## Objective

Design a small, mechanically actuated wire cutter that is able to rotate 360° and bend 90° to the shaft axis.

## Design

<table>
<thead>
<tr>
<th>Design Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Regulator</td>
<td>Drops high pressure from CO(_2) cartridge to operable pressures between 150 - 300 psi</td>
</tr>
<tr>
<td>Pneumatic Actuator</td>
<td>1&quot; stroke length</td>
</tr>
<tr>
<td>Rack &amp; Pinion Gear Set</td>
<td>90° range of motion</td>
</tr>
<tr>
<td>Pre-Existing Handle</td>
<td></td>
</tr>
<tr>
<td>Cutting Head Attachment Adapter</td>
<td></td>
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</tbody>
</table>

## Testing & Analysis

### Instron Testing

**Key Results:**
- Approximately 141 pounds needed to cut 14 AWG copper wire with shear cutting head

### Temperature Testing

**Key Results:**
- 0°F: 39 cuts average
- 40°F: 43 cuts average
- 70°F: 48 cuts average

## Background

Today’s EOD technicians must rapidly adapt their tools and techniques to counter continuously evolving methods of constructing IEDs.

### Design Overview

- Linear force translated from tool handle to activate internal pneumatic system
- Pneumatic actuator drives shear force through cutting head to snip wire
- Pneumatic system powered by reloadable CO\(_2\) canister with capacity to last one full mission

### Key Advantages of this Design

- Increased safety of operators
- Flexibility of tool allows for deactivation in a wide range of orientations
- Entirely mechanical design – no reliance on electricity in the field

## Moving Forward

### Future Design Recommendations:

- CO\(_2\) canister reload could be done in the field so tool does not need to be deconstructed
- Limited by hose capacity unable to withstand pressure in CO\(_2\), a suitable hose could be developed to fit size constraints
- Refillable CO\(_2\)