ME170
Term Design Project Tools

Concept Selection

Course Instructor:

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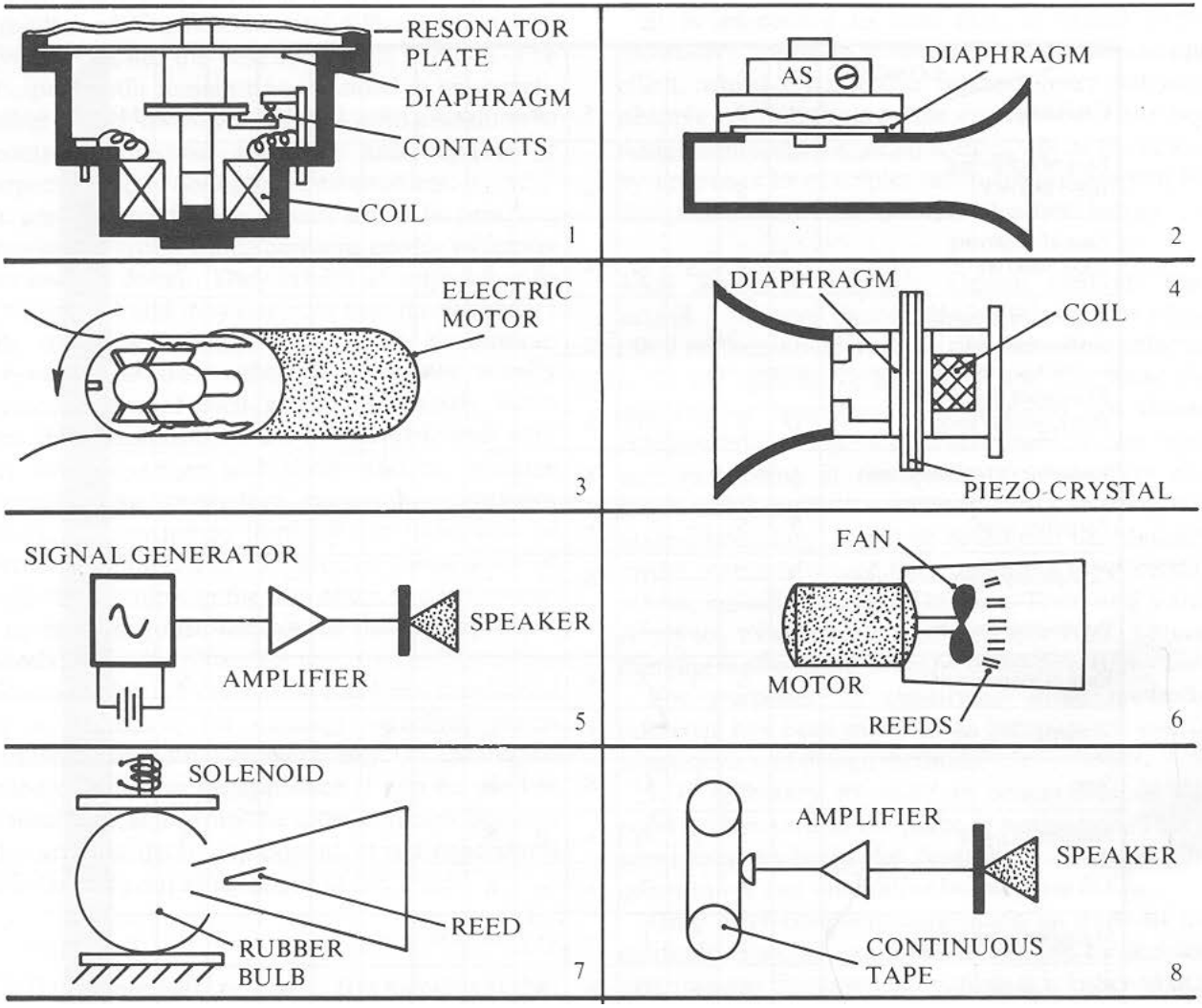
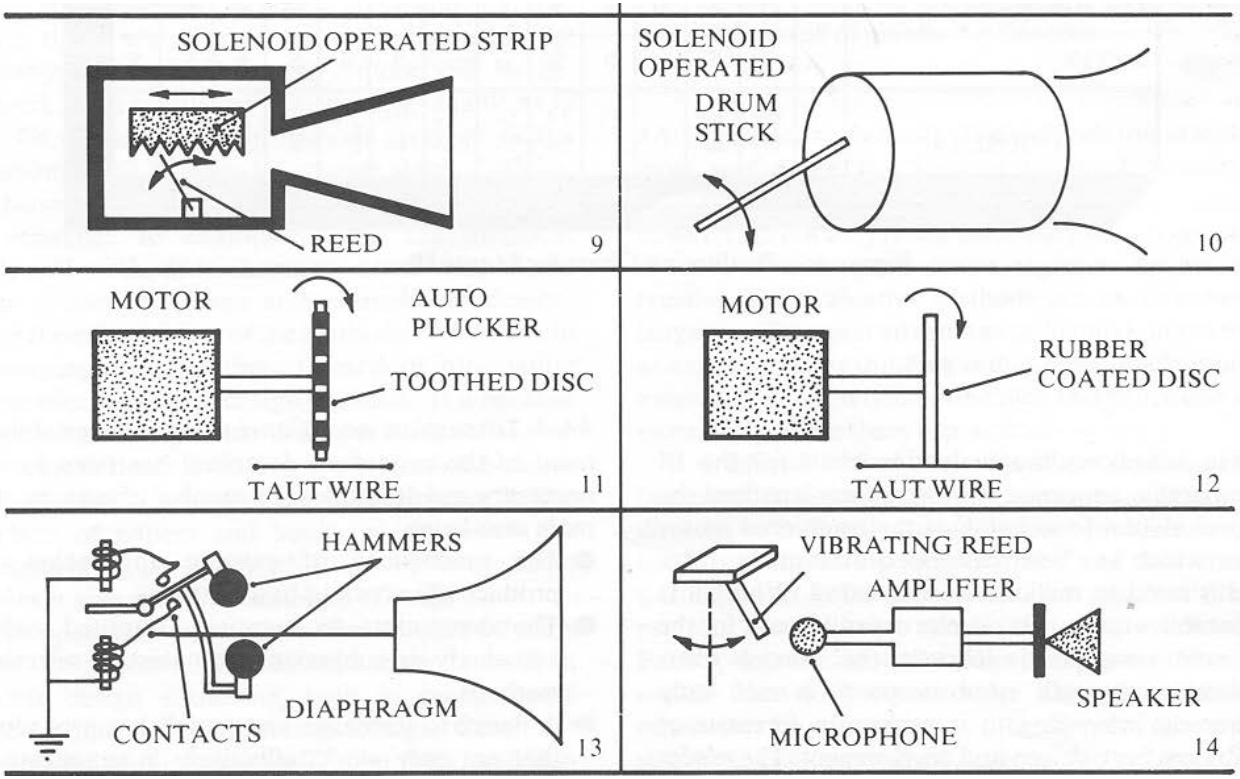


Sketch and Present Concepts:

(Sketches 1-8)

Sketch and Present Concepts:

(Sketches 9-14)



Traditional Numerical Decision Matrix

Most widely used and taught method for concept selection.

	Weight Factor	Rating			Wtd. Rating		
		1	2	3…	1	2	3…
Aesthetics	5	4	3	2	20	15	10
Speed	3	3	1	2	9	3	6
Mfg. Cost	5	1	3	5	5	15	25
Weight	3	5	2	1	15	6	3
Size	2	3	4	2	6	8	4
Reliability	4	4	3	2	16	12	8
Totals					73	59	56

Concept #1 is selected

Controlled Convergence

or Pugh's Concept Selection Matrix

An alternative matrix procedure for comparing and evaluating a number of different concepts; also, supports creation of additional improved concepts.

- ***Advantages:***
- **Provides a step by step procedural tool**
- **Constraints to creative thinking are minimized**
- **Convergence onto the best solution is achieved**
- **Useful for defending a design in a sound and logical manner**

Controlled Convergence
The Method

1. Develop conceptual designs and create small sketches, all to the same level of detail

2. Create a matrix and list the concepts to be investigated along the top of the matrix (ideally the actual sketches, perhaps photo-reduced)

Controlled Convergence
The Method (cont.)

3. List important customer criteria down the left side of the matrix:

- **Key, important, difficult, new Design Requirements**
- **Key customer requirements**

Controlled Convergence
The Method (cont.)

4. Choose one concept (often the original design) as the datum, compare criteria against this datum:

- **+ = better than, costs less than, less prone to, easier than etc.**
- **- = worse than, more expensive than, more difficult than, more complex than, etc.**
- **S = More or less the same as the datum, some doubt etc.**

Controlled Convergence
The Method (cont.)

5. Total the scores: examine concepts of exceptional strength, study each weakness, if weaknesses are acceptable this is a good candidate.

If no apparent strong concept, change datum and run again; original design may be best!

CONCEPT / CRITERIA	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ease of achieving 105-125 DbA		S	–		+	–	+	+	–	–	–	–	S	+
Ease of achieving 2000-5000 Hz		S	S	N	+	S	S	+	S	–	–	–	S	+
Resistance to corrosion, erosion and water		–	–	O	S	–	–	S	–	+	–	–	–	S
Resistance to vibration, shock, acceleration	D	S	–	T	S	–	S	–	–	S	–	–	–	–
Resistance to temperature	A	S	–		S	–	–	–	S	S	–	–	S	S
Response time	T	S	–		+	–	–	–	–	S	–	–	–	–
Complexity: number of stages	U	–	+	E	S	+	+	–	–	–	+	+	–	–
Power consumption	M	–	–	V	+	–	–	+	–	–	–	–	S	+
Ease of maintenance		S	+	A	+	+	+	–	–	S	+	+	S	–
Weight		–	–	L	+	–	–	–	S	–	–	–	–	+
Size		–	–	U	S	–	–	–	–	–	–	–	–	–
Number of parts		S	S	A	+	S	S	–	–	+	–	–	S	–
Life in service		S	–	T	+	–	S	–	–	–	–	–	–	–
Manufacturing cost		–	S	E	–	+	+	–	–	S	–	–	–	–
Ease of installation		S	S	D	S	S	+	–	S	–	–	–	S	–
Shelf life		S	S		S	S	–	–	S	S	S	S	S	S
FIGURE 4.4		0+ 6–	2+ 9–		8+ 1–	3+ 9–	5+ 7–	3+ 12–	0+ 11–	2+ 8–	2+ 13–	2+ 13–	0+ 8–	4+ 9–