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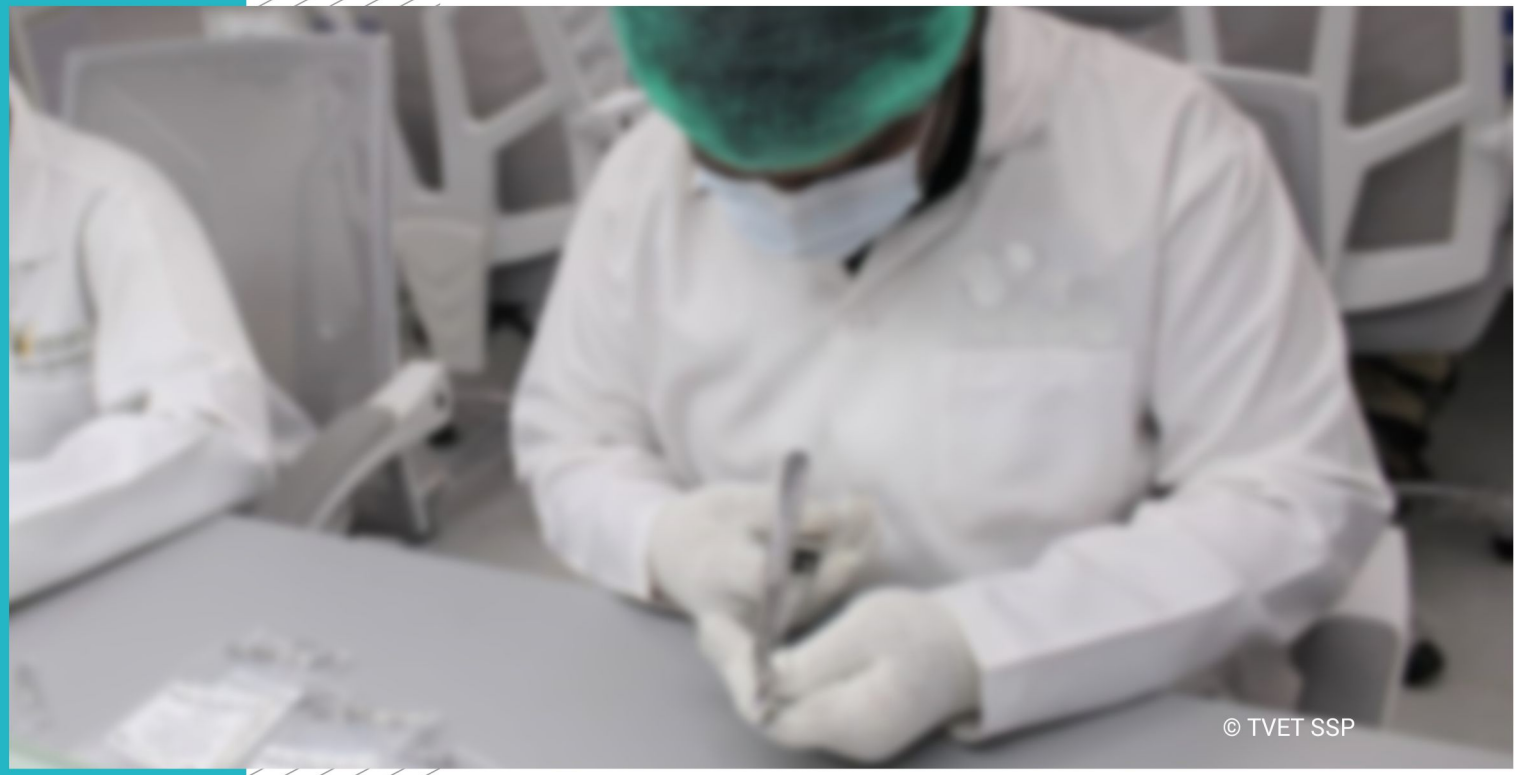
# SURGICAL INSTRUMENTS MANUFACTURING TECHNICIAN




## TRAINER GUIDE

National Vocational Certificate Level 3

Version 1 - March, 2019

NAVTTC

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

**Published by**
National Vocational and Technical Training Commission
Government of Pakistan

**Headquarter**
Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
www.navttc.org

**Responsible**
Director General Skills Standard and Curricula, National Vocational and Technical Training Commission
National Deputy Head, TVET Sector Support Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

**Layout & design**
SAP Communications

**Photo Credits**
TVET Sector Support Programme



This document has been produced with the technical assistance of the TVET Sector Support Programme, which is funded by the European Union, the Federal Republic of Germany and the Royal Norwegian Embassy and has been commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in close collaboration with the National Vocational and Technical Training Commission (NAVTTC) as well as provincial Technical Education and Vocational Training Authorities (TEVTAs), Punjab Vocational Training Council (PVTC), Qualification Awarding Bodies (QABs)s and private sector organizations.

**Document Version**
March, 2019
**Islamabad, Pakistan**

# SURGICAL INSTRUMENTS MANUFACTURING TECHNICIAN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## Introduction

Competence-based training helps to bridge the gap between what is taught in training and what tasks will be performed on the job. Training trainees to perform actual job functions helps to ensure that future front-line workers have the skills, knowledge and abilities required to perform their jobs properly, safely and effectively. In addition to competence-based training, assessment based on the performance of actual work competencies helps to ensure that:

- trainees are performing their work tasks as safely as possible
- performance gaps are recognized prior to serious incidents
- training can be implemented to improve competence.

There are significant benefits to competence-based training:

1. **Cost effectiveness**

   Since training activities and assessments in a competence-based approach are goal-oriented, trainers focus on clearly defined areas of skills, knowledge and understanding that their own industry has defined in the competence standards. At the same time, trainees are more motivated to learn when they realize the benefits of improved performance.

2. **Efficiency**

   The transfer gap between the training environment and working on the job is reduced substantially in a competence-based approach. This is because training and assessment are relevant to what needs to be done on the job. As a result, it takes less time for trainees to become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

3. **Increased productivity**

   When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach which can also increase productivity.

4. **Reduced risk**

   Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee's record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

5. **Increased customer satisfaction**

   Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

## Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the *Surgical Instruments technician* qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', 'you do it like this because …', or even 'tell me why did you choose to do it like this?'.

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why something is being done, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how a surgical instruments technician acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainees where they do not meet those standards, and where they repeat its correction until they have internalized those standards.

## Demonstration of skill

Demonstration or modeling a skill is a powerful tool used in vocational training. The instructions for trainers for demonstration are as under:

a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
b) Arrange all tools, equipment and consumable material which are required for demonstration of a skill.
c) Practice the skill before demonstration to trainees, if possible.
d) Introduce the skill to trainees clearly at the commencement of demonstration.
e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
f) Carry out demonstration in a way that can be seen by all trainees.
g) Use the same tools and materials that the learner's will be using.
h) Go through EACH of the steps involved in performing the skill.
i) Go SLOWLY - describe each step as it is completed.
j) Encourage the learner's to move around and watch what you are doing from a number of different angles.
k) Identify critical or complex steps, or steps that involve safety precautions to be followed.

l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
m) Try to involve the learner's: Ask them questions about why they think the process may work that way.
n) Repeat critical steps in demonstration, if required.
o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learner's to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learner's. A trainer may need to do repeated demonstrations of difficult or complex skills.

Remember that the learner's will learn a lot from your demonstration - and not just the demonstration itself. Learner's will learn about how to perform the skills, but they will also learn from watching demonstrations how trainers treat the tools or materials and how they follow safety procedures.

After the demonstration, it is important to again seek out questions - be sure all questions are answered. The trainer should ask the learner's if they are ready to try the skill. If not, there may be a need for recycling the demonstration (or part of it), and clarifying some of the information.

**Overview of the program**

| **Course:** NVQ Certificate Level 3 in SURGICAL INSTRUMENT MANUFACTURING TECHNICIAN | **Total Course Duration:** 800 hours |
|---|---|
| **Course Overview:** | |
| The surgical instrument manufacturing technician program is to engage young people with a program of development that will provide them with the knowledge, skills and understanding to start this career in Pakistan. The program has been developed to address specific issues, such as the national, regional and local cultures, the manpower availability within the country, and meeting and exceeding the needs and expectations of their customers. | |

| Modules | Learning Units | Duration |
|---|---|---|
| **Module 1:**<br>Perform Forging | **LU1:** Perform Sheet Cutting<br>**LU2:** Apply hammer stroke<br>**LU3:** Trim extra material | 130 hours |
| **Module 2:**<br>Perform Manual Machining | **LU1:** Perform turning operations<br>**LU2:** Perform milling operations | 130 hours |
| **Module 3:**<br>Develop Sheet Metal Surgical Instruments | **LU1:** Perform blanking<br>**LU2:** Perform punching<br>**LU3:** Perform bending<br>**LU4:** Apply deep draw process<br>**LU5:** Perform spinning | 130 hours |
| **Module 4:**<br>Apply Heat Treatment | **LU1:** Prepare workstation for heat treatment<br>**LU2:** Perform annealing<br>**LU3:** Apply heat treatment by conventional method<br>**LU4:** Apply Vacuum heat treatment<br>**LU5:** Apply Conveyor Belt Heat Treatment | 150 hours |

**Lesson Plan Template**

| Time | Content | Tutor's activity | Learner's activity | Resources | Outcomes / Assessment |
|---|---|---|---|---|---|
| | Introduction | | | | |
| | | | | | |
| | | | | | |
| | **BREAK** | | | | |
| | | | | | |
| | | | | | |
| | Conclusion | | | | |

**Lesson Plan Template - EXAMPLE**

| Time | Content | Tutor's activity | Learner's activity | Resources | Outcomes/ Assessment |
|---|---|---|---|---|---|
| | Introduction | State the learning objectives for this lesson (prepare, surgical instruments manufacturing process and see how to make a finish products). Link this to the previous lesson (various types of process that can be use on a specific machine including using of machines) and ask questions from learner's to check their prior knowledge and to arouse the interest and motivation | Answer questions about the previous lesson<br>Ask questions as required about the learning objectives for this lesson | Flip chart or similar listing the learning objectives for this lesson | Questions and answers |
| | Presentation | Introduce and explain surgical manufacturing process and Highlight any pre-preparation methods. Use some surgical instruments as samples for better explanation | Make notes for making your presentation more effective | Prepare workstations and setting machines/press<br>Appropriate preparation and manufacturing process equipment<br>Personal protective equipment's | Questions and answers |
| | **BREAK** | | | | |

| Time | Content | Tutor's activity | Learner's activity | Resources | Outcomes/ Assessment |
|---|---|---|---|---|---|
| | Practical | Observe learner's practical activities and support as appropriate | Practice skills in using equipment and multi-stage methods independently to prepare, process and present complex manufacturing process methods | Appropriate surgical manufacturing process and machine operating procedure<br>Working instruction<br>Learner's own notes<br>Appropriate preparation machining process<br>Personal protective equipment | Observation<br>Questions and answers<br>Self-assessment<br>Peer assessment |
| | Conclusion | Lead feedback session with discussion and questions and answers<br>Ask learner's to complete self-assessment form | Provide feedback on the activity<br>Complete self-assessment form<br>Ask questions | Complete manufacturing process performed by the learner's | Questions and answers<br>Self-assessment forms<br>Complete complex process performed by the learner's |

**Trainer's guidelines**

| **Module 1:** 072200883 Perform Forging | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| **LU1:**<br>Perform Sheet Cutting | This session is about the following performance criteria:<br>• Arrange suitable material and Measure thickness of sheet as per product specification / drawing<br>• Set shearing parameters as per required strip sizes<br>• Adjust the Jig size for sheet cutting on shearing press table<br>• Cut down the large size sheet into strips according to job specification using shearing press<br>• Measure strips to verify required specifications<br>• Mount cutting die on power press to cut strips for pre-forge shape (Raw shape)<br>Arrange suitable material and Measure the thickness of sheet as per product specification / drawing<br><br>Set shearing parameters as per required strip sizes<br><br>Adjust the Jig size for sheet cutting on shearing press table<br><br>Cut down the large size sheet into strips according to | Practice / realistic workshop<br><br>Steel role, Vernier caliper, scriber.<br><br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handouts illustrating:<br>• Regular base die working<br>• Process traveler card<br>• Cost reports<br>• Weekly consumption reports<br>• Details of special cutting dies<br>• Standard operating procedures for the cutting operations<br>• Job descriptions and appraisals for team associates<br>• Working practice<br>• Study the safety precautions |

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| | the job specification using shearing press<br><br>Measure strips to verify required specifications<br><br>Mount cutting die on power press to cut strips for pre-forge shape (Raw shape)<br><br>Lead a discussion on the importance of cutting die and cutting press. Encourage ALL trainees to participate in the discussion.<br><br>Ensure that the discussion addresses the following points:<br>• Knowledge and understanding the material selection & sheet grade.<br>• Operational knowledge and understanding of the cutting press operation.<br>• What technique used during press setting.<br>• Understanding the capacity of the cutting press.<br>• Brief detail the measuring instruments.<br>• Tasks and duties that can be allocated to each associate<br>Following the discussion, present examples of daily working sheets, regular see the instruction, weekly make items reports, special requirements, standard operating procedures for the operations.<br><br>Arrange learners into small groups. Ask each group to discuss the importance of being able to independently preparation of workstation and verify all dyeing and machine parameters and present **THREE** situations that illustrate their discussion.<br>Take verbal feedback from each group.<br>Learners must be able to practice and develop their | | |

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| | knowledge and skills relating to prepare workstation for winch dyeing in a simulated practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |

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| **LU2:**<br>Apply hammer stroke | This session is about the following performance criteria:<br>• Mount both parts of forging dies on drop forged hammer<br>• Align forging dies as per standard procedure<br>• Heat up the pre-forged work pieces in furnace to achieve required temperature<br>• Place preheated pieces in forging die and apply hammer stroke as per requirements<br>• Remove the forged pieces out of die safely and place in storage container/trolley/bin<br><br>Inspect the size and shape of forged pieces after cooling down to verify required specifications<br>Mount both parts of forging dies on drop forged hammer<br><br>Align forging dies as per standard procedure<br><br>Heat up the pre-forged work pieces in furnace to achieve required temperature<br><br>Place preheated pieces in forging die and apply hammer stroke as per requirements<br><br>Remove the forged pieces out of die safely and place in storage container/trolley/bin | Practice / realistic workshop<br><br>Dies, Drawing.<br><br>**EITHER**<br>Training company workshop.<br><br>**OR**<br><br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating examples of:<br>• Daily work sheets<br>• Regular and operate the machine<br>• Existing requisitions records<br>• Yield values checklists<br>• Cost reports<br>• Weekly manufacturing reports |

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| | Inspect the size and shape of forged pieces after cooling down to verify required specifications<br><br>Deliver an illustrated presentation on managing requisition requirements.<br><br>Ensure that the presentation focuses on the following:<br>• Operational knowledge and understanding of current and future requirements of the business<br>• Checking current stock of material and items available in the store<br>• Preparing demand card for already stored items.<br>• Understanding the drawings.<br>• Checking deliveries from store meet type, quality and quantity requirements<br>• Describe the die types.<br>• Press types, die setting, Understanding the equipment's used during dis setting.<br>• How to monitor the type, quality and quantity of manufacturing items<br>• Understanding the risk levels for different products.<br>• Ensuring that associates meet the requirements for and other items used in the preparation of workstation.<br><br>Ask learner's to work in small groups. Each small group should consider **THREE** of the above issues and illustrate the importance of each issue with specific examples from a die setting and press operating.<br><br>Prepare either:<br>• A flip chart | | |

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|---|---|---|---|
| | • A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary.<br>Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU3:**<br>Trim extra material | This session is about the following performance criteria:<br>• Mount trimming die on power press<br>• Set press parameters (Daylight, stroke etc.) as per job requirements<br>• Trim the extra material from forged pieces on power | | Learner's guide<br>Videos<br>Handout illustration:<br>• Understand the cutting process<br>• Daily work sheets<br>• Job descriptions for |

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| | press<br>• Check quality of trimmed forged work pieces<br>• Perform cold stamping if required and store in designated place<br><br>Prepare report of completed work on prescribed format<br>Mount trimming die on power press<br>Set press parameters (Daylight, stroke etc.) as per job requirements<br>Trim the extra material from forged pieces on power press<br>Check quality of trimmed forged work pieces<br>Perform cold stamping if required and store in designated place<br>Prepare report of completed work on prescribed format<br><br>Discuss about process of trimming extra material of metal sheets.<br><br>Ensure the discussion focuses on the following process:<br>• Operational knowledge and understanding of trimming die.<br>• Describe the hammer types.<br>• Detail knowledge the measuring instruments. | | associates<br>• Organizational quality standards for workshop |

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| | • How to read the drawing.<br>• How to set the die on press.<br>• Knowledge of hammer stock.<br><br>Arrange learners into small groups. Ask each group to discuss the importance of being able to independently preparation of workstation and verify all dyeing and machine parameters and present **THREE** situations that illustrate their discussion.<br>Take verbal feedback from each group.<br>Learners must be able to practice and develop their knowledge and skills relating to prepare workstation for winch dyeing in a simulated practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. | | |

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|---|---|---|---|
| | After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary.<br>Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| **LU1:** Perform turning operations | This session is about the following performance criteria:<br>• Arrange material for turning operations according to job requirement<br>• Prepare work-piece by required machining (sawing and filing etc.) and get it ready for clamping<br>• Arrange tools, measuring instruments and holding devices as per work instructions<br>• Clamp and align the workpiece and tools on lathe machine<br>• Set lathe machine parameters (Spindle speed (rpm), feed etc.) according to the machining requirements<br>• Perform machining to achieve required dimensions and surface finish<br>• Use appropriate measuring tools & instruments to ensure the quality and measurements of work piece according to | Practice / realistic workshop<br>Cutting tools bits, drill bits, Vernier caliper, chucks etc.<br><br>**EITHER**<br>Training company workshop.<br><br>**OR**<br><br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>For better explanation of trimming process, take your learner's to specific workstation and perform the process practical on cutting press. |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | standards<br><br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br><br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br><br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br><br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br><br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br><br>End the group discussion activity with a summary. | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners.<br>Arrange material for turning operations according to job requirement<br>Prepare work-piece by required machining (sawing and filing etc.) and get it ready for clamping<br>Arrange tools, measuring instruments and holding devices as per work instructions<br>Clamp and align the work piece and tools on lathe machine<br>Set lathe machine parameters (Spindle speed (rpm), feed etc.) according to the machining requirements<br>Perform machining to achieve required dimensions and surface finish<br>Use appropriate measuring tools & instruments to ensure the quality and measurements of work piece according to standards<br><br>Introduction of lathe machine process, how to operate the machine. List the brainstorm ideas.<br>If necessary, prompt learner's to consider the following:<br>• Give Brief explanation to students about | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | process of Lathe machine.<br>• Problems that may arise in the specific section of the Lathe machine.<br>• Lathe machine processes, turning, facing, cutting tools types, drilling, boring, counter sinking, Chuck types, tailstock.<br>• How to set the cutting tools / bits on tool post.<br>• How to make the cutting tools.<br>• How to re sharp the drill bits.<br>• How to sharp the cutting tools.<br>After the brainstorm, review the range of ideas and clarify any issues arising. Provide trainees with a handout of the main points arising from the brainstorm.<br>Show the videos and deliver the lecture.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU2:**<br>Perform milling operations | This session is about the following performance criteria:<br>• Arrange material for milling operations according to job requirement<br>• Prepare work-piece for required machining (sawing and filing etc.) and get it ready to clamp<br>• Arrange the cutters, measuring instruments and holding devices as per work instructions<br>• Clamp and align the workpiece and tool on | Practice / realistic workshop<br>Vice, Vernier caliper, cutter types, etc.<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating:<br>• Log book<br>• Noticeboard<br>• Daily work sheets<br>• Regular and see the procedure. |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | milling machine<br>• Set milling machine parameters (Spindle speed(rpm), feed, depth of cut, etc.) according to the machining requirements<br>• Perform milling to achieve required dimensions and surface finish<br>• Use appropriate measuring tools & instruments to ensure the quality and measurements of work piece according to standards<br>Arrange material for milling operations according to job requirement<br>Prepare work-piece for required machining (sawing and filing etc.) and get it ready to clamp<br>Arrange the cutters, measuring instruments and holding devices as per work instructions<br>Clamp and align the work piece and tool on milling machine<br>Set milling machine parameters (Spindle speed(rpm), | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | feed, depth of cut etc.) according to the machining requirements<br><br>Perform milling to achieve required dimensions and surface finish<br><br>Use appropriate measuring tools & instruments to ensure the quality and measurements of work piece according to standards<br><br>Deliver an illustrated presentation on ways to ensure the milling operation, open and finalize the shift effectively.<br><br>Ensure that the presentation addresses the following points:<br>• Ensuring that all associates are fully prepared at the start of the milling process<br>• Types of protective equipment and organizational requirements<br>• How to set the Cutter on milling machine.<br>• How to set the job on milling machine.<br>• Milling machines types.<br>• Describe Vice types, cutter types.<br>• Checking that all equipment is in good working | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | order<br>• Cleaning and sanitizing routines and materials<br>• Ensuring that all associates finalize the shift correctly and efficiently<br>• How to sharp the milling cutters<br>• How to set the machine<br>• How is Machine maintained.<br>Arrange the learner's in pairs. Ask each pair to devise 5 questions with correct answers about ways to ensure the workshop and working effectively. Hold a quiz for the group using the questions devised by each pair.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for | | |

| **Module 2: 072200884** Perform Manual Machining | | | |
|---|---|---|---|
| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| **LU1:**<br>Perform blanking | This session is about the following performance criteria:<br>• Arrange material and tools required for blanking operation as per work instructions<br>• Set parameters to perform shearing on shearing press as per required strip sizes<br>• Mount blanking die on power press<br>• Adjust machine daylight and stroke according to sheet thickness<br>• Perform blanking on sheets<br>• Offload &store sheet scrap and blanks safely at designated places<br>Arrange material and tools required for blanking operation as per work instructions<br>Set parameters to perform shearing on shearing press as per required strip sizes<br>Mount blanking die on power press<br>Adjust machine daylight and stroke according to sheet thickness | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Action plan template<br>Handout illustrating:<br>• Daily work sheets<br>• Work instructions<br>• Job descriptions and for team associates<br>• Record of allocated duties and tasks |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | Perform blanking on sheets<br><br>Offload and store sheet scrap and blanks safely at designated places<br><br>Deliver the presentation and importance of banking in manufacturing of surgical instruments. Also explain the working of banking die briefly.<br>Ensure that the presentation addresses the following points:<br>• Different ways of communicating effectively with members of a die section<br>• Planning the achievement of die press.<br>• Selecting and successfully applying different methods for motivating, supporting and encouraging associates and recognizing their environment.<br>• Types of die and departmental difficulties and challenges that may arise<br>• The members, purpose, objectives and plans of the workshop.<br>• The personal roles and responsibilities of members of the team.<br>• Instructions of performance for the work shop<br>Following the presentation, arrange a question and answer session.<br>During the main practical sessions, each trainee should have the opportunity to lead the workshop (the other trainees) in the preparation workstation. Arrange | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | trainees in pairs. Each pair should discuss their responsibilities as a 'pressman' team leader and create an action plan for them to develop and improve their leadership skills.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU2:**<br>Perform punching | This session is about the following performance criteria:<br>• Arrange material and tools required for punching operation as per work instructions<br>• Mount and set punching die on press as per work specifications and procedures<br>• Adjust machine daylight and stroke according to sheet thickness<br>• Perform punching on blanks<br>• Offload and store workpieces safely at designated place<br>Invite an experienced to deliver a presentation on ways in which a trainer should support the workshop. Ensure the presentation addresses the following points:<br>• Methods and formats for communication with the supervisor.<br>• How to Prepare the workplace<br>• Measuring instruments, (steel role, Vernier caliper)<br>• Define the punching dies.<br>• How to use the hand press | Practice / realistic workshop<br><br>Hand press, steel role, Punching dies, Vernier calipers<br><br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating:<br>• Record of allocated duties and tasks<br>• Daily working sheets<br>• Regular and<br>• Operating instruction Procedures for the surgical instruments |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | • Describe the hand press types, attachment<br>• How to use a PTC (Process traveler card)<br>• Supporting on the press in undertaking training and inspections<br>After the presentation, invite trainees to pose questions to the invited press and die section that will clarify their understanding.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU3:**<br>Perform bending | This session is about the following performance criteria:<br>• Arrange material and tools required for bending operation as per work instructions<br>• Adjust and set bending die on press as per work specifications and procedures.<br>• Adjust power / hydraulic press daylight and stroke according to sheet thickness<br>• Start the required operations as per drawing and job specifications<br>• Offload and store work pieces safely at designated place<br>Lead a discussion on how a perform bending process take places. Ensure the discussion captures the following points:<br>• How to set the bending die on press<br>• Describe hydraulic press types, parts<br>• How to perform bending process | Practice / realistic workshop<br>Bending dies, Hydraulic press, Vernier instruments, Steel role.<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating:<br>• Record of allocated duties and tasks<br>• Daily work sheets<br>• Fire equipment<br>• First aid equipment<br>• Equipment for safety<br>• Standard operating procedures for the workshop |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | • Discuss the safety precaution<br>• Types of bending dies<br>• Discuss the types of press<br>• How to perform a team work<br>Following the discussion, arrange trainees into small groups. Each group should produce a leaflet to encourage and support press work associates in working efficiently and effectively in a workshop.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU4:**<br>Apply deep draw process | This session is about the following performance criteria:<br>• Arrange material and tools required for deep draw operation as per work instructions<br>• Mount and set deep draw dies on hydraulic press as per work specifications and procedures.<br>• Punch marks using manual punches on the product wherever applicable<br>• Operate deep draw process on hydraulic press<br>• Offload and store work pieces safely at designated place<br>Lead a discussion on how to perform bending process. Ensure the discussion captures the following points:<br>• How to set the deep draw die on Hydraulic | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating:<br>• Record of allocated duties and tasks<br>• Daily work sheets<br>• Fire equipment<br>• First aid equipment<br>• Equipment for safety<br>• Standard operating procedures for the workshop |

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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | press<br>• How to perform deep draw process<br>• Discuss the safety precaution<br>• Types of deep draw process<br>• How to perform a team work<br>Following the discussion, arrange trainees into small groups. Each group should produce a leaflet to encourage and support press work associates in working efficiently and effectively in a workshop.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU5:**<br>Perform spinning | This session is about the following performance criteria:<br>• Arrange material and tools required for spinning operation as per work instructions<br>• Clamp the workpiece and tool on spinning lathe machine as per process requirement<br>• Apply force gradually to the spinning object to achieve required shape and size<br>• Use appropriate tools and gauges to ensure the quality of the product<br>• Offload and store work pieces safely at designated place<br>• Prepare report of completed work<br>Invite the workshop supervisor/ production manager to deliver a presentation on the importance of press section. Ensure that the presentation addresses the | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Handout illustrating:<br>• Tagging and logging materials |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | following points:<br>• Preparing the workstation including tagging and logging die, following organizational procedures, and completing all required documentation<br>• Ensuring prevent die safety.<br>• Explain your learner's, how to place the die in organized manner.<br>• Describe the spinning dies<br>After the presentation, invite trainees to pose questions to the invited supervisor / production manager that will clarify their understanding.<br><br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their | | |

| **Module 3: 072200885** Develop Sheet Metal Surgical Instruments | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| | flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |

| **Module 5: 072200886** Apply Heat Treatment | | | |
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| **Learning Unit** | **Suggested Teaching/ Learning Activities** | **Delivery Context** | **Media** |
| **LU1:**<br>Prepare workstation for heat treatment | This session is about the following performance criteria:<br>• Identify heat treatment processes required for the instrument using work instructions / specification sheets<br>• Arrange material, tools and gauges for the identified heat treatment processes<br>• Check quality of workpieces before heat treatment<br>Trainees need to practice their skills in heat treatment process and equipment to prepare the workstation realistic environment.<br>including demonstrations of equipment, preparation and heat treatment methods where appropriate:<br>• Heat treatment machine and preparation for workstation.<br>• Pre-preparation methods for complex heat treatment process<br>• Finishing and process complex products<br>• How to attain the temperature<br><br>Ask the learner's group to work in pairs to discuss the key points of using equipment and multi-stage methods independently to drilling. Following the pairs discussion, link two pairs together and ask each pair to share their findings. | Practice / realistic<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Support material for equipment used to prepare, complex process.<br>Support material as required, including recipes, promotional materials<br>Complaints Log<br>Lighter<br>Pen<br>Uniform (appropriate to the organization) |

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| | Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU2:**<br>Perform annealing | This session is about the following performance criteria:<br>• Set furnace parameters (temperature, time) as per material requirements<br>• Place workpieces inside the annealing furnace to | Practice / realistic workshop<br><br>**EITHER**<br>Training company workshop. | Learner's guide<br>Videos<br>Allocated annealing process<br>Own notes on preparing complex products<br>Support material as required |

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| | achieve set temperature<br>• Switch off the furnace and let workpieces cool down to room temperature inside the furnace (12 to 15 hours)<br>• Remove workpieces from furnace, test hardness of workpieces using Rockwell Hardness Tester as per hardness requirements and prepare test report<br><br>Trainees need to practice their skills in using equipment and multi-stage methods independently to prepare complex products for surgical instruments, in a real or realistic environment.<br>• How to prepare the furnace<br>• How to attain the temperature<br>• How to check annealing temperature<br>• How to perform the annealing process<br><br>Ask the learner's group to work in pairs to discuss the key points of using furnace and multi-stage methods independently to annealing. Following the pairs discussion, link two pairs together and ask each pair to share their findings.<br><br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout | **OR**<br>Access to a commercial environment or premises for training purposes | furnace,<br>PTC (Process traveler card)<br>Complaints Log<br>Lighter<br>Pen<br>Uniform (appropriate to the organization) |

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| | …showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU3:**<br>Apply heat treatment by conventional method | This session is about the following performance criteria:<br>• Set furnace parameters (temperature, time) as per material requirements<br>• Maintain flame quality by adjusting Air: Fuel ratio to avoid carbon deposits on instruments<br>• Hold workpieces with wires and place in the furnace for specified time<br>• Remove work pieces safely from furnace and | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial | Learner's guide<br>Videos<br>Allocated conventional process<br>Own notes on preparing complex products<br>Support material as required, including recipes, promotional materials<br>Complaints Log<br>Lighter |

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| | quench in quenching medium (air, water & oil) for specified time<br>• Remove oil from quenched workpieces using appropriate method (draining by hanging and cleaning with cotton etc.)<br>• Perform acid pickling to remove the scales from surface of work pieces<br>• Test hardness of workpieces using Rockwell Hardness Tester as per hardness requirements and prepare test report<br>Trainees need to practice their skills in using equipment and multi-stage methods independently to finish complex products, in a real or realistic environment.<br>• Heat treatment machine and preparation for workstation.<br>• Pre-preparation methods for complex heat treatment process<br>• How to perform the heat treatment conventional method<br>• How to check the temperature<br>• How to check the Hardness of instruments<br>• How to prepare the work place<br>• Finishing and process complex products<br>Ask the learner's group to work in pairs to discuss the key points of using furnace and multi-stage methods independently to vacuum heat treatment. Following the pairs discussion, link two pairs together and ask each pair to share their findings.<br>Prepare either:<br>• A flip chart | environment or premises for training purposes | Pen<br>Uniform (appropriate to the organization) |

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| | • A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU4:**<br>Apply Vacuum heat treatment | This session is about the following performance criteria:<br>• Prepare vacuum furnace (temperature, time) as per material requirements<br>• Perform vacuum heat treatment (vacuum, heating & cooling) on work pieces as per requirement | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial | Learner's guide<br>Videos<br>Allocated conventional process |

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| | • Remove work pieces safely from the furnace after completing the processes<br>• Test hardness of workpieces using Rockwell Hardness Tester (scale C) as per hardness requirements and prepare test report<br>Trainees need to practice their skills in independently presenting situation, in a real or realistic environment.<br>After the practical sessions are complete, lead a feedback session. Ask learner's to complete a self-assessment form on their ability to prepare, vacuum heat treatment process. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.<br>• Heat treatment machine and preparation for workstation.<br>• Prepare the vacuum furnace<br>• How to perform the vacuum heat treatment method<br>• How to check the temperature<br>• How to check the Hardness of instruments<br>• Finishing and process complex products<br>Ask the learner's group to work in pairs to discuss the key points of using furnace and multi-stage methods independently to vacuum heat treatment. Following the pairs discussion, link two pairs together and ask each pair to share their findings.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to | environment or premises for training purposes | |

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| | each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |
| **LU5:**<br>Apply Conveyor Belt Heat Treatment | This session is about the following performance criteria:<br>• Prepare vacuum furnace (temperature, time, speed) as per material requirements<br>• Place the workpieces on conveyor belt of the furnace and start the process<br>• Remove workpieces from furnace, test hardness of workpieces using Rockwell Hardness Tester as per hardness requirements and prepare test report<br>• Trainees need to practice their skills in independently present situation, in a real or | Practice / realistic workshop<br>**EITHER**<br>Training company workshop.<br>**OR**<br>Access to a commercial environment or premises for training purposes | Learner's guide<br>Videos<br>Allocated conveyor belt process<br>Work procedures, checklists, work schedules, maintenance schedules; records<br>Personal productivity Equipment (PPE), (appropriate to the work), for example aprons, gloves, mask, footwear |

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| | realistic environment.<br>After the practical sessions are complete, lead a feedback session. Ask learner's to complete a self-assessment form on their ability to prepare, conveyor belt heat treatment. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.<br>• Heat treatment machine and preparation for workstation.<br>• Prepare the conveyer belt heat treatment furnace<br>• How to perform the conveyor belt heat treatment method<br>• How to check the temperature<br>• How to check the Hardness of instruments<br>• Finishing and process complex products<br>Ask the learner's group to work in pairs to discuss the key points of using furnace and multi-stage methods independently to conveyor belt heat treatment. Following the pairs discussion, link two pairs together and ask each pair to share their findings.<br>Prepare either:<br>• A flip chart<br>• A PowerPoint slide<br>• A handout<br>…showing the key topics about xxx. Go through all the key topics briefly and then allocate **one key topic** to each group.<br>Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**.<br>After the discussion, begin the feedback session. Ask | | |

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| | one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for xxx. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified.<br>Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics.<br>End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. | | |

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