9/24:

* HOMEWORK ASSIGN. DUE WEDNESDAY → SEE SYLLABUS. MBTI. ON BB
  - PREFERENCE GROUPING REPORT
* READ ASME DESIGN COMP. OUTLINE

* PURCHASE DESIGN NOTEBOOK, 8.5"x 11" → A4 (HOMEWORK)

9/26:

* READ CHAPTERS 1 - 5

- DESIGNED TO WORK ON HW OVER WEEKEND, ALL MATERIAL COVERED WEEK BEFORE

- STUDIO ON FRIDAY: HAVE DESIGN NOTEBOOK

* LECTURE NOTES:

SEE PROJECT PLANNING SHEET ON BB (ULMAN NOTES)
ALL HOMEWORK DONE INDIVIDUALLY

- DUE NEXT WEDNESDAY:

PROJECT PLAN TEMPLATE

A1: TASK TITLES, TASK OBJECTIVES, DELIVERABLES/METRICS, PERSONAL TIME

A2: TASK SCHEDULE — GANNT CHART

* PROJECT PLANNING:

- WHY..? → DEVELOPMENT BUDGET (TIME AND MONEY)
- PERSONNEL REQUIREMENTS
- OVERTIME AND SLACKTIME SCHEDULING

WHY IN ME 382?

- EXPERIENCE: PLAN → DO
  FEEDBACK

9/26:

WHERE DID YOU OVERESTIMATE? UNDERESTIMATE?

* STEPS:

1.) IDENTIFY THE TASKS
- BREAK THE PROJECT DOWN AS FAR AS POSSIBLE
- AS SPECIFIC AS POSSIBLE

ALL PER TASK

2.) STATE THE OBJECTIVE — WHAT IS THE GOAL (BIG PICTURE)
- TRYING TO ACCOMPLISH

3.) DELIVERABLES / METRICS:
- TANGIBLE PRODUCT OF THE TASK, SUCH AS:
  - DRAWING
  - PROTOTYPE
  - CALCULATION / ANALYSIS REPORT

TANGIBLE MUST OBJECTIVELY IDENTIFY THE COMPLETION OF THE TASK

4.) PERSONNEL REQUIRED FOR EACH TASK BY JOB TITLE:
- DESIGN ENGINEER
- PROJECT MANAGERS
- MARKET RESEARCHER
- DRAFTER
- PROTOTYPE MECHANITION
- ETC...

TEAM MEMBERS

5.) TIME REQUIRED FOR EACH JOB: TITLE
- IN HOURS
- GENERALLY TOO OPTOMISTIC / TOO PESIMISTIC

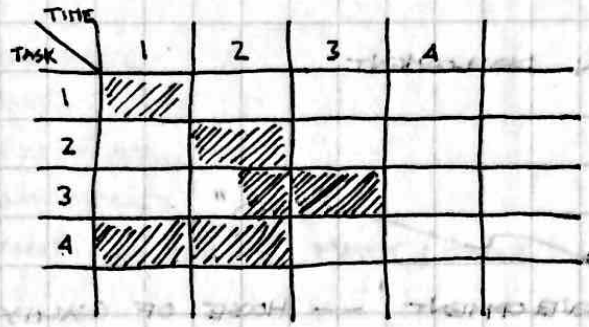
MISS DEADLINE

TO PESIMISTIC

9/26

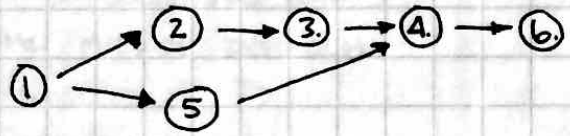
6.) SEQUENCE THE TASKS
- ID PREDESSESOR & SUCCESSOR TASKS

A. GANTT CHART



* USE GANTT CHART FOR 3B2 *

B. PERT



* READING NOTES:

CHAPTER 1:
- 3 MEASURES OF THE EFFECTIVENESS OF THE DESIGN PROCESS: * PG. 14 *
  PRODUCT COST; QUALITY; TIME TO MARKET.

[redacted] 10/1

* ASSIGNMENT 1 GANTT CHART DOES NOT NEED TO BE COMPUTER GENERATED.

- MUST MATCH 12 TASKS
- FILL OUT PROJECT PLAN FOR <u>EACH</u> TASK, PASTE INTO BOOK

* LECTURE NOTES: SPECIFICATION DEVELOPMENT

- CHAPTER 6 ULLMAN
- HW #2

"QFD"

"QUALITY FUNCTIONGTIONAL DEVELOPMENT" — HOOSE OF QUALITY

SUBJECTIVE → OBJECTIVE, GOAL - QUANTITATIVE DESIGN, ENGR. REQ.

EXAMPLE = TOYOTA

* DEFINE QUALITY..?
  - MEETING COSTOMER EXPECTATIONS

* FUNCTION:
  - MARKETING
  - ENGINEERING
  - PRODUCTION
  - FINANCIAL
  - MGMT

} ALL HAVE DIFFERENT VIEWS OF WHAT THE COSTOMER WANTS

* COMPETITION:

- ONLY PARTS ON VEHICLE CALCULATED INTO $200 BUDGET

* LECTURE NOTES: QFD

A4 - DESCRIPTION OF CUSTOMERS

INTERNAL
- CONSUMER
- USER
- PURCHASER
- WHOLESALER

OUTSIDE
- PRODUCTION, SALES, MGMT / ENGR

A5 - CUSTOMER REQUIRMENTS

- WHAT DO CUSTOMERS WANT?
- FORMAL MARKET RESEARCH
  - SURVEYS
  - INTERVIEWS
  - FOCUS GROUPS

CATAGORIZE

- PERFORMANCE
- APPEARANCE
- TIME
- COST
- PRODUCTION

A6 - COSTOMER REQUIRMENT WEIGHTING

BASED ON CUSTOMER RESPONCE OR TEAM MEMBERS' DIRECT EXPERIENCE
- MUSTS VS. WANTS
- DIRECT COMPARISON

A7 - COMPETITIVE

- BENCHMARKS FOR THE CUSTOMER REQUIREMENTS

BM: FROM ULLMAN:

1. DOESN'T MEET REQ'S
2. SLIGHTLY
3. SOMEWHAT
4. MOSTLY
5. COMPLETELY

- PERCEPTUAL MAP — HOW THE CUSTOMERS PERCIEVE THE COMPETITION

A8 - ENGINEERING REQUIRMENTS:

- TRANSFORM ABSTRACT CUSTOMER REQUIREMENTS INTO CONCRETE ER'S
- MUST HAVE UNITS
- MUST BE MEASURABLE IN A TEST → ENERGY TO SHUT
  → 10% SHUT SLOPE
  → "QUANITATIVE"

TO ADAPT REQUIREMENTS LIKE STYLING,
MUST APPLY SURVEY FOR QUANTITATIVE RESULTS

10/5/2012: QFD

	WEIGHT	E TO CLOSE	FORCE LVL	FORCE 10%	DOOR SEALERS	BLOCK NOISE REDUCTION	OVER CAR	FORD	HONDA	
EASY TO OPEN	7									
STAYS ON ON HILL	5									
DOESN'T LEAK	3									
NO ROAD NOISE	2									
UNITS		N-m	N	N	Pa	dB				
OUR CAR										
FORD										
HONDA										
TARGETS										

IF TARGETS ARE MET, CUSTOMERS SHOULD BE HAPPY

* FORGET ROOF OF HOUSE OF QUALITY *

* HW: BENCHMARK ONLY AGAINST SUPERDROID

10/5 NOTES:

* CUSTOMER REQUIRMENTS — KEEP TRACK OF NOUNS - CAN BE ASSUMPTIONS

HOUSE OF QUALITY

1ST HOUSE → CR VS. ER
2ND HOUSE → ER VS. PART CHARACTERISTICS ← PARTS DEPLOYMENT
3RD HOUSE → PC VS. KEY PROCESS OPERATIONS ← PROCESS PLANNING
4TH HOUSE → KPO VS. PRODUCTION REQUIREMENTS ← PRODUCTION PLANNING

10/8 NOTES:

* HW #2 DUE WEDNESDAY
  * DON'T NEED:
  * NEED:
    - CUSTOMER REQ'S
    - WEIGHTING
    - BENCHMARK VS. COMPETITION
    - ENGR REQ'S - MUST HAVE UNITS - MEASURABLE
    - TARGETS (VERY IMPORTANT)

* REQUIREMENTS:
  - MUST HAVE:
    WIRELESS TRANSMITTER/RECEIVER, RECHARGEABLE BATTERY, VIDEO SYSTEM, MASTER SHUT OFF
  - TASKS:
    NAVIGATE → "GOOD MANUVERABILITY" = FAST
    PICK UP SENSOR, READ GAUGE

EX:
CR: GOOD MANUVERABILITY
ER: TURNING RADIUS

* TEAM REQUIRMENTS:
  - MANUFACTURABILITY
  - COST — UNDER $200
  - RELIABILITY → MEAN TIME BETWEEN FAILURES (HRS)

$200 FOR WHAT IS ON THE VEHICLE

$30 CELL PHONE VIDEO

10/8:

NEXT WEEK: CONCEPT GENERALIZATION

- LARGEST HW ASSIGNMENT IN CLASS:

A11 – FUND. DECOMPOSITION
A12 – FUNCTION – CONCEPT MAPPING
A13 – SKETCHS (15) OF OVERALL CONCEPT

10/10

DUE NEXT WEDNESDAY:

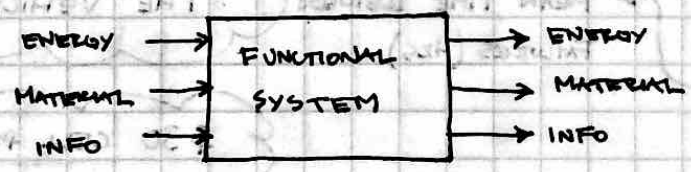
HW #3: CONCEPT GENERATION
- A11 → FUNCTIONAL DECOMP.
- A12 → FUNCTION CONCPT GEN.
- A13 → SKETCHS OF OVERALL CONCEPTS (15 TOTAL) → IN DN
  → CONCEPTUAL, NOT BOUND BY ROLES, REALITY

* ALL HW SHOULD BE PHOTOCOPIED FROM DESIGN NOTEBOOK

- "CONCEPT", A ROUGH SKETCH DEVELOPED TO THE POINT WHERE YOU CAN EVALUATE IT QUALITATIVELY AGAINST COST. REQUIRMENTS

MUST EVALUATE W/ RESPECT TO A CUSTOMER REQUIRMENTS

* FONCTIONAL DECOMPOSITION:
- A LOGICAL FLOW OF ENERGY, MATERIAL, OR INFORMATION



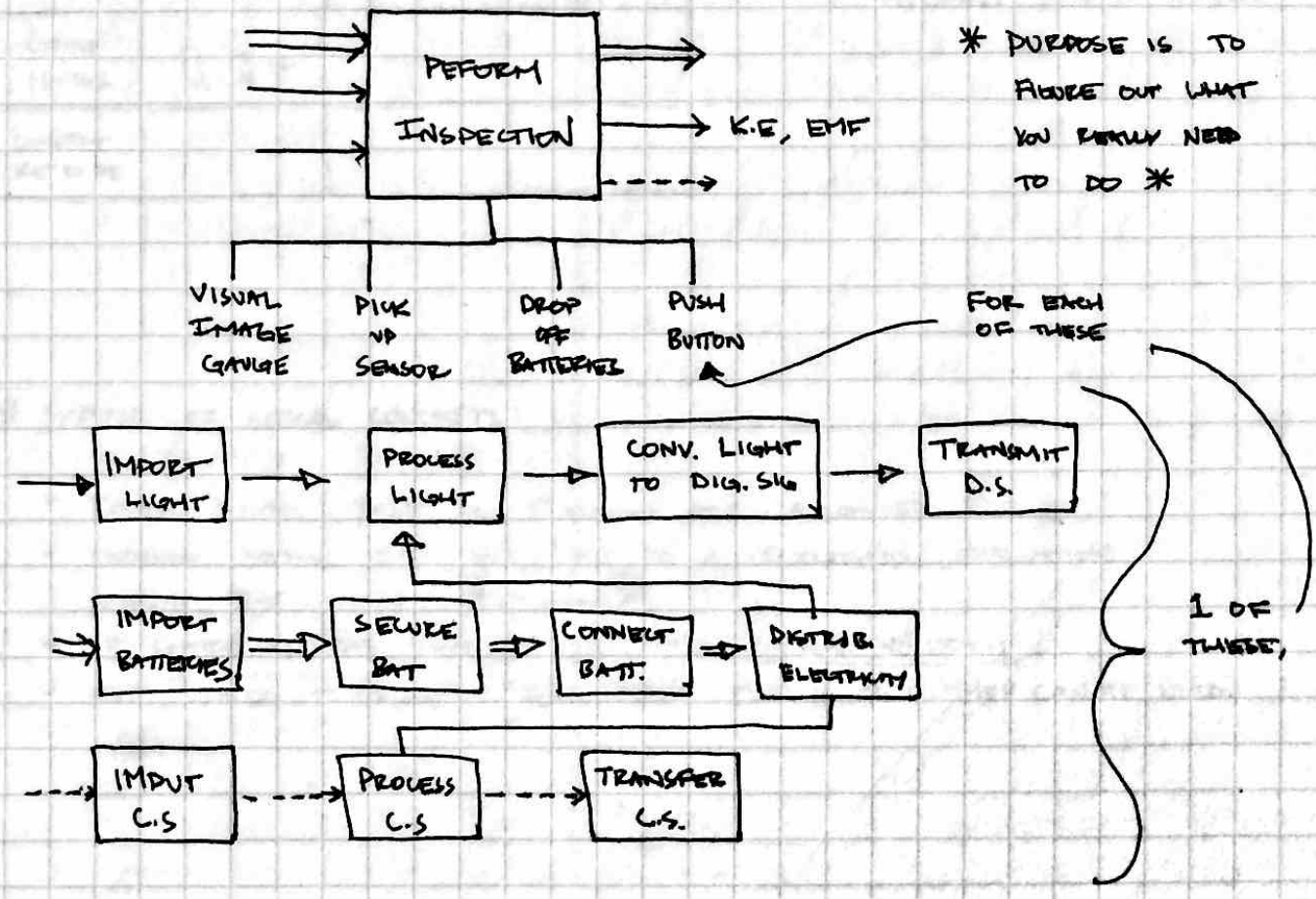
10/10 :

STEP 1: OVERALL FUNCTION OF SYSTEM, CONCISE STATEMENT OF OVERALL FUNCTION BASED ON CUSTOMER REQUIREMENTS

- WHAT DOES THE SYSTEM HAVE TO MOVE

DROP OF SENSOR
PICK UP " "
PUSH A BUTTON
READ A GAUGE
RELAY VIDEO TO OPERATOR
MOVE TO DIFFERENT TASKS

STEP 2: DECOMPOSE INTO SUBFUNCTIONS, FUNCTIONAL FLOW DIAGRAMS



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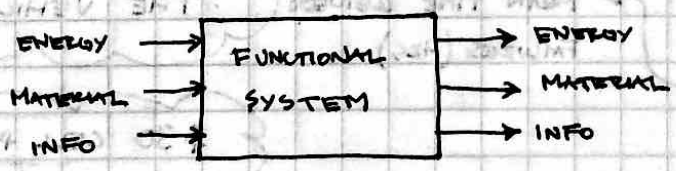

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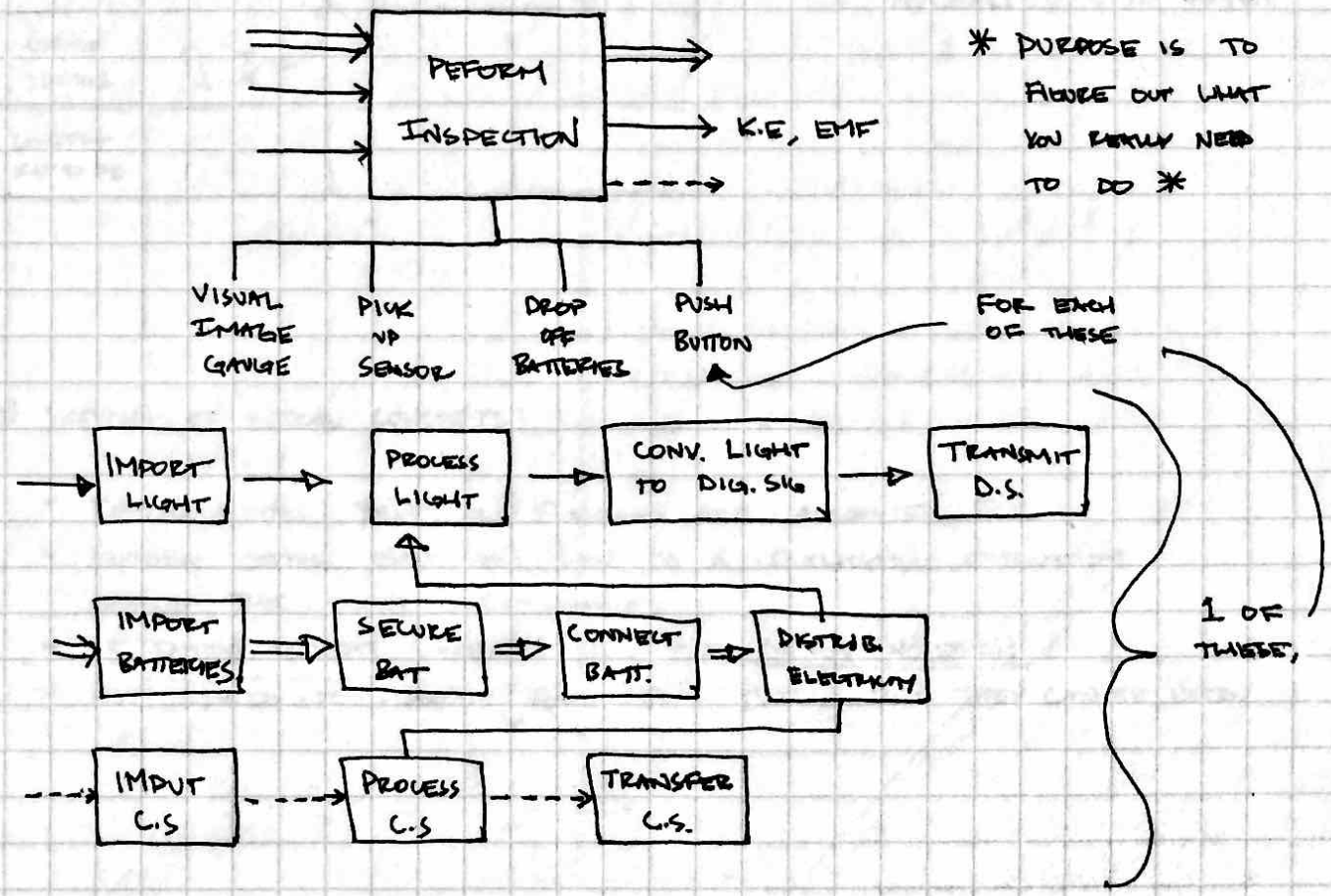


* PURPOSE IS TO FIGURE OUT WHAT YOU REALLY NEED TO DO *

10/12:

* FUNCTIONAL MODELING

- INCLUDE GUIDE DEVICE, ROBOT, SYSTEM

* ALL MATERIALS "FREE".

* FUNCTION CONCEPT MAPPING

- GENERATES CONCEPTS FOR EACH FUNCTION
- A CONCEPT IS A FORM THAT PROVIDES FUNCTION

-ME'S → PHYSICAL SYSTEM

* IN DESIGN NOTEBOOK:

FUNCTION	FORMS		
MOVE ROBOT			
GRASP SENSOR			
CONVERT KE TO PE			

* 5 IMPORT FUNCTIONS W/ 5 FORMS *
- ATLEAST 25 IN MATRIX

* SKETCHS OF OVERAL CONCEPTS:

- ENOUGH DETAIL THAT ALL FUNCTIONS ARE ACCOUNTED FOR
- ENOUGH DETAIL THAT YOU CAN DO A QUALITATIVE EVALUATION AGAINST THE CUSTOMER REQUIRMENTS
- IS ENTIRE CONCEPTS SKETCHED INTO YOUR <u>DESIGN NOTEBOOK</u>
- NOT LIMITED TO FUNCTION / FORM FROM MATRIX, BUT THEY CAN BE USED.

10/15

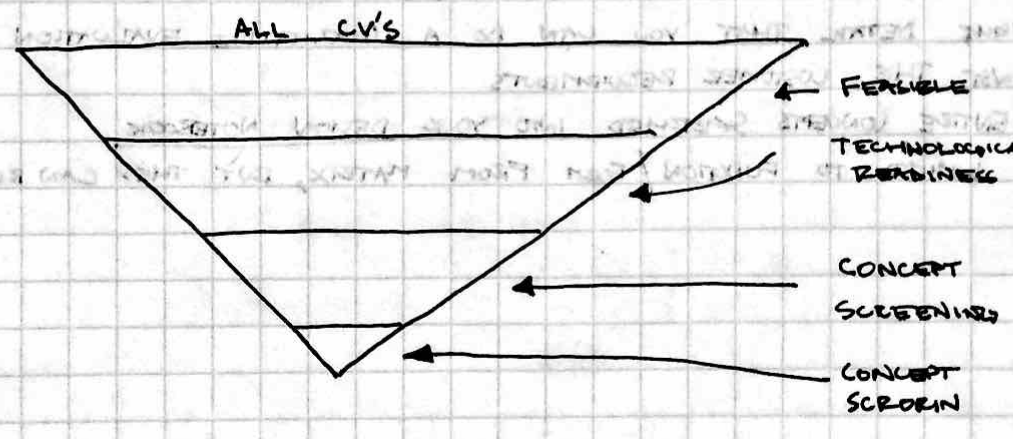
PROFESSOR HOYLE

* CONCEPT SELECTION
  - PRUNING CONCEPT VARIANTS → CONCEPT SCREENING
    ↳ ELIMINATION OF INFEASIBLE
    QUALITATIVE REASONING
  - CONCEPT SCREENING → GOAL, SELECT BEST METHOD → BEST CONCEPT
    NORMALLY A COMBONATION OF ATTRIBUTES.

* STRUCTURED SELECTION METHOD
  - EXTERNAL DECISION
  - PRODUCT CHAMPION
  - INTUITION
  - PROTOTYPE AND TEST

* BENEFITS:
  - SELECTION OF CUST. FOCUSED PRODUCT.
  - COMPETITIVE DESIGN
  - BETTER PRODUCT - PROCESS COMMUNICATION
  - REDUCED TIME TO INTRODUCTION
  - EFFECTIVE GROUP DECISION MAKING
  - DOCUMENTATION OF DECISION PROCESS

* EFFECTIVE DECISION MAKING FACTORS
  - FULL CONSIDERATIONS OF ALTERNATIVES
  - FULL CONSIDERATION OF EVALUATION CRITERIA.



10/15

* CONCEPT SELECTION PROCESS:

- DIFFERENT TEAM MEMBERS HAVE DIFFERENT OPINIONS

10/22

* DUE WED:

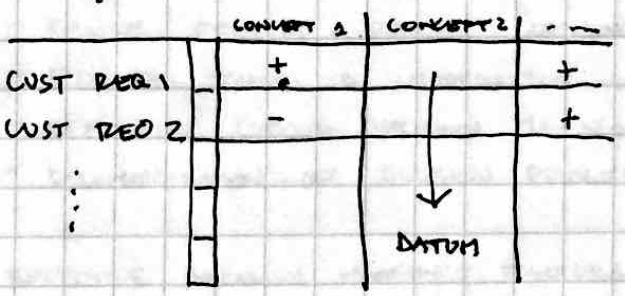
A14 - TECH REDINESS
A15 - GO/NO GO SCREENING
A16 - DECISION MATRICES
A17 - ANALYSIS, EXPERIMENTS, PROTOTYPES (DUE IN LAB, PROTOTYPE)

TECH REDINESS:

A.) CATAGORIZE EACH CONCEPT
  1.) NOT FEASIBLE (WHY)
  2.) COND. FEASIBLE
  3.) FEASIBLE

B.) FOR EACH CONCEPT IN 2, 3
  1.) LIST MAJOR FAILURE CRITERIA MODES
  2.) LIST CRITICAL PARAMETERS

A16 → GO/NO GO



ABSOLUTE ASSESMENT,
WILL THE CONCEPT SAT.
COST R?
Y, N, MAYBE

+ = 1
- = -1
0 = 0

IGNORE WEIGHT

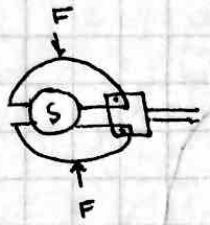
DO TWICE
FOR 2 DIFF.
DATUMS → PICK A GOOD ONE FOR #2

A17 : ANALYSIS, EXPERIMENTS, SUPPORT CONCEPT EVALUATION

- APPROPRIATE TO CONCEPTS

"BACK OF ENVELOPE" TYPES OF CALCULATIONS

EX. "HOLD SENSOR SECURELY"



→ SOLVE FOR FORCE

1, 2, SIMPLE CALCULATIONS FOR EACH PROTOTYPE

10/24/2012

A17 - ANALYSIS, EXPERIMENTS AND PROTOTYPES

A18 - EXPERIMENTS - TEST REPORT

A19

A20

A21

* PROTOTYPE OUT OF FOAM BOARD FROM BOOK STORE *

PROTOTYPE EVALUATION:

* GRADED ON: REPORT, "WHAT WAS THE INTENT OF THE PROTOTYPE" "KNOW WHAT YOU'RE GOING TO SAY." EXPLAIN BIG'S LOW'S, WHAT YOUR STRATEGY IS AND WHAT YOU'RE BENCH MARKING AGAINST.

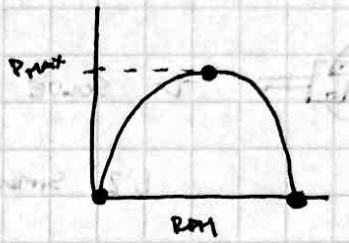
A18 - TEST REPORT, OUTLINE ONLINE - DUE NEXT WEDNESDAY

10/24/2012

PRODUCT DESIGN
- A19 - OFF THE SHELF PRODUCTS
- A20 - SHAPE DEVELOPMENT
- A21 - PRELIMINARY DEVELOPMENT

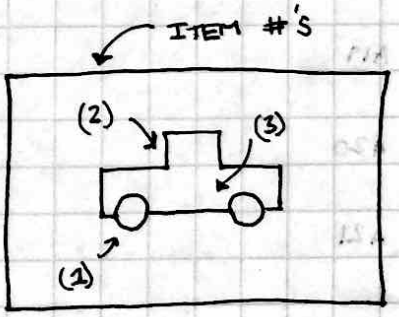
ANALYSIS

DC MOTORS



A19 : OFF THE SHELF PRODUCTS → PURCHASED PARTS
MANUFACTURED PARTS

A20: SHAPE DEVELOPMENT — LAYOUT DRAWINGS



*LAYOUT DRAWING:
- DONE TO SCALE
- SHOW THE WHOLE SYSTEM
- ORTHAGONAL VIEW
- IDENTIFY INDIVIDUAL PARTS
- SHOW IMPORTANT DIMENTIONS
- MAKE NOTES ON DRAWINGS
- START WITH SPACIAL CONSTRAINTS AND INTERFACES
- AS MANY VIEWS AS NECCESARY
- NO DRAWINGS OF INDIVIDUAL PARTS

BILL OF MATERIALS:
- A LIST OF PARTS KEYED TO THE LAYOUT DRAWINGS
- COLUMNS FOR:
  1.) ITEM #
  2.) PART #: (OPTIONAL)
  3.) QUANTITY
  4.) DESCRIPTION
  5.) EITHER
    A. MATERIAL AND MANUFACTURING PROCESS
    B. VENDOR AND VENDOR PART #

10/29/2012

* DUE WEDNESDAY:

A19 – } LAYOUT DRAWINGS
A20 – } PRELIMINARY BOM
A21 – }

DON'T NEED PART NUMBERS
PRICE NOT INCLUDED ON LIST
SHOULD HAVE ATLEAST 15 PARTS

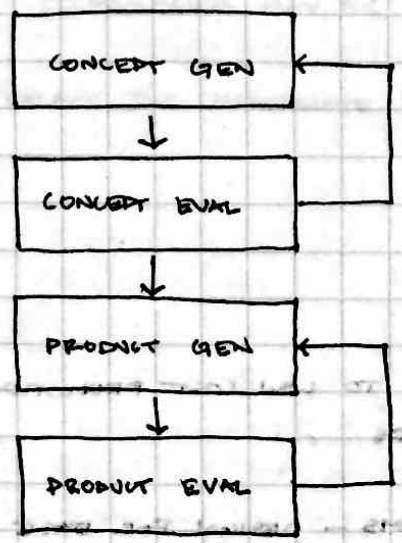
ITEM	QUANT	DESC	SOURCE
1	2	WHEEL	AMAZON: PULSE 125R
2	2	MOTOR GEARBOX	RADIOSHACK 273
3	1	FRAME	AL: MILL/DRILL

SUPPLIER PART #

A22 – COMPARISON TO ENGR. REQUIREMENTS
- IN LAB THIS WEEK, DECIDE ON TEAM ENGR. ER'S.

A23 – FUNCTIONAL CHANGES NOTED

A24 – ANALYSIS, EXPERIMENTS, PROTOTYPES AND PRODUCT EVALUATION



- COMPARISON TO ER'S:

FOR EACH ER:

a.) HOW WOULD YOU CALCULATE THIS BY ANALYSIS OR SIMULATION

b.) HOW WOULD YOU DETERMINE THIS BY EXPERIMENTATION?

10/30/2012

FUNCTIONAL CHANGES

- REDO FUNCTIONAL MODEL
- NOTE CHANGES, ARE THEY NECESSARY? ARE THEY COUNTER TO ANY ORIGINAL FUNCTION? MISSING FUNCTIONS
- HIGHLIGHT ADDITIONAL FUNCTIONS

PART 1

COMPARISON TO ER'S:

- COUPLE OF SENTENCES / IMAGES
  1) ANALYSIS
  2.) TESTING

PART 2

FOR 4 ENGR. REQUIREMENTS, PERFORM AN ANALYSIS OR EXPERIMENT TO GAGE THE PERFORMANCE OF DESIGN W/ RESPECT TO THE ER.

- AT LEAST 1 ANALYSIS
- AT LEAST 1 EXPERIMENT

(A) MANUFACTURABILITY
(B) SPEED
(C) SENSOR PICK UP
(D) YOUR CHOICE

} MUST HAVE THESE

* DESIGN FOR MANUFACTURABILITY
- SEEK SIMPLICITY
- SELECT MATERIALS THAT LEND THEMSELVES TO LOW COST PRODUCTION
- MINIMIZE THE NUMBER OF PRODUCTION STEPS
- MINIMIZE COMPLEXITY OF PRODUCTION STEP.
- MINIMIZE FIXTURE AND HANDELING PROBLEMS — DESIGN FOR EASE OF LOCATING & HOLDING PARTS
- EMPLOY MAXIMUM ACCEPTABLE TOLERANCES & FINISHES

10/31/2012

* STEPS IN MODELING:

1.) IDENTIFY THE DEPENDENT PARAMETER, THOSE THAT DEMONSTRATE PERFORMANCE
   - STRESS, VELOCITY, ACCEL, DEFLECTION

2.) HOW ACCURATE DO WE NEED TO KNOW - DEPENDS ON PROJECT
   - DEPENDS ON REFINMENT OF PRODUCT

3.) IDENTIFY THE INDEPENDENT VARIABLES
   - FORCE, SIZE, MATERIAL, MASS

4.) UNDERSTAND ANALYTICAL MODELING CAPABILITIES
   - ACCURACY VS. TIME
   - DETERMINISTIC VS. STOCHASTIC

5.) UNDERSTAND PHYSICAL MODELING CAPABILITIES
   - USUALLY MORE EXPENSIVE THAN ANALYTIC/NUMERICAL
   - CAN BE HARDER TO CHANGE IND. VARIABLES.
   - CAN BE HARDER TO CHANGE RELATIONSHIPS BETWEEN INPUT/OUTPUT
   - RELATIONSHIPS MAY BE MORE ACURATE

6.) SELECT THE APPROPRIATE METHOD, BOTH IS BEST

DUE THIS WED:

- COMPARISON TO EP: FOR EACH ONE, HOW WOULD YOU DETERMINE EXPERIMENTALLY AND ANALYTICALLY

- RE-DO FUNCTIONAL ANALYSIS
- ANALYSIS AND EXPERIMENTS SUPPORTING COMPARISONS TO EP'S

DUE NEXT WED.

A25 – DESIGN FOR ASSEMBLY
A26 – FMEA?
B1 – ASSEM. DRAWINGS
B3 – FINAL BOM
B2 – DETAIL DRAWINGS

– INDIV.
– GROUP G G G

* NOTES:

- DESIGN FOR ASSEMBLY: ULLMAN SECTION 11.5

-WHY DO WE CARE? → COST, QUALITY

- REDUCES LIKELY HOOD OF FALLING APART

-DESIGN FOR ASSEMBLY SHEET ON BB

1.) MINIMIZE PART COUNT:

a. THEORETICAL MINIMUM PART COUNT
- MOTION
- SEPARATE MATERIALS
- PHYSICAL, ASSEMBLY MANUFACTURING?

11/5/2012

6. IMPROVEMENT POTENTIAL → $= \frac{\text{ACTUAL \#} - \text{THEORETICAL MIN}}{\text{ACTUAL \#}}$

<10%	OUTSTANDING
11-20%	VERY GOOD
20-40%	GOOD
40-60%	FAIR
>60%	POOR

2.) MINIMIZE USE OF FASTENERS
- NOT PART OF PART COUNT
  - >30% OF ALL PARTS ARE FASTENERS → POOR
  - 20-30% → FAR
  - 10-20% → GOOD
  - 5-10% → VERY GOOD
  - <5% → OUTSTANDING
- NEED TO ACCOUNT FOR STANDARD SIZES
- CAPTURED FASTENERS

3.) BASE PART TO WHICH ALL OTHERS ATTACH
- ALL OTHER PARTS ARE ATTACHED
- USE JUDGEMENT

4.) REPOSITIONING
SCORE ; 0,1,2

5.) ASSEMBLY SEQUENCE EFFICIENCY:
- FEWEST STEPS
- LOW RISK OF DAMAGED COMPONENTS
- MINIMIZING AWKWARD OR UNSTABLE POSITIONS FOR PRODUCT ? PERSONNEL
- MINIMIZE SUBASSEMBLIES

TWO - METHODS:
1.) .... BOOK
2.) ESTIMATE... ← DO THIS

6.) COMPONENTS CHARACTERISTICS THAT COMPLICATE BONDING

- TANGLING
- NESTING
- FLEXIBLE COMPONENTS

7.) SPECIFIC RETRIEVAL

- HANDLING & INSERTION

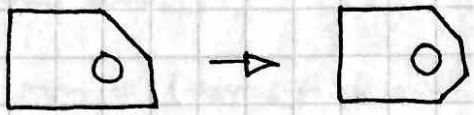
10/7/2012

8.) END TO END SYMMETRY

- SAM ABOUT AXIS PERPENDICULAR TO THE AXIS OF INSERTION

9.) AXIAL SYMMETRY

- IN LINE TO AXIS OF INSERTION



10.) IF NOT SYMMETRICAL, MAKE CLEARLY ASYMMETRICAL

11.) STRAIGHT LINE ASSEMBLY MOTION — ALL FROM SAME DIRECTION, PREFERABLY DOWN

12.) USE CHAMFERS, LEADS AND COMPLIANCE

13 MAXIMIZING PART ACCESSABILITY

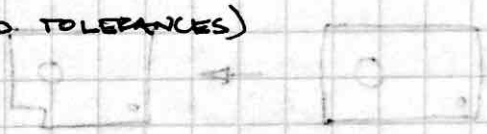
- ROOM TO GRASP AND GUIDE THE PART
- ROOM FOR TUBES

ASSEMBLY DRAWINGS:

- CAD
- SHOWS HOW ALL PARTS GO TOGETHER
- IDENTIFY EACH PART WITH A NUMBER KEYED TO BOM
- ORTHOGRAPHIC / ISOMETRIC
  OR

DETAILED DRAWINGS

- PART DRAWINGS
- INDIVIDUAL DRAWINGS OF EACH PART
- FULL DIMENSIONED (DON'T NEED TOLERANCES)
- SPECIFY MATERIAL



FULL TITLE BLOCK AND APPROVAL

- DRAWN BY
- CHECKED BY
- APPROVED BY

- KEEP EVERYTHING "A" SIZE, 8.5 x 11 STANDARD

- GIVEN A DRAWING AND RAW MATERIAL A TECH SHOULD BE ABLE TO MAKE IT.

11/19/2012

* DUE WEDNESDAY:

INDIVID. { A25 : DESIGN FOR ASSEMBLY

TEAM { B1 : ASSEMBLY DRAWING
B2 : PART DRAWINGS
B3 : FINAL BOM

* FINAL BOM:

a.) ITEM # (KEYED TO ASSEMBLY DRAWINGS)
b.) PART #
c.) QUANTITY
d.) NAME OR DESCRIPTION
e.) SOURCE

- PART NUMBERS — WHAT IS A PART?
— WHAT IS AN ASSEMBLY?

PERMANATE VS. NON-PERMANATE

NAMES — CONSISTENCY IS DIFFICULT

SEQUENCIAL NUMBERING VS. HETRARCHAL ORDERING

- SEQUENCIAL → 1, 2, 3 ..... 426, 427
- HERARCHAL → PART # MEANS SOMETHING

XXX

MILAM RESERVED — MONDAY NOV. 19, 26 → 6-7PM

SHOP OPEN LATE TH NOV. 15
SAT NOV 17

10/12/2012

DUE WED:

- TEAM: DRAWINGS AND BOM
- IND: DESIGN FOR ASSEMBLY

DUE MON:

FMEA

* FAILURE POTENTIAL ANALYSIS
  - PRESENTATION ON BB
  - WILL DO FMEA ON SENSOR PICKUP FUNCTION

11/14/2012

* FMEA:

FMEA: SENSOR PICKUP

FAILURE MODE	FAILURE CAUSE	EFFECT OF FAILURE ON SYSTEM	INDICATION	CRITICALLITY
GRABBER DOESN'T CLOSE	BROKEN WIRE BROKEN CONN. MOTOR FAILURE	CAN'T HOLD SENSOR	GRABBER DOESN'T MOVE	LOW - LOSS OF FUNCTION

* PRODUCT ~~DESIGN~~ DEVELOPMENT REPORT:

- DUE MONDAY, DECEMBER 3RD
- CONCISE DESCRIPTION OF PROBLEMS
- ONE PAGE, SELF-CONTAINED
- GRAPHICS AND TEXT.

] EXECUTIVE SUMMARY

FAILURE MODES AND EFFECTS ANALYSIS:

SENSOR PICKUP MECHANISM

FAILURE MODE	FAILURE CAUSE	EFFECT OF FAILURE ON SYS.	INDICATION	CRITICALITY
GRABBER DOESN'T LIFT	PARALLEL SYS. SERVO FAULTY, BROKEN SERVO HORN	CAN'T RAISE SENSOR / LOOK AT GUAGE EASILY	A-BAR PARALLEL SYSTEM NOT RAISING/LOWERING	MEDIUM - LOSS OF MOBILITY
GRABBER DOESN'T CLOSE	FAULTY SERVO BROKEN CABLE DAMAGE FROM COMPETITION	CAN'T GRAB SENSOR / DROP OFF SENSOR	GRABBER FAILS TO RELEASE SENSOR	HIGH - LOSS OF FUNCTION
GRABBER DOESN'T GRAB TIGHT ENOUGH	LOW BATTERY GRABBER FINGERS TO BIG SERVO	CAN'T HOLD SENSOR POSSIBLY	SENSOR SLIPS ON PICK UP / DROP OFF	LOW - POTENTIAL LOSS OF AGILITY (SPEED)
GRABBER DOESN'T OPEN	SERVO FAULTY RADIO COM. DAMAGE FROM COURSE BROKEN CABLE	FAIL TO RELEASE SENSOR FAIL TO PICK UP SENSOR	GRABBER FAILS TO RELEASE SENSOR	HIGH - LOSS OF FUNCTION

11/19/2012

* FAULT TREE ANALYSIS:

- START W/ MAJOR FAILURE (FAULTS)
- DETERMINE THE CAUSE OF THE EVENT
- WORK WAY DOWN TO DETERMINE ROOT CAUSE OR COMBINATION OF CAUSES

* PRODUCT SAFTEY:

- FIGURE OUT WHAT COULD GO WRONG
  a.) FMEA
  b.) FAULT TREE ANALYSIS
- RISK ASSESSMENT

- PREVENT RISK
  a.) DESIGN TO ACCEPTED STANDARDS
    - OSHA
    - ASME
    - ISO
    - IEC
  b.) INHERENT SAFTEY
    - (IDIOT PROOF)
  c.) PROTECTIVE DEVICES
  d.) WARNINGS (LEAST BEST)

* PRODUCT LIABILITY
  - LAW DEALING W/ PERSONAL INJURY
  - DESIGN NOTEBOOK IS A LEGAL DOCUMENT, IT IS A RECORD OF SAFTEY CONSIDERATIONS

* CODES AND STANDARDS
  - VOLUNTARY STANDARDS
  - AGREEMENTS AMONG COMPANIES
  - HD DVD / BLU-RAY
  - IEEE 802.11n WIRELESS

  - MANDATORY STANDARDS
    - ADOPTED BY GOVT., WRITTEN INTO LAW OR REGULATION
      OSHA, FAA, CONSUMER PRODUCT SAFTY COMMISSION

11/19/2012 CONT.

TYPES:

- PERFORMANCE STDS. (WHAT THE DESIGN MUST DO)
- DESIGN STD.S
- TEST STANDARDS, ASTM, UL
  ↑ UNDERWRITER LAB

MUST SUBMIT A DESIGN CHANGE FORM IF DRAWING DOES NOT MATCH BOT AT COMPETITION.

10/26

NO LAB THURSDAY

IMPOUND AT NOON, ROGERS 228 (LAB ROOM) ON THURSDAY

* MUST HAVE EASY TO SEE TEAM NUMBER! *

- WILL RELEASE FROM IMPOUND AT 5:00 PM, POSSIBLY EARLIER.

* FRIDAY, RECAP OF CLASS AND COMPETITION

* GROUP REPORT DUE MONDAY OF FINALS WEEK, 11:00 AM

* DESIGN NOTEBOOKS DUE MONDAY, IN PAASH'S OFFICE

NOTES:

* DESIGN FOR SUSTAINIBILITY:

- ALL MATERIAL THAT ENTERS A MANUFACTURING PROCESS SHOULD SHOULD LEAVE AS PART OF A PRODUCT

- ALL ENERGY SHOULD RESULT AS USEFUL WORK

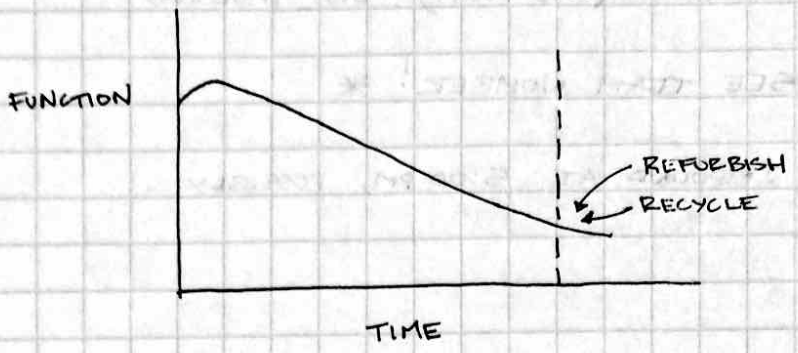
- PRODUCTS SHOULD BE MADE OF ABUNDANT, NON-TOXIC MATERIALS

- PRODUCTS SHOULD BE DESIGNED SO THAT USEFUL PRODUCTS CAN BE MADE FROM THEM AT END OF LIFE.

- MINIMIZE PACKAGING AND MAXIMIZE REUSE / RECYCLING

11/26/2012

* PRODUCT RETIREMENT :



* OPTIONS :

- HIGH VALUE PRODUCTS → REFURBISH / REUSE
- LOW VALUE PRODUCTS → RECYCLE

} DISASSEMBLY

* DISASSEMBLY OPERATION:

- COLLECTION, TRANSPORTATION, HANDLING
- STORAGE (PRE, POST DISASSEMBLY)
- POSITIONING / FIXTURING
- SEPARATION

* DESIGN FOR DISASSEMBLY:

- BASE PART
- MINIMUM REPOSITIONING
- STRAIGHT LINE MOTION
- SINGLE DIRECTION

11/26/2012

* REFURBISHMENT

- QUICK REMOVAL OF PARTS THAT ARE LIKELY TO FAIL OR WEAR OUT

* RECYCLING:

- QUICK REMOVAL OF:
  - HAZARDOUS STUFF
  - HIGH VALUE PARTS
  - UNDAMAGED PARTS
  - MINIMIZE NUMBER OF COMPONENTS AND NUMBER OF MATERIALS
  - GROUP MATERIALS INTO SUBASSEMBLIES

* EASE SEPARATION:

- REVERSIBLE FASTNERS
- DESIGN FOR BREAK APART
- MINIMIZE NUMBER AND TYPES OF FASTENERS

* MATERIALS:

- MARK MATERIALS
- MAGNETIC VS. NON-MAGNETIC
- PLASTICS W/ DIFFERENT SPECIFIC GRAVITY'S

* SEQUENCE

- MANY PATHS → MINIMUM TIME PROBLEM.

11/28/2012

* TOMORROW:

  SHOP CLEAN UP, 10 MINUTES → 5 POINTS ON HW
  IMPOUND @ NOON
  RELEASE @ 5:00 PM
  CONTEST, 6:00 PM MILAM 026

  CONTEST ORDER RANDOM

* LAB ON FRIDAY EVALUATIONS

* NOTEBOOKS DUE 3 DEC. IN ROGERS 414, 5:00 PM

* FINAL REPORT ON TEACH, ENGR.OREGONSTATE.EDU

* TEAM NAME FOR FR:

  TEAM_XX.PDF

* PROBLEM APPRAISAL:

- QFD
- DISCUSSION OF CUSTOMERS
- ~~[illegible]~~
- NEED PROJECT PLANNING FORMS
  ↳

* PRODUCT DESIGN
- SIGN PROD. EVAL TEST REPORT!
- BOM SCAN OUT OF DN.
  ↳ COREY

* DRAWINGS / BOM
  ✓

* PLANNING DISC.
- GANTT CHART

* REQ. DISC.
- PETER

* PROTOTYPE
- DONE

* EVAL OF FIELD TEST

* COVER PAGE W/ PIC
- NAMES
- DATE
- TITLE

*NOTES:

- SIGN DRAWINGS, INITIAL
- PROJECT PLANNING → COREY
- BOM → COREY
- PETER, REQUIREMENTS DISCUSION NOT FINISHED

DONE:
IN ADOBE → 1, 2, 4, 5, 7, 11, 9, 3

NEEDS WORK!
6, 5 POSSIBLY?
8 (PETER)
10 (PETER)

12/3/2012:

PROJECT PLANNING

NEED 6, 8, 10
- PETER
  ↳ FINAL DRAWINGS
    ↳ USE PAULS LAYOUTS FOR 6, SCAN MINE W/ BOM FOR 5.

ORDER:

COVER PAGE
EXEC SUMM.
INTRODUCTION
PROJ. PLANNING
HOUSE OF QUALITY
DECISIONS ON CUSTOMERS
FUNCT. DECOMP
- FUNCT. FORM MAPPING
15 CONCEPTS
CONCEPT EVALUATION
CONCEPT SELECTION
LAYOUT DRAWINGS + BOM (CATI)
PRODUCT EVALUATION
FINAL LAYOUT SIGNED
- DESIGN CHANGES
~~GANT~~
PLANNING DISC.
GANNT CHART
REQUIREMENT DISC.
PROTOTYPE DISC.
EVALUATION OF FIELD TEST
CONCLUSION