RETRAINEE - JOB CREATION

Training Proposal for:

Virgin Galactic, LLC

Agreement Number: ET16-0377

Panel Meeting of: February 26, 2016

ETP Regional Office: North Hollywood **Analyst:** L. Vuong

PROJECT PROFILE

Contract Attributes:	Retrainee Priority Rate Job Creation Initiative Veterans HUA	Industry Sector(s):	Engineering Manufacturing Priority Industry: ☒ Yes ☐ No
Counties Served:	Los Angeles, Kern	Repeat Contractor:	☐ Yes ☒ No
Union(s):	☐ Yes ☒ No		

Number of Employees in:	CA: 558	U.S.: 574	Worldwide: 583
Turnover Rate:	1%		
Managers/Supervisors: (% of total trainees)	9%		

FUNDING DETAIL

Program Costs	-	(Substantial Contribution)	(High Earner Reduction)	=	**Total ETP Funding**
$247,200		$0	$0		$247,200

In-Kind Contribution:	100% of Total ETP Funding Required	$546,300

TRAINING PLAN TABLE

Job No.	Job Description	Type of Training	Estimated No. of Trainees	Range of Hours		Average Cost per Trainee	Post-Retention Wage
				Class / Lab	CBT		
1	Retrainee Priority Rate	Adv. Technology, Business Skills, Computer Skills, Continuous Impr., Haz. Materials, Mfg. Skills	175	8-200	0-200	$630	$15.60
				Weighted Avg: 35			
2	Retrainee Job Creation Initiative	Adv. Technology, Business Skills, Computer Skills, Continuous Impr., Haz. Materials, Mfg. Skills	100	8-200	0-200	$1,100	*$12.77
				Weighted Avg: 55			
3	Retrainee Veterans	Adv. Technology, Business Skills, Computer Skills, Continuous Impr., Haz. Materials, Mfg. Skills	35	8-200	0-200	$770	*$12.77
				Weighted Avg: 35			

***** It will be made a condition of contract that the trainees in this Job Number will never be paid less than the State or local minimum wage rate as in effect at the end of retention (Final Payment) regardless of the wage expressed in this table. The highest minimum wage rate will prevail.

Minimum Wage by County: Job Number 1: $16.48 per hour for Los Angeles County and $15.60 per hour for Kern County;

Job Number 2 (Job Creation): $13.73 per hour for Los Angeles County and $12.77 for Kern County; and

Job Number 3 (Job Creation - Veterans): $13.73 per hour for Los Angeles County and $12.77 for Kern County.

Health Benefits: ☒ Yes ☐ No This is employer share of cost for healthcare premiums – medical, dental, vision.

Used to meet the Post-Retention Wage?: ☒ Yes ☐ No ☐ Maybe

Up to $1.98 per hour for Job Number 1 and up to $0.73 per hour for Job Numbers 2 and 3 may be used to meet the Post-Retention Wage.

Wage Range by Occupation		
Occupation Titles	Wage Range	Estimated # of Trainees
Job Number 1		
Support Staff		20
Manufacturing Staff/Technician		70
Engineering Design/Information Technology Staff		35

Sr. Engineering Design/Information Technology Staff		35
Supervisor/Manager		15
Job Number 2 (Job Creation)		
Support Staff Level 1		7
Manufacturing Staff/Technician		54
Engineering Design/Information Technology Staff		20
Sr. Engineering Design/Information Technology Staff		14
Supervisor/Manager		5
Job Number 3 (Veterans)		
Support Staff		5
Manufacturing Staff/Technician		10
Engineering Design/Information Technology Staff		10
Sr. Engineering Design/Information Technology Staff		5
Supervisor/Manager		5

INTRODUCTION

Virgin Galactic, LLC (Virgin Galactic) (www.virgingalactic.com) requests funding for its employees and those of its close affiliate, The Spaceship Company, LLC (TSC) (www.thespaceshipcompany.com). Both Virgin Galactic and TSC are wholly owned by Galactic Ventures, LLC (Galactic), a holding company.

Virgin Galactic designs, develops and manufactures commercial spaceships, carrier aircrafts and small satellite launch rockets. Headquartered in New York, Virgin Galactic has four facilities in California (one in Long Beach and three in Mojave). TSC is co-located in the same facilities, and provided the same type of manufacturing in alignment with Virgin Galactic. This will be Virgin Galactic's first ETP Agreement.

Virgin Galactic's goal is to "define the future of space exploration" and ultimately make space-travel accessible. The Company plans to continue to leverage its development of a human spaceflight program, and bring low-cost satellite launch systems to realization. Virgin Galactic's customer base includes individuals, commercial satellite companies, universities and schools.

The Company has several challenges that drive the need for training: new business, new products, customer demands, industry requirements, complex testing, and continued training.

Retrainee - Job Creation

The Panel offers incentives to companies that commit to hiring new employees. Training for newly-hired employees will be reimbursed at a higher rate and trainees will be subject to a lower post-retention wage.

As business growth and services expand, Virgin Galactic has committed to hiring 100 new employees over the next two years. This growth includes the hiring of 100 Job Creation trainees (Job Number 2). Virgin Galactic will train these employees to accommodate various

business needs and services. Trainees will learn to operate sophisticated equipment and technology systems, and have a better understanding of business operations.

The date-of-hire for all trainees in Job Number 2 will be within the three-month period before contract approval or within the term-of-contract. These trainees will be hired into "net new jobs" as a condition of contract.

PROJECT DETAILS

The Company is currently building and testing two spaceflight vehicles, WhiteKnightTwo and SpaceShipTwo; and designing LauncherOne, a satellite system. In addition, Virgin Galactic was recently awarded a $4.7 million contract from NASA to launch a dozen experimental satellites using LauncherOne. The addition of these projects, coupled with existing demand, the Company has developed an internal training program to improve overall business functions to keep up with technological changes and support continued growth.

Virgin Galactic's goal is to provide workers with the technical skills required to meet industry standards, and customer specifications, including all requisite certifications. Training will enable workers to perform their jobs effectively and efficiently.

Training Plan

ETP funds will help Virgin Galactic deliver formalized training to upgrade job skills and adapt to new technologies and systems to its workers and those of its affiliate. Training will take place at the Company's facilities in Long Beach and Mojave. Training will be provided by in-house subject matter experts, and outside vendors identified during the term of the proposed Agreement.

Training will be delivered via Class/Lab, Videoconference and Computer-Based Training (CBT) as outlined below:

Advanced Technology (AT) (20%): This training will be offered to Engineering Design/Information Technology Staff, Sr. Engineering Design/Information Technology Staff and Supervisors/Managers. This training will provide staff with highly technical skills to effectively utilize the Companies' advanced hardware and software programs/systems. Courses will be offered to trainees responsible for design, operation, administration, security and troubleshooting networks, systems, hardware and software.

- Virgin Galactic is requesting the AT reimbursement rate for this training. Training requires the use of expensive and sophisticated equipment and specialized trained instructors. Due to the highly technical nature, the trainer-to-trainee ratio will not exceed 1:10 to allow in-depth coverage and personal attention from the instructor.

Business Skills (15%): This training will be offered to all occupations. Trainees will gain the knowledge and skills to improve customer service through Business Acumen, Customer Service/Support, Logistics/Supply Chain, Product Knowledge, and Train-the-Trainer Skills courses in support of its engineering and manufacturing activities.

Computer Skills (15%): This training will be offered to all occupations in the skills necessary to support the business operations. Training will allow trainees to effectively use the Companies' complex systems to provide efficient and effective customer service.

Continuous Improvement (20%): This training will be offered to all occupations to improve quality and service to customers. Trainees will gain the necessary skills to increase

performance in the following areas: Agile Product Lifecycle Management/Agile Project Management Skills, Engineering Change Processes, Lean Manufacturing Skills, and Process/Quality Improvement Skills.

Hazardous Materials (10%): This training will be offered to Manufacturing Staff/Technician and Supervisors/Managers to learn the proper knowledge and techniques for handling hazardous materials and toxic substances.

Manufacturing Skills (20%): This training will be offered to Manufacturing Staff/Technician and Supervisors/Managers. Training will focus on the Companies' day-to-day operations, manufacturing practices and testing skills, which will upgrade workers' production efficiency, increase productivity and meet customers' expectations.

Computer-Based Training (CBT)

Normally, CBT hours are capped at 50% of total training hours per-trainee. However, under this proposal, Virgin Galactic is requesting reimbursement of up to 100% CBT (See Exhibit B). If approved, it will allow the Company the flexibility to provide training based on stages of development and production, throughout the two year term of the Agreement.

As technology advances, CBT is becoming a major part of Virgin Galactic's training practices and policies design to prepare and support its high-skilled workforce. This self-paced CBT delivery method will allow workers to participate in training during the work day when it best suits their job schedule or demand.

CBT is typically used to supplement/complement planned instructor-led learning in an effort to ensure a solid understanding of the concepts presented. However, a small number of trainees in all occupations may receive all of their ETP training via CBT. The majority of the training in this proposal will be delivered via classroom/laboratory method.

Commitment to Training

Virgin Galactic provides anti-harassment, diversity, basic computer skills, basic safety/OHSA, and new employee orientation training. Training is delivered via class/lab, E-Learning, CBT and on-the-job training; and all training is both job specific and Company-wide. Virgin Galactic has a current annual training budget of approximately $632,000 for both Virgin Galactic and TSC.

ETP funding will allow Virgin Galactic to implement new curriculum, related to new products and technologies, and to expand its training to its growing workforce.

ETP funds will not displace the existing financial commitment to training. Safety training is, and will continue to be, provided in accordance with all pertinent requirements under state and federal law.

- Training Infrastructure

Training is scheduled to begin upon Panel approval. Virgin Galactic has designated staff to oversee ETP training and administrative responsibilities including managing, scheduling, delivery and documentation of training. Virgin Galactic will also utilize a third party administrator for enrollment, data tracking and invoicing. (See Administrative Services below)

Veterans Program

Virgin Galactic is currently working to attract veterans into its workforce through Job Fairs and other forms of outreach. As such, Virgin Galactic is including a separate Veteran Job Number (Job Number 3) for training 35 Veterans. The Panel has established a higher reimbursement rate and other incentives for training California veterans, as will be reflected in the contract.

- Retention Modification

Retention for trainees in Job Number 3 may be satisfied by employment of at least 30 hours a week during the consecutive 90-day or at least 500 hours within 272 days with one or more employers, consistent with ETP Veterans Guidelines.

Individuals with Disabilities

The IWD program, recently adopted by the Panel, is designed to encourage California employers in their effort to "recruit, hire, train and retain" workers with disabilities. ETP funding will be available to train these workers, along with other staff who support the effort. Virgin Galactic has an existing program for outreach and training workers with disabilities. These workers will receive training in multiple courses under Job Numbers 2 and 3.

High Unemployment Area

All trainees in Job Numbers 1, 2 and 3 work in a High Unemployment Area (HUA), with unemployment exceeding the state average by 15%. The Company's location in Mojave qualifies for HUA status under these standards. However, Virgin Galactic is not asking for an HUA wage modification.

Trainees in Job Numbers 2 and 3 qualify for the ETP Job Creation wage of $13.73 per hour for Los Angeles County and $12.77 for Kern County. This is reflected in the Training Plan Table.

RECOMMENDATION

Staff recommends approval of this proposal.

DEVELOPMENT SERVICES

Virgin Galactic retained Training Funding Partners (TFP) in Fountain Valley to assist with development of this proposal for a flat fee of $10,000.

ADMINISTRATIVE SERVICES

TFP will also perform administrative services in connection with this proposal for a fee not to exceed 13% of payment earned.

TRAINING VENDORS

To Be Determined

Exhibit B: Menu Curriculum

Class/Lab Hours

8-200 Trainees may receive any of the following:

ADVANCED TECHNOLOGY

- Advanced Aerospace/Aircraft Design
- Advanced Design Project Management and Processes
- ANSYS Engineering Software
- CAD/CAM Design Software for Components and Structures
- Computer Aided Three-dimensional Interactive Application (CATIA)
- Composites Fabrication
- Computational Fluid Dynamics
- Computer Maintenance Management System (CMMS)
- Configuration Management
- Cryogenic Engineering and Safety
- Data Acquisition/Data Management System
- Database Administrator Skills (Includes Development, Performance, Tuning)
- Design Review
- Engineering Methods/Processes
- Enterprise Resource Planning (ERP) System Design and Implementation
- Finite Element Modeling And Postprocessing (FEMAP) Software
- Finite Element/ Flight Dynamics Modeling
- Flight Sciences/Technology/Software Skills
- Handling Qualities/Performance
- Mass Properties
- Mechanical Design
- Metal Part Design
- Non-destructive Testing
- Software Design and Programming
- Software Testing and Automation
- Solidworks CAD Software
- Structured Query Language (SQL)

BUSINESS SKILLS

- Accountability Skills
- Business Acumen
- Business/Technical Writing Skills
- Communication Skills
- Conflict Resolution Skills
- Customer Service/Support Skills
- Effective Meeting Management
- Finance/Accounting Skills
- Goal Setting/Motivation Skills
- Inventory Management Skills
- Logistics/Supply Chain Skills
- Marketing/Sales Skills

- Metrics Management
- Presentation Skills
- Preventative Maintenance Skills
- Product Knowledge
- Scheduling Skills
- Train the Trainer Skills

Individuals with Disabilities

- Accessibility
- Disability Culture: Sensitivity, Awareness, and Hiring Practices
- Skills Development for People with Disabilities

COMPUTER SKILLS

- Digital Literacy Skills
- HRIS System Skills
- Intermediate/Advanced Microsoft Office Skills
- Inventory Control Skills
- Learning Management System Skills
- NX Teamcenter Software Skills
- Oracle System Skills
- Quality System Skills
- Ultipro Software Skills
- Ultramain Software Skills
- Virgin Galactic Proprietary System Skills
- Web Application Skills

CONTINUOUS IMPROVEMENT

- Agile Product Lifecycle Management (PLM)/Agile Project Management Skills
- Capability Maturity Model Integration (CMMI)
- Decision Making/Problem Solving Skills
- Design of Experiments
- Engineering Change Process
- Failure Mode and Effects Analysis
- ISO Standards
- Kanban Skills
- Leadership/Coaching Skills
- Lean Manufacturing Skills
- Performance/Program Management
- Process Flow Analysis
- Process/Quality Improvement Skills
- Program/Project Management
- Root Cause Analysis
- Six Sigma
- Statistical Process Control
- Teambuilding Skills
- Time Management Skills

HAZARDOUS MATERIALS

- Hazard Analysis & Critical Control Point (HACCP)
- Hazardous Communication Skills
- High-Voltage Electronics
- Toxic and Hazardous Substances

MANUFACTURING SKILLS

- Advanced Safety Skills
  - Crane Safety
  - Electrical Safety
  - Environmental Control
  - Ground Operations
  - Ground Operations
  - Motorized Vehicle and Mechanized Equipment
  - Tools, Machinery and Machine Guarding
  - Welding, Cutting and Brazing
- Aerospace Manufacturing Skills
- Aircraft Structures/Operation/Assembly
- Aircraft Systems Integration
- CNC Machine Operation
- CNC Programming
- Cross-Functional Equipment/Production Skills
- Forklift/Forktruck Skills
- Gauges/Calibration
- Geometric Dimension and Tolerances (GD&T)
- Good Manufacturing Practices
- Inspection/Integration
- Manufacturing/Technical Process Skills
- Manufacturing Best Practices/Process Improvements
- Manufacturing Testing skills
- Production Equipment and Tools/Preventative Maintenance

Safety Training cannot exceed 10% of total training hours per-trainee

CBT Hours

0-200

BUSINESS SKILLS

- Basics of Manufacturing Costs 140 (1.5 hours)
- Conflict Resolution for Different Groups 155 (1.5 hours)
- Conflict Resolution Principles 150 (1.5 hours)
- Essentials of Communication 120 (1.5 hours)
- Intro to Managerial Accounting 145 (1.5 hours)

CONTINUOUS IMPROVEMENT

- Essentials of Leadership 110 (1.5 hours)
- Managing Performance: Best Practices 130 (1.5 hours)
- Managing Performance: Corrective Actions 135 (1.5 hours)
- Team Leadership 160 (1.5 hours)

MANUFACTURING SKILLS

Adhesives

- Basics of the Bonding Process 120 (1.5 hours)
- Intro to Adhesive Bonding 110 (1.5 hours)
- Intro to Adhesive Properties 130 (1.5 hours)
- Steps for Adhesive Application 220 (1.5 hours)
- Surface Preparation 210 (1.5 hours)
- Types of Adhesives 140 (1.5 hours)

Coatings

- Coating Defects 150 (1.5 hours)
- Intro to Coating Composition 110 (1.5 hours)
- Processes for Applying Coatings 140 (1.5 hours)
- Surface Preparation for Coatings 120 (1.5 hours)
- Troubleshooting Coating Defects 170 (1.5 hours)

Composites

- Advanced Materials for Composites 135 (1.5 hours)
- Advanced Thermoset Resins for (1.5 hours)
- Bagging 230 (1.5 hours)
- Composite Inspection and Defect (1.5 hours)
- Composites 130 (1.5 hours)
- Intro to Composites 110 (1.5 hours)
- Intro to Compression Molding 170 (1.5 hours)
- Intro to Lay-up and Spray-up Molding 140 (1.5 hours)
- Overview of Composite Processes 120 (1.5 hours)
- Prevention 240 (1.5 hours)
- Repair Methods for Composites 250 (1.5 hours)
- Safety for Composite Processing 115 (1.5 hours)
- Surface Finishing Composites 190 (1.5 hours)
- Traditional Composites 125 (1.5 hours)
- Vacuum Bagging Technique: Single-sided (1.5 hours)

Computer Numerical Control

- Basics of the CNC Machining Center 130 (1.5 hours)
- Basics of the CNC Swiss-Type Lathe 135 (1.5 hours)
- Basics of the CNC Turning Center 120 (1.5 hours)
- CAD/CAM Overview 160 (1.5 hours)
- Canned Cycles 310 (1.5 hours)
- CNC Coordinates 140 (1.5 hours)
- CNC Manual Operations 200 (1.5 hours)
- CNC Offsets 210 (1.5 hours)
- CNC Specs for the Lathe 225 (1.5 hours)
- CNC Specs for the Mill 220 (1.5 hours)
- Creating a Mazatrol Program for the Lathe 289 (1.5 hours)
- Creating a Mazatrol Program for the Mill 288 (1.5 hours)
- Creating a Milling Program 290 (1.5 hours)
- Creating a Turning Program 280 (1.5 hours)
- Creating an EIA/ISO Program for the Mazak (1.5 hours)
- Creating an EIA/ISO Program for the Mazak (1.5 hours)
- GE Fanuc Lathe: Control Panel Overview 255 (1.5 hours)
- GE Fanuc Lathe: Entering Offsets 265 (1.5 hours)
- GE Fanuc Lathe: First Part Runs 325 (1.5 hours)

- GE Fanuc Lathe: Locating Program Zero 275 (1.5 hours)
- GE Fanuc Lathe: Program Execution 285 (1.5 hours)
- GE Fanuc Lathe: Program Storage 315 (1.5 hours)
- GE Fanuc Mill: Control Panel Overview 250 (1.5 hours)
- GE Fanuc Mill: Entering Offsets 260 (1.5 hours)
- GE Fanuc Mill: First Part Runs 320 (1.5 hours)
- GE Fanuc Mill: Locating Program Zero 270 (1.5 hours)
- GE Fanuc Mill: Program Execution 280 (1.5 hours)
- GE Fanuc Mill: Program Storage 310 (1.5 hours)
- Haas Lathe: Control Panel Overview 255 (1.5 hours)
- Haas Lathe: Entering Offsets 265 (1.5 hours)
- Haas Lathe: First Part Runs 325 (1.5 hours)
- Haas Lathe: Locating Program Zero 275 (1.5 hours)
- Haas Lathe: Program Execution 285 (1.5 hours)
- Haas Lathe: Program Storage 315 (1.5 hours)
- Haas Mill: Control Panel Overview 250 (1.5 hours)
- Haas Mill: Entering Offsets 260 (1.5 hours)
- Haas Mill: First Part Runs 320 (1.5 hours)
- Haas Mill: Locating Program Zero 270 (1.5 hours)
- Haas Mill: Program Execution 280 (1.5 hours)
- Haas Mill: Program Storage 310 (1.5 hours)
- History and Definition of CNC 100 (1.5 hours)
- Lathe 287 (1.5 hours)
- Mazak Lathe: Control Panel Overview 255 (1.5 hours)
- Mazak Lathe: Entering Offsets 285 (1.5 hours)
- Mazak Lathe: First Part Runs 325 (1.5 hours)
- Mazak Lathe: Locating Program Zero 275 (1.5 hours)
- Mazak Lathe: Program Execution 295 (1.5 hours)
- Mazak Lathe: Program Storage 315 (1.5 hours)
- Mazak Lathe: Safety for the Lathe 265 (1.5 hours)
- Mazak Mill: Control Panel Overview 250 (1.5 hours)
- Mazak Mill: Entering Offsets 280 (1.5 hours)
- Mazak Mill: First Part Runs 320 (1.5 hours)
- Mazak Mill: Locating Program Zero 270 (1.5 hours)
- Mazak Mill: Program Execution 290 (1.5 hours)
- Mazak Mill: Program Storage 310 (1.5 hours)
- Mazak Mill: Safety for the Mill 260 (1.5 hours)
- Mechanics of CNC 110 (1.5 hours)
- Mill 286 (1.5 hours)
- Milling Calculations 295 (1.5 hours)
- Part Program 150 (1.5 hours)
- Turning Calculations 285 (1.5 hours)

Electrical Power

- AC Fundamentals 210 (1.5 hours)
- AC Power Sources 235 (1.5 hours)
- Battery Selection 250 (1.5 hours)
- Conductor Selection 240 (1.5 hours)
- DC Circuit Components 140 (1.5 hours)
- DC Power Sources 230 (1.5 hours)
- Electrical Instruments 220 (1.5 hours)

- Electrical Print Reading 225 (1.5 hours)
- Electrical Units 110 (1.5 hours)
- Intro to Circuits 120 (1.5 hours)
- Intro to Magnetism 130 (1.5 hours)
- NEC Overview 150 (1.5 hours)
- Parallel Circuit Calculations 205 (1.5 hours)
- Safety for Electric Work 115 (1.5 hours)
- Series Circuit Calculations 200 (1.5 hours)

Fasteners

- Intro to Assembly 100 (1.5 hours)
- Intro to Fastener Ergonomics 130 (1.5 hours)
- Intro to Fastener Threads 110 (1.5 hours)
- Overview of Non-Threaded Fasteners 125 (1.5 hours)
- Overview of Threaded Fasteners 117 (1.5 hours)
- Properties for Fasteners 200 (1.5 hours)
- Safety for Assembly 105 (1.5 hours)
- Threaded Fastener Selection 215 (1.5 hours)
- Tools for Threaded Fasteners 120 (1.5 hours)
- Understanding Torque 210 (1.5 hours)

Hydraulics and Pneumatics

- Actuator Applications 240 (1.5 hours)
- Basic Hydraulic Circuit Design 310 (1.5 hours)
- Basic Pneumatic Circuit Design 315 (1.5 hours)
- Contamination and Filter Selection 330 (1.5 hours)
- Fittings for Fluid Systems 135 (1.5 hours)
- Fluid System Print Reading 220 (1.5 hours)
- Hydraulic Control Valves 230 (1.5 hours)
- Hydraulic Fluid Selection 320 (1.5 hours)
- Hydraulic Power Sources 210 (1.5 hours)
- Hydraulic Power Variables 200 (1.5 hours)
- Hydraulic Principles and System Design 340 (1.5 hours)
- Intro to Fluid Conductors 130 (1.5 hours)
- Intro to Fluid Systems 100 (1.5 hours)
- Intro to Hydraulic Components 120 (1.5 hours)
- Intro to Pneumatic Components 125 (1.5 hours)
- Pneumatic Control Valves 235 (1.5 hours)
- Pneumatic Power Sources 215 (1.5 hours)
- Pneumatic Power Variables 205 (1.5 hours)
- Preventive Maintenance for Fluid Systems 140 (1.5 hours)
- Safety for Hydraulics and Pneumatics 105 (1.5 hours)
- The Forces of Fluid Power 110 (1.5 hours)

Inspection Skills

- Basic Measurement 110 (1.5 hours)
- Basics of the CMM 120 (1.5 hours)
- Basics of the Optical Comparator 130 (1.5 hours)
- Calibration Fundamentals 210 (1.5 hours)
- Hardness Testing 260 (1.5 hours)
- Hole Inspection 240 (1.5 hours)
- Inspecting with CMMs 220 (1.5 hours)
- Inspecting with Optical Comparators 230 (1.5 hours)

- Interpreting GD&T 310 (1.5 hours)
- Intro to GD&T 200 (1.5 hours)
- Linear Instrument Characteristics 115 (1.5 hours)
- Measuring System Analysis 300 (1.5 hours)
- Overview of Threads 150 (1.5 hours)
- Surface Measurement 140 (1.5 hours)
- Thread Inspection 250 (1.5 hours)

Manufacturing Process Skills

- Basics of the Engine Lathe 115 (1.5 hours)
- Basics of the Manual Mill 110 (1.5 hours)
- Basics of Tolerance 120 (1.5 hours)
- Benchwork and Layout Operations 210 (1.5 hours)
- Blueprint Reading 130 (1.5 hours)
- Centerless Grinder Operation 260 (1.5 hours)
- Concepts of Calculus 310 (1.5 hours)
- Cylindrical Grinder Operation 250 (1.5 hours)
- Dressing and Truing 230 (1.5 hours)
- Engine Lathe Operation 225 (1.5 hours)
- Geometry: Circles and Polygons 185 (1.5 hours)
- Geometry: Lines and Angles 155 (1.5 hours)
- Geometry: Triangles 165 (1.5 hours)
- Grinding Processes 120 (1.5 hours)
- Grinding Variables 200 (1.5 hours)
- Grinding Wheel Geometry 220 (1.5 hours)
- Grinding Wheel Materials 210 (1.5 hours)
- Holemaking on the Mill 230 (1.5 hours)
- Interpreting Blueprints 230 (1.5 hours)
- Intro to Abrasives 100 (1.5 hours)
- Manual Mill Operation 220 (1.5 hours)
- Math: Fractions and Decimals 105 (1.5 hours)
- Math: Fundamentals 100 (1.5 hours)
- Math: Units of Measurement 115 (1.5 hours)
- Overview of Engine Lathe Setup 205 (1.5 hours)
- Overview of Manual Mill Setup 200 (1.5 hours)
- Setup for Centerless Grinders 320 (1.5 hours)
- Shop Algebra Overview 200 (1.5 hours)
- Shop Geometry Overview 170 (1.5 hours)
- Shop Trig Overview 210 (1.5 hours)
- Statistics 220 (1.5 hours)
- Surface Grinder Operation 240 (1.5 hours)
- Taper Turning on the Engine Lathe 240 (1.5 hours)
- Threading on the Engine Lathe 235 (1.5 hours)
- Trig: Pythagorean Theorem 205 (1.5 hours)
- Trig: Sine Bar Applications 225 (1.5 hours)
- Trig: Sine, Cosine, and Tangent 215 (1.5 hours)
- What Is Grinding? 110 (1.5 hours)

Materials Processing

- Ceramics 250 (1.5 hours)
- Ferrous Metals and Alloys 210 (1.5 hours)

- Heat Treatment of Steel 230 (1.5 hours)
- Intro to Materials 100 (1.5 hours)
- Mechanical Properties of Metals 120 (1.5 hours)
- Metal Classification 150 (1.5 hours)
- Metal Manufacturing 140 (1.5 hours)
- Nonferrous Metals and Alloys 220 (1.5 hours)
- Overview of Plastic Materials 115 (1.5 hours)
- Overview of Plastic Processes 145 (1.5 hours)
- Overview of Properties for Plastics 135 (1.5 hours)
- Physical Properties of Metals 130 (1.5 hours)
- Plastics 240 (1.5 hours)
- Principles of Injection Molding 255 (1.5 hours)
- Principles of Thermoforming 265 (1.5 hours)
- Structure of Metals 110 (1.5 hours)

Mechanical Systems

- Bearing Applications 210 (1.5 hours)
- Belt Drive Applications 230 (1.5 hours)
- Clutch and Brake Applications 250 (1.5 hours)
- Forces of Machines 110 (1.5 hours)
- Gear Applications 245 (1.5 hours)
- Gear Geometry 240 (1.5 hours)
- Intro to Mechanical Systems 100 (1.5 hours)
- Lubricant Fundamentals 130 (1.5 hours)
- Mechanical Power Variables 200 (1.5 hours)
- Power Transmission Components 120 (1.5 hours)
- Safety for Mechanical Work 105 (1.5 hours)
- Spring Applications 220 (1.5 hours)

Metal Stamping Press/Metalworking

- ANSI Insert Selection 250 (1.5 hours)
- Band Saw Blade Selection 215 (1.5 hours)
- Carbide Grade Selection 230 (1.5 hours)
- Chucks, Collets, and Vises 110 (1.5 hours)
- Clamping Basics 108 (1.5 hours)
- Cutting Fluids 210 (1.5 hours)
- Cutting Processes 140 (1.5 hours)
- Cutting Tool Materials 220 (1.5 hours)
- Cutting Variables 200 (1.5 hours)
- Drill Bushing Selection 230 (1.5 hours)
- Drill Geometry 247 (1.5 hours)
- Fixture Body Construction 200 (1.5 hours)
- Fixture Design Basics 210 (1.5 hours)
- Hard Turning 315 (1.5 hours)
- High-Speed Machining 310 (1.5 hours)
- Intro to Screw Machining 160 (1.5 hours)
- Intro to Workholding 104 (1.5 hours)
- Locating Devices 107 (1.5 hours)
- Machines for Metal Cutting 130 (1.5 hours)
- Machining Titanium Alloys 325 (1.5 hours)
- Metal Removal Processes 110 (1.5 hours)
- Milling Geometry 245 (1.5 hours)

- Optimizing Insert Life 305 (1.5 hours)
- Safety for Metal Cutting 115 (1.5 hours)
- Sawing Fundamentals 155 (1.5 hours)
- Speed and Feed Selection 300 (1.5 hours)
- Supporting and Locating Principles 106 (1.5 hours)
- Tool Geometry 240 (1.5 hours)
- Toolholders for Turning 260 (1.5 hours)
- What Is Cutting? 120 (1.5 hours)

Motor Controls

- AC Motor Applications 240 (1.5 hours)
- Acceleration Methods 385 (1.5 hours)
- Contactors and Motor Starters 250 (1.5 hours)
- Control Devices 260 (1.5 hours)
- DC Motor Applications 230 (1.5 hours)
- Deceleration Methods 380 (1.5 hours)
- Distribution Systems 320 (1.5 hours)
- Electronic Semiconductor Devices 350 (1.5 hours)
- Intro to Electric Motors 200 (1.5 hours)
- Limit Switches and Proximity Sensors 360 (1.5 hours)
- Logic and Line Diagrams 220 (1.5 hours)
- Photoelectric and Ultrasonic Devices 365 (1.5 hours)
- Photonic Semiconductor Devices 355 (1.5 hours)
- Reduced Voltage Starting 370 (1.5 hours)
- Reversing Motor Circuits 310 (1.5 hours)
- Solenoids 235 (1.5 hours)
- Solid-State Relays and Starters 375 (1.5 hours)
- Specs for Servomotors 330 (1.5 hours)
- Symbols and Diagrams for Motors 210 (1.5 hours)
- Timers and Counters 340 (1.5 hours)

Press Brakes

- Bending Fundamentals 120 (1.5 hours)
- Die Bending Operations 130 (1.5 hours)
- Operating the Press Brake 200 (1.5 hours)
- Press Brake Components 110 (1.5 hours)
- Press Brake Safety 100 (1.5 hours)
- Press Brake Specifications 220 (1.5 hours)

Programmable Logic Controllers

- Basic Programming 250 (1.5 hours)
- Basics of Ladder Logic 220 (1.5 hours)
- Data Manipulation 360 (1.5 hours)
- Hand-Held Programmers of PLCs 280 (1.5 hours)
- Hardware for PLCs 210 (1.5 hours)
- Intro to PLCs 200 (1.5 hours)
- Math for PLCs 320 (1.5 hours)
- Networking for PLCs 270 (1.5 hours)
- Numbering Systems and Codes 230 (1.5 hours)
- Overview of PLC Registers 305 (1.5 hours)
- PID for PLCs 350 (1.5 hours)
- PLC Diagrams and Programs 300 (1.5 hours)
- PLC Inputs and Outputs 240 (1.5 hours)

- PLC Installation Practices 340 (1.5 hours)
- PLC Program Control Instructions 310 (1.5 hours)
- PLC Timers and Counters 260 (1.5 hours)
- Sequencer Instructions for PLCs 330 (1.5 hours)
- Shift Registers 370 (1.5 hours)

Quality and Testing

- 5S Overview 155 (1.5 hours)
- Approaches to Maintenance 120 (1.5 hours)
- Approaches to Quality Management 255 (1.5 hours)
- Cell Design and Pull Systems 160 (1.5 hours)
- Conducting an Internal Audit 200 (1.5 hours)
- Conducting Kaizen Events 260 (1.5 hours)
- Effects 182 (1.5 hours)
- Intro to Machine Rigging 110 (1.5 hours)
- Intro to Six Sigma 170 (1.5 hours)
- Intro to Supply Chain Management 140 (1.5 hours)
- ISO 9000 Overview 110 (1.5 hours)
- Lean Manufacturing Overview 130 (1.5 hours)
- Lifting and Moving Equipment 130 (1.5 hours)
- Managing Practices for Total Quality 320 (1.5 hours)
- Metrics for Lean 230 (1.5 hours)
- Process Flow Charting 240 (1.5 hours)
- Quality Overview 100 (1.5 hours)
- Rigging Equipment 120 (1.5 hours)
- Rigging Inspection and Safety 210 (1.5 hours)
- Rigging Mechanics 220 (1.5 hours)
- Six Sigma Goals and Tools 310 (1.5 hours)
- SPC Overview 210 (1.5 hours)
- Strategies for Setup Reduction 250 (1.5 hours)
- Total Productive Maintenance Overview 150 (1.5 hours)
- Troubleshooting: Identifying Problems 180 (1.5 hours)
- Troubleshooting: Taking Corrective Actions 184 (1.5 hours)
- Troubleshooting: Understanding Causes and (1.5 hours)
- TS 16949:2002 Overview 220 (1.5 hours)
- Value Stream Mapping: The Future State 305 (1.5 hours)
- Value Stream Mapping: The Present State 300 (1.5 hours)

Robotics

- Applications for Robots 130 (1.5 hours)
- Concepts of Robot Programming 210 (1.5 hours)
- End Effectors 125 (1.5 hours)
- Industrial Network Integration 260 (1.5 hours)
- Intro to Robotics 110 (1.5 hours)
- Robot Axes 140 (1.5 hours)
- Robot Components 120 (1.5 hours)
- Robot Installations 230 (1.5 hours)
- Robot Maintenance 170 (1.5 hours)
- Robot Safety 115 (1.5 hours)
- Robot Sensors 150 (1.5 hours)
- Robot Troubleshooting 160 (1.5 hours)
- Robotic Control Systems 240 (1.5 hours)

- Robotic Drives, Hardware, and Components 220 (1.5 hours)
- Vision Systems 250 (1.5 hours)

Soldering/Welding

- Arc Welding Aluminum Alloys 310 (1.5 hours)
- Arc Welding Power Sources 260 (1.5 hours)
- Arc Welding Processes 120 (1.5 hours)
- Arc Welding Safety 115 (1.5 hours)
- Arc Welding Symbols and Codes 250 (1.5 hours)
- Coil Handling Equipment 140 (1.5 hours)
- Coil Loading Procedures 250 (1.5 hours)
- Die Components 130 (1.5 hours)
- Die Cutting Variables 200 (1.5 hours)
- Die Setting Procedures 300 (1.5 hours)
- Electrical Power for Arc Welding 140 (1.5 hours)
- Electrode Selection 270 (1.5 hours)
- FCAW Applications 230 (1.5 hours)
- Ferrous Metals for Welding 200 (1.5 hours)
- GMAW Applications 220 (1.5 hours)
- GTAW Applications 240 (1.5 hours)
- Guiding System Components 230 (1.5 hours)
- Intro to Submerged Arc Welding 160 (1.5 hours)
- Lead-Free Soldering 230 (1.5 hours)
- Monitoring Press Operations 220 (1.5 hours)
- Nonferrous Metals for Welding 205 (1.5 hours)
- Overview of Weld Types 130 (1.5 hours)
- Oxyfuel Welding Applications 207 (1.5 hours)
- Oxyfuel Welding Safety 105 (1.5 hours)
- Plasma Cutting 265 (1.5 hours)
- Press Basics 110 (1.5 hours)
- Punch and Die Operations 120 (1.5 hours)
- Safety for Soldering 115 (1.5 hours)
- SAW Applications 255 (1.5 hours)
- SMAW Applications 210 (1.5 hours)
- Solder and Flux Selection 210 (1.5 hours)
- Soldering Applications 200 (1.5 hours)
- Soldering Equipment 130 (1.5 hours)
- Soldering PCBs 220 (1.5 hours)
- Stamping Safety 115 (1.5 hours)
- Stripper System Components 235 (1.5 hours)
- Visual Inspection of Welds 280 (1.5 hours)
- What Is Arc Welding? 110 (1.5 hours)
- What Is Oxyfuel Welding? 100 (1.5 hours)
- What Is Soldering? 110 (1.5 hours)

Note: Reimbursement for retraining is capped at 200 total training hours per trainee, regardless of the method of delivery. CBT is capped at 100% of total training hours.