



## RETRAINEE - JOB CREATION

Critical Proposal for:

**Karma Automotive, LLC**

**Agreement Number: ET16-0287**

Panel Meeting of: December 4, 2015

ETP Regional Office: San Diego

Analyst: R. Swier

### PROJECT PROFILE

Contract Attributes:	Critical Proposal Job Creation Initiative Priority Rate Retrainee	Industry Sector(s):	Manufacturing  Priority Industry: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Counties Served:	Orange, Riverside	Repeat Contractor:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Union(s):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Number of Employees in:	CA: 242	U.S.:248	Worldwide: 262
Turnover Rate:	1%		
Managers/Supervisors: (% of total trainees)	9%		

### FUNDING DETAIL

Program Costs	-	(Substantial Contribution)	(High Earner Reduction)	=	<b>Total ETP Funding</b>
\$835,218		\$0	\$0		\$835,218

In-Kind Contribution:	100% of Total ETP Funding Required	\$1,700,000
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**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	Continuous Impr, Computer Skills. HazMat, Mfg Skills, Advanced Tech, PL-Mfg Skills	242	8-200	0-200	\$1,404	\$15.07
				Weighted Avg: 78			
2	Job Creation Priority Rate	Continuous Impr, Computer Skills. HazMat, Mfg Skills, Advanced Tech, PL-Mfg Skills	167	8-200	0-200	\$2,700	\$13.00
				Weighted Avg: 135			
3	Retrainee Priority Rate Veterans	Continuous Impr, Computer Skills. HazMat, Mfg Skills, Advanced Tech, PL-Mfg Skills	15	8-200	0-200	\$2,970	\$13.00
				Weighted Avg: 135			

**Minimum Wage by County:** Job Number 1: \$16.02 per hour for Orange County; \$15.07 per hour for Riverside County (standard wage). Job Number 2: \$13.35 per hour for Orange County; \$12.33 per hour for Riverside County (Job Creation).

**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 \$0.95 per hour for Job Number 1 and up to \$0.35 per hour for Job Number 2 may be used to meet the Post-Retention Wage.

**Wage Range by Occupation**

Occupation Titles	Wage Range	Estimated # of Trainees
<b>Job Number 1</b>		
Operations		42
Sr. Operations		17
Information Technology/Engineering/Research and Development		102
Sr. Information Technology/Engineering/Research and Development		20
Quality		25
Production/Technicians		18
Supervisor/Manager/Director		12
Sr. Supervisor/Manager/Director		6

<b>Job Creation – Job Number 2</b>		
Operations		14
Information Technology/Engineering/Research and Development		38
Quality		17
Production/Technicians		104
Supervisor/Manager/Director		10
<b>Veterans Job Number 3</b>		
Operations		8
Information Technology/Engineering/Research and Development		2
Quality		2
Production/Technicians		2
Supervisor/Manager/Director		1

### **Critical Proposal**

This project has been designated as a Critical Proposal by the Governor's Office of Business and Economic Development (Go-Biz) based on Karma's planned business expansion and commitment to adding new jobs in California.

### **INTRODUCTION**

Karma Automotive, LLC Karma Auto, formerly Fisker Automotive and Technology Group, LLC, is rebuilding the Fisker and Karma brands. The Company has a new headquarters facility in Costa Mesa and will be expanding into larger facility in that city, shortly. The Company has also started work on a new 556,000 square-foot production and assembly facility in Moreno Valley, expected to be fully operational at the end of 2016.

The former company (Fisker) developed and sold the Karma® sports sedan, a gas-electric, plug-in electric "hybrid" which debuted in 2008. Under this ownership it encountered a series of problems, including issues with lithium-ion rechargeable batteries made by its supplier. Producing only about 2,000 hybrid vehicles, Fisker ceased production in 2012 and filed for bankruptcy in 2013.

In February 2014, Fisker was purchased by Chinese auto parts manufacturer Wanxiang America Corp. (Wanxiang), the same company that purchased the Fisker battery supplier. Wanxiang America is the U.S. arm of China Wanxiang Group, a large automotive parts supplier. On September 30, 2015, Wanxiang announced a new name and logo change to Karma Automotive, LLC (Karma) for the newly acquired Company in order to communicate the change in ownership while retaining the Karma® brand.

Under its new ownership Karma plans to begin producing its new plug-in, electric hybrid automobiles as early as mid-2016. Karma opened its headquarters facility in 2014, moving the remaining 20 employees (primarily original Karma model designers) from Anaheim to Costa Mesa. As noted earlier, the headquarter staff is also located in Costa Mesa.

Karma's decision to design, engineer, and produce its vehicles in California is based on several factors including its belief that it is faster, easier and less expensive to solve problems when the engineering and manufacturing teams are close together. In addition, Karma believes the trend-setting technologies and environmental focus in California are aligned with its re-launch. As a California-born company, location is an important factor to the markets that Karma is targeting.

## **Nanotechnology**

The new Karma® plug-in hybrid vehicle will use A123's new battery, which uses Nanotechnology to deliver high power energy in a more lightweight and compact package. In addition, with over 40 microcomputers included in the vehicle design, Nanotechnology plays a key role in the overall vehicle design and manufacture.

## **PROJECT DETAILS**

Karma expects rapid expansion as a newly emerged developer and manufacturer of electric hybrid automobiles in California. As noted earlier, the Company has already acquired another facility in Costa Mesa to house future employees. By the end of the first quarter of 2017, Karma expects to have a total of 661 employees between the two Costa Mesa facilities. (as compared to the current 242).

The production and assembly facility in Moreno Valley was built to produce the Company's hybrid vehicles and is projected to have 195 employees by first quarter 2017 (as compared to the current 39). Karma is currently preparing the Moreno Valley plant for prototype production in early 2016, with the start of actual production later that year. This provides the opportunity to utilize ETP funding for training before production begins.

## **Retrainee - Job Creation**

The Panel is offering 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.

The Company will focus on training Job Creation trainees in high level job skills to start manufacturing of vehicles by the end of 2016. Karma is planning to invest \$38 million in equipment and infrastructure in Moreno Valley and the Company opened an additional support facility in Costa Mesa to support its aforementioned business growth and expansion.

Karma proposes to hire 183 under the Job Creation initiatives (Job Number 2). Karma represents that the date-of-hire for all trainees in the Job Creation program will be within the three-month period before contract approval or within the term-of-contract. The Company also represents that these trainees will be hired into "net new jobs" as a condition of contract.

## **Training Plan**

Karma has significant training needs as it moves quickly to manufacture cars in California. The Company has developed its training plan to bring employees up to competency and full productivity levels. The Company is determining the fundamentals and the best/most current designs and considering the vehicles' footprint, fuel economy, weight, energy usage and flows within the vehicle. This involves extensive training to be able to put new technology and processes into place quickly and efficiently while maintaining very stringent quality standards.

The Company also plans to cross-train employees on all jobs within their department/function to allow them to fill in for other functions when necessary. Karma plans to remain as a niche, luxury automobile manufacturer running on a unique production line, at a smaller, more concentrated size than the typical auto manufacturer. With a flexible staff, the Company will be able to adjust to production needs.

**Computer Skills (5%):** Training will be offered to all occupations on systems and computer applications that are applicable to their job role and responsibilities.

**Manufacturing Skills (50%):** Training will be offered to Production Staff/ Technicians, Information Technology/Engineering/Research and Development, Supervisor/Manager/Director, and Quality. Hybrid Vehicle Manufacturing Skills will include topics such as: Hybrid Vehicle Manufacturing and Assembly Processes, Hybrid Vehicle Power Electronics, Electromechanical/Maintenance Skills, and Lean Manufacturing. These skills will ensure new and existing employees are brought up to speed with the latest developments in the manufacture and assembly of emerging technologies to ensure efficiency and quality during production.

**Continuous Improvement (10%):** Training will be offered to all occupations. Continuous Improvement Skills/Manufacturing Operations will provide an overview of Fisker's unique operations model, as well as the skills and proficiency necessary for high-level efficiency, quality, and customer service. Training will include topics such as Product Quality Planning, Change Management, Materials Selection/Product Optimization, Critical Thinking Skills, and Plant Specific Operations.

**Hazardous Materials Skills (5%):** Training will be offered to Production Staff /Technicians, Supervisor/Manager/Director, Quality Staff. Karma will provide supplemental hazardous materials skills in topics such as Hazardous Materials training (e.g. adhesives, solvents, chemicals, paint, etc.) and High-Voltage Battery and Systems Awareness.

### **Advanced Technology**

The proposed Advanced Technology (AT) training is designed exclusively for Information Technology/Engineering/ Research and Development professionals with an emphasis on innovation and new product development to further Karma's design and engineering goals. Courses will be taught by a combination of external vendors and highly skilled in-house Engineers and subject matter experts. Training will be offered to IT/Engineering/Research and Development, Supervisor/Manager/Director.

The trainer-to-trainee will be limited to 1:10 to allow in-depth coverage and personal attention from the instructor. Depending on the types of systems involved and the specific expertise required, the course will range from \$75 to \$200 per hour, per trainee.

Training of this nature is intensive and requires a large amount of time, dedicated largely to the acquisition of advanced skills including Hybrid Vehicle Engineering/Design Skills, Programming Skills, Web Development, Net Security, Information Security, Cisco Skills, and Citrix Skills included in the curriculum.

### **Computer-Based Training (CBT)**

Normally, CBT hours are capped at 50% of total training hours per trainee. However, under this proposal, Karma is requesting reimbursement of up to 100% CBT. If approved, it will allow Karma the flexibility to provide training via the appropriate training modality based on the stages of development and production throughout the two year term of the agreement.

With the current and rapid advances in technology, CBT is becoming an integral part of a larger system of practices and policies designed to prepare and support a high skilled workforce. This self-paced CBT delivery method will allow Karma's frontline worker's 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 may receive all of their ETP training via CBT delivery. The majority of the training in the proposal is Manufacturing Skills targeted for Production Staff/Technicians, Information Technology/Engineering/Research and Development, and Supervisors/Managers.

CBT was developed by Tooling U-SME. The curriculum is customized for the manufacturing industry and targets the training needs of the auto industry. Tooling U-SME is constantly developing new content for their CBT library of classes, based on the requests and needs of the manufacturing community.

### **Productive Laboratory**

The Panel recently adopted regulations to authorize reimbursement for training delivered in a Productive Laboratory (PL) setting. PL trainees may produce goods for profit as part of the training in the courses identified under the Curriculum. The instructor must be dedicated to training delivery during all hours of training.

Karma's business requires many skills that need to be learned via observation and hands-on experience. The use of PL would allow for practical, "hands-on" experience that cannot be duplicated in a classroom setting. Additionally, Karma has some equipment that is in limited supply and requires special power connections and therefore can only be used on the production line.

The trainees will be under supervision by the instructor at all times. Training assignments will be task-oriented and specific to the manufacturing or software/hardware equipment. The trainer to trainee ratio for Productive Lab training in Karma's environment is 1:1 and to be conducted at the Company's Moreno Valley location for Production, Technicians, and Quality. Karma anticipates up to 150 trainees participating in PL. The Company has identified over 100 hours of PL training courses and is requesting up to 60 hours per-trainee to be funded by ETP.

### **Commitment to Training**

Karma represents that 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.

Karma currently provides training that includes new employee orientation, basic OSHA Training, basic Microsoft Office, and anti-harassment. Additionally, Karma allows employees to attend key industry conferences that provide training break-out sessions and seminars on industry topics and trends. This training will be provided at Karma's expense during the term of the proposed agreement and beyond.

### **Green/Clean Operations**

Karma is committed to the use of Green/Clean Technology. The Company will be manufacturing a plug-in hybrid vehicle. The vehicle will have a solar panel on the roof which will charge the high voltage battery. Subsequently, the battery will run the invertors, A/C, radio, ancillary

information and entertainment systems. Additionally the Company is also looking into installing solar panels on the roof of its facilities in Costa Mesa and Moreno Valley.

### **Veterans Program**

Karma appreciates qualities and skills that veterans gain from their military service. The Company is passionate about hiring veterans and feels they will bring a unique set of skills and abilities to the Company. As such, the Company is including a separate Veteran Job Number for training 15 newly hired Veterans. The Panel has established a higher reimbursement rate and other incentives for training California veterans, as will be reflected in the contract.

### **Individuals with Disabilities**

The No More Barriers 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. Employers that hold federal contracts are particularly likely to train these workers, due to requirements under Section 503 of the Rehabilitation Act of 1973.

Although Karma does not have Section 503 compliance needs, it has an existing program for outreach and training workers with disabilities. These workers and supporting staff will receive training in special courses for “Individuals with Disabilities” (See Exhibit B). Trainees in multiple occupational titles may receive this coursework, under both Job Numbers 1 and 2.

The Company expects to train approximately 8 workers with disabilities; the actual trainee count will be reported to ETP at or before fiscal close-out. The Company is not asking for Job Creation incentives unless these workers are also newly-hired, in which case they will be enrolled under Job Number 2.

### **RECOMMENDATION**

Staff recommends approval of this proposal.

### **DEVELOPMENT SERVICES**

Karma retained Training Funding Partners in Tustin to assist with development of this proposal for a flat fee of \$33,500.

### **ADMINISTRATIVE SERVICES**

Karma also retained Training Funding Partners to perform administrative services in connection with this proposal for amount 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:

#### **CONTINUOUS IMPROVEMENT**

- Business Acumen
- Change Management
- Communication Skills
- Critical Thinking Skills
- Data Collection and Recordkeeping
- Effective Business/Technical Writing
- ISO Skills
- Leadership Skills
- Lean/Six Sigma
- Manufacturing Overview/ Plant Specific Operations
- Materials Selection/Product Optimization
- New and Revised SOP (Standard Operating Procedures)
- Presentation Skills
- Problem Solving/Troubleshooting
- Process Improvement Skills
- Product Quality Planning/ Product Liability
- Project Management
- Team Building
- Time Management
- Troubleshooting/Root Cause Analysis
- Understanding Work Instructions
  
- **Individuals with Disabilities**
  - Accessibility
  - Disability Culture: Sensitivity, Awareness, and Hiring Practices

#### **BUSINESS SKILLS**

- Individuals with Disabilities
  - Skills Development for People with Disabilities

#### **COMPUTER SKILLS**

- Computer Programming and Software Maintenance
- Fisker Proprietary Systems Skills
- Information Security
- Intermediate/Advanced MS Office Skills
- Microsoft Project
- SAP System Skills
- SharePoint
- Visio

#### **HAZARDOUS MATERIALS**

- Hazardous Materials Training (e.g. adhesives, solvents, chemicals, paint etc.)
- High-Voltage Battery and Systems Awareness

**MANUFACTURING SKILLS**

- Automotive/Electrical Safety
- Body Shop Equipment Operation/Maintenance
- Electro Mechanical/ Maintenance Skills
- Forklift Training
- Fuel Efficiency Best Practices
- High Performance Driving (Bondurant)
- Hybrid Vehicle Manufacturing and Assembly Processes
- Hybrid Vehicle Power Electronics
- Lean Manufacturing
- Line Balancing
- Hybrid Vehicle Manufacturing Equipment Skills/ Maintenance
- Hybrid Vehicle Manufacturing Fit and Finish/Quality
- Hybrid Vehicle Manufacturing Quality Control
- Paint Equipment Operation
- Paint Quality, Defects, Prevention, Repair
- Paint Types and Application Techniques
- Programmable Logic Control
- Welding Skills

**AT Hours**

0-200

**ADVANCED TECHNOLOGY**

- Catia (Computer-Aided Three-Dimensional Interactive Application)
- Cisco Skills
- Citrix Skills
- CompTIA
- Computer-Aided Engineering
- Concurrent Engineering Skills
- Design for Manufacturing
- Design of Experiments (DOE)
- Electric Vehicle Battery Applications
- Electrical Architecture-Controller Area Network (CAN) Networks, Flexray, Ethernet, etc.
- Equipment Troubleshooting, Diagnostics, and Repair
- Failure Mode and Effects Analysis (FMEA)
- Geometric Dimensioning and Tolerancing (GD&T)
- High-voltage Electronics Design and Management
- HVAC and Phase Change Thermodynamics
- Hybrid Vehicle Engineering/Design Skills
- Industrial Engineering
- Internal Combustion Engine Operation & Fuel Systems
- Java Skills
- Manufacturing Automation and Robotics
- Microsoft Server
- N Code
- Nastran
- Power Electronics
- Programming Skills
- Red Hat/Linux
- SQL

- Value Analysis and Value Engineering (VA/VE)
- Vehicle Dynamics
- VMWare
- Web Development-.Net Security
- Windows 8 and 10 Network Management

### **Productive Lab Hours**

0-60

#### **MANUFACTURING SKILLS** (limited to 1:1 trainer-to-trainee ratio)

- Body Shop Equipment Operation/Maintenance
- Paint Shop Equipment Operation/Maintenance
- Hybrid Vehicle Manufacturing and Assembly Processes
- Hybrid Vehicle Power Electronics
- Manufacturing Equipment Skills/ Maintenance
- Manufacturing Fit and Finish/Quality

### **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)
- Holmaking 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)

#### **HAZARDOUS MATERIALS**

- Environmental Safety Hazards 150 (1.5 hours)
- Flammable/Combustible Liquids 155 (1.5 hours)

Safety Training will be limited to 10% of total training hours per-trainee

Note: Reimbursement for retraining is capped at 200 total training hours per trainee, regardless of the method of delivery. PL is capped at 60hours per-trainee.