SIL VALIDATION WORKSHOP

(Part 3 of SIL Workshop Series. Please also see Part 2: SIL Determination / LOPA Workshop)

	COURSE #	COURSE NAME	LOCATION	DATE
2010	010-432	SIL VALIDATION	Calgary, AB	Sept 15 - 16
	010-466	SIL VALIDATION	San Diego, CA	Oct 20 - 21
	010-441	SIL VALIDATION	Calgary, AB	Nov 3 - 4
2011	011-405	SIL VALIDATION	Calgary, AB	Jan 13 -14
	011-415	SIL VALIDATION	San Diego, CA	Feb 10- 11
	011-425	SIL VALIDATION	Calgary, AB	Mar 10 - 11
	011-435	SIL VALIDATION	San Diego, CA	April 14 – 15
	011-445	SIL VALIDATION	Calgary, AB	May 12 -13
	011-455	SIL VALIDATION	San Diego, CA	June 16-17
	011-465	SIL VALIDATION	Calgary, AB	July 14-15
	011-475	SIL VALIDATION	San Diego, CA	Aug 11-12
	011-485	SIL VALIDATION	Calgary, AB	Sept 22-23
	011-495	SIL VALIDATION	San Diego, CA	Oct 13-14
	012-405	SIL VALIDATION	Calgary, AB	Nov 17-18
	012-415	SIL VALIDATION	San Diego, CA	Dec 15-16

Course Fee: **$1,418 CDN** per student

The course fee includes registration, lunch and refreshments, and course materials.
Price is exclusive of applicable taxes. Courses held in the U.S are billed in U.S. dollars.

SIL VALIDATION TRAINING COURSE OBJECTIVE

This 2-day course is designed to provide students with the tools necessary to perform SIL Validation studies compliant with the IEC 61511 standard. The practical course uses real life examples to demonstrate to students how to conceptually design multiple Safety Instrumented Functions (SIFs) to meet the specified safety integrity levels.

Note* The SIL Validation Workshop can be taking in conjunction with the SIL Determination / LOPA Workshop to gain a more thorough understanding of the Safety Lifecycle process.

WHO SHOULD ATTEND SIL VALIDATION TRAINING?

This course teaches Functional Safety Engineering fundamentals to engineers and technologists responsible for designing Safety Instrumented Systems, including:

- I & C Team Leaders, engineers and technologists
- High Integrity and Critical Control System specialists
- Supervisors, managers and engineers responsible for ensuring that SIS have been designed to appropriately mitigate the level of risk specified
- Engineers involved in any aspect of the SIS Safety Lifecycle

*Note: We assume participants have some understanding of critical protection systems.

SIL VALIDATION TRAINING COURSE INSTRUCTORS

Malcolm Harrison, B.Sc. Mech. Eng., P.Eng., TÜV F. S. Expert

Mr. Harrison is a P. Eng. with over 40 years experience in Instrumentation and Controls. Malcolm spent over 35 years with Shell and has diversified upstream and midstream experience in the heavy oil, offshore, refining and gas processing sectors. He is an experienced SIL Determination facilitator and has worked on billion dollar projects ensuring horizontal I & C alignment between multiple EPCMs.

Malcolm is a TÜV Functional Safety Expert and leads training workshops globally for ACM.

Ken Bingham, CET, TÜV F. S. Expert

Mr. Bingham is the Principal of ACM Facility Safety and a TÜV certified Functional Safety Expert. His background is in engineering design and management, involving safety, instrumentation, electrical and control systems. With Ken's 27 years on the client side, integration side and the SIL consulting side, he brings a holistic and practical perspective. Mr. Bingham has participated on ISA S84 SIL standard committees, has presented numerous papers and courses on SIL Analysis and is the Chief Technical Architect for ACM's field proven, IEC 61511 compliant Safety Integrity Level (SIL) Life Cycle tool, SilCore™.

SIL VALIDATION TRAINING COURSE AGENDA

The course is comprised of two days of combined classroom instruction and workshop exercises. In addition to expert instruction from an experienced SIS Engineer, you will also form a study team with other participants to work on case studies. Each team will then present their findings to the class and the ACM instructor will provide feedback. SilCore™ software is used throughout the workshop to conceptually design and evaluate SIF loops, document the SIL studies and produce typical SIL reports.

The course focuses on Phase 4 (SIS Design & Engineering) of the SIS Lifecycle within the IEC 61511 standard, but incorporates key elements of Phase 3 (Safety Requirements Specification of the SIS) and Phase 5 (SIS Installation, Commissioning & Validation).

Day 1	Day 2
Safety Requirements Specification of the SIS	SIS Engineering Workshop (continued)
SIS Design & Engineering	
SIS Installation, Commissioning & Validation	
SIS Engineering Workshop	

SIL VALIDATION WORKSHOP EXERCISE EXAMPLE

Given the following data, calculate the PFD of the Safety Instrumented Function (SIF) and offer alternate SIF configurations that will meet the target SIL.

Situation: Sour Hydrogen Gas Reciprocating Compressor

The hydrogen gas is highly flammable and very toxic (100 ppm H2S). The gas is cooled in an exchanger to knock out any liquids to prevent damage to the compressor.

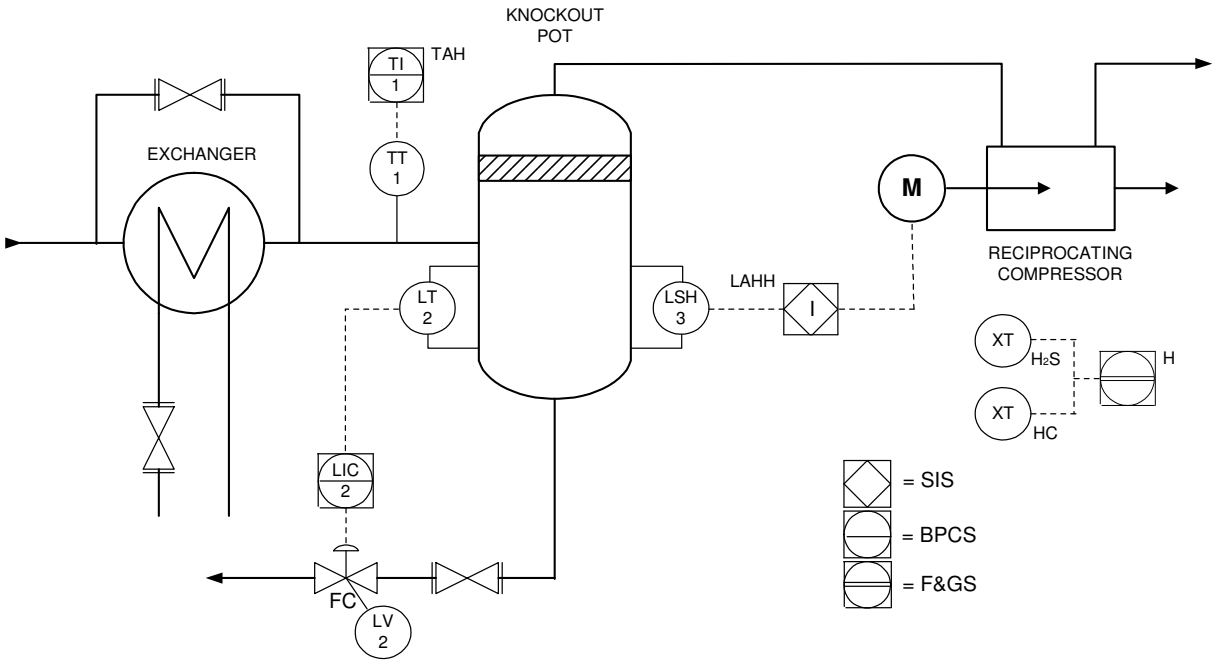
Data Available:
A HAZOP has been performed on the system

- LOPA Tolerable Frequency (TF) is one fatality in 1,000 years
- Failure Rates (per million hours) - λ
- Proof Test Interval (in months) - T
- MTTR (in hours)
- Diagnostic Coverage
  - Switch 10%
  - Transmitter 50%
  - Solenoid 40%
  - XV 20%
- Logic Solver PFD = .001
- Process upstream upset: Every 3 months
- LV-2 MTTF: 12 years
- Operator error rate: 1 in every 100 attempts
- Exchanger bypass valve manipulation: Every two weeks
- Cooling water inlet valve operation: Every two years
- Knockout outlet pot valve operation: Every week
- Exchanger leak: Every 25 years
- LSH – 3 L: 5 MTTR: 16 T: 12
- MCC relay L: 0.381 MTTR: 8 T: 24

Problem: Calculate the PFD of the SIF as designed and to offer alternate SIF configurations that will meet the target SIL

By the end of the course all students should be able to successfully perform this exercise.

SIL Determination Leadership Workshop Diagram



CONTACT ACM TO REGISTER

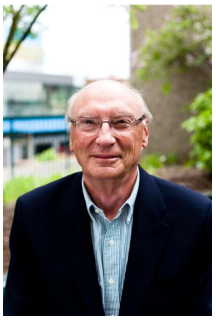
Registration form avaliable at : **www.acm.ab.ca/register**

Contact Jacqueline Schmautz for further information at jschmautz@acm.ab.ca

or call toll free at 1-877-264-9637

- *ACM Facility Safety is a recognized global provider of Process Safety training, tools and methodologies*
- *ACM prides itself on neutral, third party unbiased workshop oriented training sessions developed from real life experiences of our instructors*
- *Our instructors have lived and implemented all phases of the IEC 61511 Safety Lifecycle during their careers at some of the world's largest operating companies*
- *Our lead instructors are practitioners with industry experience and are available for **private in-house sessions** at your facilities*

OUR LEAD INSTRUCTORS

"We developed these courses and workshops based on real life situations"	"Global Expertise"	"Lived all phases of the Safety Lifecycle"
		
Malcolm Harrison, B.Sc. Mech. Eng., P.Eng., TÜV F. S. Expert	**Marcel Leal-Valias, CET, PHA/PSM Expert**	**Ken Bingham, CET, TÜV F. S. Expert**
Mr. Harrison is a P. Eng. with over 40 years experience in Instrumentation and Controls. Malcolm spent over 35 years with Shell and has diversified upstream and midstream experience in the heavy oil, offshore, refining and gas processing sectors. He is an experienced SIL Determination facilitator and has worked on billion dollar projects ensuring horizontal I & C alignment between multiple EPCMs. Malcolm is a TÜV Functional Safety Expert and leads training workshops globally for ACM.	Mr. Leal-Valias has 47 years experience in Engineering, Process Design & Drafting, mechanical maintenance, and project management. Mr. Leal-Valias has been a Piping Manager, Construction Site Manager, Project Manager and for the last 20 years, he has developed and become an internationally respected Process Hazards Analysis (PHA/HAZOP) trainer and facilitator performing hundreds of PHA studies for all types of facilities. Mr. Leal-Valias has a broad operational understanding of all exploration, production and refining facets of the oil and gas industry as a result of 45 years spent in international postings in Brazil, Australia, and Canada.	Mr. Bingham is the Principal of ACM Facility Safety, Chief Technology Officer and a TÜV certified Functional Safety Expert. His background is in engineering design and management, involving safety, instrumentation, electrical and control systems. With Ken's 27 years on the client side, integration side and the SIL consulting side, he brings a holistic and practical perspective. Mr. Bingham has participated on ISA S84 SIL standard committees, has presented numerous papers and courses on SIL Analysis and is the Chief Technical Architect for ACM's field proven, IEC 61511 compliant Safety Integrity Level (SIL) Life Cycle tool, SilCore™ the only tool in the world that prepares you in real time for loss of safeguards and ACM's MP Real-time risk exposure tool with contingency planning.