Aerospace & Aviation Sector Skill Council

Model Curriculum

Helicopter Transmission Technician

SECTOR: AEROSPACE AND AVIATION
SUB-SECTOR: MAINTENANCE REPAIR & OVERHAULING
OCCUPATION: BASE MAINTENANCE
REF ID: AAS/Q2004
NSQF LEVEL: 4

Skill India
Aerospace & Aviation Sector Skill Council
N·S·D·C National Skill Development Corporation

Certificate

CURRICULUM COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS
is hereby issued by the

AEROSPACE & AVIATION SECTOR SKILL COUNCIL (AASSC)
for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack : '**Helicopter Transmission Technician**' QP No. '**AAS/Q2004' NSQF level 4**'

Date of issuance : 01 September 2017
Valid up to : 31 August 2018
** Valid up to the next review date of the Qualification Pack*

(Authorised signatory)
Aerospace & Aviation Sector Skill Council (AASSC)

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Helicopter Transmission Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Helicopter Transmission Technician", in the "Aerospace & Aviation" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Helicopter Transmission Technician		
Qualification Pack Name & Reference ID.	AAS/Q2004		
Version No.	1.0	Version Update Date	15 – 03 - 2017
Pre-requisites to Training	Class XII (Science)		
Training Outcomes	After completing this programme, participants will be able to; • Perform critical sub-assembly operations like bearing installation with responsibility (e.g. 'bearing staking', 'bush pressing' etc.) • Effectively use the 'universal testing machine (UTM)' for 'bearing push-out' load check operations. • Identify and use basic tools, equipment & materials; Understanding of carrying out tool box, machinery equipment for its operation. • Achieve basic communication skills and good inter-personal skills. • Acquire abilities to stand and walk for long periods of time with regular/consistent kneeling, squatting and reaching over the head with caution to avoid accidents. • Work efficiently under pressure to meet the deadlines. • Take clear-cut decisions, backed by good mathematical analysis as a part of a team.		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Helicopter Transmission Technician" Qualification Pack issued by "Aerospace & Aviation Sector Skill Council (AASSC)".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Follow safety and security procedures** **Theory Duration** (hh:mm) **25:00** **Practical Duration** (hh:mm) **23:00** **Corresponding NOS Code** **AAS/N0502**	Candidates will be able to; • comprehend the organisation's safety and security policies and procedures • comprehend the regulatory guidelines on safe conduct of operations and maintenance of conditions to thwart any acts of unlawful interference • report any identified breaches of safety, and security policies and procedures to the designated person • coordinate with other resources at the workplace (within and outside the organization) to achieve safe and secure environment • identify and mitigate any safety and security hazards like illness, accidents, fires or acts of unlawful interference if it falls within the limits of individual's authority • report any hazards outside the individual's authority to the relevant person in line with organisational procedures and regulatory guidelines • follow organisation's emergency procedures for accidents, fires or acts of unlawful interference • identify and recommend opportunities for improving health, safety, and security to the designated person • complete all health and safety records are updates and procedures well defined	White/Black board, Markers, computer and projector, trainer's guide, student handbook
2	**Performing Helicopter Transmission Assembly Operations** **Theory Duration** (hh:mm) **146:00** **Practical Duration** (hh:mm) **158:00** **Corresponding NOS Code** **AAS/N2009**	Candidates will be able to; • identify damages in loaded parts and be able to check the documents for matching with the defined sop and drawings • refer to the process requirements as given in the standards, route books, and manuals • understand the Gleason spiral bevel gear system and its manufacturing techniques/manufacturing machines • study the process sheets/standard practices manuals / modification documents and evolutionary history of the transmission modules • check condition of assembly/disassembly/dimension-torque checking tools and gauges • use special tools used for giving load to the gear meshes, for alignment checks, backlash measurement of gears, bearing installation and staking tools • ensure that improper use of tools and its	White/Black board/ Chart paper, Markers/Computer and projector, trainer's guide, student handbook,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		damage to the parts beings assembled are gauged prior to assembly itself as a precautionary measure • understand the procedure of operating assembly machinery like the deep freezers, Universal testing machines, hydraulic presses of 10 Tons load, torque multipliers, hydraulic jacks, and overhead cranes • safely use the electrical-electronic gadgets for actuated freewheel rigging operations, pneumatic tools and gauges • check if the elastomeric is damaged-oozed out etc. • assemble bearings in to the Magnesium housings/gear shafts • assemble bushes (interference fits) using deep freeze-oven/heat guns • Install the pattern check tools in the gear boxes and apply 10 nm torque thru dead weights or by tightening the conical surfaces for achieving the desired patterns/ backlash values • ensure proper rotational drag on parts with bearings to ensure that unnecessary pre-load is not given • give proper torque using calibrated torque wrenches, ensuring to wire lock parts thru positive wire locking • check for burrs on edges of parts to prevent damage during assembly especially in critical areas of the gear boxes • perform rigging of the actuated freewheels, installation of hydraulic actuators with the gear boxes • perform assembly of shaft modules and balancing of the shafts • perform bearing staking and proof load testing • check for proper rotational drag/positive wire locking /line replaceable units' installation/slippage marks/wpc application on the modules needs to be understood • perform rigging of actuated freewheels, spring stiffness checks on assembly for the freewheel units, adjusting shims for achieving dynamic contact patterns in case of corrections • perform calculations for achieving balance values post PI checks of shafts in the Ground test centers • check for FOD, elimination of blocked oil jets from the gear boxes, proper sequence of wire locking and usage of plastic sleeve in the wires to prevent damage to the	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		magnesium housings, proper application of weather proofing compound/proper application of slippage marks • record the critical interfacing dimensions during the assembly operations, proper application of slippage marks, proper installation of seals and o-rings	
3	**Maintain 5S at the work premises** **Theory Duration (hh:mm)** **09:00** **Practical Duration (hh:mm)** **23:00** **Corresponding NOS Code** **ASC/N0021**	Candidates will be able to; • follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces. • ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions • follow the technique of waste disposal and waste storage in the proper bins as per SOP • segregate the items which are labeled as red tag items for the process area and keep them in the correct places • sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions • ensure that areas of material storage areas are not overflowing • properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required • return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area • follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards • follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists • check that the items in the respective areas have been identified as broken or damaged • follow the given instructions and check for labeling of fluids, oils, lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc. • make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions • check whether safety glasses are clean and in good condition	White/Black board, Markers, computer and projector, trainer's guide, student handbook,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• keep all outside surfaces of recycling containers are clean • ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards • check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up • ensure workbenches and work surfaces are clean and in good condition • follow the cleaning schedule for the lighting system to ensure proper illumination • store the cleaning material and equipment in the correct location and in good condition • ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene • follow the daily cleaning standards and schedules to create a clean working environment • attend all training programs for employees on 5S • support the team during the audit of 5 S • participate actively in employee work groups on 5S and encourage team members for active participation • follow the guidelines for What to do and What not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions	
	Total Duration **Theory Duration** (hh:mm) **180:00** **Practical Duration** (hh:mm) **204:00**	Unique equipment used; • Cut-out model of a typical helicopter engine • Test bed • Engine hoist • Slings • Ground Power Unit (GPU) • Video/2D or 3D software based audio-visual training package • Common & special tool kits • Common & special gauges and testers • Common & special cranes • Fork lift, special high lift equipment • personal protective equipment (PPE) (consisting of safety jacket, safety goggles, ear plugs, gloves, safety shoes & safety helmet)	

Grand Total Course Duration: ***384 Hours, 0 Minutes***

(This syllabus/ curriculum has been approved by ***SSC: Aerospace & Aviation)***

Trainer Prerequisites for Job role: "Helicopter Transmission Technician" mapped to Qualification Pack: "AAS/Q2004"

Sl. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "AAS/Q2004".
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	Graduate (with Class XII in Science)
4a	Domain Certification	Statutory Certificate from Aerospace & Aviation Sector Skill Council (AASSC) for Job Role: "Helicopter Transmission Technician" mapped to QP: "AAS/Q2004". Minimum accepted score for domain certification will be 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the job role "Trainer" mapped to the Qualification Pack : "MEP/Q 0102". Minimum accepted percentage as per respective SSC guidelines is 80%.
5	Experience	2-3 years of experience

Annexure: Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role : Helicopter Transmission Technician
Qualification Pack : AAS/Q2004
Sector Skill Council : Aerospace & Aviation

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria

5. To pass the Qualification Pack, every trainee should score a minimum of 70% in aggregate

6. The marks are allocated PC wise, however, every NOS will carry a weightage in the total marks allocated to the specific QP

		Marks Allocation			
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
1. AAS/N0502 Follow safety and security procedures	PC 1. comply with the organisation's safety and security policies and procedures	**100**	10	5	5
	PC 2. comply with the regulatory guidelines on safe conduct of operations and maintenance of conditions to thwart any acts of unlawful interference		10	5	5
	PC 3. report any identification breaches of safety, and security policies and procedures to the designated person		10	5	5
	PC 4. coordinate with other resource at the workplace (within and outside the organisation) to achieve safe and secure environment		20	10	10
	PC 5. identify and mitigate any safety and security hazards like illness, accidents, fires or acts of unlawful interference if ti falls within the limit of individual's authority		10	5	5
	PC 6. report any hazards outside the individual's authority to the relevant person in line with organisational procedures and regulatory guidelines		20	10	10
	PC 7. follow organisation's emergency procedures for accidents, fires or acts of unlawful interference		5	2	3
	PC 8. identify and recommend opportunities for improving health, safety, and security to the designated person		10	8	2
	PC 9. complete all health and safety records are updates and procedures well defined		5	2	3
		Total	**100**	52	48

		Marks Allocation			
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
2. AAS/N2009 (performing helicopter transmission assembly operations)	PC1. identify damages in loaded parts and be able to check the documents for matching with the defined sop and drawings	**100**	5	2	3
	PC2. refer to the process requirements as given in the standards, route books, and manuals		5	2	3
	PC3. understand the Gleason spiral bevel gear system and its manufacturing techniques/manufacturing machines		5	2	3
	PC4. study the process sheets/standard practices manuals / modification documents and evolutionary history of the transmission modules		5	2	3
	PC5. check condition of assembly/disassembly/dimension-torque checking tools and gauges		4	2	2

	PC6. use special tools used for giving load to the gear meshes, for alignment checks, backlash measurement of gears, bearing installation and staking tools		4	2	2
	PC7. ensure that improper use of tools and its damage to the parts beings assembled are gauged prior to assembly itself as a precautionary measure		4	2	2
	PC8. understand the procedure of operating assembly machinery like the deep freezers, Universal testing machines, hydraulic presses of 10 Tons load, torque multipliers, hydraulic jacks, and overhead cranes		4	2	2
	PC9. safely use the electrical-electronic gadgets for actuated freewheel rigging operations, pneumatic tools and gauges		4	2	2
	PC10. check if the elastomeric is damaged-oozed out etc.		4	2	2
	PC11. assemble bearings in to the Magnesium housings/gear shafts		4	2	2
	PC12. assemble bushes (interference fits) using deep freeze-oven/heat guns		4	2	2
	PC13. Install the pattern check tools in the gear boxes and apply 10 nm torque thru dead weights or by tightening the conical surfaces for achieving the desired patterns/ backlash values		4	2	2
	PC14. ensure proper rotational drag on parts with bearings to ensure that unnecessary pre-load is not given		4	2	2
	PC15. give proper torque using calibrated torque wrenches, ensuring to wire lock parts thru positive wire locking		4	2	2
	PC16. check for burrs on edges of parts to prevent damage during assembly especially in critical areas of the gear boxes		4	2	2
	PC17. perform rigging of the actuated freewheels, installation of hydraulic actuators with the gear boxes		4	2	2
	PC18. perform assembly of shaft modules and balancing of the shafts		4	2	2
	PC19. perform bearing staking and proof load testing		4	2	2
	PC20. check for proper rotational drag/positive wire locking /line replaceable units' installation/slippage marks/wpc application on the modules needs to be understood		4	2	2
	PC21. perform rigging of actuated freewheels, spring stiffness checks on assembly for the freewheel units, adjusting shims for achieving dynamic contact patterns in case of corrections		4	2	2
	PC22. perform calculations for achieving balance values post PI checks of shafts in the Ground test centers		4	2	2

	PC23. check for FOD, elimination of blocked oil jets from the gear boxes, proper sequence of wire locking and usage of plastic sleeve in the wires to prevent damage to the magnesium housings, proper application of weather proofing compound/proper application of slippage marks		4	2	2
	PC24. record the critical interfacing dimensions during the assembly operations, proper application of slippage marks, proper installation of seals and o-rings		4	2	2
		Total	**100**	**48**	**52**
3.AAS/N0021 (Maintain 5S at the work premises)	PC1. follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces	**170**	30	10	20
	PC2. ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions				
	PC3. follow the technique of waste disposal and waste storage in the proper bins as per SOP				
	PC4. segregate the items which are labeled as red tag items for the process area and keep them in the correct places				
	PC5. sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions				
	PC6. ensure that areas of material storage areas are not overflowing		30	10	20
	PC7. properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required				
	PC8. return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area				
	PC9. follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards				
	PC10. follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists		30	10	20
	PC11. check that the items in the respective areas have been identified as broken or damaged				

	PC12. follow the given instructions and check for labeling of fluids, oils. lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc.				
	PC13. make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions				
	PC14. check whether safety glasses are clean and in good condition		50	10	40
	PC15. keep all outside surfaces of recycling containers are clean				
	PC16. ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards				
	PC17. check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up				
	PC18. ensure workbenches and work surfaces are clean and in good condition				
	PC19. follow the cleaning schedule for the lighting system to ensure proper illumination				
	PC20. store the cleaning material and equipment in the correct location and in good condition				
	PC21. ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene				
	PC22. follow the daily cleaning standards and schedules to create a clean working environment				
	PC23. attend all training programs for employees on 5 S		30	10	20
	PC24. support the team during the audit of 5S				
	PC25. participate actively in employee work groups on 5S and encourage team members for active participation				
	PC26. follow the guidelines for What to do and what not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions				
		Total	**170**	**50**	**120**