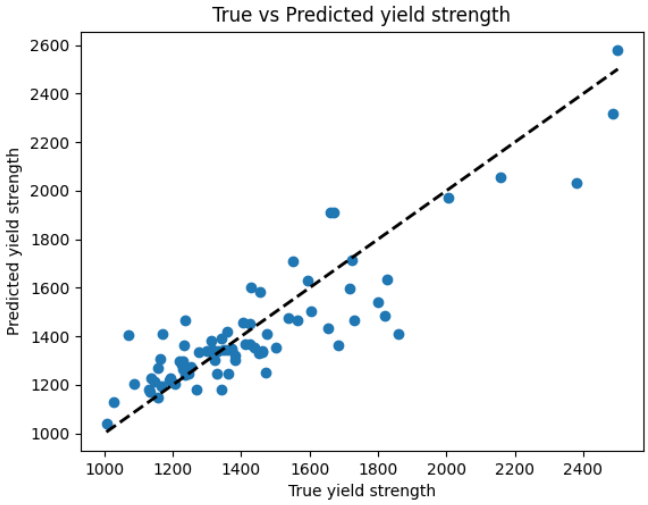
Part 2 – A and B

There are 3 sets of parameters and 3 graphs. One for each output.

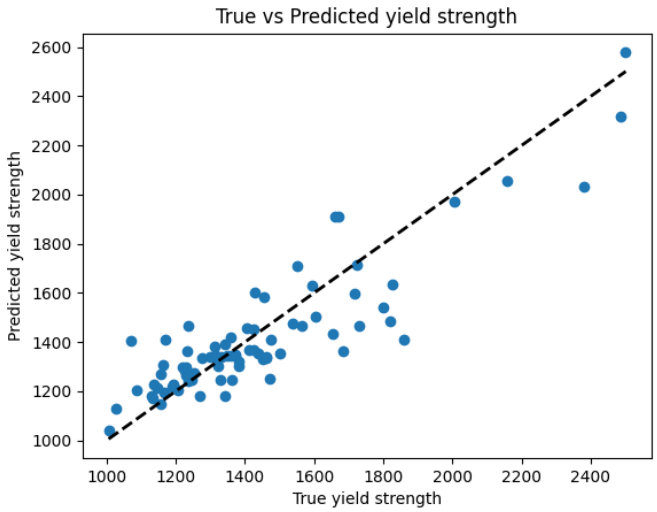
Yield Strength

	MSE	R2
Train	26384.6806	0.7071
Test	20535.9295	0.7789



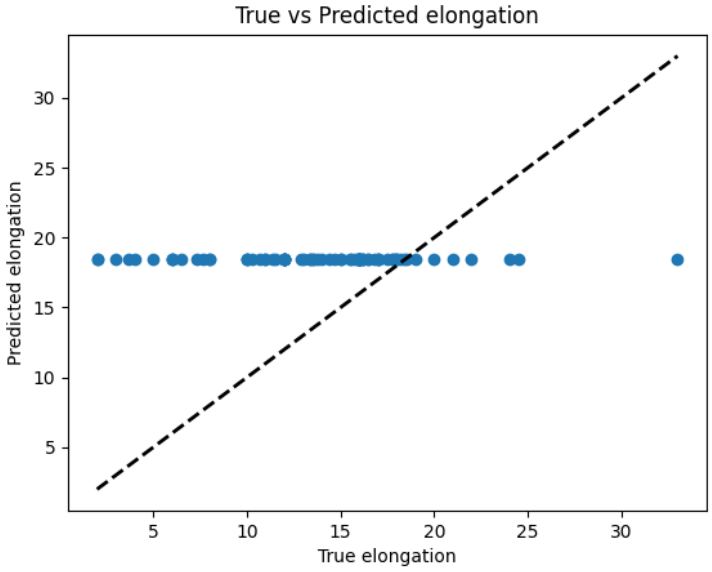
Tensile Strength

	MSE	R2
Train	23423.1765	0.8063
Test	25985.4371	0.7729



Elongation – poor model due to large epsilon

	MSE	R2
Train	44.1085	-0.7823
Test	51.9207	-0.7799



Part C

A) Best hyperparameters (no gammas more than 0.01 due to computation time)

Type	Yield	Tensile	Elongation (Poor)
Kernel	Poly	Rbf	Poly
C	500	1000	0.1
Gamma	0.01	0.01	0.001

A smaller C means a model is more tolerant of outliers, while a large C is less tolerant. The yield and tensile strength models are much less tolerant of the outliers than the model for elongation. A large gamma is a less linear fit, which can result in overfitting, while a small gamma can result in underfitting.

B) I would trust it to make tensile strength predictions for lower end strengths from ~1000 to ~1400. It seems to be a good estimator and a R2 of 0.77 for training data is pretty good. I don't think I would trust it for larger strengths simply because there is not nearly enough data to fairly gauge the effectiveness of the model.

C) When epsilon is 50 there are 151 support vectors. When epsilon is 100, there are 111 support vectors. Since more data now falls into the model there will be less data to be considered as support vectors. This is why the elongation model is bad, because all data falls within epsilon.