environmental Safety manuals, policies, & procedures as they relates to hydraulic & lubricant hazards
- ◆ Observe manufacturing and assembly processes
- ◆ Observe interaction for; start-up, lockout, commissioning, production, maintenance processes and procedures

### **An Achieved Hydraulic Safety Program will contain the Following Elements:**

- ◆ Integrated Safety Devices and components to execute energy control for task completions
- ◆ Integrated Safety Devices and component to protect equipment and components(fire, abrasion, overpressure)
- ◆ Integration of Safety Devices to protect the environment
- ◆ Written Procedures for energy control for specific tasks; white paper, computer based and placards with electronic links to media such as video for task that are deemed high risk.
- ◆ Entry Level Training (tailored hydraulic safety)
- ◆ Safe Procedure Training (video format general and task specific)
- ◆ Hazard Assessment Template which include hydraulic hazards
- ◆ Inspection Documents to include specific hydraulic components
- ◆ Hydraulic Hose Tracking System
- ◆ Near Miss Reporting to include hydraulic failures (what's reportable and why)
- ◆ Hydraulic Safety Protocols to be added to the health and safety manual (fluid injection, spills)
- ◆ Accessibility of Associated Documentation
- ◆ Hydraulic Hose Assembler Certified Training Program
- ◆ Learning Management System LMS with tracking
- ◆ Reliability & Repeatability

## Integration

Preliminary assessments of function, interaction, environment, exposure, and expected interaction by procedure may reveal controls that are not integrated (engineered) controls that eliminate hazards and reduce risk. examples would be; lockable isolation valves, bleed circuits, test points, pressure transducers, access, guarding, labelling, component protection, mechanical interlocks, integration and corrective action may require written scopes including procedures and would be completed as separate projects if engineering, bidding and contracts are required to complete any integration.

## Written Procedures

Each scope should clearly identify boundaries of what will fall or not fall within the scope of the task. Each Safe work Procedure should have a single sentence which defines the mission so the efforts remain specifically focused which may include rationale.



Mapping of steps; large steps broken into smaller in a systematic approach.

Specific procedures that are identified as “higher risk” due to feasibility or unavailable controls require a comprehensive testing and approval process. These processes are collective approaches which are developed through risk assessments, and input from 3rd parties such as manufacturers. Each procedure is written by the assistance of those with experience and expertise in aspects of the task. The procedure undergoes extensive testing prior to approval. The hazards assessment takes hierarchy of control and situational risks into consideration which is later adopted into Procedure Training.

## Hydraulic Safety Training Entry Level

Comprehensive Hydraulic safety awareness training is available and is being utilized nationally and internationally in most industry sectors. Hydraulics has been the root cause of injury, equipment loss and environmental damage in all sectors.

3 years of research into root cause including the relationship it has with occupational, standards, and educational oversights has been assembled into training.

IHSA courses are available through licensing agreements.

For Tailored Training much of the work has already been completed by utilizing a percentage of IHSA’s current content taken from the High Risk Maintenance Level course.

IHSA content can be free of licensing and royalties if;

A tailored course is developed by IHSA that contains 50% or less of IHSA content and the other 50% is content and media collected and produced that is specific to the client.

This protects IHSA content from commercial use.

A course produced of this combined nature is very effective which visually gears the participant to their working environment.





## Safe Procedure Training

The majority of the content 75% or more will be made up of specific hazards compiled from the working environment and task based procedures specific to the equipment.

Equipment procedures are task based and often focus on maintenance, component replacement, component repair, equipment testing, equipment inspection, commissioning of equipment, de-commissioning of equipment and components, disposal of components, containment & absorbent of fluids, energy control & lockout, preparation for climate change, preparation for shipping, and design changes.

### Turning Written Procedures into Trainable Ones

Once the media is collected (photo, video, animation, text) it is assembled into a story board and reviewed. Once the review has been completed the media is compiled into Microsoft Power Point or a similar program then rendered into video files for installation into an LMS or usable in instructor led training. During the review stage questions are developed as part of the testing (training assessment).

In house learning is inexpensive, repeatable, prevents complacency, and is readily available.



### Hazard Assessment Template

Templates used in hazard assessment must contain hydraulic hazards, however can be difficult if the writer and those who take part in development are unaware of associated hydraulic hazards. During the assessment and audit stage hazard assessments are designed and or modified by the subject matter expert and utilized in the development of task based procedures. If and when the hazard is eliminated by integration and control methods the hazard may be removed at that time. If the hazard remains, it becomes a permanent part of the hazard assessment template and associated task procedure would include processes to mitigate the hazard.

### Inspections

Inspections are very important and will catch many hazards like hydraulic hose wear, external seal leaks; however visual inspections will only catch a small percentage of inevitable hydraulic component failures. Thorough inspections would require dissecting the machine, which is not feasible in most cases. Where it's impractical to disassemble equipment to perform inspections, a system to reduce risk of component failures would be implemented. Manufacturers and historic tracking is to play large part in component replacement prior to failure. Inspection documents would include all that can be captured with our senses including but not limited to; processes such as fluid analysis, re-torquing, and the use of devices such as an infrared thermometer.

Complex inspections would require a task based safe procedure. Training "about performing inspections" would include; "any finding that immediately affects the safety of personnel, or equipment, or the environment must become a priority and should halt all that maybe affected until the finding is made safe". Templates would be designed suited to the equipment, complexity and time management.



## Hydraulic Hose Tracking

An intelligent tagging, tracking and reporting solution for hydraulic hose assemblies uniquely identifies hydraulic hose assemblies within a global database. Tracking is used to drive quality control, continuous improvement and scheduled maintenance programs; documentation of the original bill of materials ensures hose assembly replacement to exact specifications. Such tracking systems are available from two global suppliers or one can be tailored to match any current in place tracking system.

The system features uniquely encoded tracking labels that incorporate visual data, barcodes and optional RFID (radio frequency identification) technology. The web-based software system can be accessed through a computer, or mobile devices.

## Document Maintenance

Assessments are conducted on current in place documentation to determine hydraulic related oversights. Findings would prompt recommendations and development moving forward.

Updating of Documentation to include Hydraulic Specific Elements would include but limited to;

- Protocol for Fluid Injection Injury
- WHIMIS Controlled
- Associated Regulations
- Applicable Best Practices
- Emergency Services
- Lockout Control of Hazardous Energy
- Near Miss Reporting
- Hazard Assessments
- Hot Work
- Confined Space
- Inspections
- Policy
- Scope of Work and Bid Documentation (including approving contractors and suppliers)
- Incident report templates

## Document Accessibility

Procedures, Protocol, Inspection, Near Miss Reports, Hose Tracking, and Hazard Assessments must be made available corporate wide through a data base. Login tracking maybe an essential method to be in compliance with corporate policies. Accessibility may also be essential for contractors to perform tasks.



## Hydraulic Hose Assembly Training

Reliable hose assemblies are very critical to the safety of personnel and the overall well-being of equipment, environment and corporation. Human error has played a large facture in hydraulic hose failure causing injury and loss. Individuals who build hydraulic hose assemblies must be trained to understand how critical it is to do this task correctly. All must realize that failure resulting from error could mean litigation including jail time and large fines for the company.

It is also important that those in charge of purchasing are trained to understand that decisions cannot be made on price when it involves hose assembly parts. Anyone involved in hose assembly work must be trained and those NOT TRAINED must be PROHIBITED from this task.

## Learning Management System

An LMS is the infrastructure that delivers and manages instructional content, identifies and assesses an individual, tracks the progress toward meeting goals, and collects and presents data for supervising the learning process of the organization as a whole.

Entry level, Task Based, and Assembler Training mentioned in this presentation ideally would be delivered and managed in an LMS.

## Reliability & Repeatability

A comprehensive hydraulic safety program builds overall reliability, ensuring routine, repeatability, and consistency.

A hydraulic component will never get more reliable after its first use, in fact the moment it is put to use its life expectancy declines. Reliability experts convey that knowledge and comprehensive maintenance procedures will reduce failures by 90%. Every minute in North America a hydraulic hose will fail expelling hydraulic fluid to the surrounding environment.

All the key ingredients that build a Hydraulic Safety Program are easily repeatable. Each is a template for new equipment and associated procedures.

Training and retraining prevents complacency.

## Stakeholders, Contractors, Suppliers, Partners, Clients

Hydraulic Safety Programs must extend out to all who take part in the activities of the company as their knowledge in hydraulic safety directly affects the well-being of the company.

## Return on Investment

### *Investment in Hydraulic Safety*

Investing time in safety training is a vital part in capturing long-term success. Knowledge not only supports safe practices but increase worker productivity and reduces the likelihood that you'll have to pay work incident claims including hefty fines. Personnel recognize they are valued when they're safety is part of the investment taken to grow successfully. The ripple effect caused by an incident slows down and in many cases halts production and lowers confidence of the entire organization. Less output reduces a business's potential to bring in revenue. Investing financially in a Hydraulic Safety Program saves money.

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