ST 370 Project Proposal

Objectives:
To determine the effects of extreme heat (by a propane torch ≈ 1977°C), normal room temperature ≈ 21.1°C, and freezing temperatures ≈ 0°C - 20°C temperature and type of metal on the distance the rod bends, the rigidity of 3 different types of metal bars (3/16” thick x 1’ in length) (steel, brass, aluminum) and to see which of the 3 metals is more rigid. While supporting the rod on both ends we will hang a constant weight in the middle and measure the distance of which the rod bends.

Response Variable (numeric) Rigidity of bar, distance that the bar bends.
Experimental Unit The bars (9 individual 1ft bars)
Factors and Levels
As “factor(level 1, level 2….)”
Metal type (room temperature, extreme heat, extreme cold)
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Metal type (steel, brass, aluminum)
Temperature (extreme cold, room temp, extreme hot)

Number of treatments 9
Number of replicates 1
Number of measurements per replicate 1
Total number of observations 9 18 (number of reps*number of treatments) your answer may be different from mine.
Amount of time planned for data collection 2-3 hours
Controlled variables
As “variable(value)”
- Structure of bar
- Other environmental condition in workshop
- weight (15 lbs)
- amount of time for which weight is applied (10 seconds)
- length of rods (1ft)
- hang distance (6in)
Person measuring distance bar bends (Fred) (this should be a controlled variable or a
### Blocking variables

| blocking variable. | Person applying weight to bar (Sheila) (again, this should be a controlled variable or a blocking variable. |
| Measuring device used(whatever) |

### Important source of experimental error not addressed by the experimental design:

There may be some error in heating instrument.

An error can be made in locating the center of bar.

Temperature might not be uniform throughout the metal.

### Describe how randomization will be used:

1. Randomly picking which bar will be heated at (randomly chosen) different temperatures.
2. Randomly assign each of the 6 brass bars to one of the three temperatures. Do the same for the 6 aluminum bars, and then for the 6 steel bars.
2. We will randomly assign numbers to each of the treatments. Then using randomization, test the experimental units with the corresponding numbers outputted randomly. (I.E. if we get a 1 outputted randomly by as a calculator, then we will test the treatment corresponding with 1.) _I think they are talking about the order in which to apply the treatments. I really think blocking on order is a good idea, but this isn’t wrong._