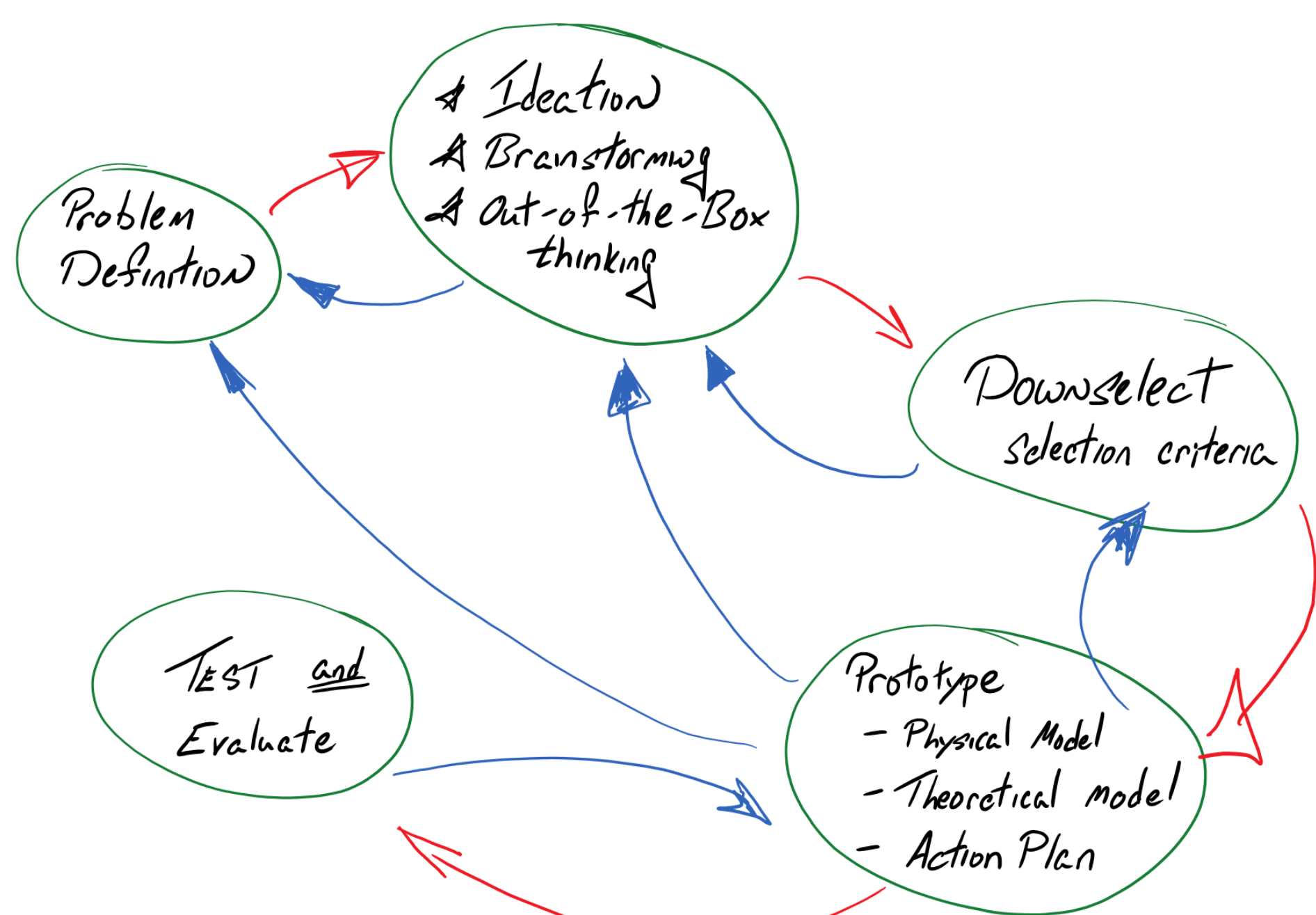


# Teaching Design: Creating The Foundation

OPEN 2016  
PORTLAND, OR

## "The DESIGN Process"

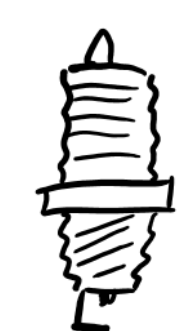


Where is the ENGINEERING?

ENGINEERING

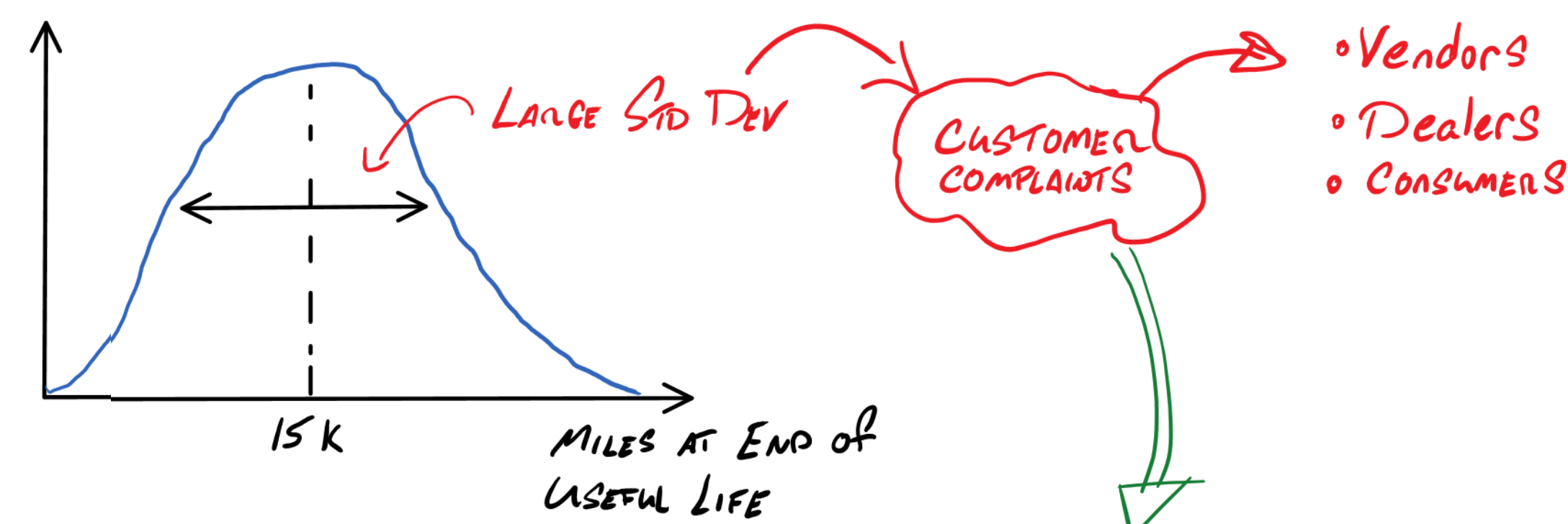
## "The DESIGN Process"

★ The Spark Plug ★



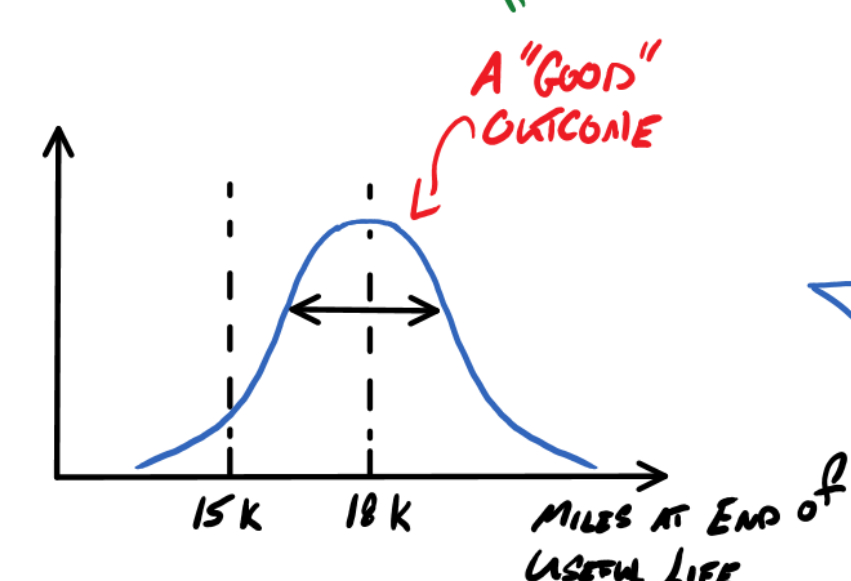
Well understood  
Simple design  
It's NOT BROKEN... NO NEED TO FIX IT

Useful Lifetime ~ 15k



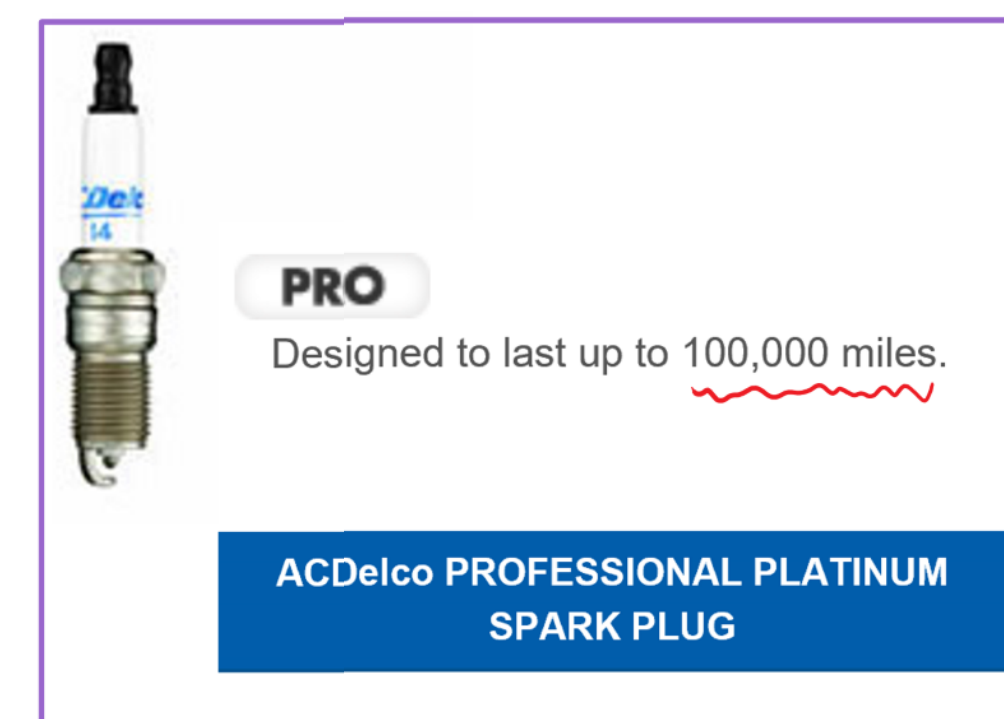
Directive...  
Make it better

Advantage over competition



ENGINEERING  
• MECHANICAL  
• ELECTRICAL  
BETTER MANUFACTURING  
↳ Quality Assurance

and repeat...



Carbon Fouling from oil seepage into cylinder

Engineering  
Improvements made at a system level. Design, Supply chain, manufacturing, quality assurance, advanced materials...

## FIRST-YEAR INTRODUCTION TO ENGINEERING

NSF FUNDED INITIATIVE ⇒ "HANDS-ON"

PI - DAVID WILLIS  
ASSISTANT PROFESSOR  
THRU STUDENTS WHO  
MAKERS

BENCHTOP CNC'S  
MULTIPLE PROJECTS  
MATLAB PROGRAMMING  
TEAM BASED WORK  
ELEMENTS OF DOCUMENTATION

PROVIDE STUDENTS WITH A  
"QUASI" DESIGN EXPERIENCE  
↳ EXPOSE THEM TO "ENGINEERING BASED MAKING"

## SECOND-YEAR COMPUTER-AIDED DESIGN

- ★ A FIRST COURSE IN SOLID MODELING
  - SOFTWARE AGNOSTIC
  - ↳ CURRENTLY USING SOLIDWORKS
- ★ AN INTRODUCTION TO THE USE OF MICROPROCESSORS
  - CURRENTLY USING THE ARDUINO AND PLATFORM
  - \* LARGE USER COMMUNITY
  - \* MANY EXAMPLES OF "MAKERS"
  - \* AMPLE AMOUNTS OF ONLINE TUTORIALS + SAMPLE CODE

SKETCHING → DESIGN INTENT

EXPLORATION OF MULTIPLE APPROACHES

BASIC → ADVANCED PART MODELING ASSEMBLIES

INTRODUCTION TO MOTION ANALYSIS

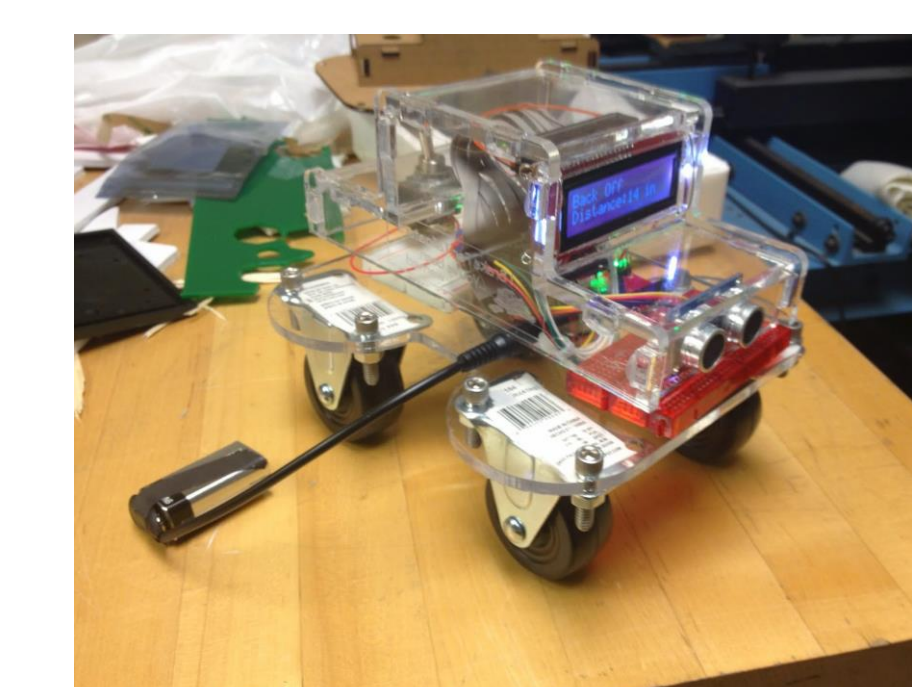
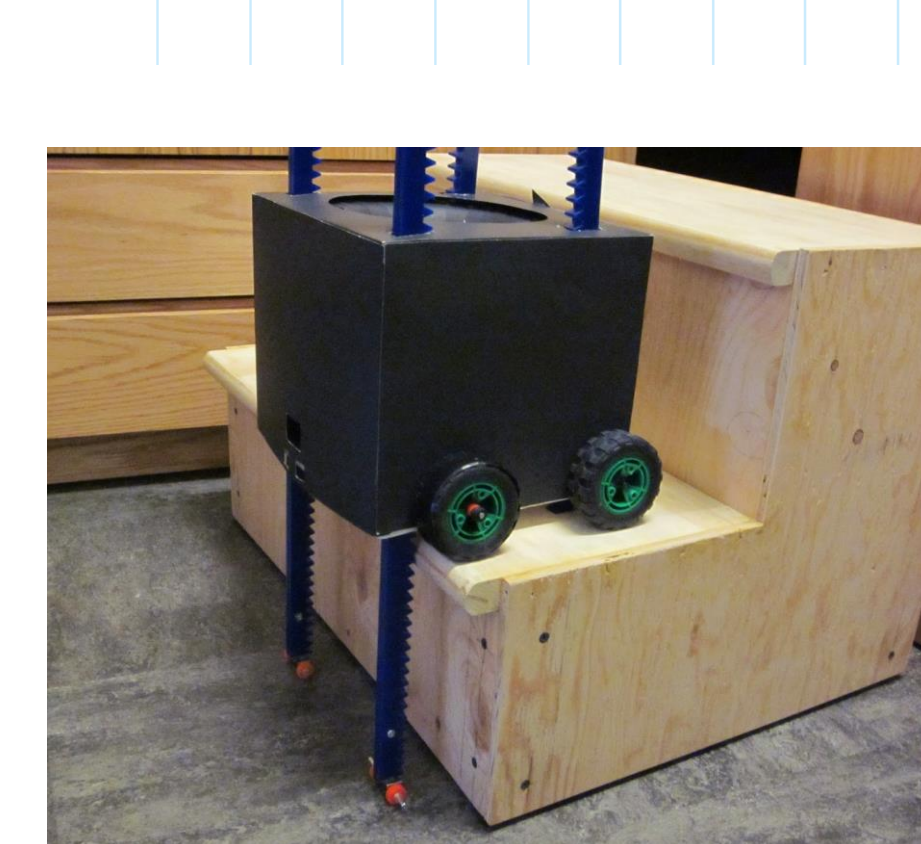
CREATION OF ANNOTATED DRAWINGS BOTH 2D + 3D FOR THE PURPOSE OF DOCUMENTATION

OBJECTIVE: \* READ INPUT FROM SENSORS - DIGITAL + ANALOG

\* CONTROL DC MOTORS, SERVO MOTORS, STEPPER MOTORS, BRUSHLESS DC MOTORS

\* FURTHER REINFORCE PROGRAMMING SKILLS

- ★ TEAM BASED "OPEN ENDED" DESIGN PROJECT
  - AS A TEAM DESIGN A DEVICE THAT CAN ACCEPT INPUT FROM A USER AND REACT USING SOME TYPE OF MOTION. DEVICE IS REQUIRED TO INCORPORATE LASER CUT MATERIAL, 3D PRINTED PARTS AND...
  - \* LASER CUTTING
  - \* 3D PRINTING
  - \* BLOG BASED DOCUMENTATION



DANIEL J. SULLIVAN, PhD  
LECTURE OF MECHANICAL ENGINEERING  
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