EML2322L – MAE Design and Manufacturing Laboratory

Concept Selection (DR2) Grade Sheet

Group Number: _____

Report Grader(s): _____

First Review or **Final Grading**
(circle one)

(____) / 30 OVERALL SCORE

[-6 pts. Max] REPORT ASSEMBLY AND FORMATTING

1. Does not follow DRT organizational structure (improperly labeled sections, appendices/report sections arranged incorrectly, etc.). ***[-0.1 pts. per error]***
2. Report has grammatical or formatting issues ***[-0.2 pts. per error]***
3. Appendices lack separate cover pages or do not use required formatting ***[-0.5 pt.]***

(___ / 6) **OBJECTIVE DESCRIPTIONS / DEFINITIONS**

Sometimes projects require additional systems or different numbers of objectives. Points per objective should be calculated as $\#_{points}/(\#_{objectives\_total})$.

1. Quantitative objectives for each subsystem are reasonable and relevant ***[3 pts (3 pts / ($\#_{objectives\_quant}$) per quantitative objective)]***
    a. Quantitative objectives do not use quantitative assessments and parameters ***[-0.2 pts. per]***

2. Qualitative objectives are adequately and logically justified ***[1.5 pts. (1.5 pts / ($\#_{objectives\_qual}$) per qualitative objective]*** ***[-0.2 pts. per incorrect or inadequate qualitative objective justification]***
    a. Qualitative objectives do not use qualitative assessments and parameters ***[-0.2 pts. per]***
    b. *Free 1.5 points if no qualitative objectives are used.*

3. Weighting factors are reasonable and justified ***[1.5 pts]***
    [-0.25 pts. per improper weighing factor justification]

(___ / 15) **SCORE ASSIGNMENT / JUSTIFICATION** (APPENDICES A-C)

1. Quantitative assessments include calculations that are:
    a. **Complete, correct, and clear** ***[4 pts]***
    [-0.1 pts. per instance of missing, incorrect, or unclear calculations]

b. Use **a single sample calculation** to show mathematical process ***[1 pt]***

c. Have final values presented in **consistent tabular format** ***[1 pt]***
[-0.25 points per improper results presentation]

2. Qualitative assessments have justifications that show **a)** comparisons to other designs, **b)** functional testing or sufficient research, and **c)** references to sketches of the designs being evaluated. ***[3 pts.]*** ***[-0.5 pts per missing test or evidence of inadequate research]***
Free 3 points if no qualitative objectives are used.

3. Competition time estimation:
   a. Shows complete computer-generated robot path trajectories with **clearly labeled** distance and speed vectors ***[1 pt]*** ***[-0.1 per missing or unlabeled trajectory]***
   b. Robot **wheel motor speed calculation**s & spreadsheet:
      i. Use the provided Excel template ***[0.5 pt]***
      ii. Follow the course notes provided $(V_{Loaded} \approx 0.75 \times \pi DN)$ ***[0.5 pts]***
      iii. Have reasonable minimum and maximum drive times specified ***[0.5 pts]***
      iv. Maneuvering, manipulation and release times are reasonable and properly explained in report appendix (not just included in spreadsheet). ***[1 pt]***
      [-0.1 per unreasonable time or missing explanation]
      v. Percentages use to compute the **average robot velocity** parameter are clearly explained in the report appendix (not just included in spreadsheet). ***[1 pt]***
      [-0.1 per missing explanation]
      vi. Is **estimated completion time** reasonable and conservative ***[0.5 pt]***

4. Calculations all have reasonable and consistent significant figures ***[1 pt]*** ***[-0.1 per sig fig error]***

(____/ 9) **EVALUATION MATRICES**

1. Separate matrices are used for each sub-system of the design ***[1 pt]***

2. Matrices have a reasonable number of objectives (usually 5-6) ***[1 pt]***

3. Weighing factors for each decision matrix sum to 1. ***[1 pt]***

4. Sig figs presented in decision matrices are reasonable and consistent. ***[1 pt]*** ***[-0.1 pts. per error]***

5. New designs are properly incorporated into evaluation matrix ***[1 pt]***

6. Design with the highest composite score is selected ***[1 pt]***
    a. *Second highest design selection with suitable justification is acceptable to earn points if discussed in advance with TA to ensure reasonable justification.*

7. Quantitative assessments use **linear scaling** of assigned scores
    a. Quantitative scores are interpreted properly (*i.e. lowest cost or highest speed receives highest score.*) **[1 pt]** ***[-0.2 per incorrect interpretation]***
    b. Quantitative scores in evaluation matrices do not match values as presented in scoring assignment and calculated in Appendices ***[-0.2 pts per mismatch, -3 pts. max]***

8. Qualitative assessments:
    a. Each score has a defined magnitude associated with it *(i.e. "Good" = 8 pts.)* ***[1 pt]*** ***[-0.2 for each undefined score]***
    b. Scores presented in matrix have different associated magnitudes ***[-1 pt. per mismatch, -3 max]***

9. Scaling of scores, calculations of values, etc. are represented through use of formulas in the Decision Matrix Template. ***[1 pt]*** **Failure to use formulas in Excel will result in 0 pts. being awarded for evaluation matrices**