Copied from Hypertherm website:
Torch to work distance distance, or standoff, during the cutting process is adjusted by monitoring and controlling the arc voltage. Note that arc voltage is the same thing as power supply output voltage. Plasma power supplies are a current source—they generate a very steady operating current when the torch is cutting.Voltage, on the other hand, varies depending on the distance between the cathode (the electrode in the torch) and the anode (the material being cut). Voltage is directly proportional to resistance (Ohms Law states that V=I*R). The resistance in the arc is a function of the distance. When the torch to work distance increases the voltage goes up; when the torch-to-work decreases the voltage goes down.

The torch height control uses arc voltage to maintain a consistent distance from the plate while the torch is cutting. This allows the system to maintain proper torch height regardless of variations in the material, or flatness of the cutting bed. The operator sets the arc voltage on the remote control according to the cut charts in the plasma system's operations manual. This voltage setting is usually between 100 and 200 VDC.

After the torch height control has completed initial height sensing and the torch has pierced the plate, motion of the cutting machine is enabled and the torch begins to move. Once the cutting begins, the THC starts sampling arc voltage from the power supply and comparing it to the target voltage set by the operator. It adjusts the torch up or down to maintain that target voltage.

Each voltage setting corresponds to a specific height that optimizes the arc characteristics for a clean, straight cut. Torch height has the greatest affect on bevel angle of the plasma cut piece. Setting the voltage too high results in more material being removed from the top of the kerf than the bottom. This causes excessive top rounding and positive bevel (see Fig. 2). Setting the voltage too low results in too much material being removed from the bottom of the plate. This causes undercutting or negative bevel (see Fig. 3).

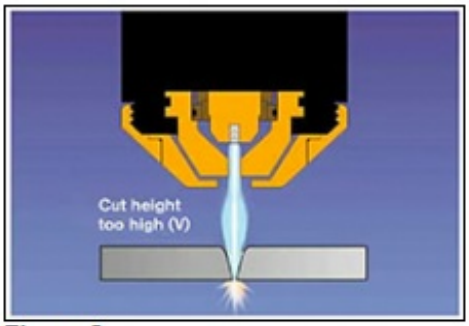

Figure 2

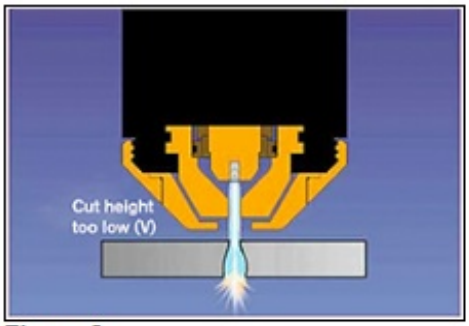

Figure 3

Today's torch height controls have many features and capabilities. But the two most important to understand are initial height sensing and arc voltage control. Piercing at the right height will save you money on parts. Cutting at the right height will ensure good cut quality and minimize expensive rework operations. When properly used a torch height control pays for itself in a short time.