

TEXAS



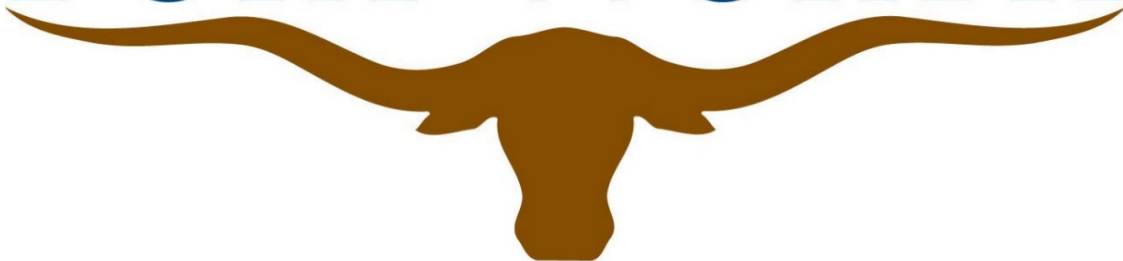
**HIGH SCHOOL SECTION
CATEGORY BASED PROJECTS**

Technology Students Association

2018-2019

**CHANGES HAVE BEEN MADE:
NEW CATEGORIES HAVE BEEN ADDED &
SOME CATEGORIES HAVE BEEN MERGED/DELETED
DO NOT USE PREVIOUS YEARS RULES BOOK!**

FORT WORTH®



April 25, 26, & 27, 2019

Texas TSA MEMBERSHIP

School chapters must be an affiliated member with the National TSA and Texas TSA in order to participate and/or compete in the Texas TSA State Contest. Students names must be specifically listed in membership rolls with Texas TSA in order to compete at the Texas TSA State Contest. Affiliation will be completed online through <http://www.tsaweb.org/>. **Chapters be must affiliated prior to November 16, 2018 to avoid a \$100.00 late fee.** Membership application closes on February 1st each year.

Schools that affiliate and/or upload students after the February 1st, 2019 deadline will be ineligible to receive school awards at the Texas TSA State Contest AND will incur a \$500.00 sanction by the Texas TSA Board of Directors.

**Chapters may affiliate and compete in ONE TSA REGION only.
Chapters may NOT affiliate and/or compete in multiple TSA Regions.**

TEXAS TSA STATE CONTEST ENTRY FEE

After qualifying through a Texas TSA regional contest, students are eligible to participate and compete in the Texas TSA State Contest. The 2018-2019 contest will be held in Fort Worth on April 25, 26, & 27 of 2019. The entry fee is \$12.00 for each entry.

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Texas TSA does not refund any money for unused state entries. Texas TSA does not require a student to be present at State Contest to enter their project(s), unless they are competing in an event that requires the student to be physically present for the event. Those events include NQE Events, UTE Written tests or Graphic Solutions, and most TSA Onsite Events.

HOTELS

Hotel Room Blocks: All hotel rooms will be booked through the Texas TSA hotel block. Any school booking outside of conference block will incur a **penalty of \$100/attendee** registered for that chapter. Additionally, all schools participating in on-site events, will be required to stay on-site in the hotel block. The only exception to this policy, are schools who are within a 20 mile radius of the Fort Worth Convention Center.

Texas TSA State Conference Attendance Registration & Conference Registration Attendance Fee

All persons who attend the Texas TSA State Conference & Contest are required to register for the Conference. The Conference Registration Attendance Fee is \$15.00 per person. This includes students, teachers, administrators, drivers, parents and all guests.

Registration will open February 15, 2019 and close March 25, 2019 at 11:50 pm CST. **NO CHANGES OR REFUNDS WILL BE MADE AFTER THIS DATE.** Please do not wait until the last minute to complete your registration.

All payments – registration fees, entry fees and bus parking will be paid to Texas TSA.

All Purchase Orders and/or payments must be received by Friday, April 19, 2019. Purchase Orders may be emailed to executive.director@texastsa.org.

Credit Cards may be taken on-line through the Registration System.

Checks are to be made payable to Texas TSA and mailed to:

Texas TSA
189 Candelara Drive
Carthage, TX 75633

NOTE: ALL forms of payments MUST include the SCHOOL NAME, not just the ISD.

7. COPYRIGHT: All entries must be the original work of the student participant or student team. **ALL** ideas, text, images (photos, computer generated, video and/or other), and sounds from other sources must be cited, including anything that is from the public domain. References and resources are to be cited using MLA (Modern Language Association) style, the most current edition. If copyrighted material is used, proper written permission must be included. Failure to follow this procedure **WILL AUTOMATICALLY RESULT IN DISQUALIFICATION OF THE STUDENT (ALL PROJECTS)** and may potentially disqualify the entire chapter from the 2019 Texas TSA State Competition.

UNIQUENESS OF STUDENT WORK

All student entries **MUST** be made from a single unique native file. Each project must be unique in both the final product and any associated electronic file regardless of file type. The **ONLY** exception is the use of common library parts such as the Content Center in AutoDesk Inventor.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted.

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

WOOD CATEGORY

Items in this category involve student created projects in which students used traditional and modern woodworking tools, methods, and techniques to create projects.

Any projects in which CNC mills, lathers, computer controlled lasers, etc... were used to produce more than 50% of the major components **SHOULD NOT** be entered in this category.

Judging criteria for production will be based on the following areas: degree of difficulty, appearance, finish, and craftsmanship. NOTE: Board footage is calculated as it is displayed.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

MANUFACTURING - WOODS

One (1) Board Foot (bf) is defined as a piece of wood 12" X 12" X 1" in size = 144 cubic inches of wood.

All Board Feet calculations are "AS DISPLAYED". Calculate the total volume of wood in the project based upon cubic inches and divide by 144 to get Board Feet in the project.

Team Entry or Mass Produced minimum .5 to 1 board foot (2 items must be displayed, item size is calculated on one item only or appropriate photo verification)

	Individual OR	
	Team Entry	
Wood turning Pen/Pencil Set - NON-CNC (Manual)	HP5000	
Wood turning Pen or Pencil- NON-CNC (Manual)	HP5001	
Wood turnings not exceeding .5 board ft	HP5002	
Wood turnings not exceeding 1 board ft	HP5003	
Wood turning not exceeding 5 board ft.	HP5004	
Wood turning not exceeding 10 board ft	HP5005	
Wood turning exceeding 10 board ft.	HP5006	
	Individual Entry	Team Entry
Wood entries not exceeding 0.5 board ft.	HP5008	HP5009
Wood entries not exceeding 1 board ft.	HP5010	HP5011
Wood entries not exceeding 2 board ft.	HP5012	HP5013
Wood entries not exceeding 4 board ft.	HP5014	HP5015
Wood entries not exceeding 6 board ft.	HP5016	HP5060 Notice Cha
Wood entries not exceeding 8 board ft.	HP5017	HP5018
Wood entries not exceeding 10 board ft.	HP5019	HP5020
Wood entries not exceeding 15 board ft.	HP5021	HP5022
Wood entries not exceeding 20 board ft.	HP5023	HP5024
Wood entries not exceeding 25 board ft.	HP5025	HP5026
Wood entries not exceeding 30 board ft.	HP5027	HP5028
Wood entries not exceeding 35 board ft.	HP5029	HP5030
Wood entries not exceeding 40 board ft.	HP5031	HP5032
Wood entries not exceeding 50 board ft.	HP5033	HP5034
Wood entries not exceeding 70 board ft.	HP5035	HP5036

MANUFACTURING - WOODS (continued)

	Individual Entry	Team Entry
Wood entries not exceeding 90 board ft.	HP5037	HP5038
Wood entries not exceeding 120 board ft.	HP5039	HP5040
Wood entries not exceeding 150 board ft.	HP5041	HP5042
Wood entries exceeding 150 board ft.	HP5043	HP5044

DIMENSIONAL MATERIALS

One (1) Board Foot (bf) is defined as a piece of wood 12" X 12" X 1" in size = 144 cubic inches of wood.

All Board Feet calculations are "AS DISPLAYED". Calculate the total volume of wood in the project based upon cubic inches and divide by 144 to get Board Feet in the project.

The following classifications are set aside for outdoor/recreational products constructed of dimensional materials such as 2X4, 2X6, etc. Board Feet calculated on 1 unit of a production run.

True Dimensions of actual lumber used. Ex: 2X4 = 1.5" X 3.5"

	Individual Entry	Team Entry
Less than 20 b.f.	HP5045	HP5046
20 to 30 b.f.	HP5047	HP5048
30 to 40 b.f.	HP5049	HP5050
40 to 50 b.f.	HP5051	HP5052
More than 50 b.f.	HP5053	HP5054

METALS CATEGORY

Items in this category involve student created projects in which students used metal working tools, methods, and techniques to create projects

Any projects in which CNC mills, lathes, computer controlled lasers, etc... were used to produce more than 50% of the major components **SHOULD NOT** be entered in this category.

Judging criteria for production will be based on the following areas: degree of difficulty, appearance, finish, and craftsmanship. Material used is calculated as item as displayed. **Large entries** may have to be displayed outside.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

MANUFACTURING - METALS

Team Entry or Mass Produced (2 items must be displayed, item size is calculated on one item only or appropriate photo verification)	Individual Entry	Team Entry
Entries not exceeding less than 3 lbs. - no sheet metal	HP5100	HP5101
Entries not exceeding 5 lbs. - no sheet metal	HP5102	HP5103
Entries not exceeding 10 lbs. - no sheet metal	HP5104	HP5105
Entries not exceeding 20 lbs. - no sheet metal	HP5106	HP5107
Entries not exceeding 30 lbs. - no sheet metal	HP5108	HP5109
Entries not exceeding 50 lbs. - no sheet metal	HP5110	HP5111
Entries exceeding 50 lbs. - no sheet metal (Entrees below need not include sheet metal)	HP5112	HP5113
Entries not exceeding 10 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5114	HP5115
Entries not exceeding 20 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5116	HP5117
Entries not exceeding 50 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5118	HP5119
Entries not exceeding 100 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5120	HP5121
Entries not exceeding 150 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5122	HP5123
Entries not exceeding 200 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5124	HP5125

MANUFACTURING - METALS (continued)

	Individual Entry	Team Entry
Entries not exceeding 250 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5126	HP5127
Entries not exceeding 300 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5128	HP5129
Entries not exceeding 350 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5130	HP5131
Entries not exceeding 400 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5132	HP5133
Entries not exceeding 500 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5134	HP5135
Entries not exceeding 1000 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5136	HP5137
Entries not exceeding 2000 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5138	HP5139
Entries not exceeding 3000 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5140	HP5141
Entries exceeding 3000 lbs. - combined sheet & wrought metal Major fabrication is wrought	HP5142	HP5143
Metal Sculpturing - Ferrous or nonferrous	HP5144	HP5145

MACHINE METAL

Finished for all entries should be appropriate. Commercial - industrial practices should be the guides as to the degree and kind of finish to use. No plating except in the designated classifications. Entries consisting of more than 1 part must be assembled if possible. All non-student made parts should be identified as per rule 16. Standard hardware items, such as screws, bolts, washers, keys, pins, etc. that are not student made will not count as parts but must be identified. Team - Mass Production - 2 items must be displayed, item size is calculated on one item only

	Individual Entry	Team Entry
Working Production machines or devices	HP5146	HP5147
Entries containing not more than 1 student made part	HP5148	HP5149
Entries containing not more than 3 student made parts	HP5150	HP5151
Entries containing 4 or more student made parts	HP5152	HP5153
Student plated entries	HP5154	HP5155
Entries made from commercial kits or castings	HP5156	HP5157

SHEET METAL

Entries in which the major material is sheet metal. (.125 inches maximum thickness)
Classifications are for the total combined sheet metal area contained in the entry.

	Individual OR	
	Team Entry	
Scroll work (fastened or joined)	HP5158	
Entries not exceeding 2 sq. ft	HP5159	
Entries not exceeding 4 sq. ft	HP5160	
Entries not exceeding 6 sq. ft	HP5161	
Entries not exceeding 8 sq. ft	HP5162	
Entries not exceeding 15 sq. ft	HP5163	
Entries exceeding 15 sq. ft.	HP5164	

FOUNDRY**Individual OR****Team****Entry**

Rough casting (1) part	HP5165
Rough casting, multiple parts	HP5166
Finished casting (1) part	HP5167
Finished casting, multiple parts	HP5168
Finished foundry products - not more than 4 cast parts	HP5169
Finished foundry products - more than 4 cast parts	HP5170

MATERIALS CATEGORY

Items in this category involve student created projects in which students used traditional and modern tools, methods, and techniques to create projects from various materials not listed under other categories.

Any projects in which CNC mills, lathers, computer controlled lasers, etc... were used to produce more than 50% of the major components **SHOULD NOT** be entered in this category.

Judging criteria for production will be based on the following areas: degree of difficulty, appearance, finish, and craftsmanship. NOTE: Board footage is calculated as it is displayed.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

MANUFACTURING - MATERIALS

	Individual OR	
	Team	Entry
Pen/Pencil Set -Manual		HP5200
Pen or Pencil- Manual		HP5201
Manual Turnings not exceeding 1 pound		HP5202
Manual Turnings exceeding 1 pound		HP5203
Entries not exceeding 1 ounce		HP5204
Entries not exceeding 1 pound		HP5205
Entries exceeding 1 pound to 5 pounds		HP5206
Entries exceeding 5 pounds to 20 pounds		HP5207
Entries exceeding 20 pounds		HP5208
Casting (non metal) not exceeding 1 pound		HP5209
Casting (non metal) exceeding 1 pound to 5 pounds		HP5210
Casting (non metal) exceeding 5 pounds		HP5211

MANUFACTURING - PLASTICS & RESINS

	Individual OR	
	Team	Entry
PVC fabrication - 10 pounds or less		HP5212
PVC fabrication - more than 10 pounds		HP5213
Injection molding (all)		HP5214
Vacuum forming (all)		HP5215
Casting (all)		HP5216
Reinforced resins (all)		HP5217
Non acrylic		HP5218
Composite		HP5219
Acrylics		HP5220

MANUFACTURING - OTHER MATERIALS

		Individual OR	
		Team	Entry
Fabric			HP5221
Paper			HP5222
Glass - Flat (Ex: plate)			HP5223
Glass - Glassware (Ex: mugs)			HP5224
Leather			HP5225
Combination of any of the above			HP5226

RESTORATION

Items that were originally commercially manufactured and have been restored to their original state. A work history must accompany the entry showing the condition of the item before the restoration. All parts not reconditioned by the student must be identified.

- You must show photographic documentation, that includes before, during, and post production effort.

	Individual	Team
	Entry	Entry
Restoration - furniture	HP5227	HP5228
Restoration - mechanical/machine devices	HP5229	HP5230
Restoration - electrical/appliances	HP5231	HP5232
Restoration - vehicles	HP5233	HP5234

RECYCLED MATERIALS

Items made out of a minimum of 50% recycled materials

A work history must accompany the entry showing the recycled item before construction

- You must show photographic documentation, that includes before, during, and post production effort.

Team Entry or Mass Produced (2 items must be displayed, item size is calculated on one item only or appropriate photo verification)

	Individual	Team
	Entry	Entry
Recycled - Woods	HP5235	HP5236
Recycled - Metals	HP5237	HP5238
Recycled - Electrical/electronics	HP5239	HP5240
Recycled - Other	HP5241	HP5242
Recycled - Combination of two or more recycled materials	HP5243	HP5244

CNC/CAM & PROGRAMMING CATEGORY

Items in this category involve student created projects in which students used Computer Numerical Control or Computer Aided Manufacturing devices to create projects.

Any projects in which CNC mills, lathes, computer controlled lasers, etc... were **NOT** used to produce **ALL** major components **SHOULD NOT** be entered in this category.

Judging criteria for production will be based on the following areas: degree of difficulty, appearance, finish, and craftsmanship.

PART - Refers to student manufactured pieces. Does not include purchased or pre-packed pieces, such as clock mechanisms.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

UNIQUENESS OF STUDENT WORK

ALL ENTRIES MUST BE 100% STUDENT ORIGINAL WORK. NO DOWNLOADED FILES/WORK - IN FULL OR PARTIAL.

All student entries **MUST** be made from a single unique native file. Using a single electronic file to produce multiple contest entries is forbidden. Each project must be unique in both the final product and any associated electronic file regardless of file type.

CNC/CAM - WOOD

CNC Mill/Router

	Individual Entry
CNC/CAM - Mill / Router - single piece less than 5" x 5"	HP5300
CNC/CAM - Mill / Router - single piece less than 10" x 10"	HP5301
CNC/CAM - Mill / Router - single piece not exceeding 20" x 20"	HP5302
CNC/CAM - Mill / Router - single piece larger than 20"	HP5303
CNC/CAM - Mill / Router - 2 to 5 parts	HP5304
CNC/CAM - Mill / Router - 6 to 10 parts	HP5305
CNC/CAM - Mill / Router - 11 or more parts	HP5306

CNC/CAM - WOOD (continued)

CNC Lathe	Individual
	Entry
CNC/CAM - Lathe - Pen/Pencil	HP5307
CNC/CAM - Lathe - Pen/Pencil Set	HP5308
CNC/CAM - Lathe - single piece less than 1/2 diameter x 12" length	HP5309
CNC/CAM - Lathe - single piece less than 1" diameter x 18" length	HP5310
CNC/CAM - Lathe - single piece less than 2" diameter x 24" length	HP5311
CNC/CAM - Lathe - single piece exceeding 2" diameter	HP5312
CNC/CAM - Lathe - 2 to 5 parts	HP5313
CNC/CAM - Lathe - 6 to 10 parts	HP5314
CNC/CAM - Lathe - 11 or more parts	HP5315

CNC Laser	Individual
	Entry
CNC/CAM - Laser Engraver - single piece less than 8" x 10"	HP5316
CNC/CAM - Laser Engraver - single piece not exceeding 16" x 20"	HP5317
CNC/CAM - Laser Engraver - single piece larger than 24"	HP5318
CNC/CAM - Laser Engraver - single piece Rotary	HP5319
CNC/CAM - Laser Engraver - 2 to 5 parts	HP5320
CNC/CAM - Laser Engraver - 6 to 10 parts	HP5321
CNC/CAM - Laser Engraver - 11 or more parts	HP5322

CNC/CAM - OTHER MATERIAL (NOT WOOD)

CNC Mill/Router	Individual
	Entry
CNC/CAM - Mill / Router - single piece less than 5" x 5"	HP5323
CNC/CAM - Mill / Router - single piece less than 10" x 10"	HP5324
CNC/CAM - Mill / Router - single piece not exceeding 20" x 20"	HP5325
CNC/CAM - Mill / Router - single piece larger than 20"	HP5326
CNC/CAM - Mill / Router - 2 to 5 parts	HP5327
CNC/CAM - Mill / Router - 6 to 10 parts	HP5328
CNC/CAM - Mill / Router - 11 or more parts	HP5329

CNC Lathe	Individual
	Entry
CNC/CAM - Lathe - Pen/Pencil	HP5330
CNC/CAM - Lathe - Pen/Pencil Set	HP5331
CNC/CAM - Lathe - single piece less than 1/2 diameter x 12" length	HP5332
CNC/CAM - Lathe - single piece less than 1" diameter x 18" length	HP5333
CNC/CAM - Lathe - single piece less than 2" diameter x 24" length	HP5334
CNC/CAM - Lathe - single piece exceeding 2" diameter	HP5335
CNC/CAM - Lathe - 2 to 5 parts	HP5336
CNC/CAM - Lathe - 6 to 10 parts	HP5337
CNC/CAM - Lathe - 11 or more parts	HP5338

CNC Laser	Individual
	Entry
CNC/CAM - Laser Engraver - single piece less than 8" x 10"	HP5339
CNC/CAM - Laser Engraver - single piece not exceeding 16" x 20"	HP5340
CNC/CAM - Laser Engraver - single piece larger than 24"	HP5341
CNC/CAM - Laser Engraver - single piece Rotary	HP5342
CNC/CAM - Laser Engraver - 2 to 5 parts	HP5343
CNC/CAM - Laser Engraver - 6 to 10 parts	HP5344
CNC/CAM - Laser Engraver - 11 or more parts	HP5345

CNC/CAM - OTHER MATERIAL (NOT WOOD) - continued

CNC Plasma Cutter	Individual Entry
CNC/CAM - Plasma Cutter - single piece less than 12" x 12"	HP5346
CNC/CAM - Plasma Cutter- single piece not exceeding 24" x 24"	HP5347
CNC/CAM - Plasma Cutter- single piece not exceeding 36" x 36"	HP5348
CNC/CAM - Plasma Cutter- single piece larger than 36" x 36"	HP5349
CNC/CAM - Plasma Cutter - single piece Rotary	HP5350
CNC/CAM - Plasma Cutter - 2 to 5 parts	HP5351
CNC/CAM - Plasma Cutter- 6 to 10 parts	HP5352
CNC/CAM - Plasma Cutter - 11 or more parts	HP5353

CNC - OTHER	Individual Entry
Robotic Welding	HP5354
CNC/CAM Embroidery Single Design	HP5355
CNC/CAM Embroidery Multiple Design	HP5356
CNC/CAM Vinyl Cutter - Single Color - less than 3.5 x 18"	HP5357
CNC/CAM Vinyl Cutter - Multi Color - less than 3.5 x 18"	HP5358
CNC/CAM Vinyl Cutter - Single Color - 8 x 10"	HP5359
CNC/CAM Vinyl Cutter - Multi Color - 8 x 10"	HP5360
CNC/CAM Vinyl Cutter - Single Color - Large Format	HP5361
CNC/CAM Vinyl Cutter - Multi Color - Large format	HP5362
Flexible Manufacturing Systems – Multiple machine – multi tasks – single part, hard copy of the programs must accompany entry on USB drive	HP5363
Flexible Manufacturing Systems – Multiple machine – multi tasks – multiple parts, hard copy of the programs must accompany entry on USB drive	HP5364
Flexible Manufacturing Systems - Multiple machine Multi-task-video <i>Demonstration</i> - 5 minute Maximum...	HP5365
Computer Integrated Manufacturing - Multiple machine Multiple task-video <i>Demonstration</i> - 5 minute maximum	HP5366

UNIQUENESS OF STUDENT WORK

ALL ENTRIES MUST BE 100% STUDENT ORIGINAL WORK. NO DOWNLOADED FILES/WORK - IN FULL OR PARTIAL.

ALL work must be 100% student original produced. ALL copyright rules and regulations apply. No downloaded files of any format - in part or in whole - may be used to create any part or parts of any 3D Print/Rapid Prototype.		Individual Entry
CNC/CAM - 3D Printer/Rapid Prototype - Single Part:	Engineering	HP5367
CNC/CAM - 3D Printer/Rapid Prototype - 2 to 5 Parts:	Engineering	HP5368
CNC/CAM - 3D Printer/Rapid Prototype - 6 to 10 Parts:	Engineering	HP5369
CNC/CAM - 3D Printer/Rapid Prototype - 11 or More Parts:	Engineering	HP5370
CNC/CAM - 3D Printer/Rapid Prototype - Single Part:	Architecture	HP5371
CNC/CAM - 3D Printer/Rapid Prototype - 2 to 5 Parts:	Architecture	HP5372
CNC/CAM - 3D Printer/Rapid Prototype - 6 to 10 Parts:	Architecture	HP5373
CNC/CAM - 3D Printer/Rapid Prototype - 11 or More Parts:	Architecture	HP5374
CNC/CAM - 3D Printer/Rapid Prototype - Single Part:	Bio-Medical	HP5375
CNC/CAM - 3D Printer/Rapid Prototype - 2 to 5 Parts:	Bio-Medical	HP5376
CNC/CAM - 3D Printer/Rapid Prototype - 6 to 10 Parts:	Bio-Medical	HP5377
CNC/CAM - 3D Printer/Rapid Prototype - 11 or More Parts:	Bio-Medical	HP5378
CNC/CAM - 3D Printer/Rapid Prototype - Single Part:	Artistic/Other	HP5379
CNC/CAM - 3D Printer/Rapid Prototype - 2 to 5 Parts:	Artistic/Other	HP5380
CNC/CAM - 3D Printer/Rapid Prototype - 6 to 10 Parts:	Artistic/Other	HP5381
CNC/CAM - 3D Printer/Rapid Prototype - 11 or More Parts:	Artistic/Other	HP5382

COMMUNICATION/PRINT MEDIA CATEGORY

Items in this category involve student created projects in which students used traditional and modern methods, equipment, and processes to create Communication projects.

SCREEN PRINTS: Entries must include 3 copies in order to judge consistent registration and quality, along with content, composition and overall visual effect. Maximum size not to exceed 11 x 17 inches.

GI-24 – Binding Terms

- Bound – Example, spiral bound, glued and tape, GBC Machine
- Saddle Stitch – Stapled in the fold.

Mounting boards may be used not to exceed 8-1/2" x 11" unless otherwise noted.

Entries that depict sex, drugs, tobacco, gangs, violence, or cults will not be permitted. This does not preclude posters, "etc." that may bring awareness of these and other issues as deemed appropriate by TEA, State Board of Education, and local school policy.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

DESKTOP PUBLISHING

	Individual Entry
Business Cards/Name Tags/Invitation - <i>Must include 4 design options</i>	HP6000
Certificate	HP6001
Flyer, newspaper ad - Single Sheet	HP6002
Form - Single Sheet	HP6003
Calendar – Single Sheet	HP6004
Calendar – Multiple Sheet	HP6005
Resume - One page, front only	HP6006
Form Single Sheet	HP6007
CD Packaging – must include CD case and labeling	HP6008
2-4 printed panels (Maximum paper size is 8.5 x 11)	HP6009
5 or more printed panels (Maximum paper size is 8.5 x 11) <i>May include: invitations, greeting cards, menus, programs, travel, marketing, information, etc.</i>	HP6011
Thematic Portfolio - A collection of four or more graphic images following a central theme (Example: section pages in a yearbook, etc. - Could be created from an "art" program, scanned and/or original art work - Not limited to these examples)	HP6012
Desktop publishing - thematic portfolio display to promote a Business <i>Must include letterhead, business card, and form</i>	HP6013

DESKTOP PUBLISHING (continued)

	Individual Entry
Booklet - Multiple page document (Instructional manual, memory book, course description, student handbook, etc.) Must be bound on edge	HP6014
Pamphlet - Multiple page document – maximum size 8.5 x 11 Folded in half and saddle stitched (stapled) Refer to GI-24)	HP6015
Newsletter - Must Include Flag (heading with title, date, etc.) Single Sheet - Front Only - Maximum sheet size 8.5 x 11 inches	HP6017
Newsletter - Must Include Flag Single Sheet Front and Back Maximum sheet size 8.5 x 11 inches	HP6018
Newspaper - Must Include Flag – Multiple sheets - Maximum Sheet Size 11 X 17 inches (could be four 8.5 x 11 inches taped together to form camera-ready flats)	HP6019
Magazine Layout Student produced magazine of 5-10 pages, must have a common theme. For example fashion, cars, sports, ect. Must be submitted on 8.5x11 pages, bound for sale. All photos and stories must be original work of the student.	HP6020
Product Label – Ex. Soup label	HP6021
Product Packaging –Ex. Cereal box	HP6022
Database	HP6023
Spreadsheet	HP6024
Computer Image Transfer- one color (fabric, mug, etc...)	HP6025
Computer Image Transfer-multi color (fabric, mug, etc...)	HP6026
Other desktop communication not mentioned above	HP6027

PRINT COMMUNICATION

Print communication entries must include a minimum of three copies in order to judge consistent registration and quality along with content, composition and overall effect. Maximum finished size is 11 x 17 inches.

	Individual Entry
Screen print communication - one color on paper, fabric, or container Should advertise a product, place or upcoming event	HP6030
Screen print communication - multicolor on paper, fabric, or container Should advertise a product, place or upcoming event	HP6031

TECHNICAL REPORT

Using Word Processing software create a technical report – include a cover sheet, body of report, and bibliography. Citations and bibliography can be in either MLA or APA format.

	Individual Entry
Aerospace related	HP6040
Architectural related	HP6041
Biotech - emerging technology	HP6042
Communication Technology - Engineering	HP6043
Communication Technology - Scientific	HP6044
Computer Aided Design	HP6045
Computer Aided Manufacturing	HP6046
Computer Digital Transfer Technology (example: Digital Music)	HP6047
Energy Technology - Engineering	HP6048
Energy Technology - Scientific	HP6049
Alternate Energy	HP6050

TECHNICAL REPORT (continued)

Using Word Processing software create a technical report – include a cover sheet, body of report, and bibliography. Citations and bibliography can be in either MLA or APA format.

Individual Entry

Engineering - Applied research. Example:: improve an existing machine or material	HP6051
Illustrate the difference 2 or more types of structures	HP6052
Machine Design	HP6053
Meteorology	HP6054
Production Technology - Engineering	HP6055
Robotics - emerging technology	HP6056
Satellite communication	HP6057
Science - Research using given scientific parameters and formulas to obtain conclusions. For example: determining the speed of an object based on time and distance.	HP6058
Statistical processing	HP6059
Web Page Design	HP6060
Technical Report – Create a report integrating two or more of the processes Word processing, database and/or spreadsheet	HP6061
A combination of any of the above Technologies - Engineering	HP6062
A combination of any of the above Technologies - Science	HP6063
Other field or area not listed	HP6064

MULTIMEDIA & ANIMATION CATEGORY

Items in this category involve student created projects in which students used Multimedia & Animation Technology to create 2D and 3D projects. Multimedia includes video, audio, graphics, and animation.

MULTIMEDIA: Entries must include two or more communications methods. A story board and brief description of the two or more communications methods used must be included.

USB Drive ONLY. This includes a wide variety of small pluggable USB memory storage devices such as thumbdrives or flash drives. Please ensure that they work on both PC and Macs. Care should be taken to ensure the safety of these devices due to their portable nature. USB Drive must be read by current version of Internet Explorer or .flc, .avi, and .mov formats. USB Drive must be in RESEALABLE clear plastic bag (Zip Lock Type). USB Drive is required and MUST BE AUTO-PLAY.

Video Editing/Sound Editing - must supply original footage/audio and finished copy.

ALL digital video/animations MUST be an MPEG or .MOV (Quick Time) file format

Entries that depict sex, drugs, tobacco, gangs, violence, or cults will not be permitted. This does not preclude posters, "etc." that may bring awareness of these and other issues as deemed appropriate by TEA, State Board of Education, and local school policy.

Documentation is to be considered only when projects are being considered for a Best In State (BIS). Documentation should not be discounted because of method used - hand drawn/written vs. computer created/drawn.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

COMPUTER GENERATED PRESENTATION

USB Drive format

Presentation must include a minimum of 2 of the following media: static images, audio, or video. A story board and brief description of the methods used must be included.

Individual Entry
HP6100
HP6101
HP6102

Presentation – 1 to 15 slides
Presentation – 16 to 25 slides
Presentation – 26 or more slides

SOUND EDITING

USB Drive format

Video Editing/Sound Editing - must supply original footage/audio and finished copy

Individual Entry
HP6103
HP6104
HP6105
HP6106
HP6107
HP6108

Audio CD/USB —30 seconds
Audio CD/USB —60 seconds
Audio Editing – must supply original & finished copy - 15 Sec. Max
Audio Editing – must supply original & finished copy - 30 Sec. Max
Audio Editing – must supply original & finished copy - 60 Sec. Max
Audio Editing – must supply original & finished copy - 3 Minutes Max

VIDEO EDITING**USB Drive format**

Video Editing/Sound Editing - must supply original footage/audio and finished copy	Individual Entry
Video Commercial – 15 Seconds precisely	HP6109
Video Commercial – 30 Seconds precisely	HP6110
Video Commercial – 60 Seconds precisely	HP6111
Video Presentation – 30 seconds precisely	HP6112
Video Presentation – 60 seconds precisely	HP6113
Video Presentation – 120 seconds precisely	HP6114
Video Promotional/Instructional/Demonstration – 3 minutes maximum	HP6115
Video Album (Example: memories on video) – 5 minutes maximum	HP6116
Video Editing Musical Original Music - Maximum one song	HP6117
Video Newscast – No commercially processed program 3 minute maximum	HP6118
Video Animation (3-5 minutes)	HP6119
Graphic Video –(Example: Logo created in PhotoShop for video)	HP6120
Marketing Video – (Example: Non-Profit organization video such as say no to drugs)	HP6121
Video Editing – must supply original & finished copy	HP6122
Video Editing Chromakey Screen - Original and After (Maximum 60 seconds.)	HP6123
Video Editing Musical – Max One Song.	HP6124
Music Video Lip Sync – (Example: MTV, CMT Video)	HP6125
Music Video Original Student – (1 Song Length Max)	HP6126
Historical aspect of your community, mini encyclopedia (must include sound, text, animation, and or digital video)	HP6127
Video Highlights - Video Footage Only	HP6128

COMPUTER IMAGING

USB Drive format <u>Must cite source for Clip Art</u>	Individual Entry
Computer Generated Graphic Art - Single page - Color	HP6129
Computer Generated Graphic Art - Single page – Black & White	HP6130
Computer generated graphic art - Multiple page - color	HP6131
Computer generated graphic art - Multiple page - black & white	HP6132
Computer generated original 3-D Sci-Fi Image	HP6133
Computer generated original 3-D Transportation	HP6134
Computer generated original 3-D Not mentioned above	HP6135
Computer Generated Original Drawing or Painting- B/W- Paint program	HP6136
Computer Generated Original Drawing or Painting- Color- Paint program	HP6137
Computer Scanned Object(s). – (Example: Montage)	HP6138
Computer Manipulated Scanned Image – <i>Scanned image(s) which have been computer manipulated. Must include original image(s)</i>	HP6139
Computer Manipulated Digital Image – <i>Digital image(s) which have been computer manipulated. Must include original image(s)</i>	HP6140
Desktop Wallpaper	HP6141

2D ANIMATION**Individual****USB Drive format****Entry**

2D Animation with sound and or lip sync- 30 sec. max	HP6145
2D Animation – Ex. animated gif's – 30 sec. max.	HP6146
2D Animation without sound. - 30 sec. max	HP6147
2D Animation. (3 minute maximum)	HP6148
Open 2D Animation. – 5 min. max	HP6149
2D Animation (15 seconds – MUST BE PRECISELY 15 SEC)	HP6150
2D Animation (30 seconds – MUST BE PRECISELY 30 SEC)	HP6151
2D Animation (60 seconds – MUST BE PRECISELY 60 SEC)	HP6152
2D Animated Commercial – 15 Seconds precisely	HP6153
2D Animated Commercial – 30 Seconds precisely	HP6154
2D Animated Commercial – 60 Seconds precisely	HP6155
Generate a Morphing image	HP6156

3D ANIMATION**Individual****USB Drive format****Entry**

3D Introduction EXAMPLE: spinning logo	HP6160
Sci-fi Animation– 60 Sec. Max.	HP6161
Time Lapse Animation – 60 Sec. Max	HP6162
Open 3D animation (3 minute maximum)	HP6163
3D Animation (15 seconds – MUST BE PRECISELY 15 SEC)	HP6164
3D Animation (30 seconds – MUST BE PRECISELY 30 SEC)	HP6165
3D Animation (60 seconds – MUST BE PRECISELY 60 SEC)	HP6166
3D Animated Commercial – 15 Seconds precisely	HP6167
3D Animated Commercial – 30 Seconds precisely	HP6168
3D Animated Commercial – 60 Seconds precisely	HP6169
Human or Animal 3D animation – 60 Sec. Max	HP6170

WEBPAGE DESIGNS**Individual****USB Drive format****Entry**

Individual Related WebPages	HP6180
School Related WebPages	HP6181
Commercial Related WebPages	HP6182

OTHER**Individual****USB Drive format****Entry**

Video Game Design - 2D	HP6183
Video Game Design -3D	HP6184
Computer assisted tutorial to teach a subject or software	HP6185
Computer Based Training – Develop an interactive training module	HP6186
Use a programming language to make a text based interactive program	HP6187
Use a programming language to make a graphic based interactive program	HP6188

PHOTOGRAPHY CATEGORY

Items in this category involve projects in which students set-up, shoot, and develop their own photographs for presentation to a specified or general audience.

PHOTOGRAPHS: Photos must be taken by the student unless otherwise noted. Maximum printed size for a single photographic entry is 8.5 x 11 inches and for multiple photo classifications the size limit is 22 x 28 inches. Each class will be one photograph unless specified.

MOUNTED ENTRIES: Entries cannot be framed except by folded tape or suitable matting material around the perimeter. The complete assembly/mounting material, taped edges, drawings, photos, backing and cover cannot exceed 8-1/2" x 11" for single photographic entry or 22" x 28" for multiple photo classifications. Maximum thickness for single sheet is .125 inches.

Printing - Photo is developed by the student in a traditional film processing lab using traditional methods and practices, **OR** digitally in the lab, classroom, at home, etc.. **OR** in a professional lab, photo store, or commercial setting.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

UNIQUENESS OF STUDENT WORK

ALL ENTRIES MUST BE 100% STUDENT ORIGINAL WORK. NO DOWNLOADED FILES/WORK - IN FULL OR PARTIAL. All student entries **MUST** be made from a single unique native file. Using a single electronic file to produce multiple contest entries is forbidden. Each project must be unique in both the final product and any associated electronic file regardless of file type.

SINGLE PHOTO ENTRIES

Individual Entries Only

	B/W	Color
Action/Motion. Animal, <i>One photograph.</i>	HP6200	HP6201
Action/Motion. Sport, <i>One photograph.</i>	HP6202	HP6203
Aerial. <i>One photograph taken from any aerial perspective.</i>	HP6204	HP6205
Animal Life. <i>One photograph.</i>	HP6206	HP6207
Architecture. <i>One photograph.</i>	HP6208	HP6209
Close- Up (Macro) <i>One photograph.</i>	HP6210	HP6211
Fashion photography. <i>One photograph of a group or individual.</i>	HP6212	HP6213
Journalist Photo - Documentary - <i>one photograph.</i>	HP6214	HP6215
Landscape. <i>One photograph.</i>	HP6216	HP6217
Marine. <i>One underwater photograph.</i>	HP6218	HP6219
Pinhole Photo - <i>One photograph.</i>	HP6220	NA

SINGLE PHOTO ENTRIES (continued)

	Individual Entries Only	
	B/W	Color
Portrait photography. <i>One photograph of a group or individual.</i>	HP6222	HP6223
Product photography. One photograph of a single product to be used in sales & advertising	HP6224	HP6225
Still Life. <i>One photograph</i>	HP6226	HP6227
Other Photo not listed above (Not special effects)	HP6228	HP6229

SPECIAL EFFECT PHOTO ENTRIES

The following entries require 2 photos to be submitted. The first photo is the original unaltered photo. The second photo will be the final product that has been edited. Each photo must be 8.5 x 11 inches or smaller.

- Entries in these classification can NOT be mounted. NO MOUNTING
- Small label on back of 2nd photo must explain effect(s)/process(es) used and can be handwritten

Individual Entries Only

	B/W	Color
Special Effects. <i>One photograph.</i> - single effect/process	HP6240	HP6241
Special Effects. <i>One photograph.</i> - multiple effects/processes	HP6242	HP6243

MULTIPLE PHOTO ENTRIES

Photos must be taken by the student unless otherwise noted. Maximum printed size for multiple photo classifications the size limit is 22 x 28 inches. Multiple photos may be mounted or printed as a single sheet up to 22 x 28 inches.

	Individual Entries Only	
	B/W	Color
Journalistic photo essay. <i>Six to twelve photographs mounted to tell a newsworthy story. Titles and brief captions may be used.</i>	HP6250	HP6251
Special Effects. <i>Three or more photographs.</i>	HP6252	HP6253
Technical process photo-essay. <i>Six to twelve photographs mounted to explain how to do something. Titles and brief captions may be used.</i>	HP6254	HP6255
Travel photo-essay. <i>Three to six photographs mounted to share the atmosphere and feel of a place while traveling.</i>	HP6256	HP6257
Montage - Multiple Photo - BW, Color, or Mix	HP6258	HP6259

DRAFTING/CAD CATEGORY

Items in this category involve student created projects in which students created projects using traditional drafting or modern computer aided design standards practices, and methods. This category will be divided into two sections: Engineering and Architecture

MAXIMUM sheet size in this category is 24 x 36 inches. No limit on number of sheets.

The most current version of the **American National Standard Institute** (ANSI) Standards of symbols and conventions will be the standard for judging.

DC: 1-1 PRECISION DIMENSIONS: Entries should include such dimensioning practices as: datum line, tolerances, limits, geometric symbols, reference dimensions and BASIC dimensions, but not limited to these examples.

DC: 1-2 DEVELOPMENT AND INTERSECTIONS: Each entry must be accompanied with a model. The suggested material is stiff paper fastened with tape or glue. The model may be painted to appear as metal as desired. The model must be attached to the drawing.

DC: 1-3 FILLETS AND ROUNDS: May be represented only by curved or straight lines on any drawing for clarity.

DC: 1-4 AEROSPACE: Aerospace is defined as anything for an aeronautical purpose or application. This may include actual aircraft or spacecraft, aircraft/spacecraft parts or projects (flight or non-flight) for NASA H.U.N.C.H. (High Schools United with NASA to Create Hardware).

FREE HAND LETTERING: Is to be used except for CADD and INK drawings. All pencil drawings must have free hand lettering except for preprinted title block.

WORKING DRAWINGS: shall consist of the following: Multi-view drawings with dimensions necessary for manufacture, and other views such as: isometric, sections, exploded views, assembly views, charts, and notes are acceptable.

Pictorials (exploded) can be used as needed for clarity.

Working drawings may include exploded assemblies/ pictorials/ rendering to describe the various elements of the working drawings. The pictorials/ exploded assemblies may be rendered/ shown.

MULTIPLE SHEETS: Drawing sets should be fastened together along the left edge.

PICTORIAL: Pictorial drawings do not have to be dimensioned.

RENDERING: Rendering or shading permitted for pictorials and presentations unless otherwise noted.

Pictorials on working drawings can be shaded and/or rendered.

TITLE BLOCK: Title blocks may contain ONLY the following information: STUDENT NAME, UNIQUE STUDENT ID NUMBER, AND CLASSIFICATION NUMBER. **NO SCHOOL LOGOS ALLOWED.**

STUDENT CREATED LOGOS THAT ARE NOT ASSOCIATED WITH A SCHOOL MASCOT/LOGO ARE ALLOWED

ALL drawings except Presentation Drawings MUST be plain printed. Presentation Drawings may be laminated or mounted, as long as the outside dimension of the matting or lamination does not exceed the drawing size by more than 1/2 " on any edge. Blank or Mylar cover sheets are allowed on Presentation Drawings.

The bold face word CADD means CADD ONLY. ALL WORK MUST BE DONE IN CADD

NOTE: ALL MANUAL DRAWINGS CAN BE EITHER PENCIL OR INK.

UNIQUENESS OF STUDENT WORK

ALL ENTRIES MUST BE 100% STUDENT ORIGINAL WORK. NO
DOWNLOADED FILES/WORK - IN FULL OR PARTIAL.

All student entries **MUST** be made from a single unique native file. Using a single electronic file to produce multiple contest entries is forbidden. Each project must be unique in both the final product and any associated electronic file regardless of file type.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

ENGINEERING DESIGN

For the Engineering Section this category: symbols, lettering, and standards should be used as appropriate. Common industrial practices and time savers may be used. Shading, rendering and coloring may be used in presentation drawings and pictorials on working drawings.

	Individual Entry	Team Entry
Sketching/Free hand - May be Single or Multi-Part. May be Single View or Multi-View. Pictorial allowed. Only hand rendering allowed.	HP7000	NA
Mechanical/Technical Drafting (pencil or ink) - May be Single or Multi-Part. May be Single View or Multi-View. Pictorial allowed. Only hand rendering allowed.	HP7002	NA
Working drawing of single part includes pictorial CADD	HP7004	NA
Working drawing of single part (Refer to DC-1:1) CADD	HP7006	NA
Development and intersection drawing CADD (Refer to DC-1:2)	HP7008	NA
Working drawing of jigs and fixtures CADD	HP7010	NA
Working drawing of gears, cams, lever, etc. CADD	HP7012	NA
Working drawing: Pipe fabrication (Fluid transportation) CADD	HP7014	NA
Working drawing of a transportation device CADD	HP7016	NA
Mechanical/Technical Drafting (pencil or ink) - Working Drawing - May be Single or Multi-Part: Pictorial allowed. Only hand rendering allowed.	HP7018	NA
Working drawings of multiple machine or mechanical 2 - 5 parts CADD	HP7020	HP7021
Working drawings of multiple machine or mechanical 6 -12 parts CADD	HP7022	HP7023
Working drawings of multiple machine or mechanical 13 or more parts CADD	HP7024	HP7025
Working drawing: Electrical/electronic (Note: NO BUILDING ELECTRICAL WIRING PLAN. EXAMPLE: electronic device with a schematic wiring diagram but not limited to this example.)	HP7026	HP7027
Working drawing: Electrical/electronic (Note: NO BUILDING ELECTRICAL WIRING PLAN. EXAMPLE: electronic device with a schematic wiring diagram but, not limited to this example). CADD	HP7028	N/A
Mechanical/Technical Drafting (pencil or ink) - Pictorial - May be Single or Multi-Part: Only hand rendering allowed.	HP7030	NA
Pictorial Drawing Single Part – no rendering (Refer to DC-1:3) CADD	HP7032	N/A

ENGINEERING DESIGN (continued)

	Individual Entry	Team Entry
Pictorial Drawing of multiple machine or mechanical 2 - 5 parts CADD – no rendering (Refer to DC-1:3)	HP7034	HP7035
Pictorial Drawing of multiple machine or mechanical 6 - 12 parts CADD – no rendering (Refer to DC-1:3)	HP7036	HP7037
Pictorial Drawing of multiple machine or mechanical 13 or more parts CADD – no rendering (Refer to DC-1:3)	HP7038	HP7039
Mechanical/Technical Drafting (pencil or ink) - Presentation - May be Single or Multi-Part: Only hand rendering allowed - no airbrush.	HP7040	NA
Presentation drawing of a transportation device. CADD	HP7042	HP7043
Presentation drawing of single part CADD .	HP7044	HP7045
Presentation drawing of multiple part CADD . 2 to 5 parts	HP7046	HP7047
Presentation drawing of multiple part CADD . 6 - 12 parts	HP7048	HP7049
Presentation drawing of multiple part CADD . 13 or more parts	HP7050	HP7051
Working Drawings for a Reverse Engineered Project -- Single Part Mechanical Drafting or CADD - Documentation must include picture of original object as well as original notes containing measurements obtained using calipers, micrometers,etc..	HP7052	NA
Working Drawings for a Reverse Engineered Project -- Multiple Parts Mechanical Drafting or CADD - Documentation must include picture of original object as well as original notes containing measurements obtained using calipers, micrometers,etc..	HP7054	HP7055
Aerospace Drawing: Mechanical Drafting or CADD - See DC1-4	HP7056	HP7057
Presentation Drawings of Space Structure: Mechanical Drafting or CADD	HP7058	HP7059
Pictorial Drawings of Space Structure - Mechanical Drafting or CADD	HP7060	HP7061
Working Drawings of Space Structure - Mechanical Drafting or CADD	HP7062	HP7063
Computer generated original 3-D Engineering - USB Drive ONLY - .MOV (Quick Time) or MPEG Format only	HP7064	NA
Animated Mechanical movement - 60 Sec. Max - USB Drive ONLY - .MOV (Quick Time) or MPEG Format only	HP7065	NA
Animated Transportation Device – 60 Sec. Max - USB Drive ONLY - .MOV (Quick Time) or MPEG Format only	HP7066	NA
Engineering Presentation Animation : Multiple part animation (Note: This category is reserved for students working with 3-D applications, Advanced Modeling and some of the Animation software - Max 5 min. USB Drive ONLY - .MOV (Quick Time) or MPEG Format only	HP7067	NA
Multimedia Presentation of a single machine part. (3-D drawing digital presentation)	HP7068	NA

ARCHITECTURAL DESIGN

For the Architectural Graphics portion of this section: American Institute of Architects or the Architectural Graphic Standards should be used as needed. Common industrial practices and timesavers may be used. Shading, rendering and coloring may be used.

NOTE: ALL MANUAL DRAWINGS CAN BE EITHER PENCIL OR INK.

ALL FINISH (RENDERING) IS PENCIL UNLESS NOTED. No limit to number of sheets.

	Individual Entry	Team Entry
Sketch drawing - Any Architectural subject - Shading Allowed - pencil (black & white)	HP7100	NA
Presentation Sketch drawing - Any Architectural subject - Floorplan and Front Elevation required - Shading Allowed - (color)	HP7101	NA
Tiny House: A tiny house is defined as a structure on a trailer that includes living area, kitchen, sleeping area and a full bath. Max trailer size is 8'X24' - bumper pull or gooseneck. Max overall height 13'6". Must draw both structure and trailer.	HP7102	HP7103
Tiny House: A tiny house is defined as a structure on a trailer that includes living area, kitchen, sleeping area and a full bath. Max trailer size is 8'X24' - bumper pull or gooseneck. Max overall height 13'6". Must draw both structure and trailer. CADD	HP7104	HP7105
Mechanical Drafting - Residential Structure: Working Drawing of any residential structure - pencil and/or ink allowed.	HP7106	HP7107
Mechanical Drafting - Commercial Structure: Working Drawing of any commercial structure - pencil and/or ink allowed.	HP7108	HP7109
Working drawings of Residential home under 2000 sq. ft HVAC 2D CADD ONLY	HP7110	HP7111
Working drawings of Residential home under 2000 sq. ft HVAC 3D CADD ONLY	HP7112	HP7113
Working drawings of Residential home over 2000 sq. ft HVAC 2D CADD ONLY	HP7114	HP7115
Working drawings of Residential home over 2000 sq. ft HVAC 3D CADD ONLY	HP7116	HP7117
Working drawings of Residential Multistory single family home under 2000 sq. ft HVAC 2D CADD ONLY	HP7118	HP7119
Working drawings of Residential Multistory single family home under 2000 sq. ft HVAC 3D CADD ONLY	HP7120	HP7121
Working drawings of Residential Multistory single family home over 2000 sq. ft HVAC 2D CADD ONLY	HP7122	HP7123
Working drawings of Residential Multistory single family home over 2000 sq. ft HVAC 3D CADD ONLY	HP7124	HP7125
Working drawings of Apartment, Condo, Townhouse, Duplex, etc. 2D CADD ONLY	HP7126	HP7127
Working drawings of Apartment, Condo, Townhouse, Duplex, etc. 3D CADD ONLY	HP7128	HP7129
Recreational facility (sheets as needed) 2D CADD ONLY	HP7130	HP7131
Recreational facility (sheets as needed) 3D CADD ONLY	HP7132	HP7133
Commercial or public structure (sheets as needed) 2D CADD ONLY	HP7134	HP7135
Commercial or public structure (sheets as needed) 3D CADD ONLY	HP7136	HP7137
Working drawing of electrical system Architectural (Ex: Phone System, Audio System, Fire Alarm, and/or Security System. NOT Electrical Floor Plan) CADD	HP7138	NA
Remodeling drawings (number sheets as needed)	HP7140	NA
Remodeling drawings (number sheets as needed) CADD	HP7142	NA
Construction detailing (All types of typical details that are used in the construction of a building - 1 sheet)	HP7144	NA
Construction detailing (All types of typical details that are used in the construction of a building - 1 sheet) CADD	HP7146	NA
Civil construction: (EXAMPLE: Tunnel, dam, bridge, or transportation systems, etc. sheets as needed)	HP7148	HP7149
Civil construction: (EXAMPLE: Tunnel, dam, bridge, or transportation systems, etc. sheets as needed) CADD	HP7150	HP7151
Topographic/Surveying drawings (number of sheets as required)	HP7152	HP7153
Topographic/Surveying drawings (number of sheets as required) CADD	HP7154	HP7155

ARCHITECTURAL DESIGN (continued)		
	Individual	Team
	Entry	Entry
Architectural Landscape Plan (Number of sheets as needed) Should include underground sprinkler plan.	HP7156	HP7157
Architectural Landscape Plan (Number of sheets as needed) CADD Should include underground sprinkler plan..	HP7158	HP7159
Presentation drawing (1 sheet) Residential - Exterior View & Floor Plan ONLY (rendered in any way except Airbrush or computer)	HP7160	NA
Presentation drawing (1 sheet) Residential - Exterior View & Floor Plan ONLY (rendering method computer only) CADD	HP7162	NA
Presentation drawing (1 sheet) Commercial/Public - Exterior View & Floor Plan ONLY (rendered in any way except Airbrush or computer)	HP7164	NA
Presentation drawing (1 sheet) Commercial/Public - Exterior View & Floor Plan ONLY (rendering method computer only) CADD	HP7166	NA
Presentation drawing (1 sheet) Architectural - Exterior View & Floor Plan ONLY (Airbrush only)	HP7168	NA
Presentation drawings of Master plan development showing streets, property subdivisions, public use areas, utility locations, easements, contours and development themes.	HP7170	NA
Presentation drawings of Master plan development showing streets, property subdivisions, public use areas, utility locations, easements, contours and development themes. CADD	HP7172	NA
Energy Conservation Design: Must include one or more applications of active, passive earth sheltered, hybrid, envelope, or other energy saving designs elements. (Number of sheets as needed)	HP7174	NA
Energy Conservation Design: Must include one or more applications of active, passive earth sheltered, hybrid, envelope, or other energy saving designs elements. (Number of sheets as needed) CADD	HP7176	NA
Computer generated original 3-D Landscape	HP7178	NA
Computer generated original 3-D Architecture	HP7179	NA
Walkthrough Architecture – between 60 Sec and 90 seconds	HP7180	NA
Flythrough Architecture – between 60 Sec and 90 seconds	HP7181	NA
Walkthrough Landscape – 60 Sec. max	HP7182	NA
Flythrough Landscape – 60 Sec. max	HP7183	NA

CONSTRUCTION, MODELING & DESIGN CATEGORY

Items in this category involve projects in which students created and designed structures, models, used commercial kits, or highlighted the design process.

Judging criteria for production will be based on the following areas: degree of difficulty, appearance, finish, and craftsmanship. Material used is calculated as item as displayed.

MAXIMUM BASE SIZE for models: 30" x 42" (unless otherwise stated)

Model must have hard copy of plan view (A bird's eye view of the ground floor)

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

MODELS - Architectural

This category is for finished models with detailing, full landscaping, sidewalks, trees, cars, people, etc.

Individual Entry

A model of a residential single or multifamily unit	HP7200
A model of an Apartment, Condo, Townhouse, Duplex, etc.	HP7201
A scale model of residential structure not previously listed	HP7202
A model of a Master plan development.	HP7203
A scale model of a commercial structure	HP7204
A scale model of a civil structure	HP7205
A model or display of an automated security or environmental control system	HP7206
A working model of a subsystem	HP7207
A model of a space structure	HP7208
A model of a space based production system	HP7209
A model of an automated facility for manufacturing a product	HP7210
A model of a Recreational facility.	HP7211
Structural Model Residential home (using appropriate scale, material and keeping with current framing standards)	HP7212
A model of a mechanical device/system	HP7213

STUDY MODEL

A study model is similar to the type used by architects for site design and planning. Suggested materials: cardboard, foam board, Styrofoam, paper, plastic, balsa wood, and glue. This model is to be unfinished, no landscaping or finishing methods allowed (only structure and typography)

All study models are a maximum of 24"x36" unless otherwise specified.

Individual Entry

Study Model Residential	HP7214
Study Model Commercial (Removable roof not required.)	HP7215

KITS

Entries made from commercial kits. **NO TEAM ENTRIES - INDIVIDUAL ONLY**

	Individual Entry
Kits—woods	HP7216
Kits—metals	HP7217
Kits—Electrical/electronics	HP7218
Kits—other	HP7219

INTERIOR DESIGN

Projects will be judged on the basis of design: function, color, texture, balance, etc. on a maximum 24"X36" board. The project should be accompanied by data that has (1) complete floor plan set, (2) furniture placement, (3) color pallate samples, (4) finish sample board. A design **MUST BE** be entirely the original work of the student.

	Individual Entry	Team Entry
Residential	HP7220	HP7221
Commercial	HP7222	HP7223

APPLIED TECHNICAL SCIENCE CATEGORY

DISPLAYS/PORTFOLIOS: The use of photographs, videos, maps, charts, schedules, safety information and other media is encouraged to communicate the message of the entry. The minimum documentation requirement must be an integral part of the display/portfolio.

Entries must be complete and in safe operating condition. All devices and products must be displayed, where feasible, in such a manner as to allow internal inspection of workmanship. High voltage components and potentially dangerous areas must be covered and labeled.

REQUIRED MINIMUM DOCUMENTATION:

Documentation should be attached to the back projects or least conspicuous location as possible.

The following is required for BOTH Level 1 & Level 2 entries:

Documentation **MUST** be computer generated on the required form found in Part 2: Rulebook Forms of the Texas TSA Rules Book. Sketches are allowed on otherwise computer generated forms. If additional room is needed for lists or other documentation, one additional copy of the Documentation Form may be attached. **Documentation is required for ALL entries.** Deductions can only be applied for lack of content, quality of writing, neatness, completeness of drawings, etc. unless otherwise noted. **NO SCHOOL LOGOS ALLOWED!**

Documentation can be housed in clear plastic page protector or folder. No 3-Ring Binders unless specified by NQE or other rules.

MULTIDISCIPLINARY

	Individual Entry
A comprehensive display encompassing selected learning activities interfacing at least two school disciplines. (<i>Math, Science, English, etc.</i>)	HP8000
A comprehensive display encompassing selected learning activities interfacing more than four school disciplines, (<i>Science, Math, etc.</i>)	HP8001

AERODYNAMICS

	Individual Entry
Develop and produce airfoils for the following. Provide drag and lift test results for each airfoil. Document the research of the air foil aerodynamics.	
Air foil testing for automobile	HP8002
Air foil testing for airplane	HP8003
Air foil testing for rockets	HP8004
Develop a portfolio that explains the process of flying including checklist for preflight, during flight, post-flight, flight plans and pilot log	HP8005
Static display showing principles or mechanics of flight	HP8006

CONSTRUCTION TECHNOLOGY

	Individual Entry
Home/commercial building - static display of a partial model that demonstrates the use of structural concepts.	
Display the use of construction products, processes, or techniques	HP8007
A display of a full size construction structure	HP8008
A display of an organizational chart for a construction company including job descriptions for each position	HP8009
A display to illustrate the difference 2 or more types of structures	HP8010
A display of a study of the types, grades, and strength of selected materials used in construction. (Metal, wood, polymers, others)	HP8011

ELECTRONICS/ELECTRICAL

These entries do allow kits in each classification.

	Individual Entry
A schematic diagram of wiring installations, residential or commercial, must include location, local wiring code and proof of compliance with code	HP8012
A display of electrical energy storage device	HP8013
A display of electronic communications devices (radio, TV, telephone etc.)	HP8014
A display of electronic communication systems	HP8015
A display of properties of electrical/electronic components, not-semiconductor	HP8016
A display of properties of electrical/electronic components, semiconductor	HP8017
A display of applications of electrical robots	HP8018
Residential Wiring	HP8019
Residential Wiring A schematic diagram of wiring installations, residential or commercial, must include location, local wiring code and proof of compliance with code	HP8020
Production of electrical/electronic motor	HP8021
Production of alarm circuits	HP8022
Production of audio systems	HP8023
Production of games/toys	HP8024
Production of communication device	HP8025
Production of electrical/electronic testing device	HP8026
Production of student-made printed circuit boards	HP8027
Production of logic circuits	HP8028
A model to display the generation of electrical energy from alternate sources	HP8029
A model to display the conservation of electrical energy	HP8030
A model of electrical distribution/transmission	HP8031
A student fabricated electronic device (non-kit)	HP8032
Power efficiency study. A display of the test results of a comparison study of electrical usage of at least five different items. Display must include statement of problem to be researched, results should outline electric usage in kWh amps, voltage drop, and time. Research would determine cost of kWh in test area and determine cost use during test time for each item	HP8033
Computer interfacing and /or instrumentation	HP8034

ENERGY, POWER, & TRANSPORTATION

Static displays that demonstrate the extraction, processing, transferring, controlling and / or use of the following:

	Individual Entry
Solar energy	HP8040
Power generation	HP8041
Electrical energy	HP8042
Hydraulics	HP8043
Pneumatics	HP8044
A display or the application of national safety codes	HP8045
A display about fuel resource, exploration, extraction, processing and utilization	HP8046
A display about energy Safety	HP8047
A display of energy conservation	HP8048
A display about the generation of electrical energy from fossil fuels	HP8049
A display about the generation of electrical energy from nuclear fuels	HP8050
A display about the generation of electrical energy from alternate sources	HP8051
A display about the application of energy from alternate sources	HP8052
A display about the conversion of electrical energy into power	HP8053
A display about distribution of electrical energy	HP8054
A display about distribution transmission storage of energy	HP8055
A display of the results of a comparison of an energy device which includes problem statement, testing guidelines and identifies the variables. The labeled example must identify the source, transmission and control of energy. (ex: solar cooker)	HP8056
A display of internal combustion engines to show principle, utilization, restoration, and impact	HP8057
A display about external combustion engines to show principle, utilization, restoration, and impact	HP8058
Rebuilt single cylinder engine. List of procedure, bill of parts, and time sheet are required documentation	HP8059
External/internal combustion engines - operation and maintenance Running - Maximum 5 horsepower	HP8060
External/internal combustion engines - operation and maintenance. Static display	HP8061
Transmission device - operational	HP8062
A display of principles, utilization and impact of fluid power systems	HP8063
A display of principles, utilization and impact of mechanical power systems	HP8064
A display of principles, utilization and impact of power systems	HP8065
Mechanical/fluid energy power devices - operational and maintenance	HP8066
A display about a career in the power / energy field	HP8067
A display about a career in the transportation field	HP8068
A display about the factors that effect the purchase and use of energy products	HP8069
A display about the factors that effect the purchase and use of power products	HP8070
A display about the marketing of power, energy, or transportation product or service	HP8071
A display about highway transportation	HP8072
A display about railway transportation	HP8073
A display about air or space transportation	HP8074
A display about pipeline transportation	HP8075
A display about water transportation	HP8076
A display of the results of a comparison of an transportation device which includes problem statement, testing guidelines and identifies the variables. The labeled example must identify the source, transmission and control of energy. (ex: air rocket)	HP8077

ENERGY, POWER, & TRANSPORTATION (continued)

Static displays that demonstrate the extraction, processing, transferring, controlling and / or use of the following:

	Individual Entry
A display about the factors that effect the purchase and use of transportation products	HP8078
Transportation system - industrial, land, air, sea	HP8079
An application of energy or power to solve a problem	HP8080

MANUFACTURING

	Individual Entry
A comprehensive display of students assembly and or maintenance of production machines and or equipment.	HP8081
A display of an organizational chart for a manufacturing company including job descriptions for each position	HP8082
A display of a study of the types, grades, and strength of selected materials used in manufacturing. (<i>Metal, wood, polymers, others</i>)	HP8083
A display of several production career opportunities including; (a) employment opportunities, (b) education or training needed, (c) job descriptions, (d) effective methods of securing jobs, and (e) future long term employment outlook	HP8084
A display of an entrepreneur production venture which must include; (a) minimum, (b) organizational chart, (c) sales forecast, (d) market survey, (e) two product samples	HP8085
A display to demonstrate computer applications in production systems	HP8086

MATERIALS

	Individual Entry
A display of materials testing	HP8087

LASERS

	Individual Entry
A display that demonstrates the use of the light energy through the use of a laser emitting device. SAFETY GLASSES REQUIRED FOR JUDGES.	
Laser generation	HP8088

BIOTECH

Activities entered in this classification must have portfolio documenting research in the area and illustrate or explain a method for solving the problem.

	Individual Entry
Biotech health portfolio	HP8089
Display of nanotech technology	HP8090
Display of Hydroponics technology	HP8091
Display of ergonomics,	HP8092
Display of other Biotech research activity	HP8093

ROBOTICS/PROGRAMMING

This section gives schools with robotics programs a place for their students to show/display their work/efforts. Display area not to exceed a space that is 4 feet wide x 18 inches deep and 4 feet tall. Projects may include the use of LEGO, VEX or Fisher Technique robotic kits.

	Entry
Robotic programming (must have printout of program with entry) teach pendant method	HP8094
Robotic programming (must have printout of program with entry) any computer based program—i.e., C++, Java, etc...	HP8095
Robot using two sensors and only 1 controlling unit	HP8096
Robot using 3 – 4 sensors and only 1 controlling unit	HP8097
Robot using 3 – 4 sensors and 2 or more controlling units	HP8098
Robot using 5 or more sensors and only 1 controlling unit	HP8099
Robot using 5 or more sensors and 2 or more controlling	HP8100
Static display of a robotic application that moves materials/parts for delivery to an assembly line or inventory area*	HP8101
Static display of a robotic application that welds materials or assembles parts for a product*	HP8102
Static display of a robotic application that involves working with a hazardous material or safety application*	HP8103
Static display of a robotic application not mentioned above*	HP8104
B.E.S.T. Robot display: must include the robot (may or may not be in working condition), engineering notebook from the contest, photos and/or DVD of the robot in action at actual event.	HP8105
F.I.R.S.T. Robot display: must include the robot (may or may not be in working condition), engineering notebook from the contest, photos and/or DVD of the robot in action at actual event.	HP8106
F.T.C. Robot display: must include the robot (may or may not be in working condition), engineering notebook from the contest, photos and/or DVD of the robot in action at actual event.	HP8107
VEX Robot display (not the TSA NQE VEX event): must include the robot (may or maynot be in working condition), engineering notebook from the contest, photos and/or DVD of the robot in action at actual event.	HP8108
Other robot system application not listed above The display must include photos and/or DVD of the robot in action at actual event.	HP8109
Remote Operated Vehicle Display (Underwater Robotic R.O.V.)	Entries Per Region
	3
	High School
	HP8110

			Individual Entry
Entries Per Region			
SAFETY POSTER		3	HP8111

A poster to illustrate safety principles in the classroom environment or in the workplace.

Poster Sizes allowed: 18x24, 22x28, or 24x36 (sizes are in inches)

Safety posters may be computer generated / printed.

Posters cannot be framed but can be laminated.

			Individual Entry
Entries Per Region			
CLUB T-SHIRT		3	HP8112

A display of one T-shirt, designed and produced for club members to wear. No copy writing will be allowed.

SCHOOL DISPLAY

Entries may be for exhibit only and awards may or may not be earned as determined by contest judges. Student must tell the contest coordinator if the entry is "For Judging" or "For Display Only" prior to judging. A team must have produced a product or solved a technological problem. Individual projects are not entered in these classifications. The contest director may refuse entry of a school display due to safety or space availability. School Displays must be approved by the contest director, **two weeks prior to state contest**.

			Individual Entry
Entries Per Region			
Activities in more than two curriculum areas		15	HP8113
Communication Technology		15	HP8114
Power/Energy/Transpiration		15	HP8115
Manufacturing/Construction		15	HP8116
Bio-Tech		15	HP8117