

GaijinTo - Chasing the dream

One of the critical tools needed to make Japanese style blades is an austenizer -- something to bring a sword length piece of steel up to critical temperature (nominally 1550 F). Donn Fogg came up with using a 55-gallon drum with a gas burner. The large volume and the small amount of heat equates to a reasonably uniform temperature at the target level. What is shown here is my take on that idea.

The forge is a typical 55 gallon drum. A pair of 90 degree 3" pipe couplings were welded over 2.5" holes at the upper rear to provide vents. The door is a stainless steel shell (approximately 6" x 7" internally) insulated with 2300 F kaolwool. The door sockets over an angle iron "mouth" on the forge, is hinged on the left with a slotted hinge system that allows the door to swing free, and is equipped with a "glory hole" to allow observation into the forge. The forge is insulated with 1.5" thick kaolwool that was treated with "Instuf" from Ellis Forge. There is a stainless bar running the length of the forge that is suspended 3" from the top center of the forge. Hooks will be used on the bar to suspend blades near the center of the forge. There is a probe port on the right side of the unit. The probe is a high-temp Type K probe that talks to a digital temperature meter (both from Omega). There is a 1.25" diameter stainless steel burner port at the center bottom. The port is equipped with a 3/8x16 nut welded to the side and a bolt that passes through the nut and into the lumen of the port. A venturi burner with a 0.040" orifice (2.5" bell & a 3/4" black pipe tube (~1.1" diameter)) is inserted into the burner port and is locked in place with the bolt. A refractory brick with a 1.25" hole is placed over the burner tip and a stainless steel diffuser sits just above the burner opening.



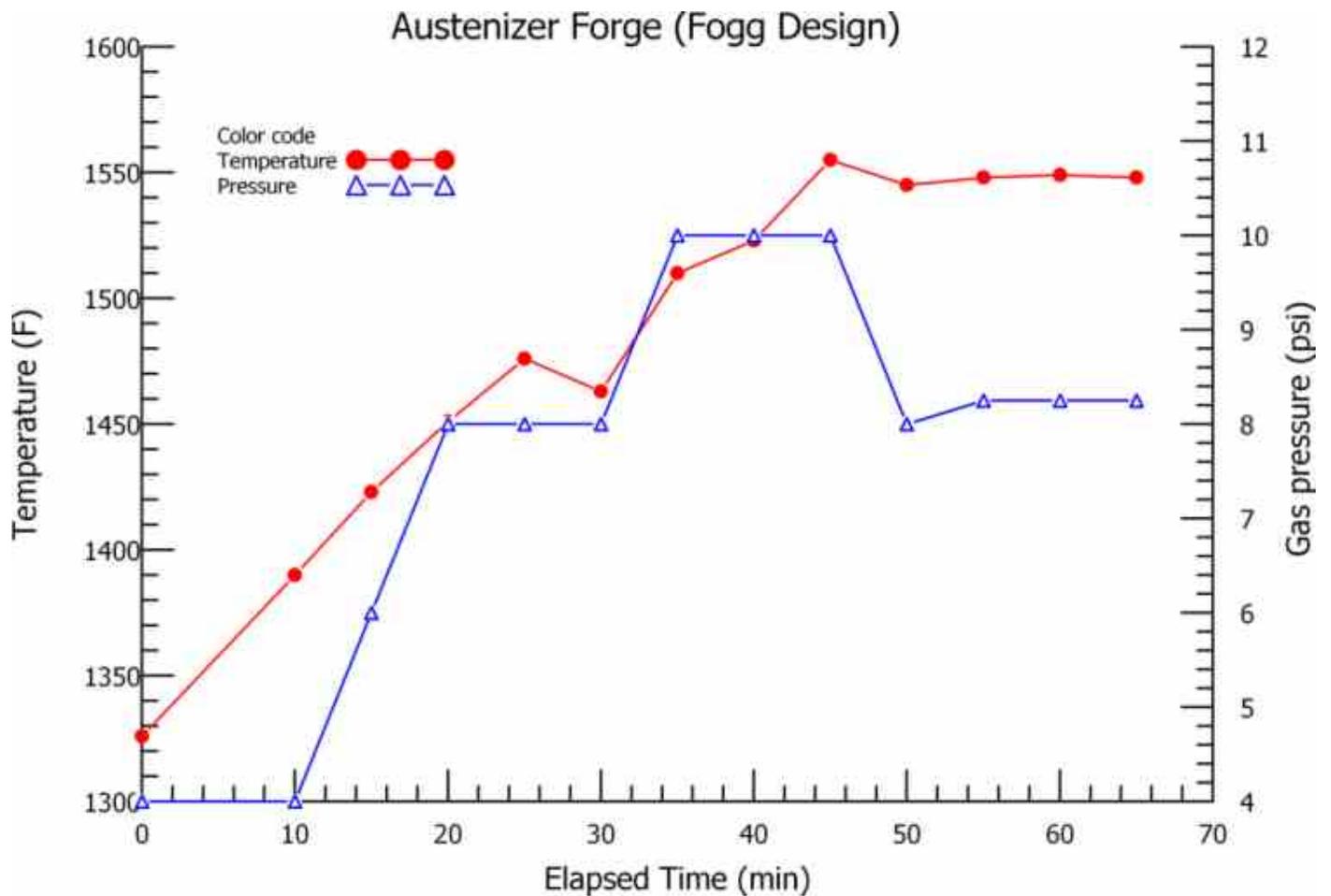
(showing temp meter & probe)



(showing LP & blower)

It turned out that with the door closed and the burner at minimum pressure, the burner would flame out. To counter that, I applied a very gentle breeze from a 12V DC blower running on a hair above the current needed to keep the squirrel cage spinning. The next step was to determine if the unit could maintain 1550 F. As you

can see in the plot:



the system needed about 8.25 psi pressure to hover at 1550 F. When the door was opened (as in removing a blade for quenching), the temperature popped up to 1575 F - indicating that there must have been a reducing atmosphere in the forge. Looks promising!

(click on an image to see a higher resolution version)