

Arizona Department of Education

Career and Technical Education

Recommended Equipment List

Program: ENGINEERING
CIP#: 15.0000.00

NOTE: The following items and descriptions are the recommended equipment guidelines for each **CTE Engineering** program. Please note that this list of recommended items does not necessarily need to be supported financially by Federal Perkins or State Priority funding sources. In many cases, local school district funds are used to purchase items on a regular basis (i.e. furniture, consumables, etc.) Further, please understand that this is not an exhaustive list. Local program and business needs may necessitate the purchase of additional equipment and software resources, as may the rapidly-changing nature of the industry-specific technologies used in the program.

Please contact ADE-CTE Program Specialist Tracy Rexroat (tracy.rexroat@azed.gov) if you have questions regarding the appropriateness of any item you are considering for addition to your **CTE Engineering** program.

Recommended Equipment and Software

Item	Item
Hand tools: (as needed) C-clamps, parallel-closing clamps, Calipers, interior, exterior, digital Clamps Diagonal Cutter Drills, portable power High Speed Drill bit Set Bench vise and arbor press. four-inch Edge finder, appropriate tools for determining squareness Files and Rasps; Flat, Round and Half Round with handles Layout ink or a Magic Marker, Levels Hammers; ball peen, and soft-faced hammers Magnifying glass Nut Driver Set Pliers (slip-joint, long nose, diagonal, etc.) Punches; Sanders Saw; Band Vertical (blades), Hacksaw with blades, Handsaws; wood- Metal Cutting, Scrapers-assorted Screwdrivers, Flat head, Phillips and Jewelers Shop Vacuum Sliding T bevel Snips Socket Set 3/8 drive set Squares, (e.g. tri, flat steel and combination)	Hand tools (continued): Tap wrenches, tap and die set, standard/metric Waste can for contaminated rags Wrenches, combination, standard and metric sets, Hex Key Consumables: Abrasives; sand paper Adhesives; Assortment of fasteners Tensile test samples (aluminum, brass, steel) Common workbench a layout surface plate at least 12" X 18 Drill press. With a 6" drill vise or greater, screws, studs, nuts, washers, and clamps sufficient to secure the vise, or the part. Surface grinders with an 8" or smaller diameter wheel with a suitable magnetic chuck. Assorted grinding wheels suitable for mounting to the spindle, files, magnetic base for indicators, surface gage of sufficient size, and diamond dresser. Grinding Wheel Dresser Safety First Aid Station or Kit Flammable Liquid Storage Cabinet Hearing Protection; Respiratory Protection Protective Clothing (coveralls, aprons, sleeves, etc. as needed) Safety Cabinet (OSHA and EPA compliant) Safety & Environmental Labels (Fire/Explosives Diamonds) Safety Glasses, Goggles, and Face Shields Variety of Material Data Safety Sheets (MSDS) Work Gloves

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Item	Item
Measuring Instruments: Tape measures Calipers, digital or dial Combination set Micrometers: Depth, Height, Inside, Outside 0-3 Micrometers (to .001") Dial indicator (to .001" min resolution) 6" rule Gages: Go/no-go gage for threads, Layout height gage, marking gauges, surface finish, Comparison gages, Telescopic gages to .750 Squares; Master Square or magnetic square, Solid square, Test and Measurement for engineering (Optional) Dividers Engineer scale Coordinate Measuring Machine (CMM) Microscope Oscilloscope Spectrophotometer Stress Analyzer Tensile/Compression Tester Ultrasonic Tester Equipment for drafting/Blue print reading portions of Engineering Equipment for other options Programmable Logic Controller (PLC) Robotic Arm on Slide Base SPC Miniprocessor lockable Tool drawers Box Bench type work table with or without storage	Measuring Instruments (continued) Computer Equipment *Computers with sufficient memory and removable storage for drafting and virtual learning programs, peripherals and printers (minimum of 1 computer per 2 students) Minimum specifications: DVD CDRW Color monitor Computer & Software Resources (optional) Dimensional Calculations and Conversions software with manuals Computer Aided Design and Drafting (CADD) software e.g. SolidWorks/AutoCADD Computer-Numerically Controlled (CNC) software. Data collection and analysis software (MS Excel, Minitab, LabVIEW) ERP/MRP software and manuals General productivity software, general utility software and Internet browsers Project Management software, with manuals Word processing software, with manuals (MS Office Pro XP Including Access/Excel/ PowerPoint/Word) Automated MFG/Manufacturing Execution Systems (MES) software and manuals Robotics and Materials Handling Software and manuals Rapid Prototyping software and manuals 3-D printer Rapid prototyping machine □ Equipment for other options Programmable Logic Controller (PLC) Robotic Arm on Slide Base SPC Miniprocessor

*Must meet the guidelines for specialized computing equipment as outlined on the "CTE Equipment Guidelines" at www.azed.gov/cte/grants