

A large, vibrant red splatter graphic that serves as a background for the word 'Artisan's'. The splatter has several smaller red droplets extending from its edges.

Artisan's

A rectangular metal plate with a grey, metallic texture. It features four hexagonal bolts at the corners and a series of small black arrows pointing outwards from the edges of the plate. The word 'ASYLUM' is written in a bold, black, blocky font across the center of the plate.

ASYLUM



Introduction to Steel Fabrication

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Why Steel?



- **Top priorities for hexapod structure:**
 - 1. Strength at scale**
 - 2. Availability/Affordability**
 - 3. Manufacturability**
 - 4. Analyzability**
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Advantages of Steel



- **Highest strength conventionally available**
 - **Easily weldable**
 - **Machineable... ish**
 - **Widely available in large quantities**
 - **Cheaper than most other metals**
 - **Fatigues in a predictable way**
 - **Welds are as strong as parent material**
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Disadvantages of Steel



- **Heavy as hell**
 - **Slow to machine/cut/modify**
 - **Unstable in plain form (rusts over time)**
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Steel



- **Some alloys we will be using:**
 - **1018 Mild Steel**
 - **Most common, lowest strength (1.5x stronger than aluminum), relatively easy to form**
 - **12L14 Free Machining**
 - **Tougher than 1018, easiest to machine due to .25% lead**
 - **A36 Steel**
 - **Weakest steel, lowest yield point – would prefer if we didn't use any, but most commonly used in angles**
 - **A513 (1020-1026) Steel**
 - **Stronger than 1018, used in steel forms such as angles and tubes**
 - **4130 Chromoly**
 - **Strongest steel, used in high-end thin-wall tubing**
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Steel



- **Rolling:**

- **All steel is rolled or formed into shapes**

- **Hot Rolled:**

- **Steel is above recrystallization temp when rolled**
 - **Poorer finish, weaker, but better stability**
 - **Used in angles and square and rectangular tubes**

- **Cold Rolled:**

- **Steel is below recrystallization temp when rolled**
 - **Shiny finish, stronger, more prone to warping**
 - **Used in bars and round tubes**
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Common Steel Shapes



Angle



Square/Rectangular Tubing



Round Tubing



Channel

Weldments

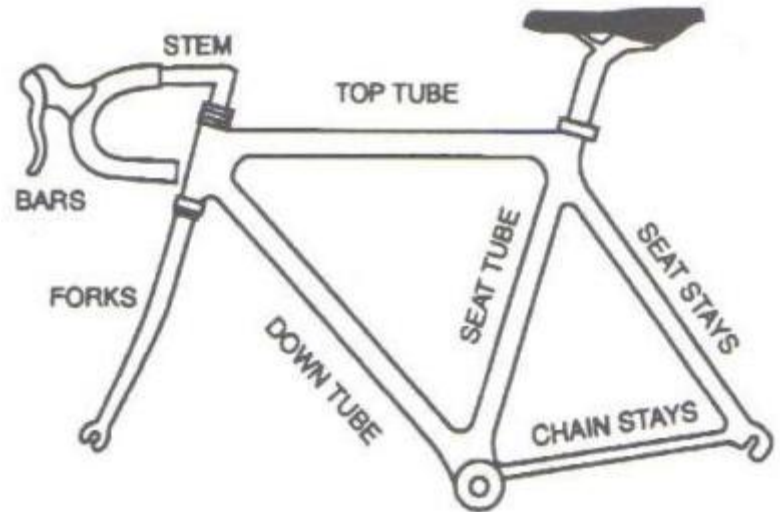


Weldment: Assembly of parts welded together

Weldment Advantages



- **Low part count**
 - **High robustness**
 - **Geometrical strength**
 - **Relatively low weight**
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Weldment Disadvantages

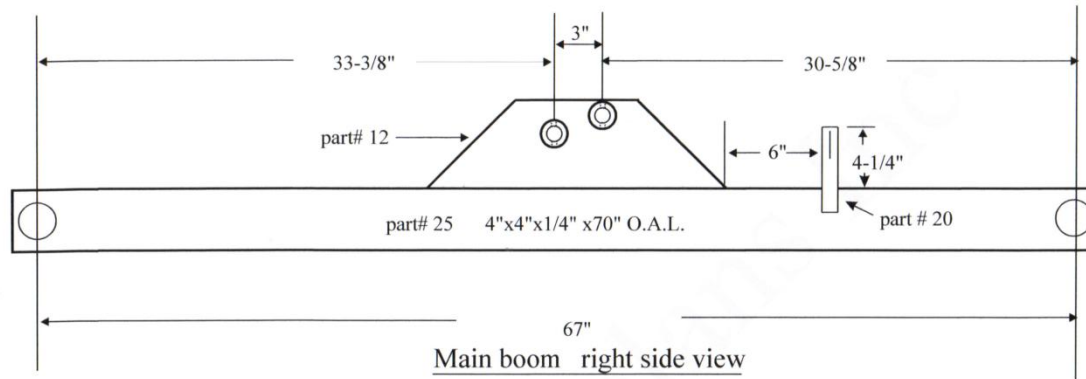


- **Time consuming**
 - **Low accuracy and precision**
 - **All repairs are ad hoc**
 - **Almost impossible to significantly change designs once made**
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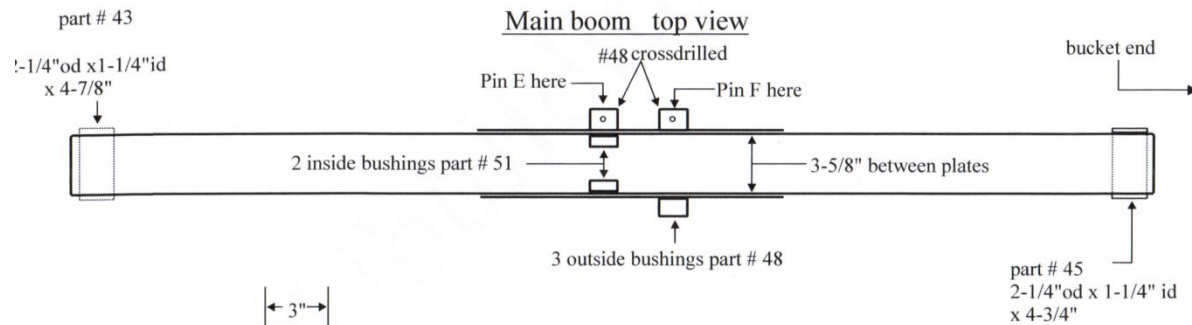
Case Study: Ground Hawg



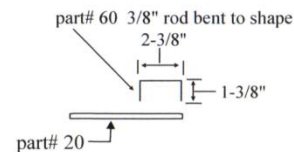
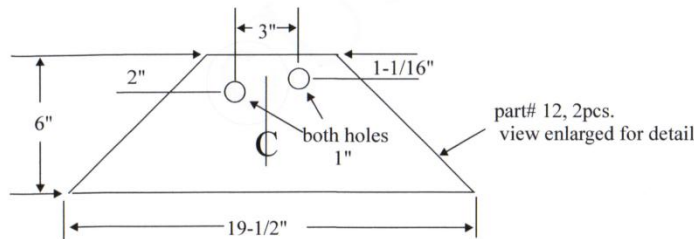
Case Study: Ground Hawg



Main boom right side view

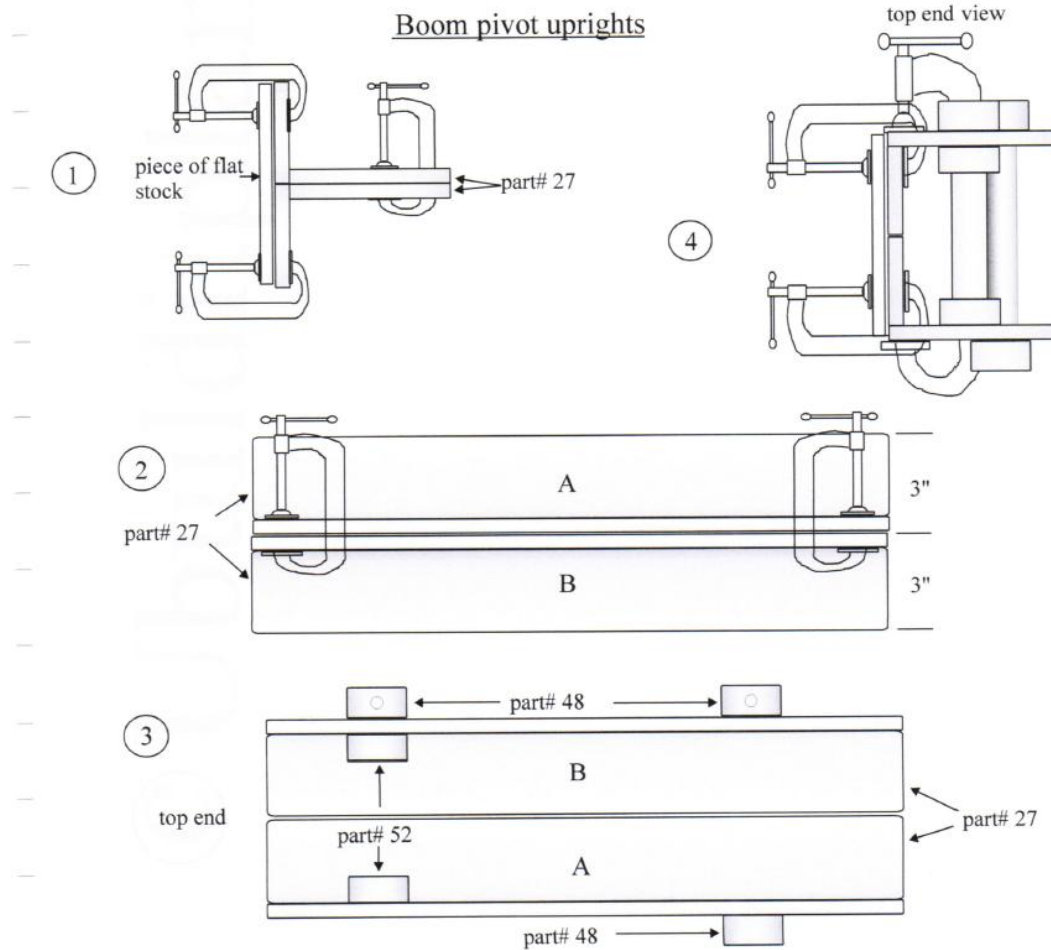


Boom Details

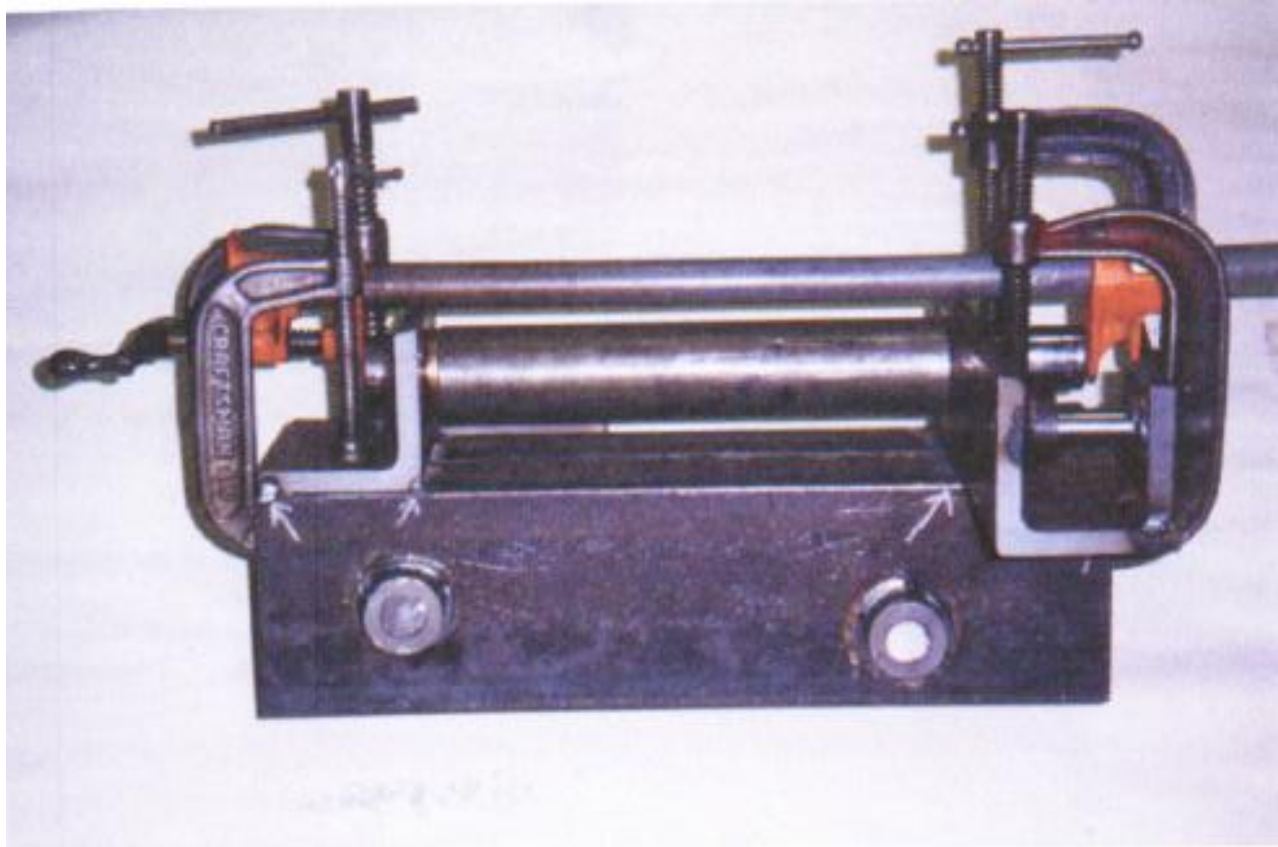


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Case Study: Ground Hawg



Case Study: Ground Hawg



Leg Cart

