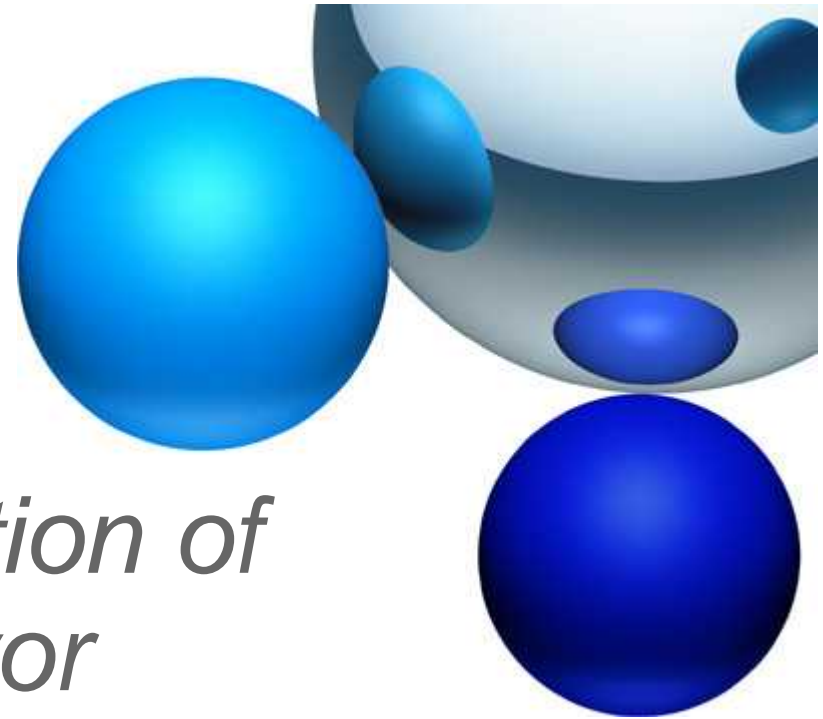


## *Introduction*



- *Name: Verosh Singh*
- *Age: 23*
- *Designation: Candidate Engineer (19 months)*
- *Allocation: Twistdraai Export Plant*
- *Qualification: BSc Eng (Mech) ; University of Natal ,2005*



*independent isolation of  
shuttle car conveyor*

*a self-initiated project in the interest of safety*



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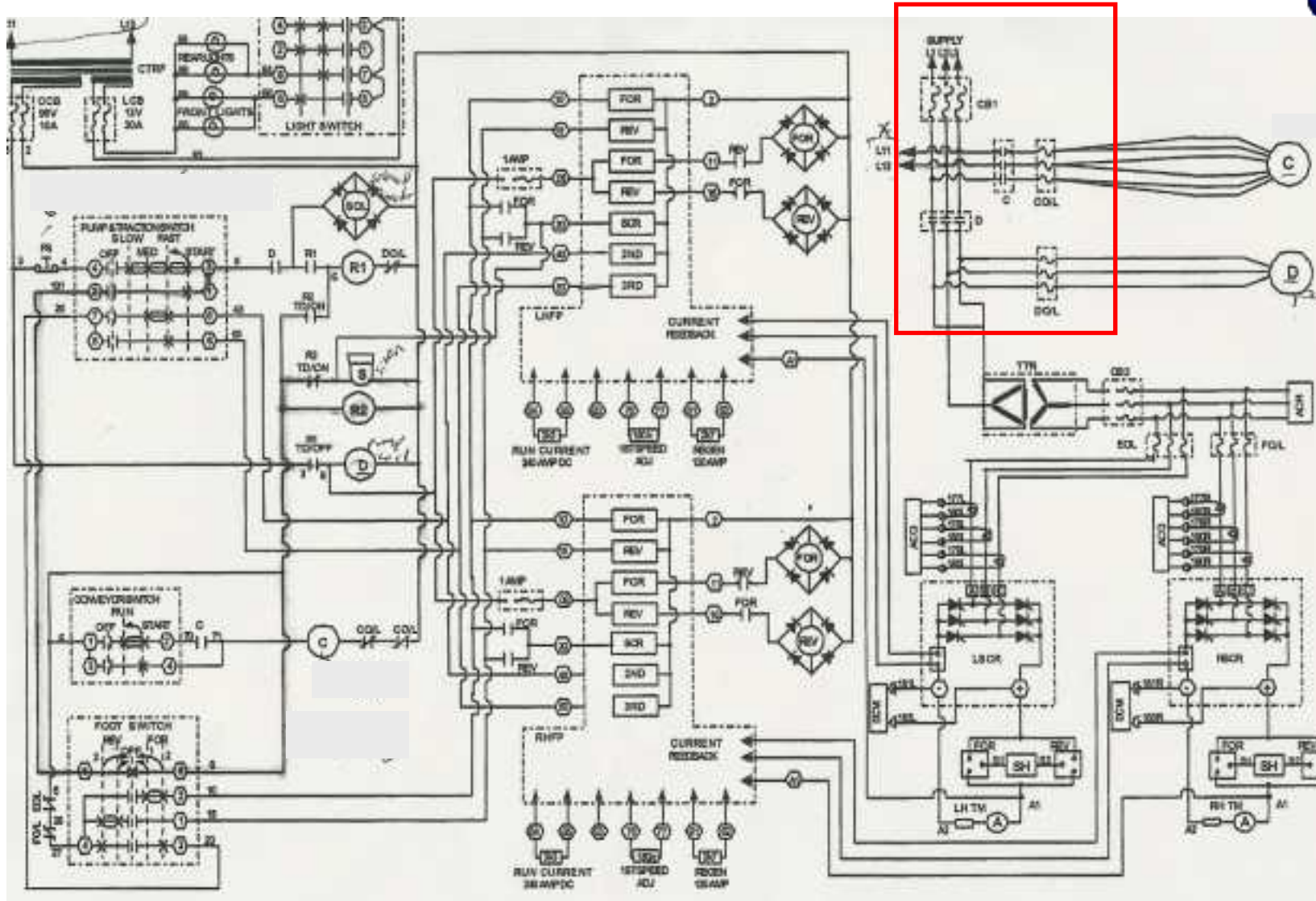
*sacea presidential function, swaziland,  
2007*

## *hazard description*



**conveyor chain can start-up with workmen situated on it whilst inspecting the operation of steering cylinders and levers!**

# *hazard description*



# *HIRAC approach*



- *hazard identification – underground*
- *risk assessment – comprehensive issue based risk assessment was carried out involving personal from the safety department, sasol mining central workshops, the mines and training department.*
- *controls / barriers: design*


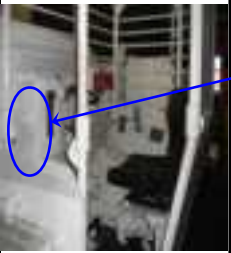

*administrative / policies*

*signs and signals*

*used Qualitative Functional Development (QFD) approach to examine each Control / Barrier*

# report of issue based risk assessment



Setting the context				
Illustration	Key issues	Remarks	Adequate • Yes <span style="color: yellow;">■</span> • No <span style="color: red;">■</span> • Best practice <span style="color: green;">■</span>	Concerns
	Inspection of steering system with persons inside of conveyor bin through the inspection hole	<ul style="list-style-type: none"> <li>• Persons must stand on top of the shuttle car to inspect/work on the steering system</li> <li>• The conveyor can start up causing injury to persons</li> </ul>		<ul style="list-style-type: none"> <li>• Position of the workmen</li> <li>• The conveyor chain can start up</li> </ul>
	Inspection of steering system with persons inside of conveyor bin through the inspection hole	<ul style="list-style-type: none"> <li>• Persons must stand on top of the shuttle car to inspect/work on the steering system</li> <li>• The conveyor can start up causing damage to tools and/or equipment</li> </ul>		<ul style="list-style-type: none"> <li>• Position of the workmen</li> <li>• The conveyor chain can start up</li> </ul>
	Lockout system	<ul style="list-style-type: none"> <li>• The lock out procedure COP V 5.3.6 cannot be performed successfully during all steps of the inspection period - (power is needed on the circuit to activate the steering system)</li> </ul>		When locking out at the main switch the steering can not be tested
	Training manual	<ul style="list-style-type: none"> <li>• The training manual does not address the lock out/inspection aspect in detail</li> </ul>		The risk of the conveyor system starting while testing the steering system, is not presently addressed
	Conveyor boom can be energized with persons on the boom.	<ul style="list-style-type: none"> <li>• The conveyor boom can be lifted up by the operator.</li> <li>• Limbs can be caught between canopy and conveyor boom causing hand/arm injuries.</li> <li>• Persons can be crushed between the conveyor boom and the roof.</li> </ul>		Persons can be injured if the boom is activated.

# *QFD approach requirements and limitations*



- *effective safety device*
- *installation feasibility*
- *maintenance feasibility*
- *ease of operation*
- *cost*

# *QFD approach concept generation & selection*



*1) alternative position of workmen*

*2) use of a portable platform*



# *QFD approach concept generation & selection*



*3) replacement of existing conveyor switch with a key switch*





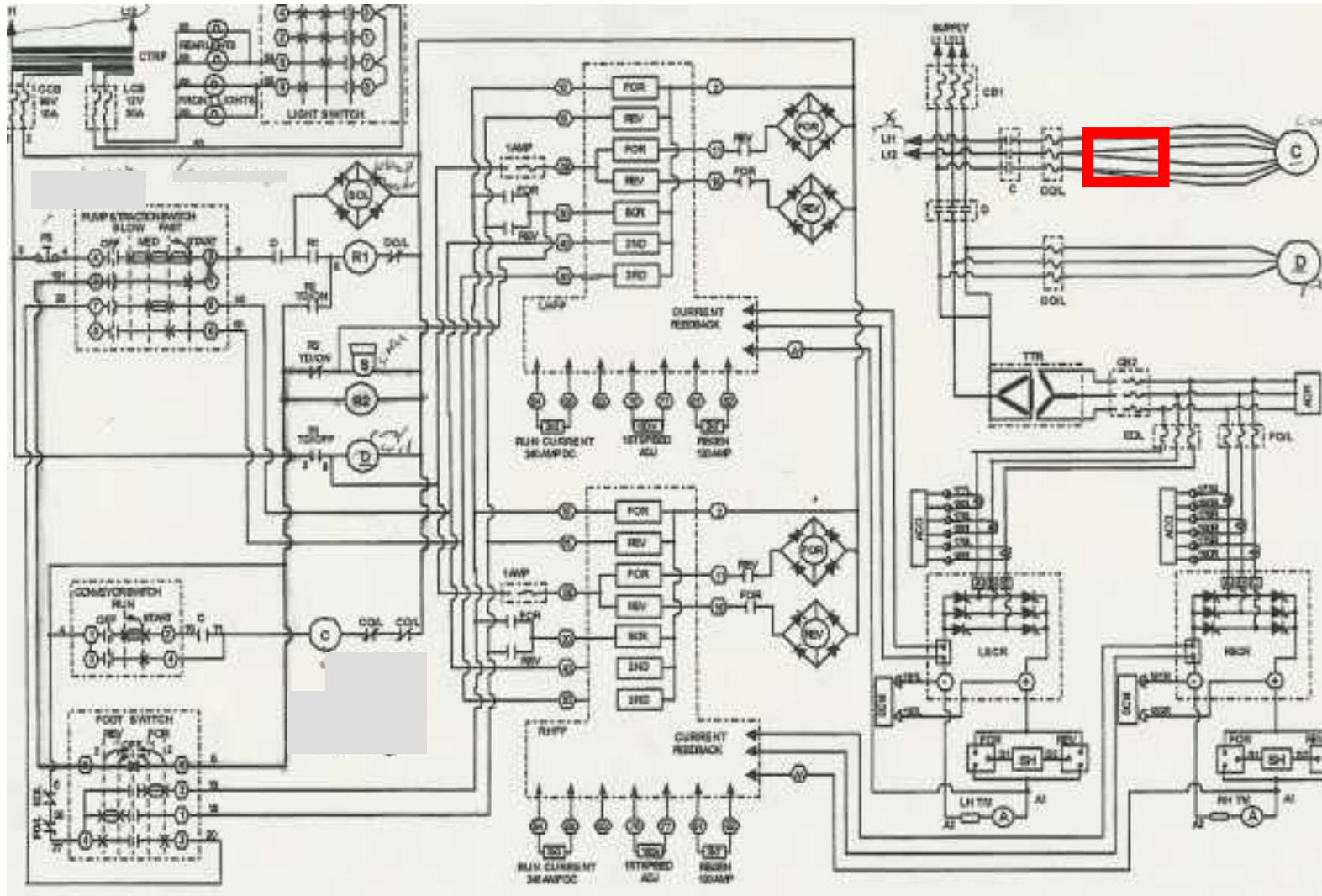
# *QFD approach concept generation & selection*



5) electrical isolator between conveyor contactor and motor



# 5) electrical isolator between contactor and motor



# QFD approach selection matrix



		Concepts							
Selection Criteria	Weight	<i>Use of Key Switch (reference)</i>		<i>Isolator in main circuit</i>		<i>Mechanical lock-out on switch</i>		<i>Portable platform</i>	
		R	W S	R	W S	R	W S	R	W S
Effective Safety Device	25	3	0.75	5	1.25	2	0.50	2	0.50
Installation Feasibility	15	3	0.45	3	0.45	3	0.45	3	0.45
Maintenance Feasibility	20	3	0.60	3	0.60	4	0.80	4	0.80
Ease of Operation	25	3	0.75	4	1.00	3	0.75	2	0.50
Cost	15	3	0.45	3	0.45	4	0.45	4	0.60
Total Score Rank			3.00 2		3.75 1		2.95 3		2.85 4
Continue?			No		Yes		No		No

# *management of change*



*successful combination of document control and  
practical control of a change*

§ flameproof certification (Ex d)

§ training of operators and artisans

§ addition to standard operating procedures (SOP) and  
code of practice (COP)

§ addition to training manuals

§ addition to RCM tasklists

§ addition to task observations

## *project status*



- ü A detailed report and presentation was delivered to the shuttle car standardisation committee
- ü the project was accepted and registered (SM 052 SC) with great appreciation and enthusiasm.
- ü Creation of commodities for the new components
- Ø flameproof certification: new isolator enclosure  
: “blanket flameproof”
- Ø approval of new drawings by the Sasol Mining Electrical Standardisation Committee

## *cost estimation*



- once off-cost: flameproof certification – R8000 @ Expo Labs
- cost per installation: isolator, flameproof enclosure, additional glands and labour
- total cost per complete installation: R7600
- cost based on installation done at sasol mining central workshops

## *concerns raised by the standardisation committee*



*1) can the traction motors also start with the pump running?*

*ü traction breaker*

*ü shuttle car must be on the service cylinders to inspect the steering operation as standard procedure.*

*ü safety sprats must be placed around the service cylinders*

# *conclusion*



- *a hazard was identified.*
- *a comprehensive issue based risk assessment was preformed.*
- *the QFD approach was utilized to establish new controls/barriers.*
- *effective management of change was considered.*
- *standardisation committee is still negotiating the final implementation period and strategy.*

# *acknowledgements*



- ✓ *Mentors: Lucky Kgatle, Abie Kallie, Charl Norden, Radesh Rampersad*
- ✓ *SMCW: Hansie Annadale, Carl Lombard, Shirly Beni, Piet Schoeman, Roderick Thomas, Martin Gibson, Pieter van der Walt*
- ✓ *P&TS: Robbie Wilson, Caryn Sibuyi, Chetan Ravjee*
- ✓ *Safety: Dharmita Bhoola, Johan Botha, Andre Oberholzer, James Ndwande, Piet Smith*
- ✓ *Training: Joe Houy*



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