Decision matrix for the design of a crane hook

CRANE HOOK			Welded Plates			Riveted Plates			Cast Hook		
Objective	Weighting Factor	Parameter	Mag.	Score	Value	Mag.	Score	Value	Mag.	Score	Value
Material Cost	0.10	$	2500	8.8	0.9	2500	8.8	0.9	2200	10.0	1.0
Manufacturing Cost	0.20	$	1500	8.0	1.6	1200	10.0	2.0	2400	5.0	1.0
Manufacturing Time	0.10	hours	40	6.3	0.6	25	10.0	1.0	50	5.0	0.5
Durability	0.15	experience	great	10	1.5	good	8	1.2	good	8	1.2
Reliability	0.30	experience	good	8	2.4	great	10	3.0	okay	6	1.8
Repairability	0.15	experience	good	8	1.2	great	10	1.5	fair	4	0.6
Overall value					**8.2**			**9.6**			**6.1**

Qualitative Score Assignments:	
great	10
good	8
okay	6
fair	4
poor	2

Important Tips for the Decision Matrices Required for Design Report #2:

1. *Whenever possible, place all decision matrices on the same page for compact formatting.*

2. *Your definitions and score assignments should be included in the report body instead of on the same page as the matrices. (They are included here simply so everything related to this example matrix is in one place for convenient reference.)*

3. *Note that your team's objectives and weighting factors will likely be different than the ones listed above and that the objectives and weighting factors for each subsystem on your design will be different as well.*

4. *Repeat the above for the other functional parts of your robot design (i.e. bucket/ball manipulator, ball hopper and/or release mechanism(s), etc.)*

5. *Pay attention to significant figures. For example, don't report estimated robot speed to 5 decimal places, as an estimate simply doesn't have that kind of precision. Think about the numbers you report: if you can't measure robot size to one thousandth of an inch, or manufacturing time to one thousandth of a second (which you clearly cannot), then don't report them that way under the magnitude columns of the matrix.*

6. *If two designs are assigned qualitative assessments of "good", they must both receive the same score; otherwise, the magnitude and score must be reported as a quantitative assessment and you must include the equation used to calculate the magnitudes.*

7. *All quantitative assessments must be clearly justified with estimated data, such as material costs, manufacturing times and robot speeds. Without this data, it's impossible to unbiasly and accurately compare individual ideas. This data should be placed in the report appendices where it can referenced during grading.*

8. *For the purpose of this class always use linear score assignments; for example, if material cost is an objective and one design costs twice as much as another, the more expensive design MUST receive half the score assignment or the matrix cannot serve its intended purpose. This applies for all quantitative assessments such as cost, manufacturing time, speed, etc.*

9. *After creating the decision matrices your group must choose the design from each matrix that achieves the highest value or again the matrices cannot serve their intended purpose of unbiasedly allowing selection of the best idea.*

10. *If a new idea develops while your group works through this part of the design process, simply add another column to the matrix (i.e. "Design 5") and compare the new idea to the other ideas already contained in the matrix. Note: Evaluating a fifth design in one matrix (i.e. mobile platform) does NOT require you to add a fifth design to the other matrices.*