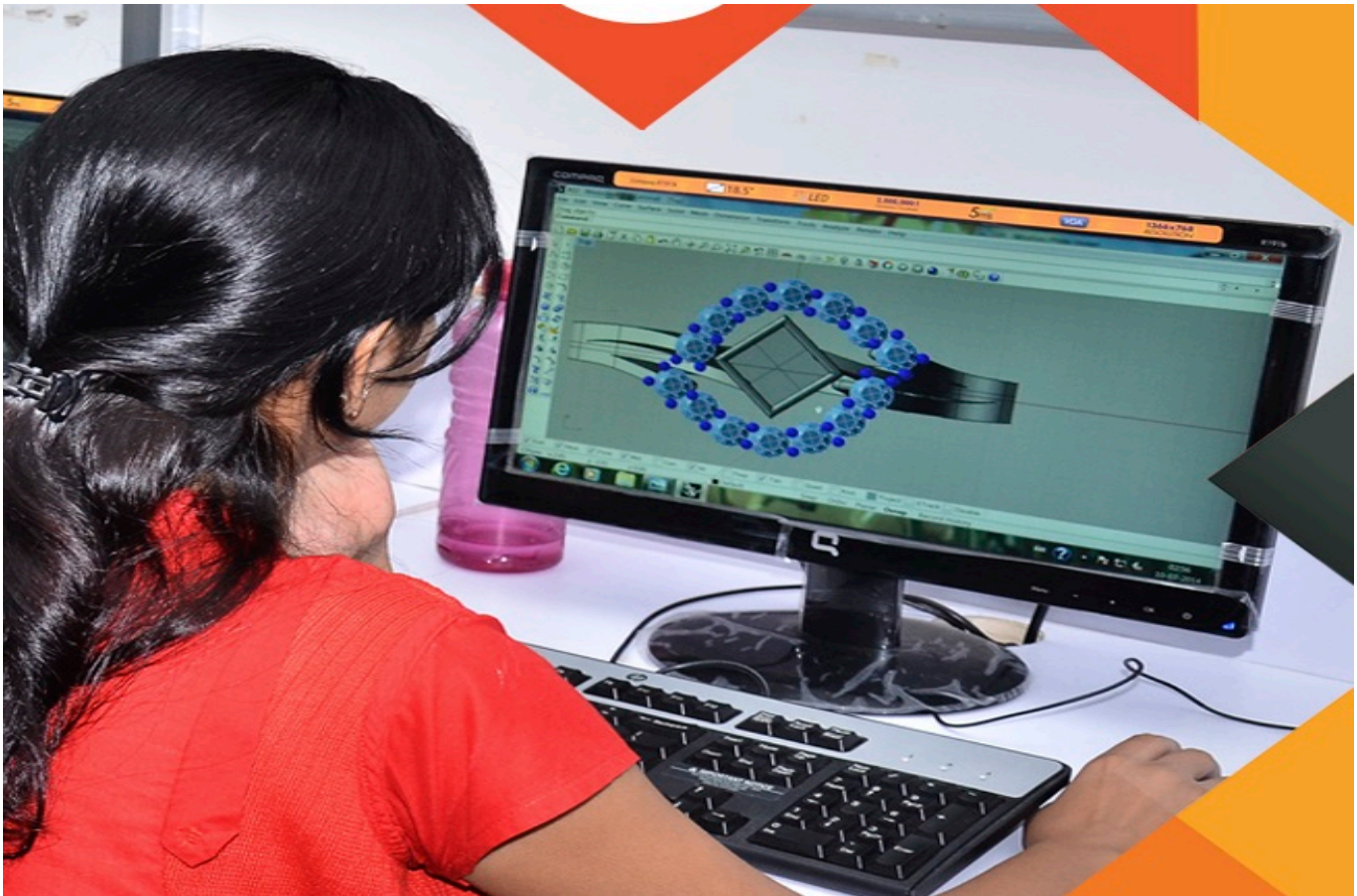


Qualification Pack



Senior Jewellery CAD designer

Options: 3D Printing Operator

QP Code: G&J/Q2306

Version: 1.0

NSQF Level: 5

GJSCI || Gem Jewellery Skill Council of India, 4th Floor, Business Facilitation Centre, SEEPZ SEZ,
Andheri (E)

Mumbai 400096 || email:standards.qa@gjsci.org

Qualification Pack

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Qualification Pack

G&J/Q2306: Senior Jewellery CAD designer

Brief Job Description

The individual at work uses Computer-Aided Designing (CAD) technology to produce 3D jewellery designs, which serve as a model for producing prototypes of jewellery and to initiate manufacturing of intricate jewellery or jewellery collection.

Personal Attributes

The job requires the individual to have attention to details, patience, good eyesight and visualization.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [G&J/N2307: Create intricate 3D jewellery design using CAD software](#)
2. [G&J/N9950: Work effectively with internal and external people](#)
3. [G&J/N9949: Follow material and energy conservation practices at workplace](#)
4. [G&J/N9902: Maintain health and safety at workplace](#)

Options(Not mandatory):

Option : 3D Printing Operator

3D Printing Operator produces 3D (Three Dimensional) jewellery prototype in various materials using 3D Printers.

1. [G&J/N2306: Create jewellery prototype using 3D printing](#)

Qualification Pack (QP) Parameters

Sector	Gem & Jewellery
Sub-Sector	Cast and diamonds-set jewellery, Handmade Gold and Gems-set Jewellery, Silver Smithing, Imitation Jewellery
Occupation	Designing and Product Development, Designing

Qualification Pack

Country	India
NSQF Level	5
Credits	NA
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2166.0401
Minimum Educational Qualification & Experience	12th Class with 1-2 Years of experience Minimum 1-year experience in Jewellery CAD Designing or Jewellery Designer (G&J/Q2303) Version 2.0
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	Basic computer handling and MS office
Minimum Job Entry Age	18 Years
Last Reviewed On	22/10/2020
Next Review Date	01/05/2024
NSQC Approval Date	27/05/2021
Version	1.0
Reference code on NQR	2021/GJ/GJSCI/04247
NQR Version	1

Qualification Pack

G&J/N2307: Create intricate 3D jewellery design using CAD software

Description

This OS unit is about producing three-dimensional (3D) jewellery designs using CAD software for an intricate range of jewellery or jewellery collection.

Scope

The scope covers the following :

- Prepare for 3D jewellery design creation
- Creating intricate 3D jewellery design
- Achieving quality standards
- Achieving Productivity

Elements and Performance Criteria

Prepare for 3D jewellery design creation

To be competent, the user/individual on the job must be able to:

- PC1.** collate the design requirements in terms of dimension, final weight of metal and gemstone, process metal loss and finishing allowance, assembly sequence of components, etc. from the internal team in the form of hand sketches, coral draw sketches, a knockdown jewellery piece, clonning sample, etc.
- PC2.** report any issues related to design concept clarity, dimensions and practicality to CAD manager
- PC3.** determine the various design and Computer-Aided Manufacturing (CAM) related parameters at various stages of manufacturing in consultation with the CAD manager

Creating intricate 3D jewellery design

To be competent, the user/individual on the job must be able to:

- PC4.** set the required unit and dimension parameters in the CAD file
- PC5.** insert sketches, scanned images, diagrams, signs or symbols, etc. of required jewellery design in a CAD file
- PC6.** create 3D jewellery CAD design using appropriate curve commands such as line, arc, solid commands such as box, etc. present in the menu.
- PC7.** use a library like the Bermark library, Stuller findings library of preloaded and editable completed pieces, components like shank, ring settings, clamps and findings like chains etc.
- PC8.** use basic and advanced transformed tools like scale and orient, flow, array, move, edit, etc.
- PC9.** create designs with rail, profile tools, smart targets and image trace, etc.
- PC10.** create Signet, Award and Eternity rings using various builder tools
- PC11.** use production tools like object checker, ring resizer, metal weights, mesh repair, 3D printing etc.
- PC12.** use advanced surface making tools like T-Splines, T-Splines HUD, etc.,

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- PC13.** use various gem placing basic and advanced commands like Gem loader, Gem springs, Gem on curve Multi, Auto pave builder, Halo builder, etc. in the Gems menu to load, replace, and control the layout of one or more gems at a time
- PC14.** use single or multiple diamond and gem setting tools like Head builder, Bezel builder, Prong builder, Prong on the surface, etc. from setting menu to create heads, bezels, under the bezel, and prongs around gems that have already placed in the model
- PC15.** create free-form shapes or designs like filigree, vines, scrollwork, flowers, etc. using clayoo, organic 3D-modeling tools
- PC16.** create voids in solid objects for azures, channels and popular setting styles like bright-cut and fishtail, using creating cutters menu for single or multiple stones cutter, Boolean Builder, etc.
- PC17.** use relief sculpting or art tools for designing embossed or engraved text or shapes over coins, medallions or family crests
- PC18.** create photo-realistic renders and animations quickly and easily using Render menu commands like Vray styles, Render Editor, props library etc., various light and Animation commands too
- PC19.** use appropriate shrinkage and stone setting parameters for making seat and hole for diamond, for making prongs of particular thickness and height, for the gap between prongs, for the gap between diamonds etc.
- PC20.** prepare a drawing of different views of 3D jewellery design using different projection methods like orthographic, perspective, etc. in different positions and angles
- PC21.** apply different colours for the stone in different sizes in the drawing
- PC22.** prepare notes related to design in terms of overall dimensions or other manufacturing specifications like assembly sequence, surface texturing, Customer specific dimensional tolerances, stamping instructions etc. in the drawing
- PC23.** maintain CAD files using advanced content manager or project manager tools, backup of CAD files and records of other related information shared by internal team or customer
- PC24.** report any issues while working with CAD file using to CAD manager

Achieving quality standards

To be competent, the user/individual on the job must be able to:

- PC25.** check each CAD design for the final look and various design parameters before final submission
- PC26.** rework as per the CAD manager's feedback when required, based on inputs from marketing, merchandising, product development and production department

Achieving Productivity

To be competent, the user/individual on the job must be able to:

- PC27.** ensure timely delivery of 3D jewellery design file or STL (stereolithography) or OBJ (object), etc. files converted from the CAD designs to enable the commencement of prototyping process
- PC28.** create 3D jewellery CAD designs as per target given
- PC29.** update the CAD manager on work completion status

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

Qualification Pack

- KU1.** company's policies on acceptable limits of quality, delivery standards, safety practices and hazard, security and performance measurements
- KU2.** importance of non-disclosure of "confidential information" provided by the company either orally or in writing marked as confidential
- KU3.** work flow involved in jewellery manufacturing process of the company
- KU4.** importance of the individual's role in the workflow
- KU5.** the reporting structures
- KU6.** different types of jewellery product like rings, pendants, bracelets, necklace etc.
- KU7.** various types of basic and advanced jewellery manufacturing processes like stone set lost-wax investment casting, polishing, invisible setting, soldering etc.
- KU8.** various physical properties like hardness, malleability, shrinkage factor of different fineness of precious metals like gold, silver, platinum etc.,
- KU9.** various types of diamonds and gemstones in terms of shape, size, cut, colour etc.
- KU10.** various types of stone setting used for a different style of jewellery
- KU11.** various textures or surface enhancement techniques like mill graining used in jewellery manufacturing
- KU12.** basics of internet usage
- KU13.** various CAD software like Matrix, Matrix Gold, Rhino Gold, Panther, Rhino Jewel, 3Design, Z Brush, CouterSketch, Mud box etc.
- KU14.** technical drawing practices as per the company standards
- KU15.** basic calculations in terms of final weight of jewellery, shrinkage allowance for different precious metals, count of a number of diamonds or gemstones etc.
- KU16.** various measuring tools like scale, vernier calliper or gauges like ring sizer, bangle sizer etc.
- KU17.** basic measuring system and units

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read notes, designs and instructions shared by different internal team
- GS2.** read company rules and compliance documents required to complete the work
- GS3.** read design, concept and software related books
- GS4.** share technical information clearly using appropriate language
- GS5.** visualize designs

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for 3D jewellery design creation</i>	11	22	-	-
PC1. collate the design requirements in terms of dimension, final weight of metal and gemstone, process metal loss and finishing allowance, assembly sequence of components, etc. from the internal team in the form of hand sketches, coral draw sketches, a knockdown jewellery piece, clowning sample, etc.	4	8	-	-
PC2. report any issues related to design concept clarity, dimensions and practicality to CAD manager	2	4	-	-
PC3. determine the various design and Computer-Aided Manufacturing (CAM) related parameters at various stages of manufacturing in consultation with the CAD manager	5	10	-	-
<i>Creating intricate 3D jewellery design</i>	42	89	-	-
PC4. set the required unit and dimension parameters in the CAD file	2	4	-	-
PC5. insert sketches, scanned images, diagrams, signs or symbols, etc. of required jewellery design in a CAD file	2	5	-	-
PC6. create 3D jewellery CAD design using appropriate curve commands such as line, arc, solid commands such as box, etc. present in the menu.	2	5	-	-
PC7. use a library like the Bermark library, Stuller findings library of preloaded and editable completed pieces, components like shank, ring settings, clamps and findings like chains etc.	2	4	-	-
PC8. use basic and advanced transformed tools like scale and orient, flow, array, move, edit, etc.	2	5	-	-
PC9. create designs with rail, profile tools, smart targets and image trace, etc.	2	5	-	-
PC10. create Signet, Award and Eternity rings using various builder tools	2	4	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. use production tools like object checker, ring resizer, metal weights, mesh repair, 3D printing etc.	2	4	-	-
PC12. use advanced surface making tools like T-Splines, T-Splines HUD, etc.,	2	4	-	-
PC13. use various gem placing basic and advanced commands like Gem loader, Gem springs, Gem on curve Multi, Auto pave builder, Halo builder, etc. in the Gems menu to load, replace, and control the layout of one or more gems at a time	2	4	-	-
PC14. use single or multiple diamond and gem setting tools like Head builder, Bezel builder, Prong builder, Prong on the surface, etc. from setting menu to create heads, bezels, under the bezel, and prongs around gems that have already placed in the model	2	4	-	-
PC15. create free-form shapes or designs like filigree, vines, scrollwork, flowers, etc. using clayoo, organic 3D-modeling tools	2	4	-	-
PC16. create voids in solid objects for azures, channels and popular setting styles like bright-cut and fishtail, using creating cutters menu for single or multiple stones cutter, Boolean Builder, etc.	2	4	-	-
PC17. use relief sculpting or art tools for designing embossed or engraved text or shapes over coins, medallions or family crests	2	4	-	-
PC18. create photo-realistic renders and animations quickly and easily using Render menu commands like Vray styles, Render Editor, props library etc., various light and Animation commands too	2	6	-	-
PC19. use appropriate shrinkage and stone setting parameters for making seat and hole for diamond, for making prongs of particular thickness and height, for the gap between prongs, for the gap between diamonds etc.	3	6	-	-
PC20. prepare a drawing of different views of 3D jewellery design using different projection methods like orthographic, perspective, etc. in different positions and angles	2	6	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC21. apply different colours for the stone in different sizes in the drawing	2	3	-	-
PC22. prepare notes related to design in terms of overall dimensions or other manufacturing specifications like assembly sequence, surface texturing, Customer specific dimensional tolerances, stamping instructions etc. in the drawing	2	3	-	-
PC23. maintain CAD files using advanced content manager or project manager tools, backup of CAD files and records of other related information shared by internal team or customer	2	3	-	-
PC24. report any issues while working with CAD file using to CAD manager	1	2	-	-
<i>Achieving quality standards</i>	4	8	-	-
PC25. check each CAD design for the final look and various design parameters before final submission	2	5	-	-
PC26. rework as per the CAD manager's feedback when required, based on inputs from marketing, merchandising, product development and production department	2	3	-	-
<i>Achieving Productivity</i>	4	7	-	-
PC27. ensure timely delivery of 3D jewellery design file or STL (stereolithography) or OBJ (object), etc. files converted from the CAD designs to enable the commencement of prototyping process	2	3	-	-
PC28. create 3D jewellery CAD designs as per target given	1	2	-	-
PC29. update the CAD manager on work completion status	1	2	-	-
NOS Total	61	126	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	G&J/N2307
NOS Name	Create intricate 3D jewellery design using CAD software
Sector	Gem & Jewellery
Sub-Sector	Cast and diamonds-set jewellery, Handmade Gold and Gems-set Jewellery, Silver Smithing, Imitation Jewellery
Occupation	Designing and Product Development, Designing
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	27/05/2026
NSQC Clearance Date	27/05/2021

Qualification Pack

G&J/N9950: Work effectively with internal and external people

Description

This OS unit is about communicating with colleagues, seniors and outside parties in order to achieve the deliverables as per schedule.

Scope

The scope covers the following :

- Interacting with supervisor
- Interacting with colleagues
- Interacting with vendors or clients
- Practice inclusion

Elements and Performance Criteria

Interacting with supervisor

To be competent, the user/individual on the job must be able to:

- PC1.** coordinate for receiving work instructions and raw materials from reporting supervisor
- PC2.** communicate to the reporting supervisor about process flow improvements, product defects, repairs and maintenance of tools and machinery as required
- PC3.** interact with the reporting supervisor about any possible hazards and safety concerns
- PC4.** coordinate with the supervisor regarding company policies and rules pertaining to job role

Interacting with colleagues

To be competent, the user/individual on the job must be able to:

- PC5.** coordinate with colleagues to share work, as per the workload in order to achieve team goals
- PC6.** communicate work flow related difficulties with colleagues in order to find solutions with mutual agreement
- PC7.** coordinate with quality control personnel for any quality related issue
- PC8.** resolve conflicts by communicating with colleagues and other departments

Interacting with vendors or clients

To be competent, the user/individual on the job must be able to:

- PC9.** share relevant information with clients or vendors
- PC10.** adhere to nondisclosure policy of the company in all outside communication

Practice inclusion

To be competent, the user/individual on the job must be able to:

- PC11.** respect all colleagues and co-workers
- PC12.** empathize with people with disability
- PC13.** extend help to people with Disability (PwD) at workplace, if required
- PC14.** adopt a gender neutral behavior

Knowledge and Understanding (KU)

Qualification Pack

The individual on the job needs to know and understand:

- KU1.** company's policies on preferred language of communication, reporting and escalation policy, quality delivery standards and personnel management
- KU2.** company's policies on non-disclosure of "confidential information" provided by the company either orally or in writing marked as confidential
- KU3.** liability arising out of loss, theft or inadvertent disclosure of confidential information
- KU4.** the reporting structure
- KU5.** various categories of people, required to communicate and coordinate within the organization
- KU6.** importance of effective communication in the workplace like expressing and addressing grievances appropriately and effectively
- KU7.** importance of teamwork in organization and individual success
- KU8.** various components of effective communication
- KU9.** barriers to effective communication
- KU10.** common reasons for interpersonal conflict
- KU11.** what constitutes disciplined behaviour for a working professional
- KU12.** gender concepts, issues & legislation
- KU13.** organizational policies and procedures related to gender equality
- KU14.** challenges faced by PWD and the ways to help them overcome the same

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write instructions, remarks, job sheets, basic information, technical details etc. in preferred local language and English
- GS2.** read preferred language of communication as prescribed by the company
- GS3.** read job sheets and interpret technical details mentioned in the job sheet
- GS4.** discuss task lists, schedules, and work-loads with co-workers
- GS5.** be a good listener
- GS6.** effectively communicate the issues faced, to the supervisor
- GS7.** spot and communicate potential areas of disruptions in the work process and report the same
- GS8.** report to the supervisor or deal with a colleague individually, depending on the type of concern
- GS9.** plan work for maximum productivity
- GS10.** plan and organize the schedule for maintenance of tools and machines
- GS11.** convey accurate information to relevant internal as well as external customers
- GS12.** handle critical situations caused due to communication issues at workplace and solve problems without blaming others
- GS13.** analyse the work processes by interacting with others and adopting best practices
- GS14.** use prior experience to improvise upon the work

Qualification Pack

- GS15.** how to think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)
- GS16.** spot process disruptions and delays and report
- GS17.** identify immediate or temporary solutions to resolve delays
- GS18.** evaluate and apply the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action
- GS19.** read legislative documents relevant to gender and PWD sensitization
- GS20.** communicate with colleagues on the significance of gender and PWD sensitization
- GS21.** make timely communication for the decisions to be taken at work
- GS22.** communicate effectively with the clients in need of technical background

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Interacting with supervisor</i>	2	6	-	-
PC1. coordinate for receiving work instructions and raw materials from reporting supervisor	0.5	1	-	-
PC2. communicate to the reporting supervisor about process flow improvements, product defects, repairs and maintenance of tools and machinery as required	0.5	1	-	-
PC3. interact with the reporting supervisor about any possible hazards and safety concerns	0.5	1	-	-
PC4. coordinate with the supervisor regarding company policies and rules pertaining to job role	0.5	3	-	-
<i>Interacting with colleagues</i>	3	10	-	-
PC5. coordinate with colleagues to share work, as per the workload in order to achieve team goals	0.5	3	-	-
PC6. communicate work flow related difficulties with colleagues in order to find solutions with mutual agreement	1	3	-	-
PC7. coordinate with quality control personnel for any quality related issue	1	2	-	-
PC8. resolve conflicts by communicating with colleagues and other departments	0.5	2	-	-
<i>Interacting with vendors or clients</i>	1	3	-	-
PC9. share relevant information with clients or vendors	0.5	1	-	-
PC10. adhere to nondisclosure policy of the company in all outside communication	0.5	2	-	-
<i>Practice inclusion</i>	6	13	-	-
PC11. respect all colleagues and co-workers	1	3	-	-
PC12. empathize with people with disability	2	3	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. extend help to people with Disability (PwD) at workplace, if required	1	3	-	-
PC14. adopt a gender neutral behavior	2	4	-	-
NOS Total	12	32	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	G&J/N9950
NOS Name	Work effectively with internal and external people
Sector	Gem & Jewellery
Sub-Sector	Handmade Gold and Gems-set Jewellery, Jewellery Retail, Cast and diamonds-set jewellery, Gemstone Processing, Silver Smithing, Imitation Jewellery, Diamond Processing
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	27/03/2020
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

Qualification Pack

G&J/N9949: Follow material and energy conservation practices at workplace

Description

This OS unit is about adopting sustainable practices and optimizing use of resources, especially material, energy and waste, in day-to-day operations at work.

Scope

The scope covers the following :

- Material conservation practices at workplace
- Energy/electricity conservation practices at workplace

Elements and Performance Criteria

Material conservation practices at workplace

To be competent, the user/individual on the job must be able to:

- PC1.** identify ways to optimize usage of material including water in various activities and processes
- PC2.** check for spills/leakages in various activities and processes
- PC3.** plug spills/leakages and escalate the issue to appropriate authority if unable to rectify
- PC4.** carry out routine cleaning of tools, machines and equipment

Energy/electricity conservation practices at workplace

To be competent, the user/individual on the job must be able to:

- PC5.** identify ways to optimize usage of electricity/energy in various activities and processes
- PC6.** check if the equipment/machine is functioning normally before starting work and rectify the issues wherever required
- PC7.** report malfunctioning (fumes/sparks/emission/vibration/noise) of the equipment/machine and delay in maintenance of equipment
- PC8.** check electrical equipment and appliances are properly connected and turned off when not in use

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** company's policies on material and energy conservation practices
- KU2.** potential hazards and risks involved in the work
- KU3.** layout of the workstation and electrical and thermal equipment used as required
- KU4.** ways of efficient material management including water
- KU5.** basics of electricity and prevalent energy efficient devices
- KU6.** common practices of conserving electricity

Qualification Pack

KU7. safety precautions (electric and mechanical isolation) before starting any maintenance activity on machine/equipment.

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read Standard Operating Procedure(SOP) documents
- GS2.** communicate effectively about material and energy conservation practices to others
- GS3.** make timely communication for the decisions to be taken at work
- GS4.** complete tasks efficiently and accurately within stipulated time
- GS5.** critically analyze the processes carried out by self and colleagues in the department related to material and energy conservation
- GS6.** record observations on effect of material and energy conservation at workplace.
- GS7.** work with supervisors/team members to carry out related tasks

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Material conservation practices at workplace</i>	2	4	-	-
PC1. identify ways to optimize usage of material including water in various activities and processes	0.5	1	-	-
PC2. check for spills/leakages in various activities and processes	0.5	1	-	-
PC3. plug spills/leakages and escalate the issue to appropriate authority if unable to rectify	0.5	1	-	-
PC4. carry out routine cleaning of tools, machines and equipment	0.5	1	-	-
<i>Energy/electricity conservation practices at workplace</i>	2	4	-	-
PC5. identify ways to optimize usage of electricity/energy in various activities and processes	0.5	1	-	-
PC6. check if the equipment/machine is functioning normally before starting work and rectify the issues wherever required	0.5	1	-	-
PC7. report malfunctioning (fumes/sparks/emission/vibration/noise) of the equipment/machine and delay in maintenance of equipment	0.5	1	-	-
PC8. check electrical equipment and appliances are properly connected and turned off when not in use	0.5	1	-	-
NOS Total	4	8	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	G&J/N9949
NOS Name	Follow material and energy conservation practices at workplace
Sector	Gem & Jewellery
Sub-Sector	Diamond Processing, Handmade Gold and Gems-set Jewellery, Jewellery Retail, Cast and diamonds-set jewellery, Gemstone Processing, Silver Smithing, Imitation Jewellery
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	27/03/2020
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

Qualification Pack

G&J/N9902: Maintain health and safety at workplace

Description

This OS unit is about being aware of, communicating and taking steps towards minimizing potential hazards and maintaining health and safety at workplace.

Scope

The scope covers the following :

- Health, hygiene and safety in work area
- Fire safety
- Emergencies, rescue and first aid procedures
- Waste management

Elements and Performance Criteria

Health, hygiene and safety in work area

To be competent, the user/individual on the job must be able to:

- PC1.** follow regular cleaning and disinfection practices at work place using appropriate techniques and materials
- PC2.** follow hand hygiene practices at work place using appropriate techniques and materials
- PC3.** follow alternative ways of conducting meeting and organizing event to ensure safety
- PC4.** follow contactless attendance system
- PC5.** report regarding the contagious illness of self or people in close contact
- PC6.** use appropriate protective clothing/ equipment for specific tasks
- PC7.** identify hazardous activities and the possible causes of risks or accidents in the workplace
- PC8.** follow safe working practices while dealing with hazards to ensure safety of self and others
- PC9.** maintain appropriate working postures to minimize occupational health related issues

Fire safety

To be competent, the user/individual on the job must be able to:

- PC10.** use appropriate type of fire extinguisher
- PC11.** apply appropriate rescue techniques during fire hazard
- PC12.** ensure good housekeeping in order to prevent fire hazards

Emergencies, rescue and first aid procedures

To be competent, the user/individual on the job must be able to:

- PC13.** provide appropriate first aid procedure to victims wherever required eg.in case of bleeding, burns, choking, electric shock etc.
- PC14.** respond promptly and appropriately to an accident or medical emergency.
- PC15.** follow emergency procedures such as raising alarm, safe evacuation etc.

Waste management

To be competent, the user/individual on the job must be able to:

Qualification Pack

- PC16.** identify recyclable, non-recyclable and hazardous waste
- PC17.** collect the segregated waste - at designated space
- PC18.** dispose non-recyclable waste appropriately and deposit recyclable and reusable material at identified location

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** company's policies on safety, hazards and personnel management
- KU2.** signages that refer to health and safety in work place
- KU3.** the reporting structure
- KU4.** health and safety hazards commonly present in the work place and related precautions
- KU5.** preventative and remedial actions to be taken in case of exposure to toxic material
- KU6.** methods of accident prevention
- KU7.** how different chemicals react and the related hazards
- KU8.** how to use machines and tools without causing any accident
- KU9.** importance of using protective clothing/ equipment while working
- KU10.** precautionary activities to prevent the fire accident
- KU11.** various causes of fire
- KU12.** techniques of using different fire extinguishers
- KU13.** different materials used for extinguishing fire
- KU14.** rescue techniques applied during a fire hazard
- KU15.** various types of safety signs and their meaning
- KU16.** appropriate basic first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.,
- KU17.** casualty lifting in case of an accident
- KU18.** usage of different colors of dustbins.
- KU19.** categorization of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics.
- KU20.** waste management and methods of waste disposal.

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read and comprehend labels, charts, signages
- GS2.** read and comprehend manuals of operations
- GS3.** communicate effectively, the risk of not following safety measures
- GS4.** respond to emergencies/accidents, by taking an appropriate and timely decision
- GS5.** organize work schedule, work area, tools, equipment and material to minimize health and safety risk

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- GS6.** ensure appropriate action in case of any emergencies, accidents or fire at the work location
- GS7.** analyze untoward incidents from the past and follow correct procedures in handling machines, tools or hazardous chemicals
- GS8.** critically analyze the processes carried out by self and colleagues in the department to spot potential hazards and safety issues
- GS9.** record data on waste disposal at workplace.
- GS10.** complete statutory documents relevant to safety and hygiene.

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Health, hygiene and safety in work area</i>	9	16	-	-
PC1. follow regular cleaning and disinfection practices at work place using appropriate techniques and materials	1	2	-	-
PC2. follow hand hygiene practices at work place using appropriate techniques and materials	1	2	-	-
PC3. follow alternative ways of conducting meeting and organizing event to ensure safety	1	2	-	-
PC4. follow contactless attendance system	1	1	-	-
PC5. report regarding the contagious illness of self or people in close contact	1	2	-	-
PC6. use appropriate protective clothing/ equipment for specific tasks	1	2	-	-
PC7. identify hazardous activities and the possible causes of risks or accidents in the workplace	1	2	-	-
PC8. follow safe working practices while dealing with hazards to ensure safety of self and others	1	1	-	-
PC9. maintain appropriate working postures to minimize occupational health related issues	1	2	-	-
<i>Fire safety</i>	3	6	-	-
PC10. use appropriate type of fire extinguisher	1	3	-	-
PC11. apply appropriate rescue techniques during fire hazard	1	2	-	-
PC12. ensure good housekeeping in order to prevent fire hazards	1	1	-	-
<i>Emergencies, rescue and first aid procedures</i>	3	4	-	-
PC13. provide appropriate first aid procedure to victims wherever required eg.in case of bleeding, burns, choking, electric shock etc.	1	1	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. respond promptly and appropriately to an accident or medical emergency.	1	2	-	-
PC15. follow emergency procedures such as raising alarm, safe evacuation etc.	1	1	-	-
<i>Waste management</i>	3	6	-	-
PC16. identify recyclable, non-recyclable and hazardous waste	1	2	-	-
PC17. collect the segregated waste - at designated space	1	2	-	-
PC18. dispose non-recyclable waste appropriately and deposit recyclable and reusable material at identified location	1	2	-	-
NOS Total	18	32	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	G&J/N9902
NOS Name	Maintain health and safety at workplace
Sector	Gem & Jewellery
Sub-Sector	Handmade Gold and Gems-set Jewellery, Gemstone Processing, Silver Smithing, Jewellery Retail, Cast and diamonds-set jewellery, Imitation Jewellery, Diamond Processing
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	3.0
Last Reviewed Date	NA
Next Review Date	24/02/2025
NSQC Clearance Date	24/02/2022

Qualification Pack

G&J/N2306: Create jewellery prototype using 3D printing

Description

This OS unit is about producing jewellery prototype from a CAD model using 3D printing

Scope

The scope covers the following :

- Preparation of Build and STL (Standard Triangle Language) file
- Producing wax or wax mix resin-based prototype using 3D printers
- Cleaning and curing of printed resin or wax parts
- Achieving quality standards
- Achieving Productivity

Elements and Performance Criteria

Preparation of Build and STL (Standard Triangle Language) file

To be competent, the user/individual on the job must be able to:

- PC1.** convert the solid or surface 3D model created using various CAD software and in different file format like SLC (export slice file) to STL format using appropriate software or plugin
- PC2.** identify the errors in the STL file like gaps or missing facets, degenerate facets, non-manifold condition, and flipped triangles etc.
- PC3.** fix these errors to get a watertight model of proper thickness and volume model using appropriate software and different repairing commands like separating shells, closing holes, bridging gaps, resolving overlaps and intersections, stitching, double faces, remeshing, etc.
- PC4.** export the repaired STL models to build preparation software
- PC5.** orient the individual STL models to appropriate position and angle using various commands such as translate, rotate, duplicate, Z compensate etc. on the build platform
- PC6.** create support for the STL models
- PC7.** inspect the build file for wall thickness, platform bounds, collision detection etc.
- PC8.** create the slice data or file of the complete build and transfer on 3D printers or rapid prototyping machines for part building

Producing wax or wax mix resin-based prototype using 3D printers

To be competent, the user/individual on the job must be able to:

- PC9.** upload the sliced build or platform file on the 3D printer
- PC10.** check and set various parameters like resin level in the vat, resin homogeneity, platform clamping, room temperature and humidity etc.,
- PC11.** start the machine and check prototype or part building at regular intervals
- PC12.** remove the platform from clamps and allow resin to drain before part removal

Cleaning and curing of printed resin or wax parts

To be competent, the user/individual on the job must be able to:

- PC13.** remove the supports from the resin parts using tweezers

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- PC14.** clean resin parts in Isopropyl alcohol or acetone solution and dry with compressed air
- PC15.** clean the wax parts using boiling water in case of wax-based support material and dry with compressed air
- PC16.** put the resin part for curing in UV light chamber for appropriate duration
- PC17.** finish the surface of resin part using emery paper or by sandblasting

Achieving quality standards

To be competent, the user/individual on the job must be able to:

- PC18.** inspect the parts thoroughly by comparing with the 3D model file before sending for rubber mould cutting or casting process or dispatch
- PC19.** report supervisor in case of any issue during file fixing, part building, cleaning or curing process

Achieving Productivity

To be competent, the user/individual on the job must be able to:

- PC20.** organize the work station, machine and tools
- PC21.** ensure timely delivery of parts to enable the commencement of rubber mould cutting or casting process or dispatch
- PC22.** print the number of parts per day as per target given
- PC23.** update the supervisor on the work completion status at the end of shift

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** company's policies on quality, incentives, delivery standards, safety and hazards, integrity and nondisclosure of confidential information, and personnel management
- KU2.** importance of nondisclosure of confidential information provided by the company either orally or in writing marked as confidential
- KU3.** liability arising out of loss, theft or inadvertent disclosure of confidential information
- KU4.** work flow involved in jewellery manufacturing process of the company
- KU5.** importance of the individuals role in the workflow
- KU6.** the reporting structures
- KU7.** how to use computer and few basic software like MS office, MS Excel, internet, etc.
- KU8.** how to use of Rapid Prototyping (RPT) workstation software, build generation software, file fixing software like Magics, Blender, NetFabb, Meshmixer, Meshlab, etc.
- KU9.** different types of jewellery products: rings, bracelets, pendants, necklace, etc.
- KU10.** different types of resins or printing materials and their properties such as shrinkages, curing time, viscosity etc.
- KU11.** basic measuring system and units
- KU12.** different types 3D printing technologies used for rapid prototyping of jewellery like selective laser apparatus (SLA), Digital light processing (DLP), cast able wax mix resin printing etc.
- KU13.** how to make basic adjustments, calibration and performance improvement of printers
- KU14.** basic preventive maintenance of 3D printers
- KU15.** process to get technical support from the manufacturer

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Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read notes, designs and instructions shared by different internal team
- GS2.** read equipment manuals and process documents to understand the equipments and processes better
- GS3.** write task list, schedules and confirm with the supervisor
- GS4.** plan and organize the work order and jobs received
- GS5.** read company rules and compliance documents required to complete the work
- GS6.** fill requisition slip of for ordering parts and consumables
- GS7.** follow standard operating procedures
- GS8.** how to write a document for machine maintenance or failure, tools and consumables related issues, etc.
- GS9.** various standard machining parameters based on various material used for 3D printing
- GS10.** various basic machining, software, tools and materials related issues
- GS11.** use various measuring tools like scale, vernier calliper or gauges like ring or bangle sizer etc.
- GS12.** operate a computer and few other hardware like scanner, digital camera, etc.
- GS13.** detect problems in day to day tasks

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Preparation of Build and STL (Standard Triangle Language) file</i>	20	45	-	-
PC1. convert the solid or surface 3D model created using various CAD software and in different file format like SLC (export slice file) to STL format using appropriate software or plugin	2	5	-	-
PC2. identify the errors in the STL file like gaps or missing facets, degenerate facets, non-manifold condition, and flipped triangles etc.	4	8	-	-
PC3. fix these errors to get a watertight model of proper thickness and volume model using appropriate software and different repairing commands like separating shells, closing holes, bridging gaps, resolving overlaps and intersections, stitching, double faces, remeshing, etc.	4	8	-	-
PC4. export the repaired STL models to build preparation software	2	3	-	-
PC5. orient the individual STL models to appropriate position and angle using various commands such as translate, rotate, duplicate, Z compensate etc. on the build platform	2	6	-	-
PC6. create support for the STL models	2	5	-	-
PC7. inspect the build file for wall thickness, platform bounds, collision detection etc.	2	6	-	-
PC8. create the slice data or file of the complete build and transfer on 3D printers or rapid prototyping machines for part building	2	4	-	-
<i>Producing wax or wax mix resin-based prototype using 3D printers</i>	10	17	-	-
PC9. upload the sliced build or platform file on the 3D printer	2	3	-	-
PC10. check and set various parameters like resin level in the vat, resin homogeneity, platform clamping, room temperature and humidity etc.,	4	8	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. start the machine and check prototype or part building at regular intervals	2	3	-	-
PC12. remove the platform from clamps and allow resin to drain before part removal	2	3	-	-
<i>Cleaning and curing of printed resin or wax parts</i>	9	18	-	-
PC13. remove the supports from the resin parts using tweezers	1	2	-	-
PC14. clean resin parts in Isopropyl alcohol or acetone solution and dry with compressed air	2	5	-	-
PC15. clean the wax parts using boiling water in case of wax-based support material and dry with compressed air	2	5	-	-
PC16. put the resin part for curing in UV light chamber for appropriate duration	2	3	-	-
PC17. finish the surface of resin part using emery paper or by sandblasting	2	3	-	-
<i>Achieving quality standards</i>	4	8	-	-
PC18. inspect the parts thoroughly by comparing with the 3D model file before sending for rubber mould cutting or casting process or dispatch	2	5	-	-
PC19. report supervisor in case of any issue during file fixing, part building, cleaning or curing process	2	3	-	-
<i>Achieving Productivity</i>	7	12	-	-
PC20. organize the work station, machine and tools	2	3	-	-
PC21. ensure timely delivery of parts to enable the commencement of rubber mould cutting or casting process or dispatch	2	3	-	-
PC22. print the number of parts per day as per target given	2	3	-	-
PC23. update the supervisor on the work completion status at the end of shift	1	3	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	50	100	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	G&J/N2306
NOS Name	Create jewellery prototype using 3D printing
Sector	Gem & Jewellery
Sub-Sector	Cast and diamonds-set jewellery, Handmade Gold and Gems-set Jewellery, Silver Smithing, Imitation Jewellery
Occupation	Designing and Product Development, Designing
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	27/05/2026
NSQC Clearance Date	27/05/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

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 theory question papers for candidates at every examination/training centre. (As per assessment criteria below).

4. Individual assessment agencies will create practical tests for skill evaluation for candidates at every examination/training centre. (As per assessment criteria below).

5. To pass the Qualification Pack, every candidate should score a minimum 70% to successfully clear the assessment.

6. In case of successfully passing only certain number of NOSs, the candidate is eligible to take subsequent assessment on the balance NOSs to pass the Qualification Pack.

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Minimum Aggregate Passing % at QP Level : 70

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
G&J/N2307.Create intricate 3D jewellery design using CAD software	61	126	-	-	187	70
G&J/N9950.Work effectively with internal and external people	12	32	-	-	44	12
G&J/N9949.Follow material and energy conservation practices at workplace	4	8	-	-	12	12
G&J/N9902.Maintain health and safety at workplace	18	32	-	-	50	6
Total	95	198	-	-	293	100

Optional: 1 3D Printing Operator

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
G&J/N2306.Create jewellery prototype using 3D printing	50	100	-	-	150	50
Total	50	100	0	0	150	50

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
CAD	Computer-Aided Designing
3D	Three Dimesional
2D	Two Dimensional
CAM	Computer-Aided Manufacturing

Qualification Pack

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

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Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.