

Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunarmand Pakistan Program

"Skills for All"



Course Contents / Lesson Plan

Course Title: AutoCAD Mechanical

Duration: 6 Months

Trainer Name	
Course Title	CAD/CAM & Digital Manufacturing For Product Design
Objective of Course	<p>To prepare the trainees to work as Professional Product Designer/Programmer in a wide variety of product manufacturing related industries and has a strong emphasis on Digital Manufacturing related problems.</p> <p>(i) Motivational Lectures</p> <p>The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:</p> <ul style="list-style-type: none"> • Clear Purpose to convey message to trainees effectively. • Personal Story to quote as an example to follow. • Trainees Fit so that the situation is actionable by trainees and not represent a just idealism. • Ending Points to persuade the trainees on changing themselves. <p>A good motivational lecture should help drive creativity, curiosity and spark the desire needed for trainees to want to learn more.</p> <p>Impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for longer time without boredom and loss of interest because they can clearly see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 -10 years) and long term (more than 10 years).</p> <p>As this tool is expected that the training providers would make arrangements for regular well planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson</p>

plans in this document.

Motivational sessions can be organized on following topics or can be presented virtually; the links are mentioned in Annex-II.

- Work Ethics
- Problem Solving
- Communication
-

(ii)

(iii)

(iv) Success Stories

Another effective way of motivating the trainees is by means of Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation or by means of a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehensible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being revealed. Optimum impact is created when the story is revealed in the form of:-

- Directly in person (At least 2-3 cases must be arranged by the training institute)
- Through an audio/ videotaped message (2-3 high quality videos must be arranged by the training institute)

It is expected that the training provider would collect relevant high quality success stories for inclusion in the training as suggested in the weekly lesson plan given in this document.

Suggestive structure and sequence of a sample success story and its various shapes can be seen at annexure II.

(v) Case Studies

Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real life specific problem/situation and to explore the solutions.

In simple terms, the case study method of teaching uses a real life case

	<p>example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes class room atmosphere interesting thus maintaining the trainee interest in training till the end of the course.</p> <p>Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies to be presented to the trainees. The trainer may adopt a power point presentation or video format for such case studies whichever is deemed suitable but it's important that only those cases are selected that are relevant and of a learning value.</p> <p>The Trainees should be required and supervised to carefully analyze the cases.</p> <p>For the purpose they must be encouraged to inquire and collect specific information / data, actively participate in the discussions and intended solutions of the problem / situation.</p> <p>Case studies can be implemented in the following ways: -</p> <ol style="list-style-type: none"> i. A good quality trade specific documentary (At least 2-3 documentaries must be arranged by the training institute) ii. Health & Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute) <p>Field visits(At least one visit to a trade specific major industry/ site must be arranged by the training institute)</p>
<p>Learning Outcome of the Course</p>	<p>Knowledge Proficiency Details</p> <ul style="list-style-type: none"> • Knowledge of PLM (Product Lifecycle Management) principles and capabilities with particular emphasis on the CAD (computer aided design) & CAM (Computer Aided Manufacturing). • Knowledge of digitalizing the products manufacturing. • Knowledge of the DFM (Design for Manufacturing) & DFA (Design for

	<p>Assembling)</p> <ul style="list-style-type: none">• Knowledge of programing on digital data through software, to machine a physical component. <p>Skills Proficiency Details</p> <ul style="list-style-type: none">• Ability to understand Design intent in product, for applying in Manufacturing.• Hands on experience to develop Solid Modeling and techniques.• Capable to apply concepts of parametric modeling with 3D surfacing and Understand geometric constrains.• Capable to apply concepts to develop drawings and techniques to apply GD&T (Geometric Dimensioning and Tolerances).• Able to understand and make Template drawings, Dimensioning methodology, 2D Orthographic Projections, Section and Auxiliary Views• Manufacturing methodology of product.• Able to perform programing of CNC turning and CNC Multi Axis milling through CAM (Computer Aided Manufacturing) software.• Ability to generate cutting tool path and G&M codes file.• Capable of analysis tool path defects, and detect gouges in CAM (Computer Aided Manufacturing) to secure component.
--	---

<p>Course Execution Plan</p>	<p>Total Duration of Course: 6 Months (26 Weeks)</p> <p>Class Hours: 4 Hours per day</p> <p>Theory: 20% Practical: 80%</p> <p>Weekly Hours: 20 Hours Per week</p> <p>Total Contact Hours: 600 Hours</p>
<p>Companies Offering Jobs in the respective trade</p>	<ul style="list-style-type: none"> • Honda • Toyota • TUSDEC • GTDMC • KTDMC • BOSS • NDC (National Development Complex) • KotSteel Pvt Ltd • ZNJ hygienic • Pak Fan • AMTC • Super Asia • UAE CNC Industries • Magna Ind., • Alba Engineering Company • Anwar Khawaja Composites • Azeem Engineering • Boss Plastic • Fatima Fertilizer • Chenab Eng works & foundry • Qadbros Engineering (pvt) Ltd. • Panther Tyres & Tubes • F.T.M.M • Green Land Engineering

	<ul style="list-style-type: none">• PAEC• Pak Fan (Wahid Ind)• KSA CNC Industries• OGDCL• Darson Industries (Pvt) Ltd.• Diamond Engineering Works• Gondal Precasting Industries• K.B. International• Master Poly Plastic• Mughal Engineering, Gujranwala• Tariq Engineering Products• Tetra Link Technologies• Indus Plastic• Packages Intl• Manan Shahid Co.• Climax• Qatar CNC Industries• SNGPL• HMC• SABRO Islamabad• Shahsons Pakistan (Pvt) Ltd.• Services Industries Ltd• Spell Lahore• Slandered Engineering• Syed Engineering• Faisal Sanitary• KotSteel Pvt Ltd• Tetra Link Technologies• Omar Jibran Co.,• FICO Co.,• Oman CNC Industries• Pakistan Railways
--	--

Job Opportunities	Product Designer, CNC Programmer, CAM Operator, Product developer
No of Students	25
Learning Place	Classroom, CNC Simulation Lab, CNC Workshop with 3Axis and 5 Axis machining Centers
Instructional Resources	<p>1- CNC Milling Machine, CNC Operating by Training Department, GTDMC</p> <p>2- Applied CNC Machining (Josh Mitchell, McGraw-Hill (Publisher: (May 10, 2008)</p> <p>3- Wikipedia Resources (Course outline/ TLM)</p>

Scheduled Week	Module Title	Learning Units	Remarks
Week 1	Introduction	<ul style="list-style-type: none"> • Motivational Lecture • Course Introduction • Success stories • Job market • Course Applications • Institute/work ethics 	Home Assignment
Week 2	Introduction to Engineering Drawing	<ul style="list-style-type: none"> • Introduction to Basic Engineering Drawing • Basic Measurements (scales) • Difference between Absolute and Increment System 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3

		<ul style="list-style-type: none"> • Isometric Drawings, Pictorial Drawing, Orthographic Views • First Angle of Projection and Third Angle of Projection, Sectioning and Dimensioning • Isometric Drawings, Pictorial Drawing, Orthographic Views 	<p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 3	Design and Software Interface	<ul style="list-style-type: none"> • Introduction of CAD/CAM and digital manufacturing for product design • Introduction of CAD/CAM software's • Principles and Elements of a Design. • Getting familiar with user interface of CAD/CAM software. • Success story (For further detail please see Annexure-II) 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 4	References and Parameterization	<ul style="list-style-type: none"> • Introduction to Datum (Lines, Planes, points etc.) • Coordinate systems. • Parametric modeling and Associativity. • Understand the basics of sketcher environment. • Create sketch geometry. 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 5	Sketch Geometry	<ul style="list-style-type: none"> • Analyze sketch geometry. • Edit existing profiles. • Dimension sketch geometry and modify it with constraints. • Introduction of parametric solid 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3

		<p>modeling</p> <ul style="list-style-type: none"> • Create and manage a solid model. • Modify the solid models. • Transform the solid model. • Motivational Lecture(For further detail please see Annexure III) • 	<p><u>Details may be seen at Annexure-I</u></p>
Week 6	Constraint	<ul style="list-style-type: none"> • Dressing up the solid model • Constraint management. • Workplace ethics 	<ul style="list-style-type: none"> • Task-1 <p><u>Details may be seen at Annexure-I</u></p>
Week 7	Drafting	<ul style="list-style-type: none"> • Generate drawings from part model. • Ballooning and Bill of material generation • GD&T in drawing. • Symbol understanding like surface finish etc. 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><u>Details may be seen at Annexure-I</u></p>
Week 8	Surface and Solid Modeling	<ul style="list-style-type: none"> • Manage sketches within a 3D environment. • Difference between solid and surface modeling. • Create and manage a surface model. • Motivational Lecture(For further detail please see Annexure III) 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><u>Details may be seen at Annexure-I</u></p>
Week 9	Surface	<ul style="list-style-type: none"> • Dressing up the surface model. 	

	Management	<ul style="list-style-type: none"> • Modify the surface models. • Workplace ethics 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 10	Wireframes Geometry	<ul style="list-style-type: none"> • Creating the wireframes. • Transform the surface model. • Constraint management. • Success story (<i>For further detail please see Annexure-II</i>) 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 11	Jig an Fixtures	<ul style="list-style-type: none"> • Introduction to tooling development • (Dies, Molds, Jigs and fixture) through assembly module. • Design parts in the context of product manufacturing • Motivational Lecture(<i>For further detail please see Annexure III</i>) 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 12	Introduction to Assembly	<ul style="list-style-type: none"> • Introduction to assembly and its constrains • Top-Down and Bottom-Up Assemblies. • Degrees of freedom. • Success story (<i>For further detail please see Annexure-II</i>) 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i><u>Details may be</u></i></p>

			<i>seen at Annexure-I</i>
Week 13	Geometric Dimensioning and Tolerances	<ul style="list-style-type: none"> • GD&T for assembly. • Re-use existing data to complete assemblies. • Manage relationships between assembled parts 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3 • Task 26 A <p><i>Details may be seen at Annexure-I</i></p>
Week 14	Visualization and Rendering	<ul style="list-style-type: none"> • Analyze and annotate your design. • Visualization techniques • Workplace ethics 	<ul style="list-style-type: none"> • Task-1 • Task-2 <p><i>Details may be seen at Annexure-I</i></p>
Week 15	Mid-Term Assignment/Exam		
Week 16	Tool Design	<ul style="list-style-type: none"> • Introduction to tool design • Design intent in Dies and Mold manufacturing. 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-28A

			<i><u>Details may be seen at Annexure-I</u></i>
Week 17	Mold Designing	<ul style="list-style-type: none"> • Designing of injection mold / sheet metal die Assignment • Success story (For further detail please see Annexure-II) 	<ul style="list-style-type: none"> • Task-1 <i><u>Details may be seen at Annexure-I</u></i>
Week 18	Digital Manufacturing	<ul style="list-style-type: none"> • Introduction to CAM/Digital Manufacturing • Introduction to CNC • Motivational Lecture(For further detail please see Annexure III) 	<ul style="list-style-type: none"> • Task-1 • Task-2 <i><u>Details may be seen at Annexure-I</u></i>
Week 19	G AND M CODES	<ul style="list-style-type: none"> • Introduction to G&M codes • Addresses & Commands • Workplace ethics 	<ul style="list-style-type: none"> • Task-1 • Task-2 <i><u>Details may be seen at Annexure-I</u></i>

<p>Week 20</p>	<p>Introduction to Cam Software's</p>	<ul style="list-style-type: none"> • Introduction of GUI (Graphical User interface) of CAM software • Introduction to Cutting Tool Geometry 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task 35A <p><i><u>Details may be seen at Annexure-I</u></i></p>
<p>Week 21</p>	<p>Employable Project/Assignment (6 weeks i.e. 21-26) in addition of regular classes.</p> <p style="text-align: center;">OR</p> <p>On job training (2 weeks)</p>	<ul style="list-style-type: none"> • Guidelines to the Trainees for selection of students employable project like final year project (FYP) • Assign Independent project to each Trainee • A project based on trainee's aptitude and acquired skills. • Designed by keeping in view the emerging trends in the local market as well as across the globe. • The project idea may be based on Entrepreneur. • Leading to the successful employment. • The duration of the project will be 6 weeks 	

		<ul style="list-style-type: none"> • Ideas may be generated via different sites such as: • Final viva/assessment will be conducted on project assignments. • At the end of session the project will be presented in skills competition • The skill competition will be conducted on zonal, regional and National level. • The project will be presented in front of Industrialists for commercialization • The best business idea will be placed in NAVTTC business incubation center for commercialization. <p style="text-align: center;">-----</p> <p style="text-align: center;">OR</p> <p>On job training for 2 weeks:</p> <ul style="list-style-type: none"> • Aims to provide 2 weeks industrial training to the Trainees as part of overall training program • Ideal for the manufacturing trades • As an alternate to the projects that involve expensive equipment • Focuses on increasing Trainee's motivation, productivity, efficiency and quick learning approach. • Motivational Lecture(<i>For further detail please see Annexure III</i>) 	
--	--	---	--

Week 22	Operations	<ul style="list-style-type: none"> • Application of suitable Operations/Strategy • Success story (<i>For further detail please see Annexure-II</i>) 	
Week 23	Operational Settings	<ul style="list-style-type: none"> • Applying blank/work piece to required CAD drawings • Preprocessing of tool path • Parameters setting • Step over, depth of cut, feed rate, RPM, selection of tool diameter and types etc. • Parameter Settings of non-cutting moves • Setting of Rapid moves and tool engage method. • Basic Practical Training • Workplace ethics 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 24	Simulation and Development of NC files	<ul style="list-style-type: none"> • Simulating tool path in CAM software • Collision detection, gouge checking • Post processing of tool path to NC file (i.e. G&M Code files) • Back plot G&M code file on computer simulator software • Basic Practical Training 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3 <p><i><u>Details may be seen at Annexure-I</u></i></p>
Week 25	Simulation of Numeric Control	<ul style="list-style-type: none"> • Back plot G&M code file on computer simulator software 	<ul style="list-style-type: none"> • Task-1 • Task-2

	NC File	<ul style="list-style-type: none"> • Run NC file on CNC machine • Basic Practical Training • Motivational Lecture(For further detail please see Annexure III) 	<u>Details may be seen at Annexure-I</u>
	Advance Machining	<ul style="list-style-type: none"> • Advance CAM 4-axis & 5-axis machine call in software • Make simultaneous operations and tool path for complex geometries • Practical Training on Machines with Fanuc /Heidenhain Controller • Project assignment 	
Week 26	Entrepreneurship and Final Assessment in project	<ul style="list-style-type: none"> • Job Market Searching • Self-employment • Freelancing sites • Introduction • Fundamentals of Business Development • Entrepreneurship • Startup Funding • Business Incubation and Acceleration • Business Value Statement • Business Model Canvas • Sales and Marketing Strategies • How to Reach Customers and Engage CxOs • Stakeholders Power Grid • RACI Model, SWOT Analysis, PEST Analysis • SMART Objectives • OKRs • Cost Management (OPEX, CAPEX, ROCE 	<ul style="list-style-type: none"> • Task-1 • Task-2 • Task-3 <p><u>Details may be seen at Annexure-I</u></p>

		etc.) <ul style="list-style-type: none"> • Final Assessment • Success story (<i>For further detail please see Annexure-II</i>) 	
--	--	--	--

List of Machinery / Equipment

Sr. No	Name of item as per curriculum	Quantity physically available at the training location
1	Desktop Computers	25
2	CAD CAM software	01
3	Measuring Tools	25
4	Laser Printer	01

1. Software List

Sr. No	Software Name
1.	Dassault Catia <ul style="list-style-type: none"> • Complete PLM software (CAD, CAM, CAE, Motion and simulation)
2.	Swan Soft Computer Numeric Control (SSCNC) <ul style="list-style-type: none"> • Simulator for most of CNC control Panels with material removal (Fanuc, Fagor, Heidenhain etc)
3.	Cimco Edit <ul style="list-style-type: none"> • Numeric control NC file back plot to tool path

	<ul style="list-style-type: none"> • Basic simulation • Communication with CNC
4.	<p>Siemens NX</p> <ul style="list-style-type: none"> • Complete PLM software (CAD, CAM, CAE, Motion and simulation)
5.	<p>AutoCAD</p> <ul style="list-style-type: none"> • Advanced CAD software for mechanical drafting
6.	<p>Power Mill</p> <ul style="list-style-type: none"> • Usage is for CAM computer aided manufacturing
7.	<p>Master CAM</p> <ul style="list-style-type: none"> • Usage is for CAM computer aided manufacturing

2. Minimum Qualification of Teachers / Instructor

The qualification of teachers / instructor of this course should be:

B.Sc./BE Mechanical/Industrial & Manufacturing Engineering with minimum of 1-Years related Experience

OR

B. Tech / Honors Mechanical with 2 Years related Experience

OR

D.A.E. in Mechanical, Civil / CAD CAM Designers / Operators with 3to 5 Years related experiences

3. Supportive Notes

Teaching Learning Material

Books Name	Author
CAD CAM Notes	James H Earl
AutoCAD	Dessualt
Autocad CBT Curriculum	TSSP website developed by NAVTTC/GIZ
Applied CNC Machining	Josh Mitchell
CAD CAM II Handbook	Hassan Jawad, Training Department Gujranwala Tools Dies and Moulds Center
CNC Programming Handbook	Mujahid Gillani, Training Department Gujranwala Tools Dies and Moulds Center
CAD CAM II Handbook	Training Department Gujranwala Tools Dies and Moulds Center

Annexure - I

Tasks For Certificate in (Auto Cad Mechanical)

Task No.	Task	Description	Week
1	Draw a lettering according to given standards	<ul style="list-style-type: none">• Introduction to Basic Engineering Drawing• Basic Measurements (scales)• Basic Lettering	Week-2
2	Draw orthographic & Isometric View of given object	<ul style="list-style-type: none">• Difference between Absolute and Increment System• Isometric Drawings, Pictorial Drawing, Orthographic Views	
3	Draw First angle & Third angle of projection	<ul style="list-style-type: none">• First Angle of Projection and Third Angle of Projection, Sectioning and Dimensioning	
4	Install Auto Cad software	<ul style="list-style-type: none">• Introduction of CAD• Introduction & Install CAD software's	Week-3
5	Using Auto Cad software	<ul style="list-style-type: none">• Principles and Elements of a Design.• Getting familiar with user interface of CAD software	
6	Using Coordinate system Draw parametric Modeling	<ul style="list-style-type: none">• Coordinate systems.• Parametric modeling and Associativity	Week-4
7	Create sketch Geometry	<ul style="list-style-type: none">• Understand the basics of sketcher environment.• Create sketch geometry	

Task No.	Task	Description	Week
8	Change & edit existing profiles	<ul style="list-style-type: none"> Analyze sketch geometry. Edit existing profiles. 	Week-5
9	Create a solid Model	<ul style="list-style-type: none"> Introduction of parametric solid modeling Create and manage a solid model. 	
10	Transform & Modify solid model	<ul style="list-style-type: none"> Modify the solid models. Transform the solid model 	
11	Dress up the solid model	<ul style="list-style-type: none"> Dressing up the solid model Constraint management 	Week-6
12	Generate part Model drawing	<ul style="list-style-type: none"> Generate drawings from part model. Ballooning and Bill of material generation 	Week-7
13	Understand GD & T , Symbols	<ul style="list-style-type: none"> GD&T in drawing. Symbol understanding like surface finish etc. 	
14	Draw 3D sketch of given object	<ul style="list-style-type: none"> sketches within a 3D environment. 	Week-8
15	Create solid & surface Model	<ul style="list-style-type: none"> Difference between solid and surface modeling. Create and manage a surface model.. 	

Task No.	Task	Description	Week
16	Dress up the surface model	<ul style="list-style-type: none"> • Dressing up the surface model 	Week-9
17	Modify surface model	<ul style="list-style-type: none"> • Modify the surface models 	
18	Create Geometric Modeling using wireframe method	<ul style="list-style-type: none"> • Creating the wireframes. 	Week-10
19	Transform surface Mode	<ul style="list-style-type: none"> • Transform the surface model. • Constraint management 	
20	Define different types of tools use in product manufacturing	<ul style="list-style-type: none"> • Introduction to tooling development 	Week-11
21	Design part through assembly module	<ul style="list-style-type: none"> • . (Dies, Molds, Jigs and fixture) through assembly module. • Design parts in the context of product manufacturing 	
22	Create Top – down & Bottom down assemblies	<ul style="list-style-type: none"> • Introduction to assembly and its constrains • Top-Down and Bottom-Up Assemblies 	Week-12
23			

Task No.	Task	Description	Week
	Correspondance of degree of freedom	<ul style="list-style-type: none"> Degrees of freedom. 	
24	Use GD & T for assembly drawing	<ul style="list-style-type: none"> GD&T for assembly. 	Week-13
25	Complete assemblies Use existing data	<ul style="list-style-type: none"> Re-use existing data to complete assemblies. 	
26	Create a relationship b/w assembled parts	<ul style="list-style-type: none"> Manage relationships between assembled parts 	
Task 26 A	Build your CV	<p>Download professional CV template from any good site (https://www.coolfreecv.com or relevant)</p> <ul style="list-style-type: none"> Add Personal Information Add Educational details Add Experience/Portfolio Add contact details/profile links 	
27	Analyse & annotate given design	<ul style="list-style-type: none"> Analyze and annotate your design. 	Week-14
28	Using visualization Techniques create given diagram	<ul style="list-style-type: none"> Visualization techniques 	
28A	Create an account profile on Fiverr (at least two gigs) and Upwork	<p>Create an account by following these steps:</p> <p>Step 1: Personal Info Step 2: Professional Info Step 3: Linked Accounts Step 4: Account Security</p>	Week-16
29	Understand tool design	<ul style="list-style-type: none"> Introduction to tool design 	

Task No.	Task	Description	Week
30	Use design intent method in Dies & mold	<ul style="list-style-type: none"> • Design intent in Dies and Mold manufacturing. 	
31	Design mold/die of given drawing	<ul style="list-style-type: none"> • Designing of injection mold / sheet metal die Assignment 	Week-17
32	Define digital manufacturing	<ul style="list-style-type: none"> • Introduction to CAM/Digital Manufacturing 	Week-18
33	Understand CNC machine operation	<ul style="list-style-type: none"> • Introduction to CNC 	
34	Understand G&M codes	<ul style="list-style-type: none"> • Introduction to G&M codes 	Week-19
35	Perform given commands	<ul style="list-style-type: none"> • Addresses & Commands 	
35A	How to search and apply for jobs in at least two labor marketplace countries (KSA, UAE, etc.)	<ul style="list-style-type: none"> • Browse the following website and create an account on each website <ul style="list-style-type: none"> ▪ Bayt.com – The Middle East Leading Job Site ▪ Monster Gulf – The International Job Portal ▪ Gulf Talent – Jobs in Dubai and the Middle East • Find the handy 'search' option at the top of your homepage to search for the jobs that best suit your skills. • Select the job type from the first 'Job Type' drop-down menu, next, select the location from the second drop-down menu. • Enter any keywords you want to use to find suitable job vacancies. • On the results page you can search for part-time jobs 	Week 20 onwards

Task No.	Task	Description	Week
		<p>only, full-time jobs only, employers only, or agencies only. Tick the boxes as appropriate to your search.</p> <ul style="list-style-type: none"> • Search for jobs by: <ul style="list-style-type: none"> ▪ Company ▪ Category ▪ Location ▪ All jobs ▪ Agency ▪ Industry 	
36	Understand GUI	<ul style="list-style-type: none"> • Introduction of GUI (Graphical User interface) of CAM software 	Week-20
37	Understand cutting tool Geometry	<ul style="list-style-type: none"> • Introduction to Cutting Tool Geometry 	
38	Set Tool path & parameters as per CAD drawing	<ul style="list-style-type: none"> • Applying blank/work piece to required CAD drawings • Preprocessing of tool path • Parameters setting 	Week-23
39	Set all parameters & non cutting moves as per requirement	<ul style="list-style-type: none"> • Step over, depth of cut, feed rate, RPM, selection of tool diameter and types etc. • Parameter Settings of non-cutting moves 	
40	Set Tool engage method	<ul style="list-style-type: none"> • Setting of Rapid moves and tool engage method. • Basic Practical Training 	

Task No.	Task	Description	Week
41	Simulate tool path, collision detection in CAD software	<ul style="list-style-type: none"> • Simulating tool path in CAM software • Collision detection, gouge checking 	Week-24
42	Perform post processing tool path	<ul style="list-style-type: none"> • Post processing of tool path to NC file (i.e. G&M Code files) 	
43	Perform back plot G&M code in CAD software	<ul style="list-style-type: none"> • Back plot G&M code file on computer simulator software • Basic Practical Training 	
44	Operate CNC machine As per given NC file	<ul style="list-style-type: none"> • Run NC file on CNC machine • Basic Practical Training 	Week-25
45	Perform simultaneous Operations for given complex Geometries	<ul style="list-style-type: none"> • Advance CAM 4-axis & 5-axis machine call in software • Make simultaneous operations and tool path for complex geometries • Practical Training on Machines with Fanuc /Heidenhain Controller <p>Project assignment</p>	

Annexure II

Plot no. 38, Kirthar Road, H-9 Islamabad
051-9044250

SUCCESS STORY-1 (Auto Cad Mechanical)

S. No	Key Information	Detail/Description
1.	Self & Family background	<ul style="list-style-type: none"> • Asim Qamar • Middle class Family & live in a rented house, with 3 children & parents. • B.Tech. Mechanical, freelance designing & consultant. • Financial hardships etc
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post training activities	<ul style="list-style-type: none"> • After the graduation I am searching in any specialized field of my trade. So I am keeping on search where I give my full potential & get success. Then I realize I have a passion in designing • Through free lancing where zero investment required, I have generate reasonable capital to start my own Design house. • As a freelance designer you can see my work at (https://grabcad.com/aq-2) In design house I have 14 nos. of designers in the area Mechanical, Manufacturing, Civil & Fabrication. • The clients are local & international & last year company generate 107,000 USD remittance. • After a long journey of strive the life is going good and have own house and sufficient capital.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and ensure regularity • Make Hard work pays in the end so be always ready for the same.

SUCCESS STORY-2

S. No	Key Information	Detail/Description
-------	-----------------	--------------------

1.	Self & Family background	<ul style="list-style-type: none"> • Eftkhakar Alam • Belong to Middle class Family. • Intermediate & Different CAD courses . • It was 2010 and I had passed the hardest time in my life. I will never forget those days. My father faced a huge loss in his business. For this reason, our family was unable to pass the days. We were nearly hand to mouth.
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post training activities	<ul style="list-style-type: none"> • After the Intermediate, I have purchase a computer from my pocket money, I am keeping on finding where I give my full efforts & get success. Then I realize Job is not the only solution & than I become an Entrepreneur. • Through my Business I have generate USD 5000 per month. • My clients are generally Automotive industry. • At that time I am in a comfortable position & my Business has flourished.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and become regular. • Make Hard work & convert in to smart work pays in the end so be always ready for the same.

SUCCESS STORY-3

S. No	Key Information	Detail/Description
-------	-----------------	--------------------

1.	Self & Family background	<ul style="list-style-type: none"> • Arsalan Alam • Belong to Poor Family. • Bs. Mechanical & expertise in AUTO CAD. • During my teenage I have faced hardest time in my life.& this time give me a lot of learning.
2.	How he came on board NAVTTC Training/ or got trained through any other source	<ul style="list-style-type: none"> • Information about course, apply and selection • Course duration, trade selection • Attendance, active participation, monthly tests, interest in lab work.
3.	Post training activities	<ul style="list-style-type: none"> • After completing his Engineering.he starting job in a small organization & with the passage of time he improves his skills. • Now he is become a Product Design Engineer . In a well known company & take a salary USD 4000 per month.
4.	Message to others (under training)	<ul style="list-style-type: none"> • Take the training opportunity seriously • Impose self-discipline and become regular. • Make Hard work & pays in the end so be always ready for the same.

Note: Success story is a source of motivation for the trainees and can be presented in a number of ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio video recording that has to cover the above mentioned points.
3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning etc) and narrates his/her story in teacher's own motivational words.

Annexure III

Motivation Lecture Template

Mentor

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The

Plot no. 38, Kirthar Road, H-9 Islamabad
051-9044250

checklists are an opportunity for mentors to share their unique perspective on group dynamics based off various team activities, gameplay sessions, pitch preparation and other sessions, giving insights on the nature of communication and teamwork taking place and how the both learning outcomes and the student experience can be improved in the future.

Session- 1 (Communication):

Please find below and overview of the activities taking place Session plan that will support your delivery and an overview of this session’s activity.

Session- 1 OVERVIEW
Aims and Objectives:
<ul style="list-style-type: none"> • To introduce the communication skills and how it will work • Get to know mentor and team - build rapport and develop a strong sense of a team • Provide an introduction of communication skills • Team to collaborate on an activity sheet developing their communication, teamwork and problem solving • Gain understanding of participants’ own communication skills rating at the start of the programme

Activity:	Participant Time	Teacher Time	Mentor Time
Intro Attend and contribute to the scheduled.			
Understand the good communication skills and how it works.			
Understand what good communication skills means			
Understand what skills are important for good communication skills			
Key learning outcomes:	Resources:		Enterprise skills developed:
<input type="checkbox"/> <input type="checkbox"/> Understand the communication skills and how it works. <input type="checkbox"/> <input type="checkbox"/> Understand what communication skills means	<ul style="list-style-type: none"> • Podium • Projector • Computer • Flip Chart • Marker 		<input type="checkbox"/> Communication <input type="checkbox"/> Self Confidence <input type="checkbox"/> Teamwork

<input type="checkbox"/> <input type="checkbox"/> Understand what skills are important for communication skills		
---	--	--

Schedule	Mentor Should do
Welcome: 5 min	Short welcome and ask the Mentor to introduce him/herself. Provide a brief welcome to the qualification to the class. Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.
Icebreaker: 10 min	Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presence for the tasks ahead. The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions.
Introduction & Onboarding: 20mins	Provide a brief introduction of the qualification to the class and play the “Onboarding Video or Presentation”. In your introduction cover the following: <ol style="list-style-type: none"> 1. Explanation of the programme and structure. (Kamyab jawan Program) 2. How you will use your communication skills in your professional life. 3. Key contacts and key information – e.g. role of teacher, mentor and SEED. Policies and procedures (user agreements and “contact us” section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm) 4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.
Team Activity Planning: 30 minutes	MENTOR: Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activity that will take place outside of the session. There will not be another session until next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed so that everyone knows what they are doing for this activity and how.

	<ul style="list-style-type: none"> • “IDENTIFY ENTREPRENEURS” TEAM ACTIVITY • “BRAINSTORMING SOCIAL PROBLEMS” TEAM ACTIVITY” <p><i>As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas you feel most passionate about as a team, then write down what change you would like to see happen.</i></p> <p>Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager etc. Make sure you allocate each young person a specific week that they are project manager for the weekly activities and make a note of this.</p> <p>Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.</p>
<p>Session Close: 5 minutes</p>	<p>MENTOR: Close the session with opportunity for anyone to ask any remaining questions.</p> <p>Instructor: Facilitate the wrap-up of the session. Quick reminder of what is coming up next and when the next session will be.</p>

Motivational lectures & success story Links

S.No.	LINK	Topics
-------	------	--------

01.	https://www.youtube.com/watch?v=G5G5kj5sgOU	Team Building
02.	https://www.youtube.com/results?search_query=ethics+lecture+in+urdu	Ethics
03.	https://www.youtube.com/watch?v=i0uyi1MWY5Y	Future of CAD
04.	https://www.creativemechanisms.com/blog/everything-you-need-to-know-about-computer-aided-design-cad	CAD usage in industry for prototype