*This editing sample is from Jason Miller's thesis* ***Functional Element Analysis of Bronze Age Aegean Sword Types Using Finite Element Analysis****. Used by permission.*

estimated based on symmetry with other parts of the form. The lengths of blades, for example, were particularly problematic due to the limited sets of whole swords. Increasing accuracy will require additional examples from which ~~to~~ one could build models or direct access to the objects themselves. In addition to being intact and without breaks, there are other differences between the models and the original swords. They ~~also~~ do not have any wear from use or time. In addition, the models are more symmetrical than the originals.

**Comment [S35]:** I'm going to assume that these two sentences describe the differences between the models and original swords mentioned in the previous sentence. If so, you don't need the "also".

Second, it was necessary to determine if the specific alloys and tempers used in the composition of the swords is sufficient to influence the results of testing. The results of the tests should indicate if it is necessary to take into account both alloy and temper when determining changes in strength over time. Therefore, I created a list of bronze alloys or alloy treatments that may have been used during the Bronze Age. I then entered their sheer and tensile strengths ~~entered~~ into the SolidWorks material catalog using basic tin bronze as the starting point (AMS 1979:28; ~~AMS~~ Davis 2001:91-96).

Third, I determined which tests to run within the SolidWorks platform. From research done before starting this paper, I found that the two blows likely to strike with the most force on a sword were the thrust and the hack or hard block (Turner 2009). Furthermore, in the worst-case scenario these blows would fall upon a target impervious to their blows, items like heavy armor and or shields.

I used SolidWorks to simulate a blow striking a specific point or edge of the sword with a force. This procedure might sound backwards, but in terms of the physics of the blow's impact on the sword, striking an object with a sword is identical to striking a sword with an object (Clemens 1999, 2001, 2002; Turner 2009). With a thrust the physics is straight forward, as all the force and velocity behind the blow transmits through the handle to the point of the sword. Inelegantly, with a hacking blow the maximal force transmits to the blade at one-third the distance from the tip opposite the center of balance (Turner 2009).

After these three steps, I performed a series of tests on each sword type and alloy or alloy treatment to determine the force at which each object would break as defined by SolidWorks. I then analyzed and explained the results.

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