**MLA Produced by Instructor Richard Makarski. 19 July 2017 / Revised 10 Aug 2017**

Title: Electric Guitar Template Design

**Learning Objectives:**

**To teach students the fundamentals of electric guitar body template design by tasking them to actually make a useable paper cardboard template given accepted standards and principles.**

**The students will learn the importance of math and measurement to overall guitar design for functionality. Body shape, headstock shape, and contours, can vary widely and are limited to the imagination of the designer and any ergonomic factors that would be considered. Design samples will be provided as a primer to help students get started.**

**The basic parameters provided for the electric guitar (refer to handouts and guitar design principles) however, must conform to minimal specifications so that the dimensions can properly accommodate guitar hardware and scale distances for ensuring functionality and playability when the final guitar is completed and setup at the end of an actual full production build.**

**At the conclusion of final deliverable (a useable cardboard electric guitar template), the students will understand the anatomy of an electric guitar, its parts and components – as well as to appreciate the science and logic behind the placement of guitar hardware and the need for discipline in exact scale, width, length and human factors of guitar controls knob and switch placement to make the instrument fully functional.**

**A resulting successful paper cardboard template can then be utilized in the next step in a future class, to produce a final refined wooden 0.5-0.75” thick MDF (Medium-Density Fiberboard) or Plexiglass cut out. This MDF or Plexiglass “smooth” template could then be used to produce one or more guitars as desired.**

**Materials Required:**

* **Laptop with wireless Internet capability**
* **Pencils and erasers**
* **Note paper for brainstorming designs**
* **Large paper cardboard to support a full scale electric guitar template (24”x48”)**
* **Large and small metal rulers (metric and imperial measurement capable), 48” and 12”**
* **Digital Micrometer with both imperial and metric readings**

**Safety is critical in any shop environment where electricity/ cutting/ drilling and shaping of materials are activities. Since this class plan will only involve paper cardboard design, drawing and measuring, and no actual “workshop” tasks will be required at this phase, the typical safety briefing normally given for wood shop / metal shop operations will not be provided for mandatory eye, hearing, and other wearable safety protective devices.**

**Safety:**

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**Pre-Activity:**

**Pre-activity would include reviewing examples of a commercially and publicly available electric guitar templates and electric guitar design plan ideas and kits for enlightenment and inspiration. See related handouts.**

**Activity**

**The Primary Activity would involve students using the skills of math, engineering, science and measurement, drawing and design to make a high quality paper cardboard electric guitar template, ready for pre-production refinement into an executable template creation in a wood shop using durable MDF (Medium-Density Fiberboard) or plexiglass. Ref to NGSS/CCC SEPs: HS-PS-3-3 and HS-PS-2-6.**

**Conclusion**

**This course plan will provide the technical math, design, music science related measurements and standards necessary to create viable electric guitar templates for guitar builders.**

**References**

**Technology of the Guitar 2012th Edition, Chapter 7 & 8, pp282, pp291**

**by Richard Mark French (Author), 14 May 2012.**

**Engineering the Guitar: Theory and Practice 2009th Edition, pp248-253,**

**by Richard Mark French (Author), 23 Oct 2008.**

**The Savart Journal,** <http://www.savartjournal.org/index.php/sj>

**The Science and Technology of Stringed Musical Instruments.**

**The Savart Journal is published in collaboration with the Guild of American Luthiers.**

**Liutaio Mottol,** <http://www.liutaiomottola.com/books.htm>

**Youtube guitar template videos (various – see PPT handout)**

**Pinterest guitar body shape and neck headstock ideas (various – see PPT handout)**

**Standards**

STEM Guitar Building <http://www.guitarbuilding.org/>

Liutaio Mottol, Scale and Fret distance technical specification standards

<http://www.liutaiomottola.com/formulae/fret.htm>

For purposes of uniformity, the following standards will be adhered to when designing the electric guitar template (Ref handouts for Engineering/Technology of Guitar and Anatomy):

Scale Length – 25.5’ or 648mm. This scale length is measured as the distance from the top inside edge of the guitar nut, to the top edge of the guitar saddle. This standard is one which has been used by Fender since the 1950s.

Fretboard length will be a 22-fret configuration and will be assumed to be a bolt on (screwed on) neck with metal plate.

The guitar body template will identify the exact location and correct length, width and depth of the neck pocket using both imperial and metric units per the Fender Stratocaster standard: 2 3/16” width (or 55.6mm) x 3.0” length (or 76.2mm) x 0.63” deep (or 16.5mm).

The two pickup pockets will be drawn to conform to standard 6-string humbuckers for the neck and bridge positions and likewise be indicated on the template by the correct length, width and depth of the pickup cavity pocket using both imperial and metric units per the Fender Stratocaster standard.

The bridge and saddle location and alignment will be perfectly centered and squared with the x, y axis of the guitar template for a perfect bolt-on neck and body position to encompass the accuracy of the 25.5’ / 648mm scale. It should also be noted that the pickup cavities must also be exactly centered to the centerline as well which runs the length of the guitar body and neck.

The use of a hardtail adjustable bridge/saddle along with string-through holes for six ferrules must also be aligned to ensure both x, y axis center alignment and satisfactory to meet the 25.5” scale criteria.