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turn-in)

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:	Daniel Smith	Student ID number:	144455
Programme:	HNC Process Operations Engineering		
Module:	Process Engineering Practice		
Module code:	PCPO4007	Contribution to Overall Module Assessment (%):	50%
Lecturer:	M. Lewis	Internal Verifier:	L. Rutherford
Assignment Title:	Responsibility, operational and maintenance activities.	Word count (or equivalent):	2000
Submission deadline:	14 th January 2021 Electronically via Moodle	Return date of provisional marks & written feedback:	25 th February
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): Late submission of the assessment will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Disclosure:	I declare that this assignment is all my own work and that I have acknowledged all materials used from the published or unpublished works of other people. All references have been duly cited.		
Student's Signature:	<i>Hardcopy assignments will not be accepted without a signature here</i> D.Smith	Date:	07/01/2021

**Module Learning Outcomes
(from module syllabus)**

LO1 LO2



Process Engineering Practice

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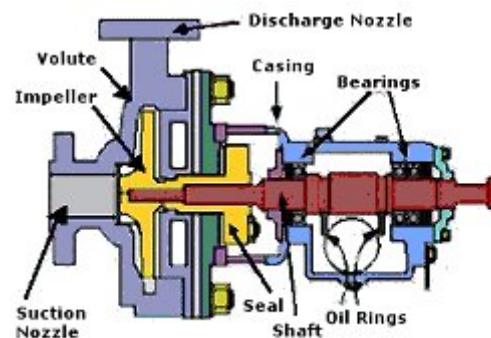
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Task 1

Within Valero there are multiple pieces of equipment that we as plant operators must maintain and operate. On each unit there is multiple pieces of equipment from valves all the way to entire columns and reactors that we must operate and maintain. One of the main pieces of equipment operated on the units are pumps. There are two main types of pumps, centrifugal and reciprocating pumps. Both pumps are used all over Valero, however, on the Crude most of the pumps are centrifugal. Pumps work by having feed come into the pump via the suction nozzle where the feed is picked up via the impeller and turned around the pump casing. The impeller then ejects the feed up through the discharge nozzle. The impeller is spun via a connected shaft which is powered by either a motor or a turbine. The shaft spins on bearings which need to continually be lubricated to ensure they do not wear out. To prevent the feed from escaping the casing and going into the bearing housing there is a seal placed on the rear of the impeller casing, seal monitoring is a normal task carried out on pumps by operations.

When starting up a pump there are certain tasks that should be carried out to ensure that the pump is started up correctly. One of the first operator tasks is to check that there is a sufficient oil in all 'denco' bottles and bearing housing oil sumps, oil should all be clean lubrication oil correct for use on style of equipment. Oil should be stored on each unit oil lubrication cabinet, different types of oil are used different applications, in Valero the different types of are identified quickly by colours on a label, for pumps use the blue labelled oil. When the pump has been checked for correct lubrication, the operator should check to see if the pump is in a hot operation, if it is then the operator should ensure that the HXV bypass is open on the discharge line as this works as the warmup line for the pump. Once the pump is warm enough, ensure control operator is aware that the pump is going to be started shortly, once confirmed with them ensure suction valve is set to the open position and the discharge HXV is set to open. When the control operator is ready the field operator should ensure the emergency stop button is pulled out and press start.



(IndiaTradeinfo, 2006.)

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When the pump is running the field operator has some tasks that should be carried out to ensure the pump is running correctly. One of the first tasks that should be carried out is to check the discharge pressure from the pump, the discharge pressure should be greater than the pressure of the header line as the discharging process must overcome the downwards pressure of

the process in the line. The discharge pressure should be checked via a pressure gauge on the discharge line, however the field operator can also radio to the control operator to check the digital pressure reading recorded via pressure transmitters to ensure both readings are within 0-2% of each other. Whilst the field operator is speaking to the control operator, they should also ask for a reading on the flow rate of the active pump, each pump on site has a normal operating range which the flow rate should be within, by checking their readings the control operator should have a flow rate indicated on the pumps faceplate within their software. If the flowrate is not at the required rate the field operator can attempt to open the discharge valve fully, however, opening the discharge valve too much can decrease the discharge pressure. If the pump is pumping away liquid from a vessel and the level is still increasing but the pump is not decreasing the level quick enough then the operator can open the bypass valve on the discharge control valve, by opening the bypass it is allowing the process multiple exit pathways. *pump*

When the pump has been running for a period then there are certain checks that need to be carried out on it, the first of which is temperature checks which are carried out by using a temperature gun to measure the temperature of the casing around the bearing housings, this is due to this area being the location where heat will be created due to the constant movement on the bearings. By recording this data, the vibe technicians can put all these figures into a graph or chart and see trends of when equipment may fail, this will allow them to have parts ready for repairs. These checks are also good for operations as we know when the equipment is not running efficiently, this will allow the field operator to report to the control panel where they can make the decision to change pump's if a partner pump is available. *Do you do this?*

Another task that is carried out by the field operator is small level one maintenance tasks, the main level one tasks carried out is flushing bearing housings and replacing with new oil. To flush a bearing house the operator should start by removing the denco bottle and draining the original oil from the bearing housing into a container, this can be through the sediment pot or can be done by unscrewing the sediment pot and draining directly. Once drained the sediment pot must be removed, then the operator should remove the plug on the topside of the bearing housing this will allow for fresh oil to be put into the housing to flush and fill the housing. If possible 'gallon cleaner' or another similar product should be used to flush the bearing housing of any contaminates or particles of dirt. When the product being flushed through is clear exiting the housing the correct colour oil can be put into the housing, this should be flushed through to ensure the cleaning product is no longer present. The field operator should look at the condition of the sediment pot and decide if a new sediment pot is needed, if so, fill sediment pot to top and screw

onto pipework from bottom of bearing housing. Tighten on hand tight to ensure the pot can be removed in the future if needed, when tight the operator should use a hand pump oil container and pump around 8-9 full pumps of oil into the bearing housing. The field operator should then check the sediment pot to ensure there is no big amounts of sediment dropped into the pot, another check needed is to ensure that the sediment pot has no air pockets left within it, if present the operator should slowly undo the sediment pot until the air can escape and the oil from the bearing housing can replace it. When the operator has done their checks for the pump, they should ensure the denco bottle has no damage or sediment within it, when confirmed the operator should take the lid off the denco and fill to the top, screw the lid back on and place the denco bottle in the correct location. When the denco bottle is in place ensure it is fully engaged with the fitting to ensure no air can make its way into the bottle and empty the contents. The denco bottle will bubble and slowly drop oil into the bearing housing until the oil is at the correct level. When at the correct level and the denco bottle has stopped bubbling the operator should remove the bottle and fill back to the top to ensure there is sufficient oil present as the pump will slowly overtime consume the oil as lubricant. When the denco is full again and the level settled the operator should replace the plug located on top of the bearing housing once again, this should be done by wrapping the plug with thread tape (PTFE) and then screwing the plug back in until it is tight.

Another small level ^{one} maintenance task carried out by field operators is maintaining pump couplings, guards, and pump beds, this is mainly part of the Valero company specific project called PRIDE, Valero encourages the Pride project as it ensures operators 'have pride about their areas and ensures they look after the equipment within them, ensuring all equipment is up to standard' (Valero Training Guide, 2020) in terms of pumps this means ensuring the coupling is suitable, not damaged, not missing any bolts and not out of alignment. The operator should also ensure any pump guards or coupling guards are up to standard, the guards should not have any holes in it that anyone could put their finger through, if holes are present the guard should be replaced, if the guard looks old under the PRIDE project the guard should be painted and made to look fresh. The operator is also responsible for upkeeping the pump bed and making sure the bed is suitable for use, they should ensure there is no damage to concrete or any metal lining if there is a work order should be entered to the system. The pump bed should also be clean of any debris or dirt present to make sure it is suitable for work to be carried out on it, it is also standard for the pump number to be clean and visible, this should be represented on the equipment itself or on the pump be.

Task 2

Development plan, College Cert.

Within Valero there is a lot of responsibility within the operator role, to ensure that we are competent to carry out this job there is various training and development plans in place before becoming passed out as an operator. As an apprentice we must first be selected by viewing CV's (attached in appendix 1) when selected they must then complete a mathematics, English, and mechanical aptitude tests, when that is passed there is a COBRA test which is a refinery control operator simulation where we must control conditions. Once taken on as an apprentice, they must go through multiple years of college to learn a wide variety of skills and knowledge needed for work within the process industry. As well as doing this we had to learn one of three trades to have a background knowledge and gain an NVQ level 3 in either mechanical, electrical or instrumentation. By completing this it shows that we have a basic understanding about how some of the equipment works on site.

After the second year is complete the next step is to learn the basic tasks and skills needed to become an operator, to do this we must undertake a basic operator training (B.O.T) module. This training ensures we are competent to undertake operator task carried out on day-to-day activities as well as understanding most of the process units on site. This is completed by carrying out tasks and having trained operators sign off on completion of the task, when completed the training supervisor should look through tasks to ensure they have been done to a standard which is acceptable. Whilst carrying out this B.O.T folder there is also lots of competency-based training (C.B.T) to carry out, the main ones being basic operator routines, fired heater training and equipment monitoring tasks. When the competency based training is completed there is a certificate to say that the training has been carried out, these are attached below in figure ??. There is also practical training carried out on site before certain tasks can be carried out, these are things such as breathing apparatus training, confined space training, harness training, and fire pad/ fire fighting training. These training tasks are carried out with help from the fire department which ensures that the activities are carried out to a suitable standard, when completed they give out specific cards and update your status within the internal system.

References

IndiaTradeinfo (2006) Centrifugal Pumps 2 information. [Accessed on 06/11/2020] Available at: <http://www.indiatradeinfo.com/articles/centrifugal-pumps-2.html>

Valero Training Guide (2020) Operations training manual part 3. [Accessed on 12/11/2020] Available at: Valero Intranet – training department.

Wayne Roberts (2020) Company specific maintenance logs and techniques from discussions with Lead Operator/Operations maintainer.

Any more References used?

Appendix

Appendix 1

Daniel Smith

Address: 20 Springfield Road, Pembroke Dock, Pembrokeshire,
SA72 6PZ

Phone: 01646 622140 • 07854624450 •

e-mail: danlsmith312@gmail.com

D.O.B: 13/03/2000

Employment:

Valero Operations Apprenticeship Framework at Valero, Pembroke. 2018 - present.

Past Employment:

Advanced Modern Apprenticeship in Engineering at PSM International, Pembroke Dock, Ferry Lane, SA71 4RE. 2017- 2018.

Education & Qualifications:

Current-

Valero Operations Apprenticeship Framework at Valero, Pembroke.

Completed-

HNC Process Operations Engineering Year 1. Grade: Merit.

Advanced Modern Apprenticeship Framework in Engineering at PSM International, Pembroke Dock, Ferry Lane, SA71 4RE. 2017- 2018.

- BTEC 120 credit diploma in Mechanical Engineering- Pembrokeshire College.
- City & Guilds 1786-70 level three NVQ Extended Diploma in Engineering Technical support - Pembrokeshire College.

Learning Area Program: BTEC 90-Credit Diploma in Engineering & New Advanced Welsh Baccalaureate Pembrokeshire College September 2016- June 2017. Grade: Distinction*, Distinction*.

- Pembrokeshire College.
 - Units Studied: Health & Safety in the Engineering Workplace, Mathematics for Engineering Technicians, Mechanical Principles, Electrical & Electronic Principles, Properties & Applications of Engineering Materials, Applications of Mechanical Systems in Engineering, Engineering Drawing for Technicians in Engineering, Engineering Secondary and Finishing Techniques, Welding Technology & Machining Techniques.
- The Engineering Scheme Wales (EESW, STEM) project with Valero oil refinery and Pembrokeshire College. Conversion of hazardous waste into non- hazardous waste.

Pembroke School, Bush, Pembroke, Pembrokeshire SA71 4RL

GCSE's:

- Information Technology-A
- English-B
- Physics - B
- Maths - B
- Biology-B
- Chemistry-B
- Geography-C
- Graphics-C
- Resistant Material Technology-C
- Welsh-C
- Welsh Baccalaureate-Pass
- Key Skills-Pass

Interests.

I am interested in football; I represented Hundleton football team throughout the junior seasons and then went on to play for my first year of the men's Pembrokeshire football league in 2017 through till last season. I enjoyed being part of a team environment, meeting new people and keeping fit. I enjoy keeping fit generally and regularly attend the local gym.

I am interested in Information Technology and in the past helped to design a website for an online gaming community, I also helped my father to build my own computer from scratch.

In my spare time I enjoy completing my own maintenance on my car and helping my father when he requires assistance with any maintenance on his vehicles. This is a useful way of gaining more of an understanding to how the machinery works.

Skills.

- o Patience and flexibility.
- o Ability to organize and work effectively in all job aspects.
- o Work as an individual and as part of a team.
- o Languages; Basic Welsh Speaker.
- o Computing; Able to use Windows packages e.g. Word, Excel, PowerPoint and software applications such as Adobe, Sony Vegas and Autodesk Inventor CAD Software.

References.

Pembrokeshire College Engineering Lecturer.

Mr William Bateman.

Merlins Bridge,

Haverfordwest

Pembrokeshire

Telephone: 013437 753 420

Email: williamb@pembrokeshire.ac.uk

Resistant Material Technology Teacher.

Mr T. Meiring,

Pembroke School,

Pembroke,

Pembrokeshire,

SA71 4RL

Telephone 01646 682461

Email: Tmeiring@pembrokeschool.org

Appendix 2



Prentisiaethau Apprenticeships



Llywodraeth Cymru
Welsh Government

www.cymru.gov.uk

Dyfernir y dystysgrif hon i • This certificate is awarded to

Daniel Luke Smith

sydd wedi llwyddo i gwblhau **Prentisiaeth Lefel 3** mewn
who has successfully completed the **Level 3 Apprenticeship** in

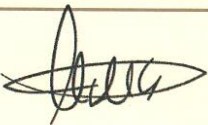
Gweithgynhyrchu Peirianeg (Peirianeg Cynnal a
Chadw)

Engineering Manufacture (Engineering Maintenance)

Gwyddoniaeth, Peirianeg a Thechnolegau Gweithgynhyrchu

Science, Engineering and Manufacturing Technologies

Dyddiad cyflawni	• Completion date
02 Rhagfyr 2020	• 02 December 2020



Rheolwr Gyfarwyddwr	• Managing Director
Ffederasiwn Sgiliau a Safonau'r Sector Diwydiant	• Federation for Industry Sector Skills & Standards
Rhif y Dystysgrif	• Certificate Number : ACW024288



Federation for
Industry Sector
Skills & Standards



ESF
Llywodraeth Cymru
Welsh Government
Ewrop & Chymru: Buddsoddi yn eich dyfodol
Cronfa Gymdeithasol Ewrop
Europe & Wales: Investing in your future
European Social Fund

Appendix 3



Hereby certifies that

Daniel Smith

Has satisfactorily completed the training and testing requirements for compliance with the

Confined Space Entry - SWP (Site Specific) (PM-PLT-S-009-01L)

09/11/2020 08:07

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616



Hereby certifies that

Daniel Smith

Has satisfactorily completed the training and testing requirements for compliance.

Fired Heater-Normal Operation of a Natural Draft Gas Fired Heater ILT

Class Title

PM-PLT-P-100-02I

Course Code

(Dean Rawlings)

Instructor

(VRPM) Popton Fort Class Room

Training Location

07/17/2020 06:27

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616



Hereby certifies that

Daniel Smith

**Has satisfactorily completed the training and testing requirements for
compliance with the**

Information Security Awareness (For Contractors) (SA-SEC-O-020-02B)

11/07/2019 05:03

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616



Hereby certifies that

Daniel Smith

**Has satisfactorily completed the training and testing requirements for
compliance with the**

Recertification test for generic plant operator duties (PM-ART-Q-000-05T)

24/11/2020

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616



Hereby certifies that

Daniel Smith

**Has satisfactorily completed the training and testing requirements for
compliance with the**

Pembroke - Steam hammer training for operations 2016 (Site Specific) (PM-PLT-S-000-24B)

09/11/2020 08:13

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616



Hereby certifies that

Daniel Smith

**Has satisfactorily completed the training and testing requirements for
compliance with the**

Worst Case Failure Mechanism (Site Specific) (PM-PLT-R-000-03B)

09/11/2020 08:08

Training Date

Valero Energy Corporation • One Valero Way • San Antonio, TX 78249-1616