higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 3

27 November 2023

This marking guideline consists of 7 pages.

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QUESTION 1

1.1
- Excessive load or too high working speed on the bearing
- Lack of/Insufficient lubrication/No lubrication
- Faulty mounting of bearing
- Poor maintenance
- Misalignment of shaft and bearing
- Bearing wrongly designed
- Grit or dirt on the surfaces
- Contaminated lubricant
- Bearing surfaces are uneven
- Wrong type and grade of lubricant
- Shaft upon which the bearing is mounted, is not completely round

(Any 5 × 1) (5)

1.2 A – Rolling-element bearing/Ball bearing/Rolling bearing
B – Inner race/ring
C – Cage
D – Outer race/ring (4)

1.3
- Bearings and components can be damaged.
- It may be hazardous.
- It may be costly.
- It can lead to unnecessary losses and downtime.
- It may lead to injury.
- The bearings may not operate properly.

(Any 3 × 1) (3)

1.4
- Rolling bearings are generally cleaned by using a paintbrush with diesel or paraffin.
- After cleaning, the bearing and components should be dried and lightly oiled. (2)

1.5 The seal cannot be removed (1)
[15]

QUESTION 2

2.1
- Check the alignment of all the components.
- Check for leakages.
- Check for signs of wear or looseness in fasteners and re-torque where necessary.
- Check for unusual noise or excessive temperatures in the system's components.
- Check that all safety guards or safety devices are in place and operational.
- Check for excessive vibrations or other indicators of a change in alignment within the system. (Any 3 × 1) (3)

2.2
- Reduces noise
- Reduces vibration
- Reduces costs of repair and downtime
- Prolongs equipment's life (4)

2.3
- To transmit power from one shaft to another.
- To align different machines to motors.
- To connect the drive shaft to the driven shaft.
- To transmit motion from one shaft to another.
- To transmit torque from one shaft to another
- To allow misalignment between two shafts
- To allow axial movement from one shaft to another (Any 3 × 1) (3)

[10]

QUESTION 3

3.1 3.1.1 Spiral claw clutch (1)

3.1.2 A – Sliding/Movable claw
B – Spring
C – Driven shaft
D – Key (feather) (4)

3.2
- Noise
- Shudder
- Slipping
- Overheating
- Non-engagement (Any 3 × 1) (3)

3.3
- Defects are noticeable after cleaning.
- Cleaning forms an integral part of effective maintenance operation. (2)

[10]

QUESTION 4

4.1 4.1.1 The drive pulley is the pulley that is fitted to the motor which provides the driving motion by means of a V-belt/flat belt.

4.1.2 The driven pulley is attached to the working part of a machine that is driven by the drive pulley using a V-belt/flat belt.

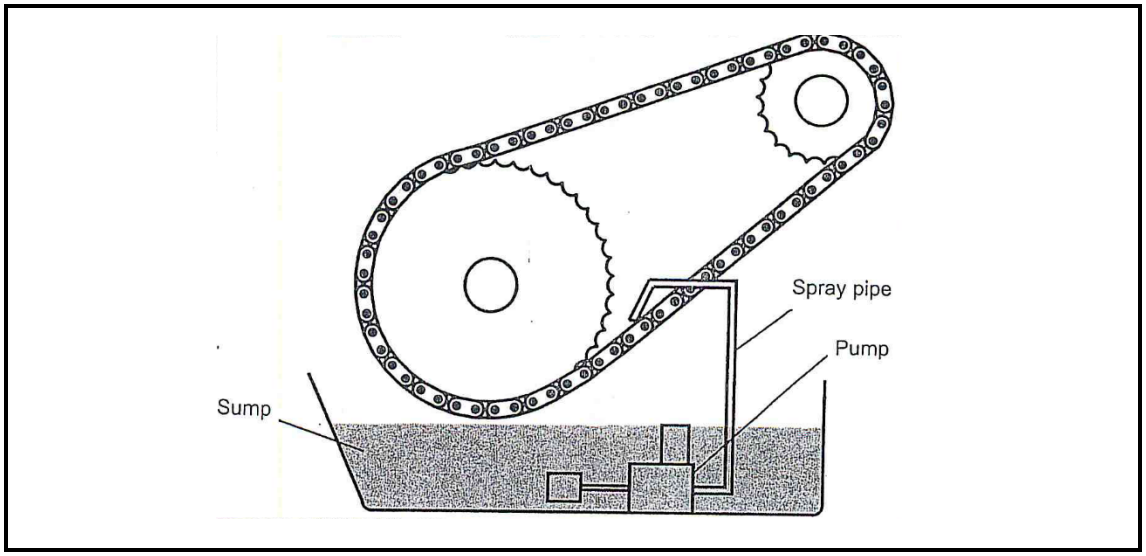
4.1.3 An idler pulley keeps the tension of the V-belt/flat belt constant and/or increases the arc of contact.

4.1.4 The arc of contact is that portion of the pulley that is in contact with the V-belt/flat belt along its circumference.

4.1.5 Centre distance is the distance between the centre of the driving pulley and the centre of the driven pulley.

(5 × 1) (5)

4.2



(Chain and sprocket are also correct labels) (Any 3 labels = 3 marks)
(Drawing = 2 marks) (5)

4.3
- More efficient
- Higher speed ratios
- More compact
- Longer life span
- Less likely to break down
- Less friction resistance occurs
- Transmits more power directly
- Radial loads on the bearings of the gear system are low (Any 5 × 1) (5)

[15]

QUESTION 5

5.1
- Bolts and nuts are not tight enough.
- Flanges do not fit properly together.
- Sealing devices are damaged.
- There are corrosion and cracks on the flanges.
- Damage occurs as a result of vibrations.
- Flanges are not pulled up evenly. (Any 5 × 1) (5)

5.2
- Never attempt to repair any pipeline or valve with which you are not familiar.
- Remove the pressure relief valve before performing any pressure testing on the system.
- Never attempt to remove a pressure relief valve from a system that is pressurised.
- When a valve is under pressure, never place any part of your body near the outlet of the main valve.
- Before dismantling any valve, double-check that it is completely isolated.
- Before inspecting or servicing any equipment, perform an approved lock-out/tag-out procedure on an electrical service, a compressed-air supply or any other energy source.
- Make sure the appropriate safety guards are in place before working on high-pressure valves.
- Wear personal protective equipment (PPE). (Any 5 × 1) (5)

[10]

QUESTION 6

6.1
- Do not over-tighten the jaws
- Do not take very large cuts
- Do not grip workpieces close to the front of the jaws
- Do not use a tube on chuck key handle to gain leverage (4)

6.2 S = 20 m/min
D = 100 mm = 100/1 000 = 0.1m
N = ? r/min

$S = \pi \times D \times N$
$N = S/\pi \times D$
$= 20/\pi \times 0,1$✓✓
$= \underline{63,662 \text{ r/min}}$✓ (3)

6.3
- Never leave the chuck key in the chuck.
- Wear appropriate personal protective equipment (PPE).
- Never leave the running machine unattended.
- Do not make any adjustments while the machine is in motion.
- Clamp the workpiece securely.
- Safety guards must always be in place.
- No fooling around when using a centre lathe. (Any 5 × 1) (5)

6.4
- The chuck can hold a wide range of hexagonal and cylindrical workpieces.
- Jaws are available for internal and external work.
- Work can be done on the end face of the workpiece.
- It is easy to mount the workpiece.
- Work can become a routine/can be boring/No challenges when the job is being done. (Any 4 × 1) (4)

6.5

PROBLEMS	POSSIBLE CAUSES
• Tool breaks	• Wrong tool material, high feed pressure
• Excessive tool wear	• No cutting fluid used, wrong tool angle, high feed pressure
• Tool chatter (Any 2 × 1)	• Workpiece or tool not clamped securely; tool is blunt (Any 2 × 1)

(4)
[20]

QUESTION 7

7.1
- Shape of the workpiece
- Pressure by the clamp
- Rigidity of the workpiece
- Pressure exerted by the milling cutter
- Ease of locating and removing the clamps (5)

7.2
7.2.1 Hold or support round workpieces
7.2.2 Secures a workpiece firmly
7.2.3 Holds and supports the workpiece to be machined
7.2.4 Provides clamping support to the workpiece (4)

7.3
- Before mounting, clean the dividing head; especially the underside.
- Clamp directly to table and align.
- Slide head to correct position and tighten with T-bolts.
- Mount footstock if required. (4)

7.4 D = 75 mm = 75/1 000 = 0,075 m
S = 22 m/min
fł = 0,08 mm/tooth
T = 8 teeth

S = π × D × N

N = S/ π × D
= 22/ π × 0,075✓✓
= 93,371 r/min✓

f = fł × T × N
= 0,08 × 8 × 93,371✓✓
= 59,757 mm/min✓ (6)

7.5 Soluble oil (1)
[20]

TOTAL: 100

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