



CONCEPT GENERATION

How to get lots of ideas

(Ref: Chap. 6, Ulrich & Eppinger text)

THE BASICS

- ◆ “Concept” = idea that satisfies some or all of the design requirements
- ◆ Fragmented or complete, abstract or detailed
- ◆ Concept generation is **cheap** and **easy!**
- ◆ Do early and often
- ◆ Have a process
- ◆ Know when to stop...but don't ever stop

GENERATING CONCEPTS

- ◆ **LOTS of ideas...100's!**
- ◆ **First idea is rarely the best**
- ◆ **Goal: Find ALL the ideas**
- ◆ **It's more than brainstorming**
- ◆ **Internal and external search**
- ◆ **You need some idea of the design requirements first**
- ◆ **Divide (by function) and conquer in pieces**
- ◆ **Document, document, document**

Functional decomposition

Paper clip

ALIGN PAPER

JOIN PAPER

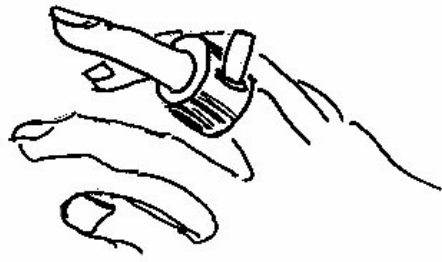
SEPARATE PAPER

Text, Chap 6 (e.g. figure 6-4), Chap 9

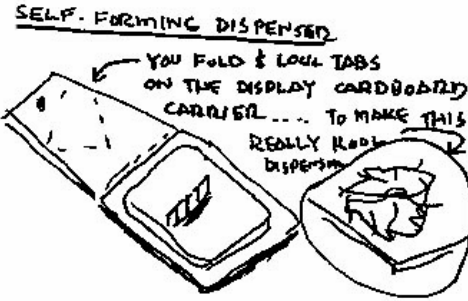
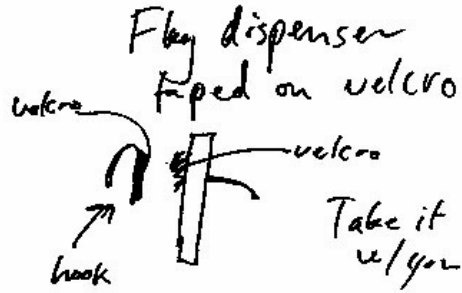
DOCUMENT!

- ◆ **Design notebook**
 - Number and date pages
 - Witness for good ideas
 - 2 witnesses for really good ideas
- ◆ **Index cards**
 - Thumbnail sketch
 - Trigger words (2-3 max)

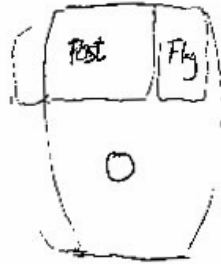
FLAG RINGS



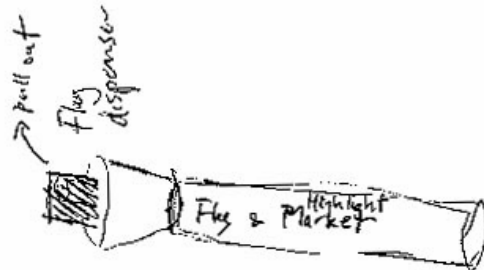
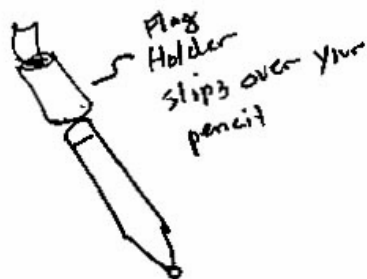
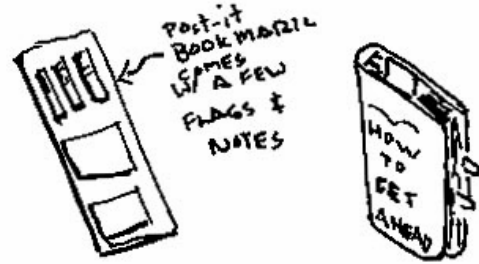
Flag dispenser for
office desk drawer.
(in paper clip holder)

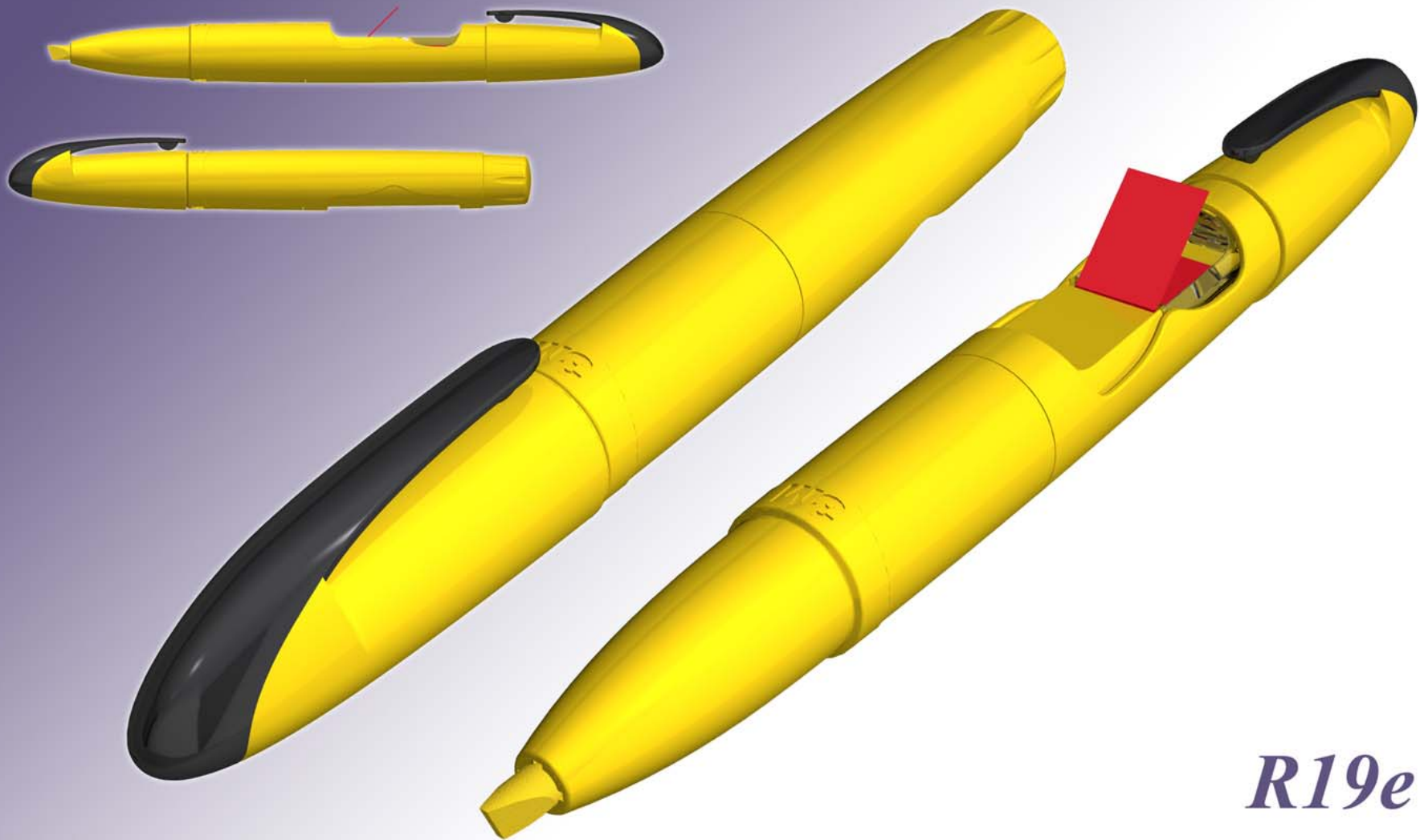


Mouse post it + flag dispenser
"Clicker."



FLAGS/NOTES -- FOR BOOK LOVER





R19e

IDEATION

Is a process

Can be learned

Is not predictable

Is easy if attitudes are positive

What is half of 8 ?

~~8~~



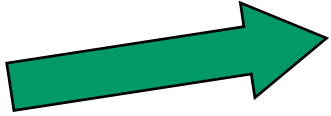
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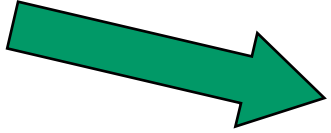


4

8



3



8

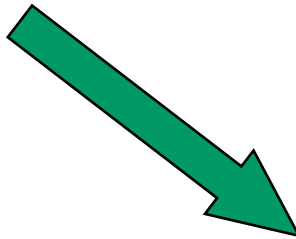
EXTERNAL SEARCH

- ◆ **Reverse engineer existing products**
 - Direct competitors
 - Indirect competitors
- ◆ **Patent search**
- ◆ **Interview experts**
- ◆ **Trade journals, handbooks, magazines, text books**
- ◆ **Consult vendors**

INTERNAL SEARCH

- ◆ Brainstorming (group)
- ◆ Brainstorming (individual)
- ◆ “In the shower” (individual)

Reminder



GOAL: Find all of the ideas!

BRAINSTORMING

- 1. Generate lots of ideas**
- 2. “Wild” ideas OK**
- 3. Withhold judgment**

BRAINSTORMING -- Process

- ◆ **Assign facilitator**
- ◆ **Define topic**
- ◆ **Agree on stop time**
- ◆ **Agree on method for recording ideas
(index cards)**
- ◆ **Build on ideas of others**
- ◆ **No stopping to evaluate**
- ◆ **Interruptions are OK**

RESIST URGE TO JUDGE

“Oh that’ll never work”

“That’s way too expensive”

“Gee, where are we going to get an anti-gravity machine?”

“The sponsor will think that’s ridiculous”

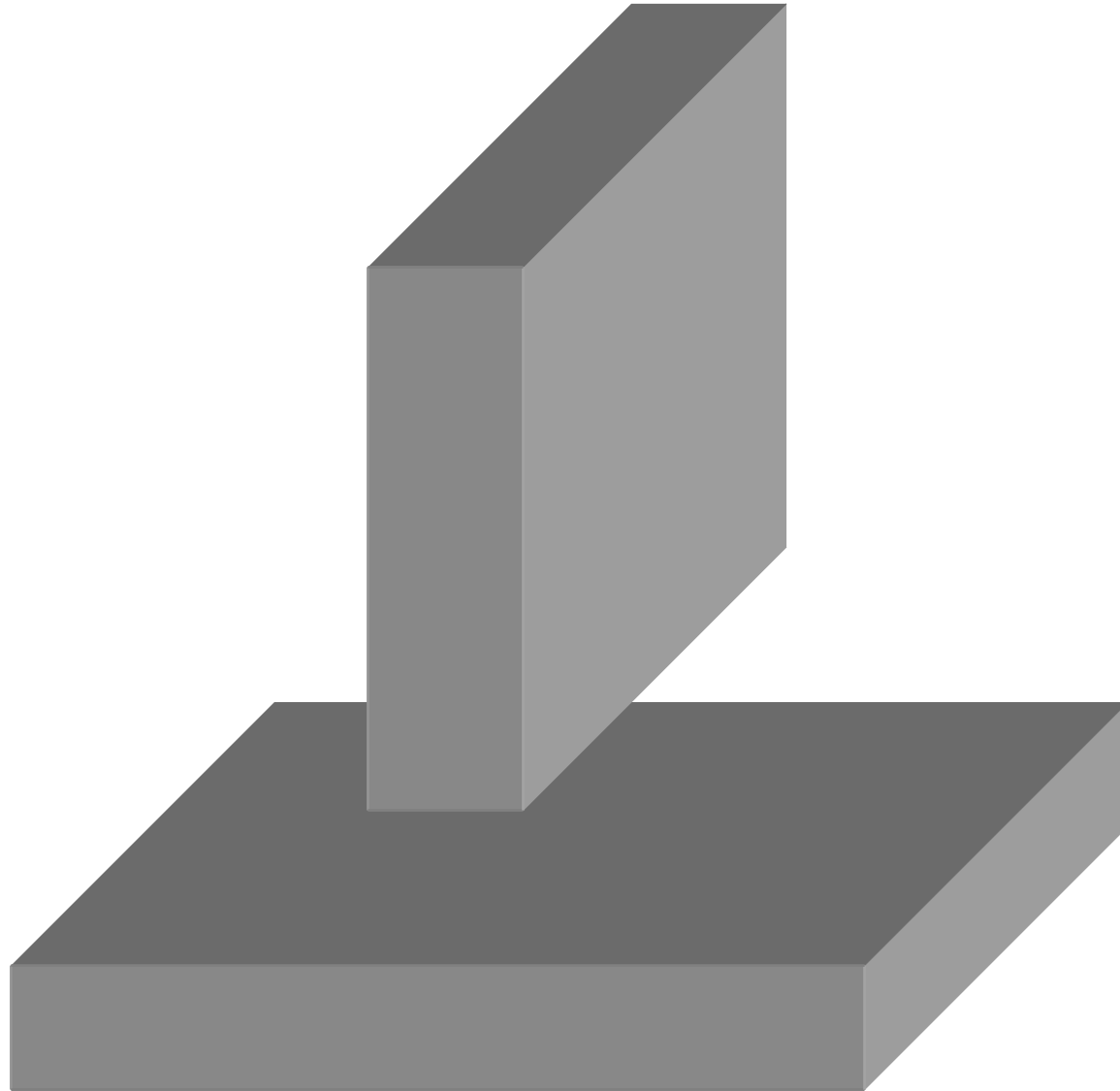
“That’ll never be light enough”

“That’s not going to be the idea we end up with”

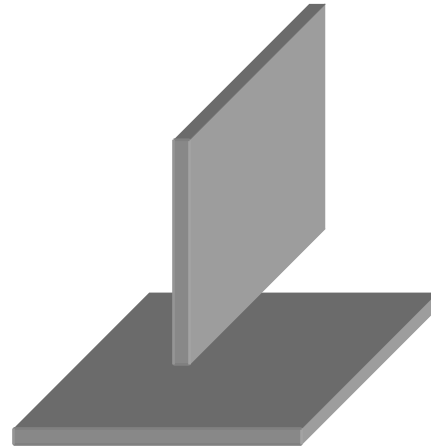
BRAINSTORMING EXERCISE

Groups of 3, arrange so you can see each other

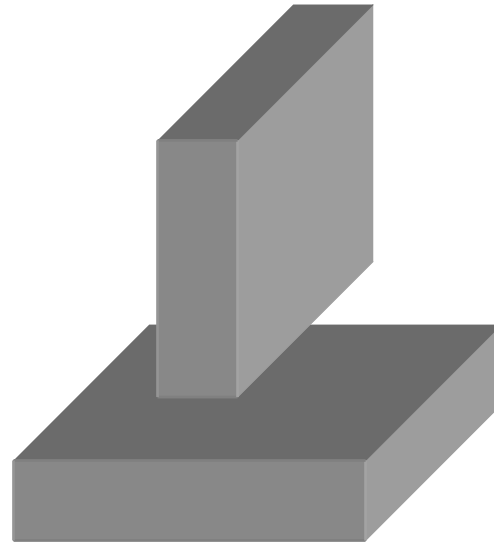
Paper for idea recording



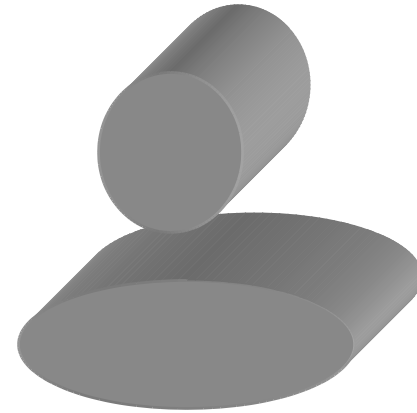
Ways to join these two objects



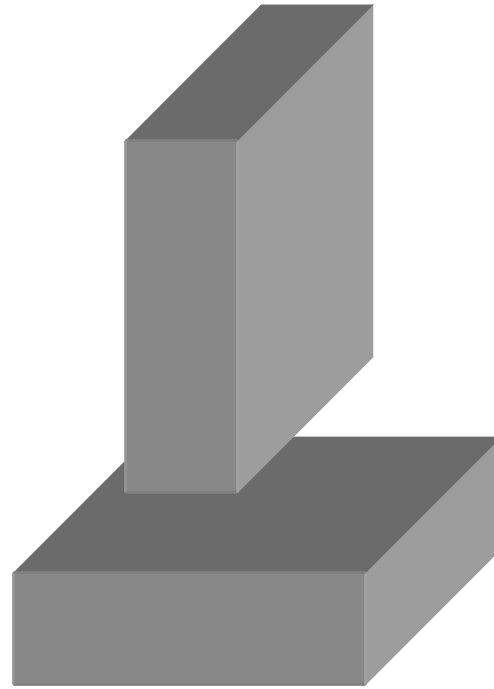
What if objects were 2 index cards?



What if objects were steel slabs?



What if objects were biological cells?



**What if objects were large stone slabs,
the size of Stonehenge?**



**What if objects were large stone slabs,
but you had to keep them apart?**

BRAINSTORMING -- Paradigm shift

- ◆ **Analogous tasks**
- ◆ **Change the scale**
- ◆ **Combine ideas**
- ◆ **Relax one spec**
- ◆ **Imagine new technologies**
- ◆ **Invert**

WHAT DO YOU DO WITH THE IDEAS?

- ◆ **Catalog**
- ◆ **Sort (affinity grouping)**
- ◆ **Combine**
- ◆ **Post on the wall**
- ◆ **Preserve**
- ◆ **Revisit**

CG MISTAKES YOUR TEAM WON'T MAKE

- ◆ All ideas generated before requirements set
- ◆ Judgment mixed into generation process
- ◆ Too few
- ◆ Going with first idea
- ◆ Equating brainstorming with concept generation
- ◆ NIH

What will your team be doing other than brainstorming to generate concepts?

- ◆ Patent search?
- ◆ Trade magazines?
- ◆ Consult experts?
- ◆ Consult lead users?

Yes, do all of these.....