Welcome to the World of CO2 Cars

Introduction:

Imagine that you are in charge of researching, designing, and building a state of the art CO2 dragster car. Oh wait you are!! If you were given the materials to start this project today, without reading any further, it would be very difficult. This web quest is designed to focus on the fundamentals of CO2 cars. You will also be looking at different designs and types. As you know, this is a competition project where the best car wins!! Let the games begin!

Your final designs must follow the specifications in the Technology Student Association Guidelines—**below.** The fastest cars from Palm Bay HS and the students who made them, go to the State TSA conferences in April in Orlando and June in Baltimore Maryland.

Task:

In this activity you will be visiting and investigating web sites that will give you an insight on CO2 cars. When you are finished with this web quest you will be able to:

- Identify what a CO2 car is
- Explain the different types of cars
- Relate to terms used in classroom discussion
- Understand the different steps in the construction of a CO2 car
- Design a competitive CO2 car based on your findings and research

Resources:

Below are web sites that can be useful to look at car types, construction, terms, and possible design ideas. Take your time and explore the different sites to better familiarize yourself with CO2 cars.

First for some background info:
http://filebox.vt.edu/users/sfagg/teched/pdf/dragster.pdf
How are they built? At this site use the forward arrow and navigate through the steps of constructing a CO2 car.
http://www.science-of-speed.com/building.asp?id=33

Glossary
http://www.science-of-speed.com/glossary.asp?id=147

Showroom

http://skyview.billings.k12.mt.us/departments/teched/images/Co2%20web%20page/Co2%20web%20page.html
http://web.westbloomfield.k12.mi.us/abbott/staff/maike/co2info.html

Electronic Worksheets-already printed and ready for you
CO2 Car Types http://www.educatingwithtechnology.com/T3mrengland.htm
CO2 Car Design http://www.educatingwithtechnology.com/T3mrengland.htm

Procedures:

1. Start out by doing some investigative research work. Look at the first two sites to get an idea
of how the whole process will work. Knowing what to do when the time comes will make the whole project easier to understand.
2. Take a look at the glossary section and familiarize yourself with some of the terms that will be used in class.
3. When you think you have it down, complete the CO2 Car Types electronic worksheet. To do this you will: COMPLETE THE WORKSHEET PROVIDED

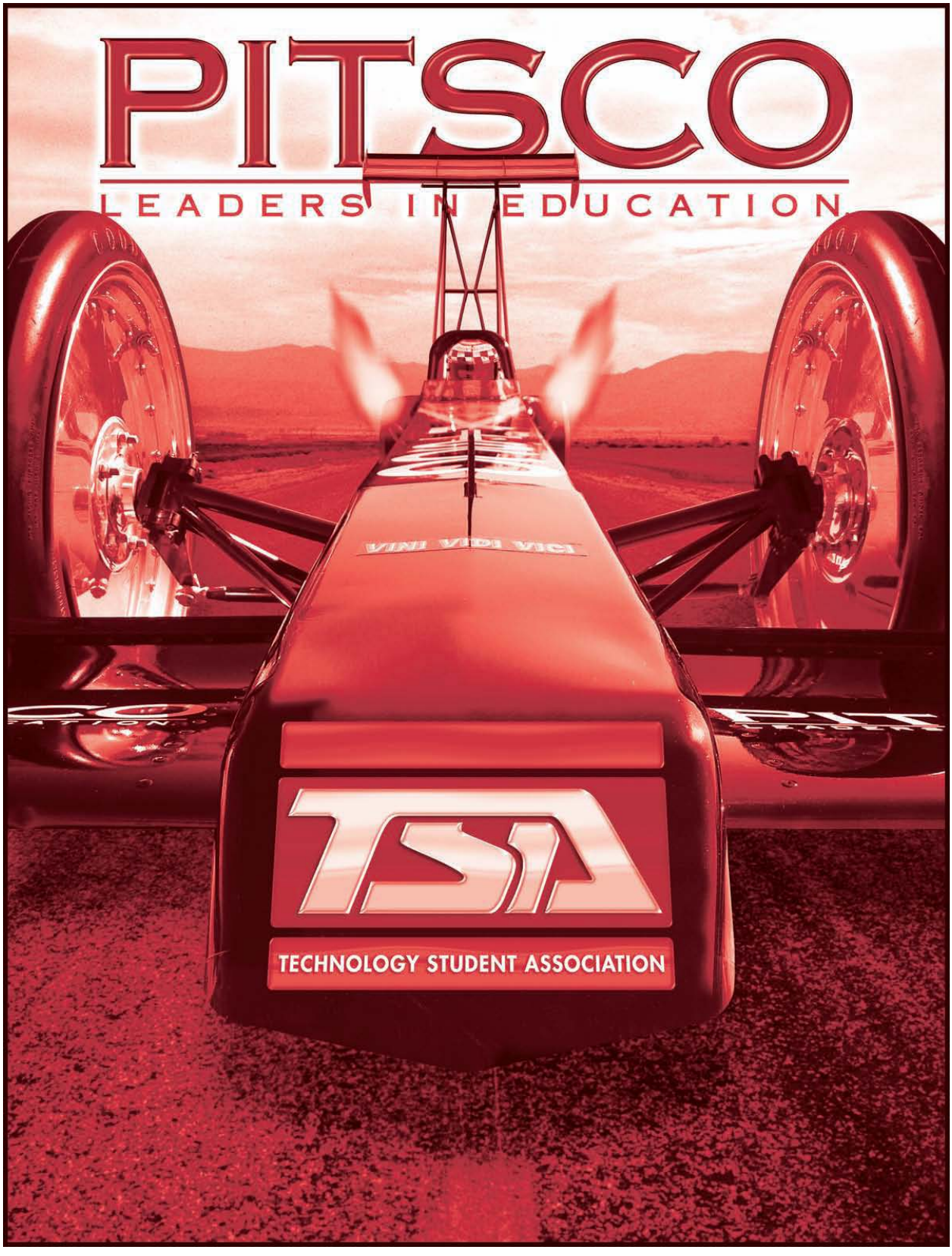
4. After looking at the possible designs for your car (if you need to go back and look at them again, please do) complete the CO2 Car Design electronic worksheet. To do this you will: COMPLETE THE WORKSHEET PROVIDED

REMEMBER NOT TO DRAW THROUGH THE CO2 OPENING!
d. If you do not finish the worksheets in class, they will be homework that will be turned in tomorrow.

Conclusion:

Hopefully after looking at the web sites you have gained a better understanding of CO2 cars. This activity will be a reference for your CO2 car project.

The Activity will be an individual project, you will each have your own car to design, draw and build. You will draw a three view orthographic drawing on metric block graph paper and measured in metrics (you will use this later for a 3D CAD project too).



OVERVIEW

Participants design, produce working drawings, and build a CO_2-powered dragster.

PURPOSE

Participants are limited to two (2) individuals per chapter, one (1) entry per individual.

ELIGIBILITY

Participants are limited to two (2) individuals per chapter, one (1) entry per individual.

TIME LIMITS

A. Entries must be started and completed during the current school year.
B. Each dragster and drawing is submitted at the time and place stated in the conference program.
C. Drawings and cars must be picked up at the specified time upon the conclusion of the event.

ATTIRE

Business Casual dress as described in Competitive Events Attire is the minimum requirement.

PROCEDURE

A. Participants check in their entries at the time and place stated in the conference program.
B. Entries are reviewed by evaluators to determine, among other things, safety on the track.
C. Safe dragsters race for qualifying time on the same lane of the raceway.

D. The top sixteen (16) qualifying cars based on the time trials are evaluated against the criteria for this event.

E. Dragsters that do not meet event regulations are disqualified and lower qualifying cars are moved up until sixteen (16) dragsters that meet specifications are determined.

F. A wind tunnel test is performed to determine relative wind resistance.

G. The top sixteen (16) cars race in a double-elimination format to earn points for the race portion of the event.

H. Drawing and design points are combined with race points to determine the final standings.

REGULATIONS

A. Each entry must be submitted with a full-size metric drawing of the completed vehicle. A two (2)-view (top and side) drawing with metric dimensions is made on paper no larger than 11"x17" drawing paper. Drawings are developed using standard engineering practices and procedures. The drawing may be produced using traditional drafting methods or CAD. The title block includes only the participant's "entry number" that is assigned at registration time and is placed on the entry and drawing during check-in.

B. The official distance between the start line and the finish line on the race track is twenty (20) meters.

C. ***Dragsters that do not meet the following specifications/ tolerances are disqualified from the race.***

Dragster body

DB1. One-piece, all-wood construction. Any type of lamination results in disqualification. No add-ons such as body strengtheners, fenders, plastic canopy, exhausts, or air foils may be attached to or enclosed within the vehicle. Fiberglass and shrink wrap are considered body strengtheners and cannot be used on the car body for any reason. Decals may be used for decoration only; they may not be used to gain an aerodynamic advantage, i.e., decals cannot cover the exterior axle holes or be used to cover open areas of the body. Two (2) or more like or unlike pieces of wood glued together are not considered one-piece, all-wood construction.

MINIMUM MAXIMUM

DB2. Body length..... 200mm.....305mm

☑ Be sure to review the specifications each year, even if you're a regular participant. This event is modified with each new edition of this guide.

DB3. Body height with wheels 75mm

DB4. Body mass (completed car without CO_2) .....(2009) 45g

.....(2010) 60g

DB5 Body width at axles, front and back .....35mm.....42mm

DB6. Vehicle total width (including wheels) 90mm

Axles/axle holes/wheelbase

A1. Dragsters must have two (2) axles per car, no more.

A2. Bottom of axle hole or bearing above bottom of car body (measured at sides) .....5mm.....10mm

A3. Rear axle hole from rear of car .....9mm.....100mm

A4. Wheelbase (axle distance apart at farthest points)..105mm.....270mm

A5. Bearings, bushings and lubricants may be used.

A6. Glue may be used to secure bearings to body.

Spacer washers/clips

S1. Spacer washers 8

S2. Axle clips.....8

S3. Silicone or any other type of glue/adhesive may not be used in place of wheel clips to hold wheels or axles in place.

Power plant (CO_2 cartridge hole)

P1. The power plant hole must be at the farthest point at the rear of the car and must be drilled parallel to the racing surface to assure proper puncture of the CO_2 cartridge. A minimum of 3mm thickness around the entire power plant hole must be maintained on the dragster for safety. The inside of the power plant hole must not be painted.

P2. Hole depth .....48mm.....54mm

P3. Safety zone thickness.....3mm

P4. Chamber diameter .....19mm.....20mm

P5. Lowest point of chamber diameter to race surface (with wheels).....26mm.....40mm

Eye screws

ES1. Dragsters must have two (2) screw eyes per car that meet tolerances, no more. Screw eyes must not make contact with the racing surface. The track string must pass through both screw eyelets, which are located on the center line of the bottom of the car. Glue may be used to reinforce the screw eyes. It is the responsibility of the car designer/engineer to see that the eye screw holes are tightly closed to prevent the track string from slipping out. As with all adjustments, this must be done prior to event check-in.

ES2. Inside diameter .....3mm.....5mm

ES3. Distance apart (at farthest points)..... 150mm.....270mm

Wheels

W1. A dragster must have four (4) wheels, no more. Two (2) wheels must meet rules W2 and W3. The other two (2) must meet rules W4 and W5. All four (4) wheels must touch the racing surface at the same time. All wheels must roll. Wheels must be made entirely from plastic. Dimensions must be consistent for the full circumference of the wheel.

W2. Front diameter .....30mm.....37mm

W3. Front width (at surface contact point) .....2mm.....5mm

W4. Rear diameter .....30mm.....40mm

W5. Rear width (at surface contact point) ..... 12mm.....18mm

D. No repair or maintenance is allowed after the entries have been registered. Any entry damaged during the race is evaluated by the event coordinator to determine whether or not the vehicle is allowed to race again. In the event that the vehicle is damaged by the conference personnel, the event coordinator rules as to whether the vehicle may be repaired by the student entering the vehicle. This is the only reason a student is allowed to touch his/ her vehicle after registration. Undamaged wheels that come off during the event may be replaced as determined by the event coordinator. Damaged wheels may not be replaced.

E. All CO_2 cartridges for the race are provided by national TSA.

☑ Read the General Rules and Regulations in the front of this guide for information that applies to all of TSA's competitive events.