

## 4-H MECHANICS AND DESIGN



Judges will use the criteria outlined in this tip sheet to **evaluate mechanics and design exhibits** that represent a **constructed, repaired, or restored item**.

*Does the above description not quite fit your project?*

If your exhibit is **intended to inform** its audience about a mechanics topic—use the **Poster Exhibits Tip Sheet**.

If your exhibit **represents an engineering solution** to a problem—use the **Engineering Exhibit Tip Sheet**.

If your exhibit **represents a scientific investigation** of a question—use the **Scientific Investigation Tip Sheet**.

If your exhibit **uses technology** to accomplish a task or render a service—use the **Using Technology Tip Sheet**.

## What's the judge looking for?

**For all exhibits, be prepared to explain:**

- 1) What did you plan to learn or do? (What was your exhibit goal(s)?)
- 2) What steps did you take to learn or do this? Explain what you wanted to do so it is easily understood. The judge wants to know and understand the steps you used to make your exhibit.
- 3) What were the most important things you learned?

### Automotive

- Overhauling, rebuilding, and repairing should be correctly done, including accurate information about the process.
- Mechanical procedures used should be appropriate. Paint should be of proper type and free from runs and sags. Engines should start easily and run smoothly.
- Proper safety precautions should be taken; safety shields and guards should be used where needed. Shielding of mechanical and electrical components should conform to customary automotive practice. Original or equivalent, or current replacement safety signs, shall be in place and legible.
- All electrical wires should be correctly routed, secured and protected from mechanical damage.
- If restoration to original condition is the goal, it should be as authentic as possible, including color of paint, accessories, parts, etc.

### Small Engine

- Replacement parts should be properly installed and identified. Information should be included about repairs made.
- Engine should start easily and run smoothly. (Fuel tank should contain a minimum amount of fuel.)
- All safety shields must be in place and the engine should present no hazards to the operator.
- If a new finish has been applied, it should be even, without streaks, runs or blisters.
- Decals should be smooth and straight.

**4-H**  
GROWING TOGETHER



## Electric/Electronics

- Plans, either original or commercial, should be included and followed correctly. Parts should be constructed and located according to the plans.
- The wiring diagram should be shown in the plans. The wiring circuit should follow the plans and meet the requirements of electric codes.
- All wires and other electrical components should be intact and safe from becoming damaged or causing an electrical safety hazard.
- Wiring connection should be neat, tight, and appropriate for the use.
- Electric motors, switches, control relays, and equipment operated by electric motors should be compatible with voltage, amperage, horsepower, and speed.
- Power cords must have grounded connectors (3-prong plug or polarized 2-prong plug). The type and size of the wire must be proper and adequate for the electrical use and load.
- If possible, electric and electronic exhibits should be operable for judging purposes. If necessary, include operating instructions.

## Tractor

- Overhauling, rebuilding, and repairing, should be correctly done, including accurate information about the process.
- Mechanical procedures used should be appropriate. Paints should be of proper type and free from runs and blisters. Engines should start easily and run smoothly. (A minimum amount of fuel should be in the tank.)
- All original shields must be in place. Exposed moving parts shall be shielded if there is a safety hazard. Attachments that create a safety hazard, such as a PTO shaft adaptor, i.e., 1000 RPM replaced by 540 RPM, will not be permitted.
- All safety related functions, such as brakes, lights and the neutral start circuit, shall be operational, if applicable.
- All electrical wires shall be correctly routed, secured and protected from mechanical damage.
- Highway lighting and marking equipment shall be in place and operational, if applicable, when possible use includes operation on public right of way.
- Original or equivalent, or current replacement safety signs, including slow moving vehicle signs, shall be in place and legible.

## Welding

- Plans should be used and construction should follow the plans.
- There should not be excessive slag or spatter or dirt present. Grinding or chisel marks on bead should not be evident. The surface of the metal should have been cleaned before welding with a wire brush so that any paint or rust is removed and the metal is exposed.
- Butt weld in thicker metals should be beveled so that a V is formed when the edges are fitted together.
- The joints should fit squarely with the welds properly placed and fused into joined parts. Each weld must be as strong as the strength of the parent material.
- Bead should be smooth and of uniform width and correct height. (Bead starts are sometimes too hot or too cold, bead height is sometimes too high or too low. Bead should not be sawed off on either end. Excessive amperage can cause undercut edges.)
- Quality material should be used. Metal compatibility should be taken into account