



UNH TURBOJET

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ABSTRACT

A TURBOJET ENGINE WAS DESIGNED AND CONSTRUCTED BASED ON AN INDUSTRIAL DIESEL TURBOCHARGER. THE ENGINE RUNS ON BOTH DIESEL AND PROPANE FUELS. SEVERAL SUBSYSTEMS ARE INCORPORATED IN THE DESIGN OF THE ENGINE, WHICH INCLUDE LUBRICATION, IGNITION, FUEL SUPPLY, AND MEASUREMENT DEVICES. A BRAYTON CYCLE ANALYSIS WAS PERFORMED ON THE ENGINE TO DESCRIBE PERFORMANCE CHARACTERISTICS.

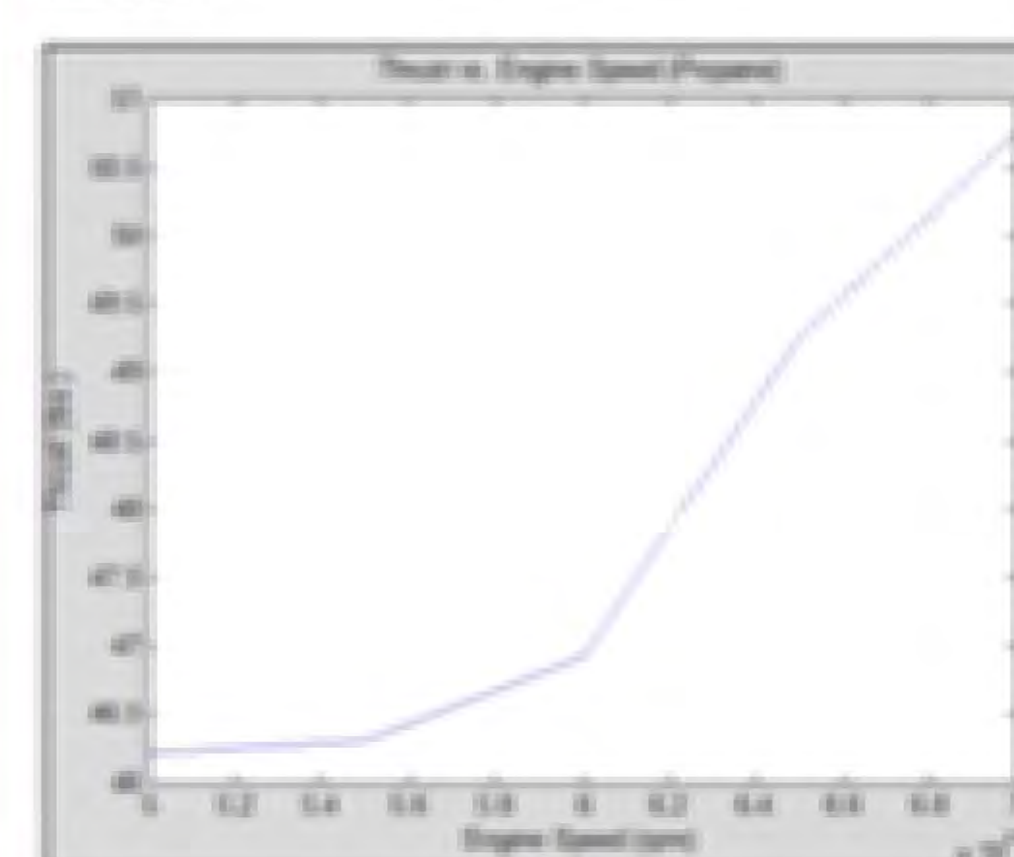


OPERATION

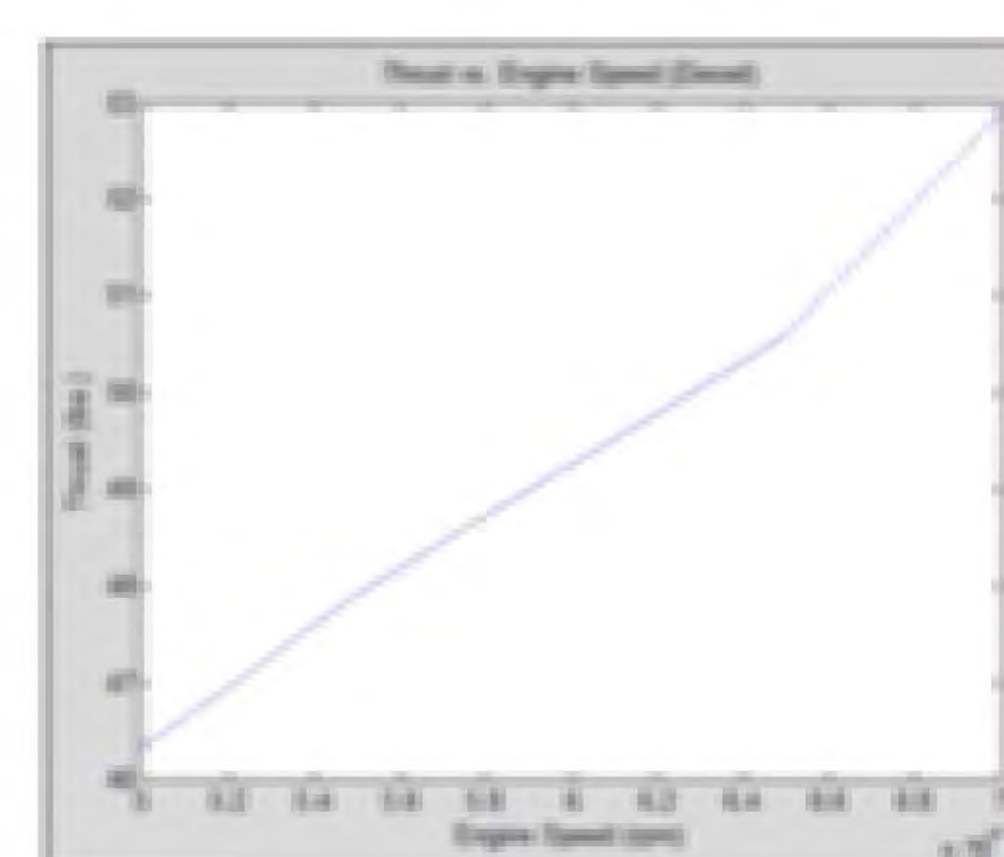
1. COMPRESSOR: DRAWS IN AMBIENT AIR AXIALLY WITH ROTARY COMPRESSOR ON TURBOCHARGER
2. INTAKE TUBE: COMPRESSOR FORCES AIR RADIALLY THROUGH TUBE LEADING TO COMBUSTION CHAMBER
3. COMBUSTION CHAMBER: FUEL IS INJECTED AND MIXED WITH THE COMPRESSED AIR. MIXTURE IS IGNITED, PRODUCING HOT GASES
4. TURBINE: ENERGY IS EXTRACTED FROM THE HOT GASES IN THE TURBINE SECTION OF THE TURBOCHARGER, WHICH IS USED TO DRIVE THE COMPRESSOR. EXCESS GASES EXIT IN THE FORM OF THRUST

THRUST

HIGH PRESSURE, LOW VELOCITY GASES EXIT THE TURBINE AND ENTER THE NOZZLE, WHERE A REDUCTION IN AREA DECREASES THE PRESSURE AND ACCELERATES THE GASES, RESULTING IN AN INCREASE IN THRUST.



MINIMUM THRUST: 48.22 LBF
MAXIMUM THRUST: 50.76 LBF



MINIMUM THRUST: 48.31 LBF
MAXIMUM THRUST: 52.80 LBF

FROM THE PLOTS, THRUST WITH RESPECT TO ENGINE SPEED IS MORE LINEAR WITH DIESEL FUEL THAN WITH PROPANE FUEL. AT LOW ENGINE SPEEDS, PROPANE IS MUCH LESS EFFECTIVE IN TERMS OF THRUST GENERATED BY THE ENGINE



ENGINE SUBSYSTEMS

LUBRICATION

- ROTARY VANE PUMP
- 30 PSI OIL PRESSURE
- 10W-30 SYNTHETIC OIL
- 100 GPM FLOW RATE

STARTER

- SOLENOID CONTROLLED
- 350 PSI AIR SUPPLY REQUIRED
- (2) COPPER LINES DIRECT HIGH VELOCITY AIR PERPENDICULAR TO COMPRESSOR BLADES
- ENGINE STARTING SPEED BETWEEN 15000-20000 RPM

FUEL DELIVERY (PROPANE)

- PRESSURIZED PROPANE TANK
- SOLENOID CONTROLLED FUEL ON/OFF
- PROPANE CYLINDER VALVE CONTROLS THROTTLE
- 15 LB PROPANE FUEL CYLINDER

FUEL DELIVERY (DIESEL FUEL)

- ROTARY VANE PUMP
- 100 PSI FUEL PRESSURE
- (2) DELAVAN BURNER NOZZLES, 5 GPM
- THROTTLE CONTROLLED BY NEEDLE VALVE ON INSTRUMENT PANEL

MEASUREMENTS



TACHOMETER

- ARROUND-CONTROLLED
- INFRARED EMITTER AND DETECTOR
- INFRARED LIGHT REFLECTS OFF WHITE HALF OF ROTOR AND IS ABSORBED BY BLACK HALF
- ARROUND SENSES INTERRUPTIONS IN REFLECTED LIGHT AND COMPARES THEM TO TIME INTERVAL

THERMOCOUPLES

- (4) TYPE-K THERMOCOUPLES
- COMPRESSOR INLET, COMPRESSOR OUTLET, TURBINE INLET, TURBINE OUTLET
- USE ARROUND WITH THERMOCOUPLE AMPLIFIERS TO CONVERT VOLTAGES TO TEMPERATURES

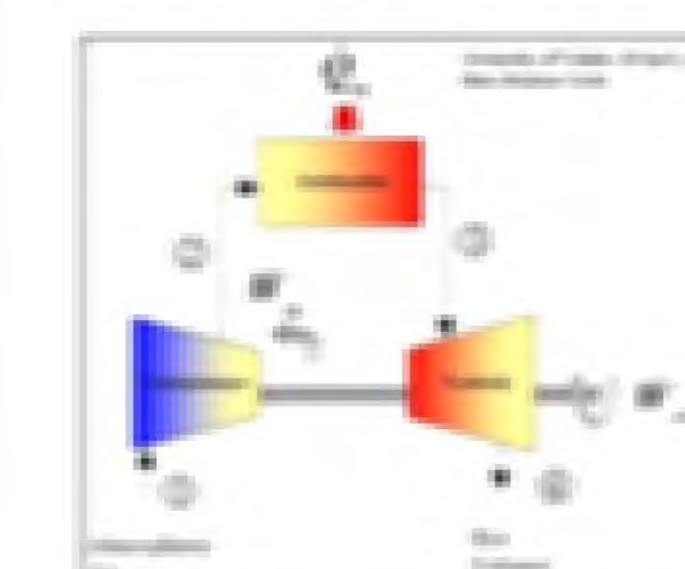


THRUST

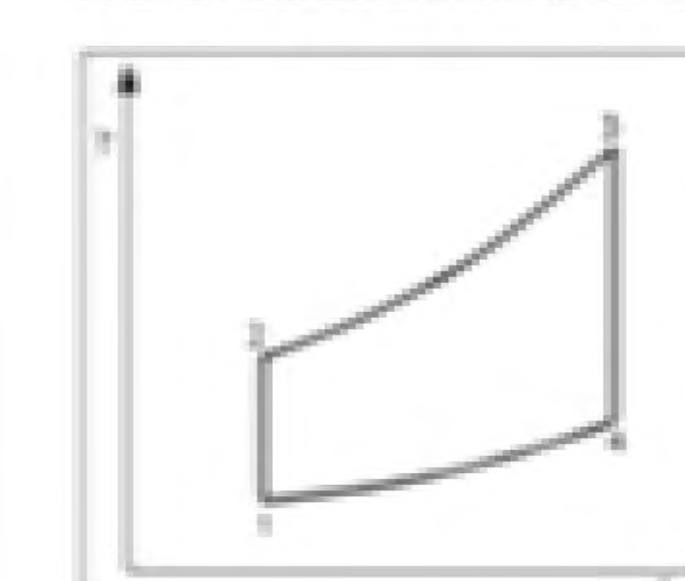
- INTERFACE COMPRESSION FORCE TRANSDUCER
- 0-100 LBF MEASUREMENT RANGE

BRAYTON CYCLE ANALYSIS

BRAYTON CYCLE - IDEAL THERMODYNAMIC CYCLE FOR GAS TURBINE ENGINE OPERATION

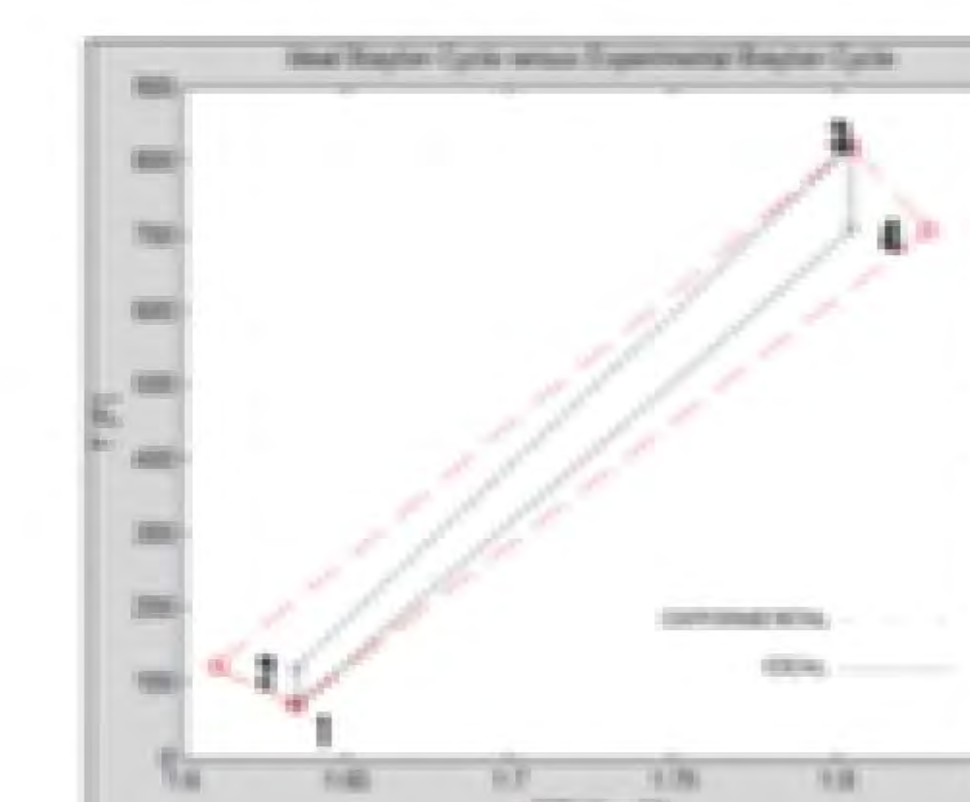


IDEAL GAS TURBINE T-S DIAGRAM



$$WORK = \dot{m} \cdot \left[\frac{BTU}{lb \cdot m} \right]$$

- 1-2 ISENTROPIC (CONSTANT ENTROPY) COMPRESSION
- 2-3 CONSTANT PRESSURE HEAT ADDITION
- 3-4 ISENTROPIC EXPANSION
- 4-1 REVERSIBLE, CONSTANT PRESSURE HEAT REJECTION



COMPRESSION RATIO = 2.0

THERMAL EFFICIENCY = 0.0%

A SPECIAL THANKS TO OUR SPONSORS:

- LARRY C. GRETCHEN WOODMAN
- BEST MACHINE, INC.
- BOCK BOON REPAIR

MECHANICAL ENGINEERING
CLASS OF 2013

ADVISOR

• CHRISTOPHER WHITE, UNH

A photo that really pops can make your poster a winner!

Overview

Xemed LLC designs and manufactures cutting-edge laser systems for medical and future military systems. Functionality of the systems depends on the quality of laser which is currently used to polarize gas for medical purposes. While optimization of laser light has been completed previously, a system of multiple emitters functioning in unison has not. Using the system shown as a test bed, the creation of such a system will be attempted. If it is successful in optimizing all emitters, the technology from this project will be used in a larger-scale weapons system.

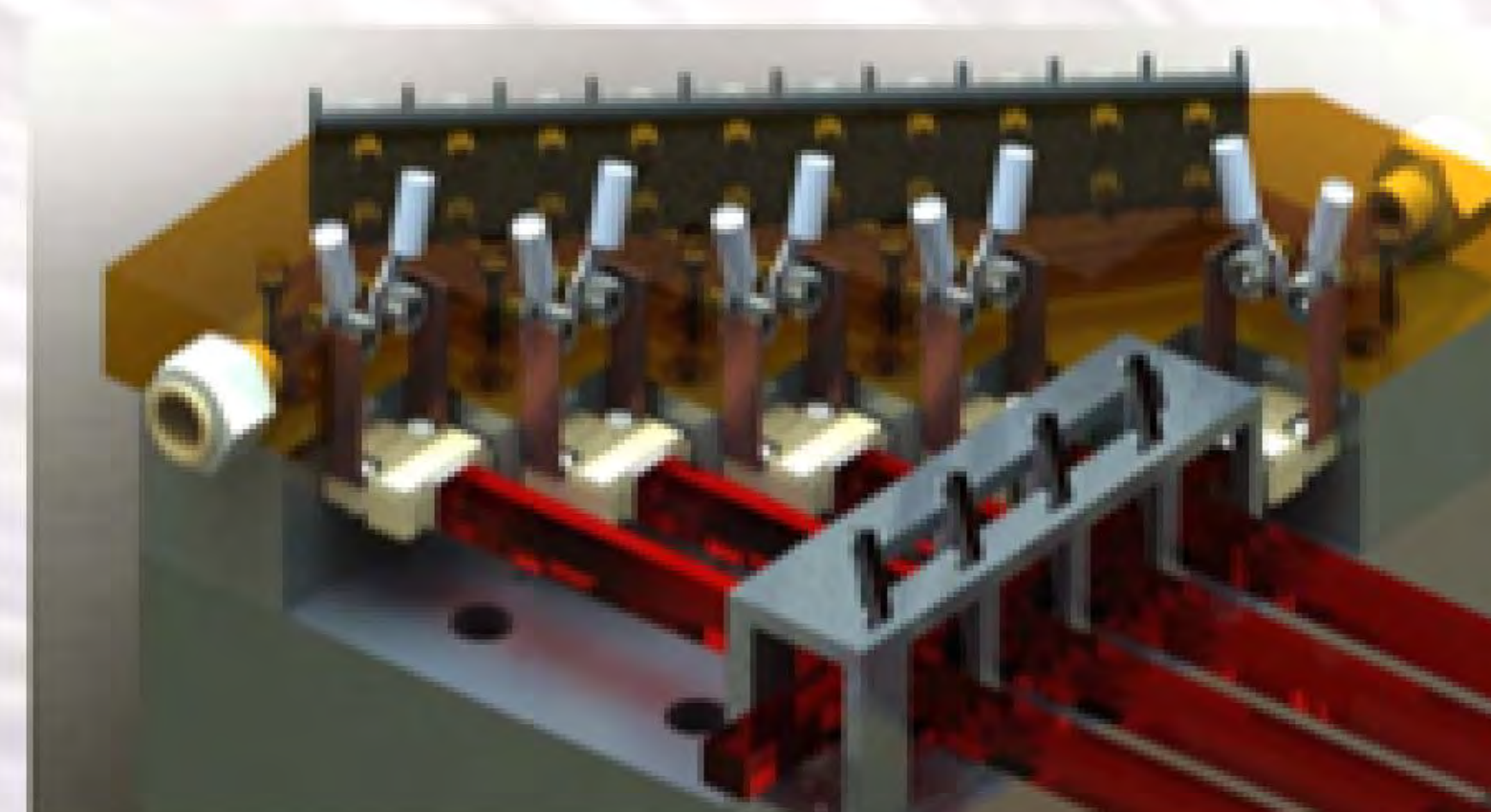


Objectives & Requirements

- Design mounting hardware for all components
- Integrate cooling and power into mounting
- Develop clever construction methods for high precision
- Calculate angles and position for various specific parts
- Minimize construction cost
- Perform cooling calculation for beam dumps

Splitter Array and Emitter Assembly

- Sketch-driven top-down design
- All emitters have exactly the same optical path length



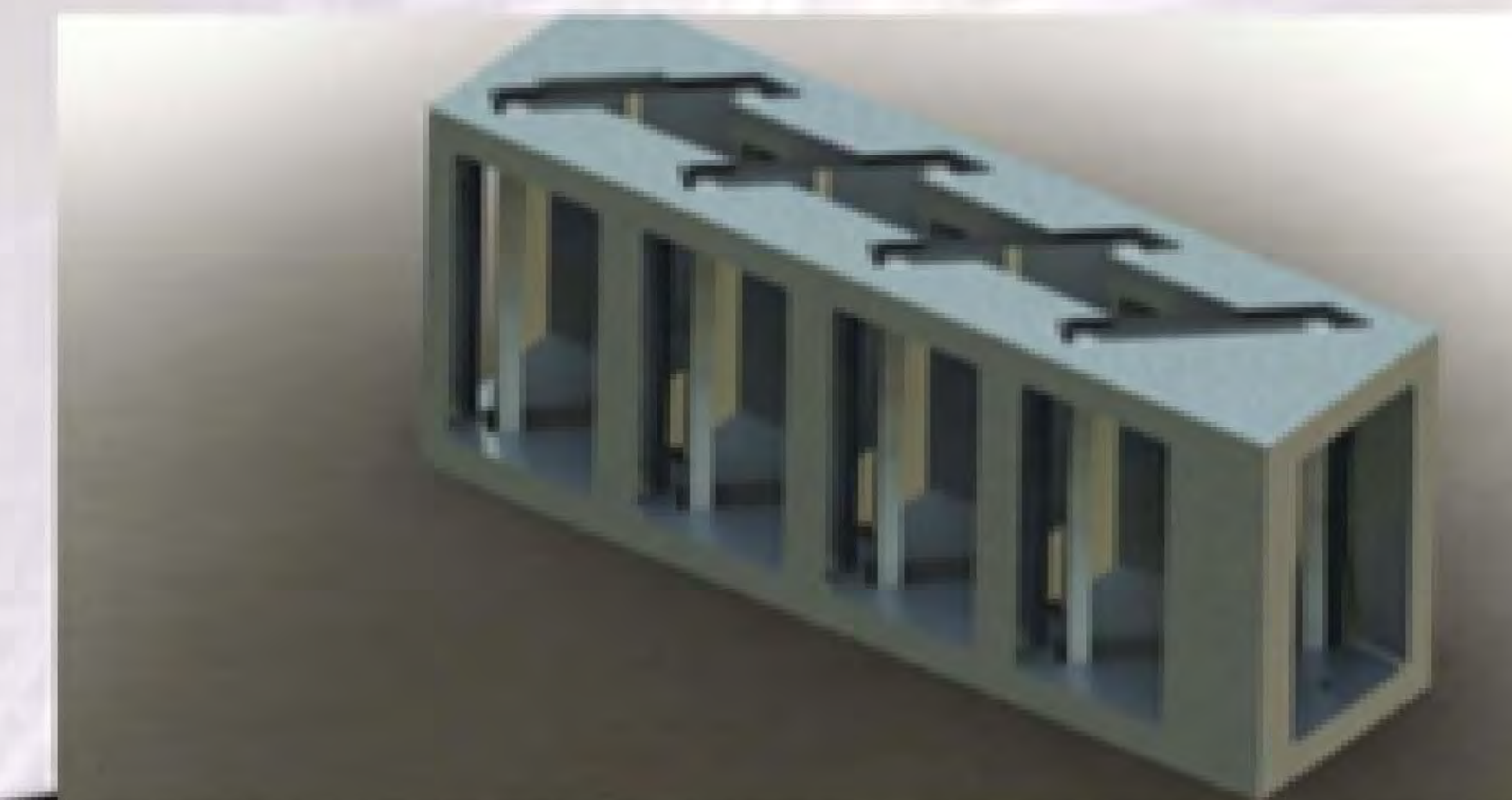
Emitters

- Lasertel T6 emitter pagechosen for compact size as well as narrow wavelength performance



Splitter Array

- Fused silica plates with custom coating allow specified percentage of light to pass
- Pressed into position in precise aluminum frame with leaf springs



Future Work

- Final design and construction complete over summer 2013
- Testing to continue through 2013-2014
- Next generation model development with class of 2014 senior project group

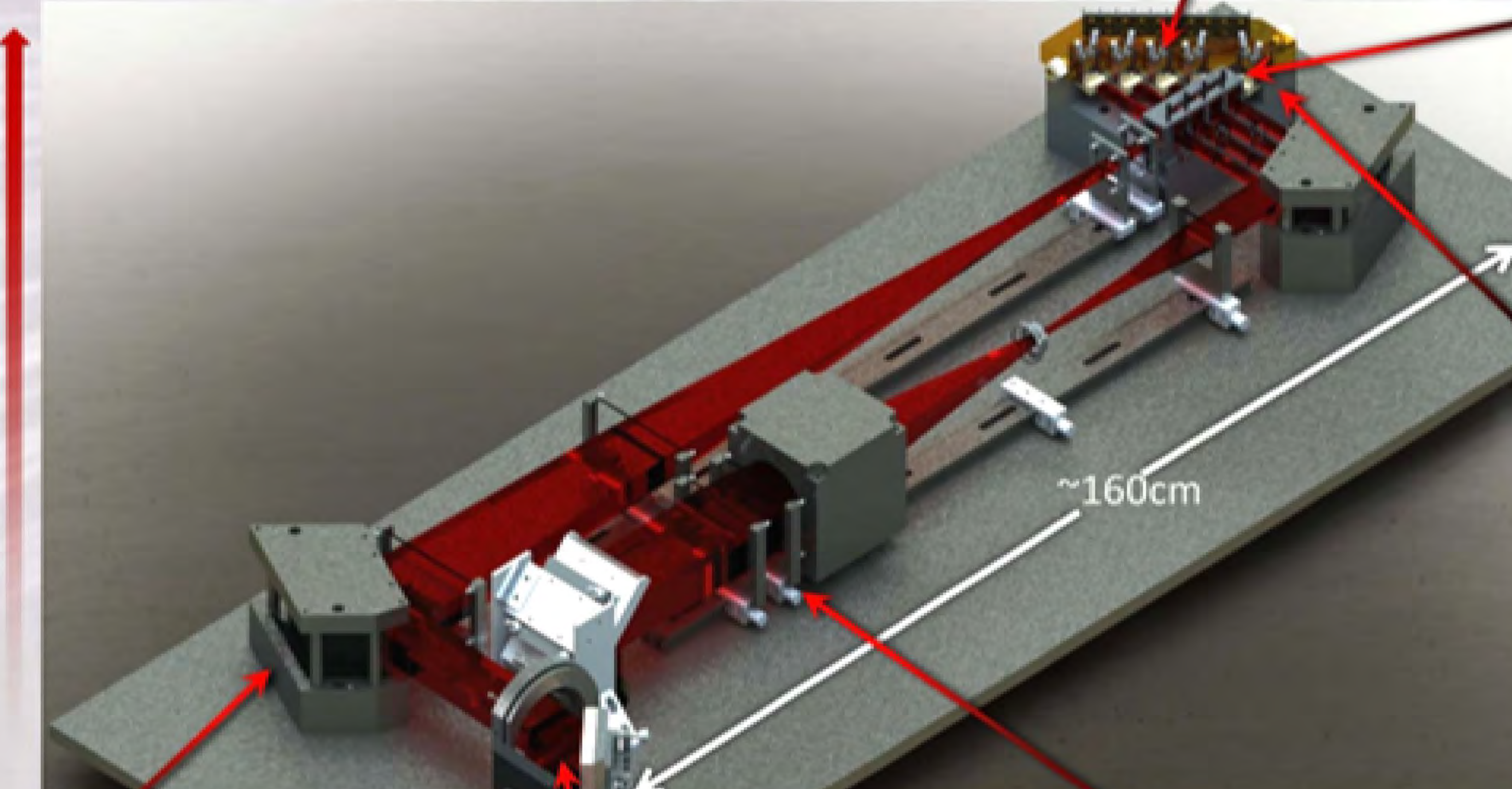
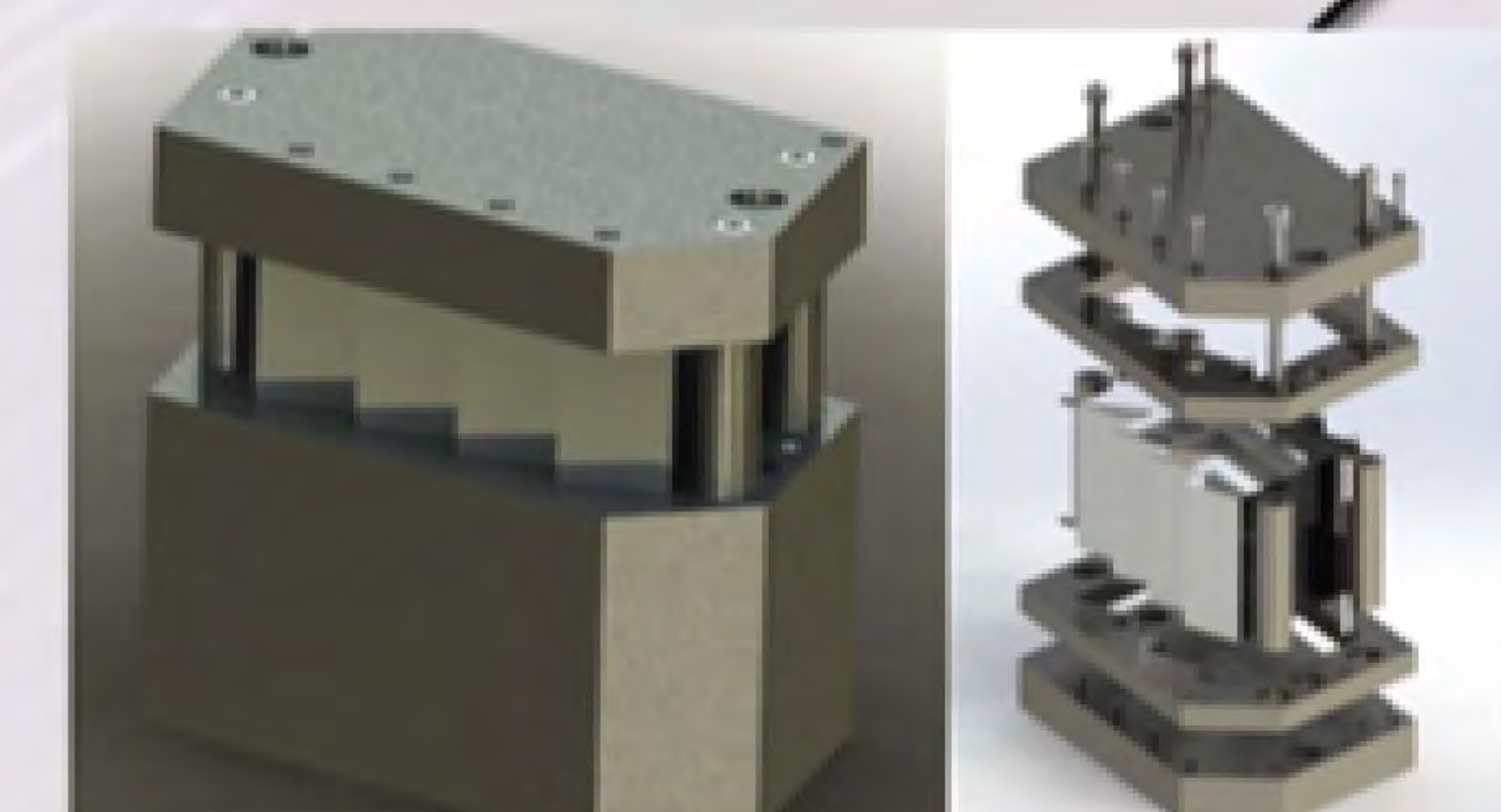


Cost Analysis

- To-date cost of approximately \$60,000
- Estimated completion cost greater than \$100,000

Step Mirrors

- Eliminates adjustability found in previous designs
- Compact design with removability and high precision



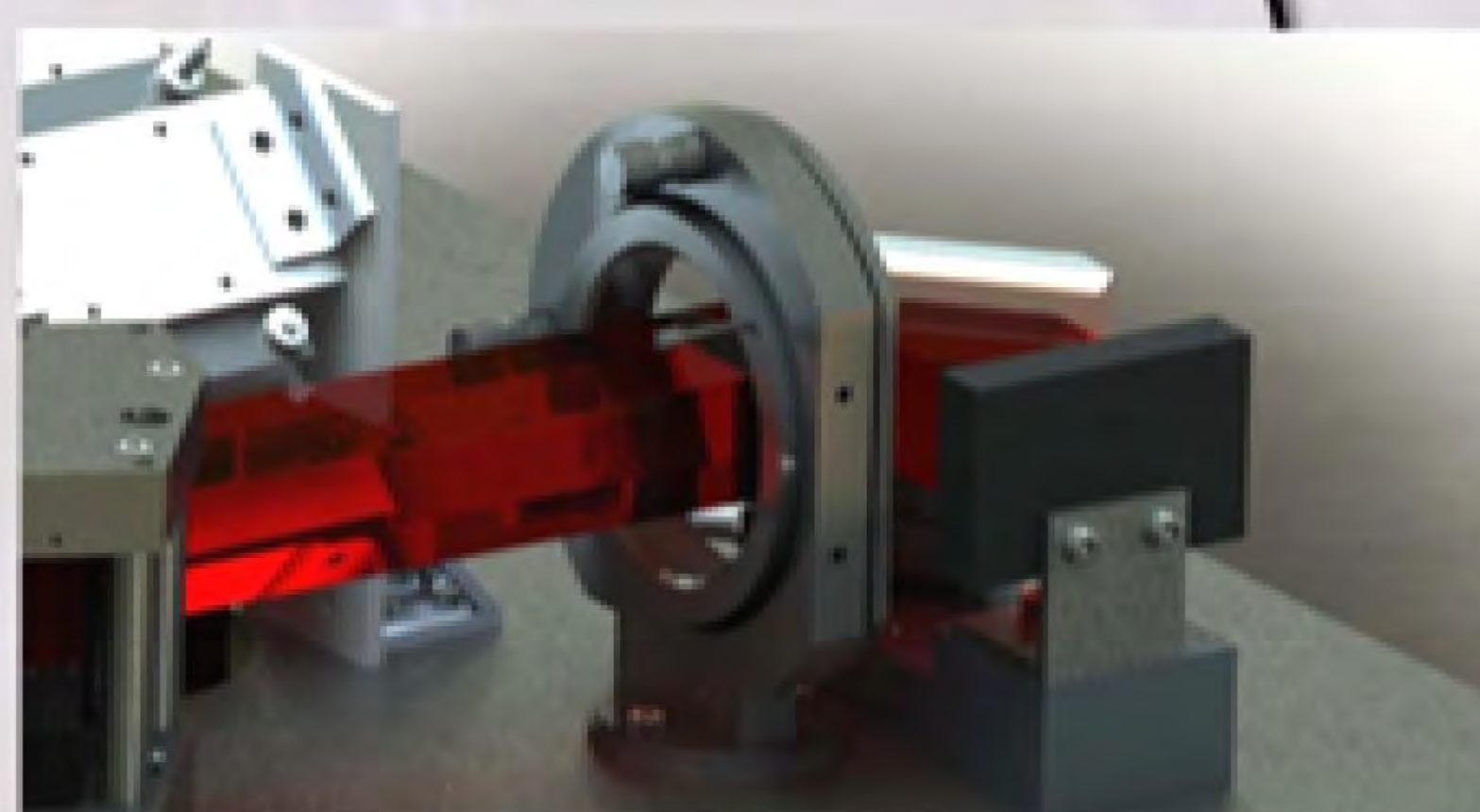
Cooling & Power

- Fused Ultem 1000 plastic manifold to carry cool water to emitters and remove warm water
- Copper power jumpers allow service without contacting emitters
- One-touch fittings for easy cooling tube removal
- Custom power terminal for high power application



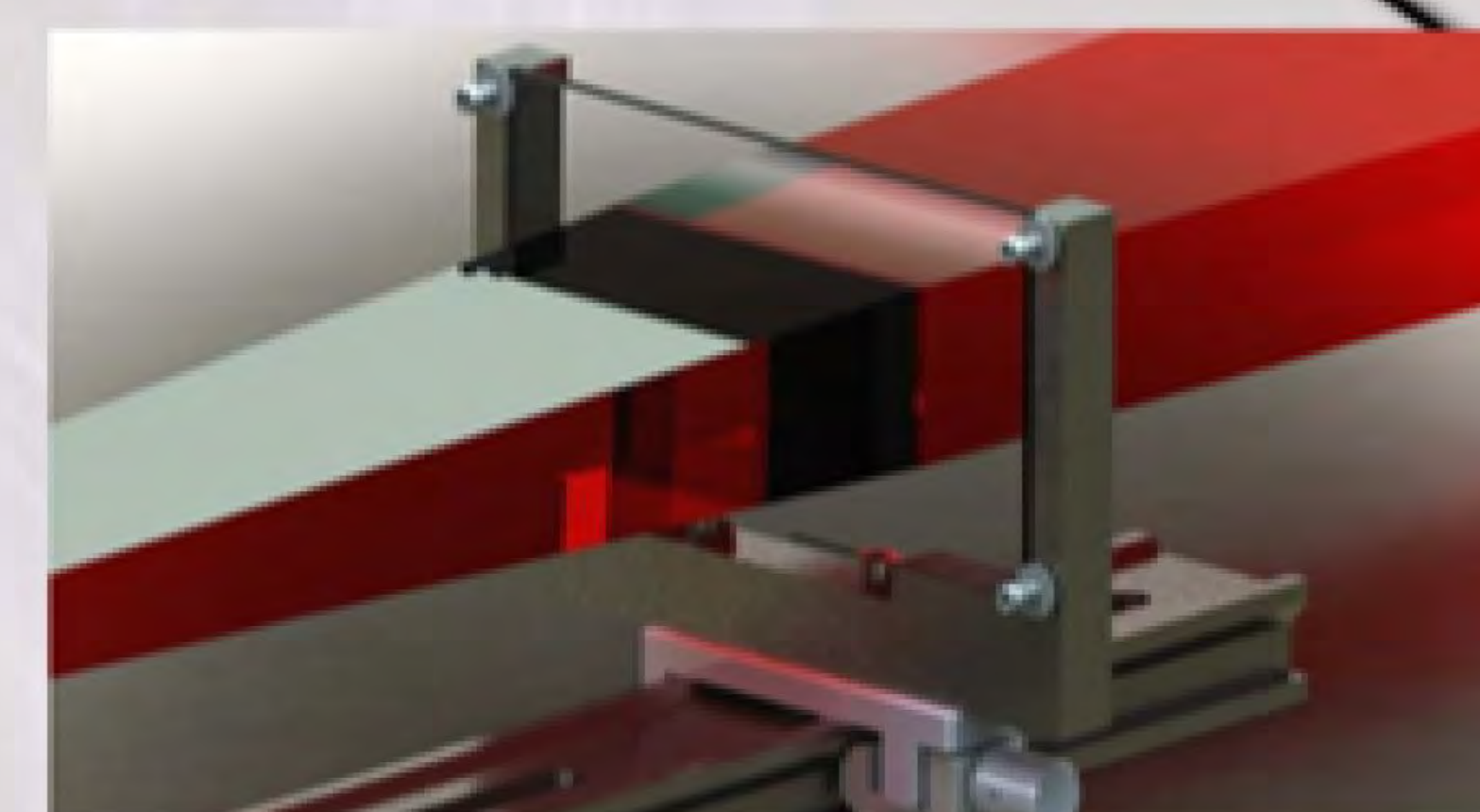
Beam Dump, Etalon, & Grating

- Subassembly containing optimization pieces
- Beam dump and grating analyzed for cooling



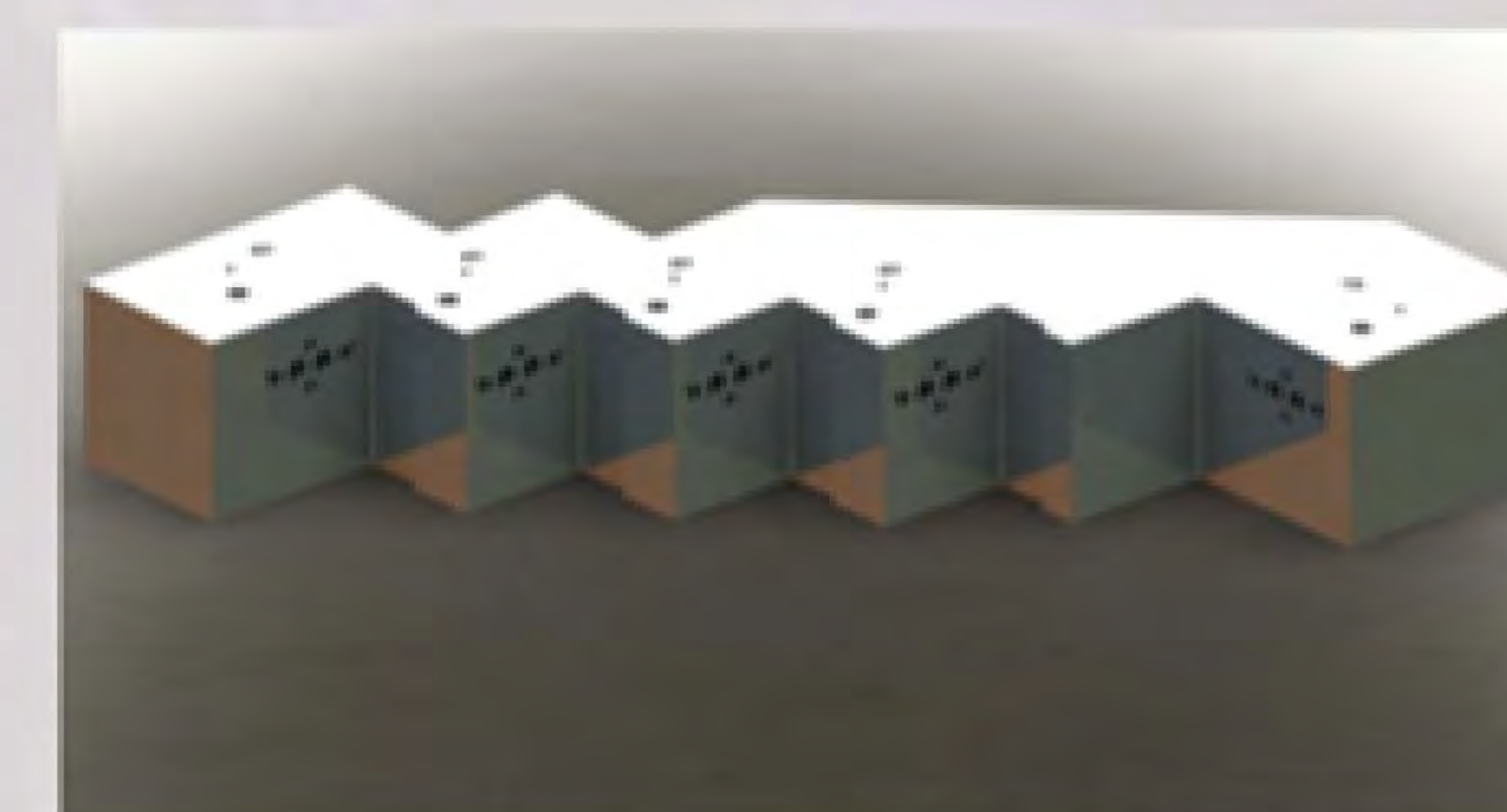
New Lens Mounts

- Simple, affordable manufacturing
- Single piece reduces overall system height



Mounting

- Stepped design for optical path equality
- Mounting holes and cooling paths for emitters included



With very little type, this research is clearly explained and easy to follow.

Comfort Theory

By Tracey Damon, Sydney Rubin Fitzgerald, and Jodi Tracy

Patient Information

- Mr. E is a 59 year-old male who has been admitted to S South at Concord Hospital from the ICU
- Initially presented to Cheshire Medical Center Emergency Department with a perirectal abscess that was causing him a lot of pain. Mr. E was febrile, hypotensive, and experiencing dyspnea.
- Transferred to Concord Hospital for debridement surgery for Fournier's Gangrene that extensively covered his perirectal area, groin, and scrotum.
- He was in septic shock due to the infection.

Past Medical History

- Mr. E's past medical history includes extensive cardiovascular disease including cardiomyopathy, aortic insufficiency, a ventricular apical aneurism, AFIB and he has undergone multiple surgeries related to these conditions.
- Mr. E is married and lives at home with his wife who is his caregiver. He does not work. He has a biological daughter who is also having issues with heart disease.

Current Admission

- Mr. E underwent three debridement surgeries for the Fournier's Gangrene in the ICU.
- His testes were also placed in thigh pouches after removal of the necrotic skin of the scrotum.
- Six liters of antibiotics were irrigated using pulse lavage throughout the wound and he is currently on IV and topical antibiotic treatment for the infection with dressing changes three times a day.
- He had a tracheostomy and is currently being weaned from the ventilator. He has a Foley catheter, PEG tube, ileostomy, and Penrose drains within the wound.

Comfort Theory

- Middle range theory because it is focused in nursing.
- First developed in the early 1990's. (Kolcaba, 2003)
- The immediate experience of having the needs for relief, ease and transcendence met in four contexts of experience.
- It is associated with activities that nurture and strengthen patients.

Comfort: the immediate experience of being strengthened by having needs for relief, ease and transcendence met in four contexts.

- It is an essential outcome for healthcare.
- It is patient centered and holistic.
- Comfort is perceived by the recipients of care.

Comfort exists in three forms:

- Relief:** Patient's relief of pain is met.
- Ease:** Patient is comfortable in a state of contentment
- Transcendence:** Patient is comfortable so that they are able to rise above their challenges.

Four contexts in which patient comfort can occur: physical, psychospiritual, environmental, and social cultural.

UNIVERSITY of NEW HAMPSHIRE



Reference:

Kolcaba, K. (2003) Comfort theory and practice: A vision for holistic health care and research. New York, NY: Springer Publishing Company.

Context of Comfort

Physical

Tracheostomy care, cardiac monitoring, wound care, medication administration, hygiene, repositioning, nutrition

Psychospiritual

Honoring religious beliefs, provide comfort and support to help him process his sense of self

Environmental

Creating a room where his wife had a place to stay, staff open to learning how she cares for him at home and implementing her techniques, pleasant things for him to look at, flowers, pictures of his family, keeping the curtain closed so he could not be seen from the door to preserve dignity

Sociocultural

Supportive counseling around the tracheostomy and colostomy, how they will affect his life and education on how to manage them, patient centered approach, future goals

Theoretical assumptions

Person: is the individual, family, or community that is in need of some type of health care (i.e primary, tertiary or preventative)

Health: refers to the optimum functioning of a patient, family or community who is being enhanced by comfort

Environment: certain aspects of the patient's surroundings that can be manipulated to enhance comfort

Nursing: the process of assessing the patient's comfort needs and developing and implementing appropriate comfort measures. The patient's needs are then reassessed after implementation of comfort measures, compared to a previous baseline.

Significance of Comfort Theory to Mr. E

- Comfort Theory addresses the importance of strengthening a patient by addressing the need for relief, ease, and transcendence. Mr. E has gone through a life altering experience and the use of these types of comfort as well as understanding the contexts of comfort will allow the nurses, providers, as well as family to help him cope with the situation and heal
- Mr. E's physical comfort must to be managed in order to promote healing. In this case, his level of pain and anxiety, as well as any physical discomfort associated with the invasive lines and equipment
- Practice of Psychospiritual comfort will allow the nurse to comfort Mr. E as he evaluates the components of his self including his mental status, spirituality, sexuality, self-esteem, and his role within his family
- The nurse has the ability to adapt Mr. E's environment to be individualized in a way that will promote his healing process and make him as comfortable as possible
- Comfort Theory encourages the nurse to understand the patient's social relationships and provide social support in order to promote a deeper level of comfort. Mr. E's wife is very active in his care and it is important for the nurse to respect their relationship and encourage her involvement in his care
- Comfort Theory addresses the four important concepts of a nursing theory, which are person, health, environment, and nursing, and allow for holistic and individualized care of Mr. E

Care Based on Theory Concepts

Person- Information on the wall about his likes, dislikes, family members names, ages and information, preferences when it comes to his care (no top sheet on the bed), things for care providers to use to start a conversation with him (Nascar), engaging in jokes with him (tell your husbands to watch out)

Health- determining patients goals for wellness and optimum health, reviewing expectations for future based on body changes from the infection, fragile-preventing regression,

Environment- fans brought in to keep him at a comfortable body temperature, pictures of his family, letters from his family, bed provided for his wife to stay with him, special bed used to prevent pressure sores with out having to physically reposition him constantly,

Nursing- asking if it was ok to bring the students in, changing the bedding the way that his family showed us, providing pain medication before a painful procedure, being attentive to his needs, non-verbal so anticipating his needs and being vigilant to check for needs, positive attitude, not rushing, speaking to him, not just his wife,

Absolutely nothing that would make you stop and ask about this research.

Arctic Box

What is Arctic Box?

- Rechargeable, portable, full size cooler.
- The goal → to provide an innovative cooler with convenience and simplicity for recreational activities.
- Eliminate the need for ice and prolong the ability to keep things cool → temperature is controlled similar to a mini-fridge
- Convenience and sustainability
- Unique → utilize refrigeration technology and a rechargeable battery.
- Rechargeable → use an AC power source (wall outlet) and also be able to recharge from a car cigarette lighter.
- Spacious → has a built in liquid dispenser for cold beverages on demand & small storage compartments that would keep valuables away from effects of the environment
- Entertainment → built in small speaker system.



Target Market: Hotels & Resorts
→ Secondary Markets : Medical Field

SWOT Analysis:

Strengths→

Convenience
Beneficial to Community
Unique
Durable/Long Lasting
Saves Energy
Attractive Design
Environmentally Conscious
Warranty
Customer Service

Weaknesses→

Expensive
Luxury Product
Ensuring Quality

Opportunities→

Market Niche
Environmentally Friendly is “in”
Brand Awareness
Large Target Market

Threats→

Copy Cats
Other Low- Priced Coolers
Frequent Remodeling

Product

Luxury Model: \$250
→ For resorts, clubs and recreational based companies
Industrial Model: \$200
→ For hospitals and medical facilities

Place

→ Warm Climates
→ Coastal Areas
→ Resorts/Hotels/Clubs
→ Vacation “Hot-Spots”
→ Hospitals



Promotion

→ Contests
→ Co-Sponsor Events
→ Celebrity Endorsements
→ Health Industry
→ Specialty Advertisements
→ Social Networking

Price

Luxury Model: \$250
→ For resorts, clubs and recreational based companies
Industrial Model: \$200
→ For hospitals and medical facilities

Financials and Company Goals

- Year 1: \$1million in sales (4000 units)
- Year 3: \$3million in sales (12,000 units)
- Year 5: \$5 million in sales (20,000 units)
- Break Even at 14,948 units
- Seeking \$1,000,000 loan for startup
- Angel Investors with specialized skills

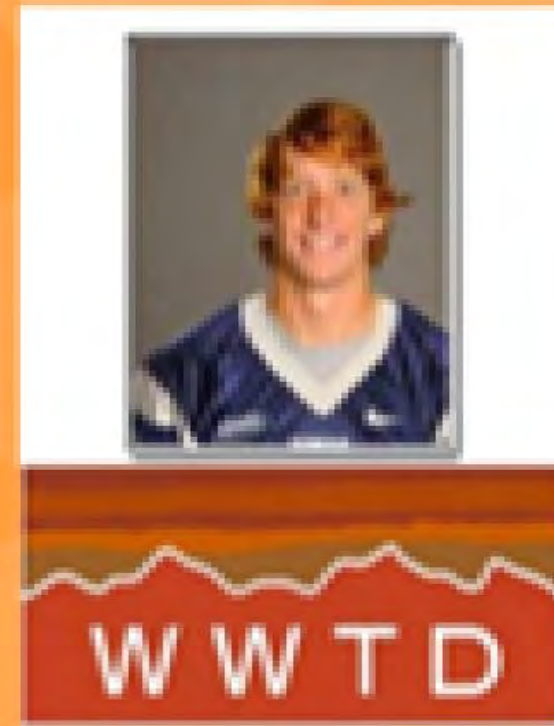


Arctic Box 12/31/1003 Financial Statements in U.S. Dollars			
Revenue			
Gross Sales		\$1,000,000.00 (4000 units)	
Less: Sales Returns and Allowances			
Net Sales		\$950,000.00 (4000 units)	\$950,000.00
Cost of Goods Sold			
Beginning Inventory		\$0.00	
ADD:	Purchases	\$650,000.00	
	Freight-in	\$5,000.00	
	Direct Labor	\$20,000.00	
	Indirect Expenses	\$5,000.00	
Inventory Available		\$720,000.00	
Less: Ending Inventory		\$65,000.00	
Cost of Goods Sold			\$655,000.00
			\$1,405,000.00
Gross Profit (Loss)			
			\$750,000.00
Expenses			
Advertising		\$80,000.00	
Commissions		\$10,000.00	
Employee Benefits		\$15,000.00	
Programs		\$10,000.00	
Insurance		\$5,000.00	
Interest		\$5,000.00	
Legal and Professional Fees		\$5,000.00	
Licenses and Fees		\$5,000.00	
Miscellaneous		\$5,000.00	
Office Expenses		\$5,000.00	
Payroll Taxes		\$5,000.00	
Rent		\$5,000.00	
Repairs and Maintenance		\$5,000.00	
Utilities		\$5,000.00	
Total Expenses		\$300,000.00	
			\$300,000.00
Net Operating Income			
			\$450,000.00

Income Statement			
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Rent		\$5,000.00	
Repairs and Maintenance		\$5,000.00	
Utilities		\$5,000.00	
Total Expenses		\$300,000.00	
			\$300,000.00
Net Operating Income			
			\$450,000.00

Great color,
and message,
but graphics
should be
more
dominant on
the poster.

About Todd Walker...



Todd Walker, a UNH football player was a vibrant and courageous individual. In 2011, at just 20 years old, his life was taken by a tragic act of violence. But Todd's legacy lives on

Todd Walker 5K



W.W.T.D

Why a 5K?

Many people knew Todd as being not only diversely athletic, but also having a caring and giving heart.

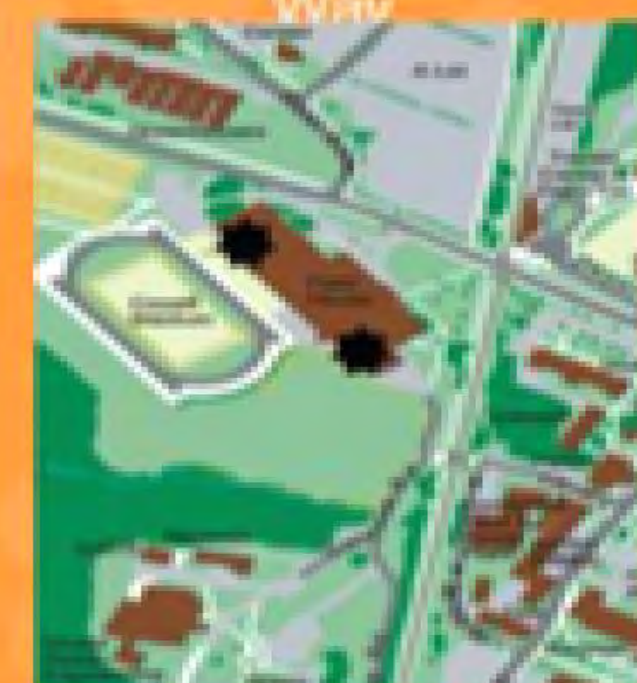
He held no limitations on giving back to those who needed help.

The Todd Walker 5K is designed so that Todd's love for athletics can live on, while also supporting his favorite organization:



The Route

Start: Field House (starred) → Serco → Mill Road → Faculty Drive → Academic Way → College



When? Where? How Much?

The Todd Walker 5K will take place on

Wednesday, May 8th 2013
at 10 a.m. & costs only \$10.00

Participants will congregate at the lower lot of the field house at 9:30



How Do I Sign Up?

Participants can sign up ahead of time by contacting Niklas Sigl at:



nco23@wildcats.unh.edu

Or phone @ (603) 930-5804

Checks or cash may be made out to "The Todd Walker Foundation" & may be physically handed in at the race

Day-of participants are strongly welcomed!

Why Participate?



Take a break from studying for all those stress inducing finals

Support a wonderful cause while partaking in a physical, mental and emotional stress reliever!

Most importantly, support the legacy of **Todd Walker**

W.W.T.D



Make A Wish was founded by Frank Shankwitz, Scott Stahland Linda Bergendahl-Pauling after they supported making a sick, young boy's dream come true.

"Since 1980, the Make-A-Wish Foundation® has given hope, strength and joy to children with life-threatening medical conditions. From our humble beginnings with one boy's wish to be a police officer, we've evolved into an organization that grants a child's wish in the U.S. every 40 minutes."
-President David Williams



Developed by Nancy Brinker in honor of her sister, Susan G. Komen, the foundation was developed as a financial support system to "end breast cancer."

They use their funds for "ground-breaking research, community health outreach, advocacy and programs in more than 50 countries."



So much going on here, you don't even know where to start!
Boxes on top of boxes, on top of dots makes
for very hard reading!



By: Kristen Kouloheras, Nicole Olsen, Dana Pandorf, and Brittany Emerson

presents



Herbal
essences®

TRENDS



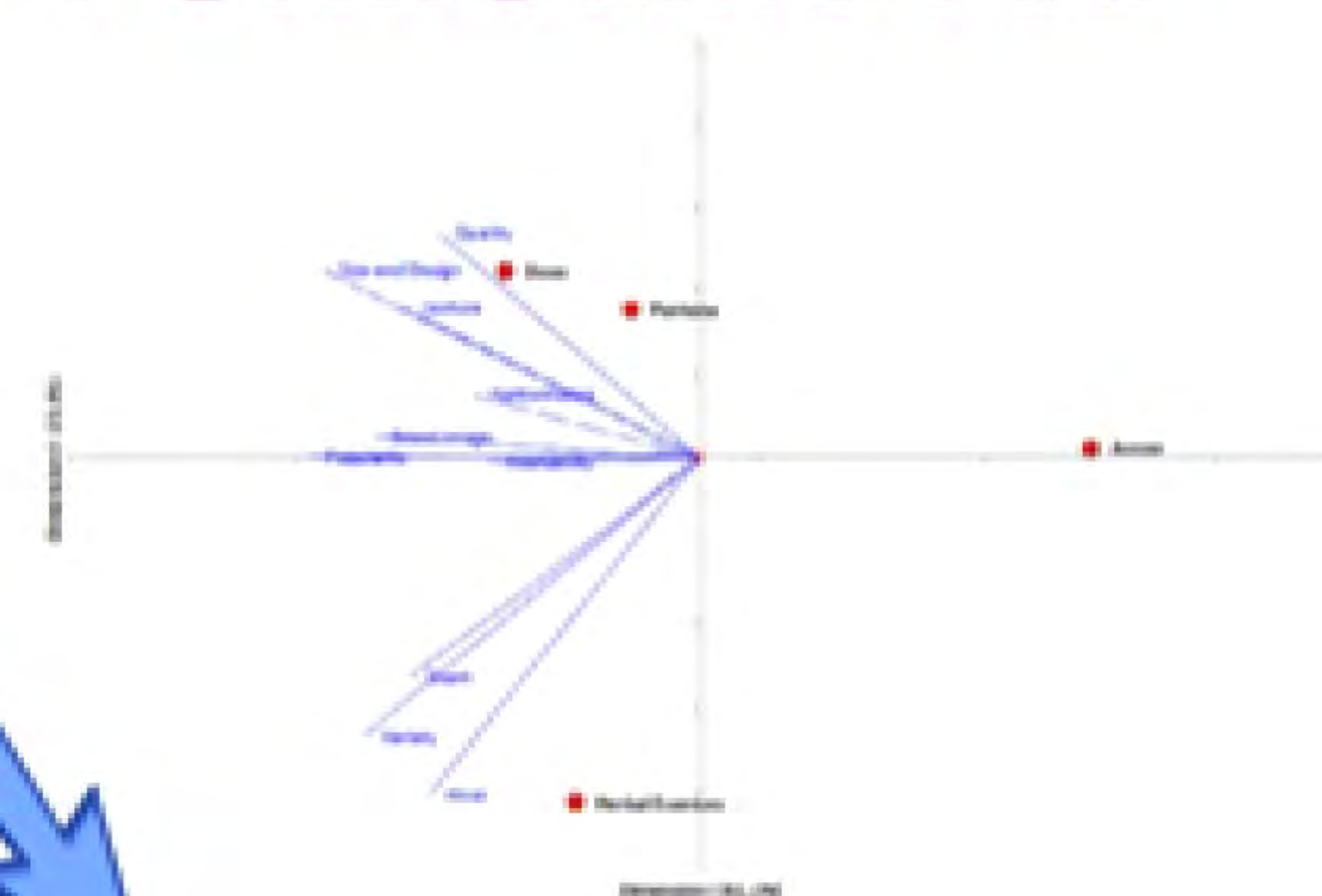
OPPORTUNITIES



SEGMENTATION VARIABLES



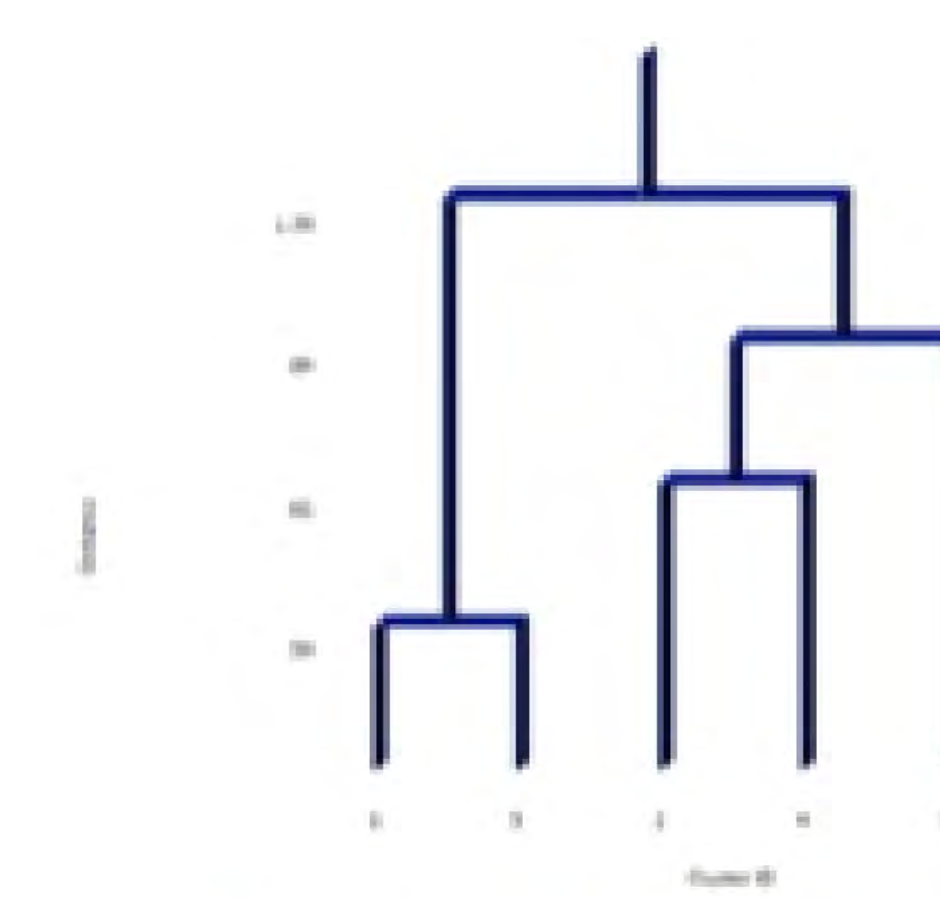
POSITIONING MAP



TARGET SEGMENT



DENDROGRAM



CONJOINT STUDY DESIGN



NEW PRODUCT



HOW TO MARKET



No caption necessary.

Help Keep E-Waste From Growing!

By Sarah Benner

E-Waste contains hazardous materials that can harm human health and the environment if they are not disposed of properly.



3 Ways to be Environmentally Safe

1. Donate

Donate your working device to a donation organization!

Goodwill has over 1,900 locations that accept old electronics.

2. Recycle

Recycle broken devices at a certified recycling center.

Check your local recycling center to see if they accept electronic devices.

3. Take-Back

Many companies will accept working and broken devices.

Apple has a great take-back program. You could even receive Apple Store credit!

Image source: green.ebay.com

If all of your information about your topic comes from a Wikipedia page, try again..... it **SHOULD** take you longer than 15 minutes to design and layout your poster presentation!

Macro Survey of The United Kingdom



Figure 1: The AD/AS Graph of the United Kingdom

Current State of the Economy

The Economy is experiencing a **recession**. The government has increased taxes and cut spending. Consumers are also experiencing tough times and unemployment so consumer spending has declined as well. All factors have led to a decrease in GDP therefore shifting the Aggregate demand curve to the left. The Bank of England would like to enforce expansionary monetary policy to help shift the curve back to equilibrium, but no actions have had a significant impact to this point on GDP. Dot number 1 represents the economy in long run equilibrium. However, the economy has shifted to dot 2 where it is experiencing short run equilibrium below the potential output level.

Central Bank

- The central bank of the United Kingdom is the Bank of England. It was founded in 1694 and gained operational independence to set monetary policy in 1997.
- Unlike in the United States and other countries, the United Kingdom does **not have reserve requirements**. Reserves are currency and deposits a bank keeps on hand or at the central bank, to manage cash inflows and outflows. Without any required amount though, individual banks calculate themselves the amount of reserves they need and this typically leads to much lower amounts of reserves than is typical in countries that have a requirement.
- Bank of England is that it is part of the government. For instance, in extreme situations, the government has the authority to give instructions to the Central Bank on interest rates for a short period of time.
- The Government's inflation target is announced each year by the Chancellor of the Exchequer in the annual Budget statement and this year the current target rate is 2%.



Figure 4: Bank of England

Kingdom



Figure 2: Map of the United Kingdom

The United Kingdom's economy is the **third largest economy** in all of Europe, following behind Germany and France. The United Kingdom is one of the United States closest allies. It provides the United States with a strong market for its exports and also imports many resources to the United States, but its main trading partner is Germany. The economy is split up into its three main economic sectors of agriculture, industry, and services. Agriculture makes up about .7% of GDP, while the industry sector is 21.1% and services at 78.2%. With a labor force of approximately 31.9 million, 80.4% of those occupations are within the services sector, especially in the financial sector. 18.2% of the work force is in industry and 1.4% in agriculture. With a declining agricultural and industrial sector, the growing services sector has been a needed stabilizer.



Figure 5: Exchange Rate Graph

Exchange Rates

The large difference between the currency of the United States and the United Kingdom is the exchange rate. One British pound is equivalent in monetary value to 1.52266 United States dollars as of April 1st, 2013. If we change that around, it means that one United States dollar is equal to .6567 pounds approximately. In previous years, it was equivalent to .6324 in 2012, .624 in 2011, and .6472 in 2010. So over the past few years, the pound has gained significant value and experienced currency appreciation while the United States dollar has lost value and experienced currency depreciation. Taking a deeper look at what these statistics mean, we find that United States goods are cheaper for the United Kingdom and so they would want to purchase more imports in trading or tourists would be encouraged to travel to the United States. This is great for the United States because their goods are cheaper and so it gives producers a more competitive edge. It is not beneficial to the United Kingdom in that their domestic producers will suffer since their goods are more expensive. However, like I described, this is a global economy and that means these two countries are not the only ones trading. With that in mind, the United Kingdom's currency could be more expensive to other countries.

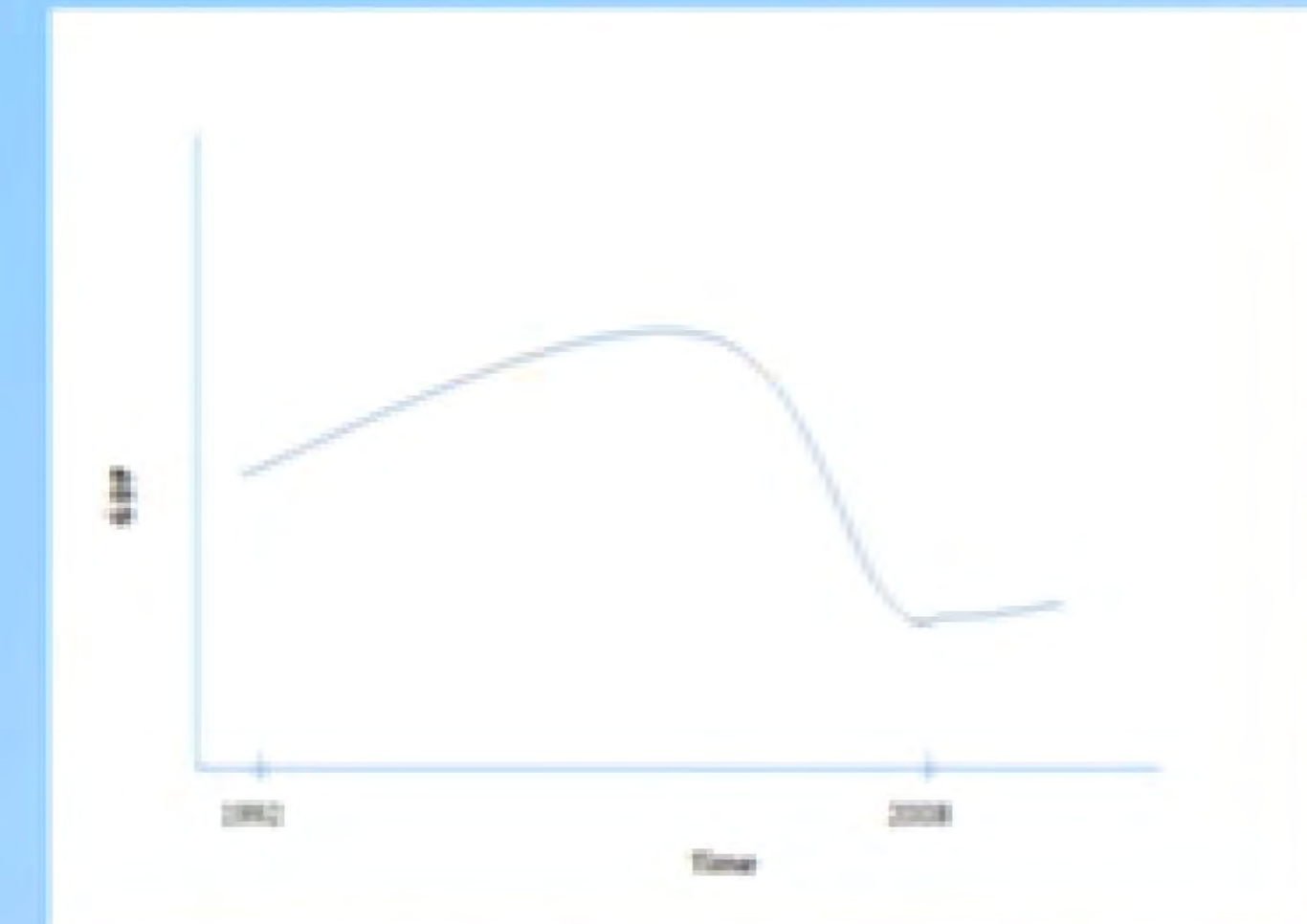


Figure 3: The United Kingdom's Business cycle

Current Business Cycle

"The period since the start of the financial crisis has been categorized by short bursts of growth and contraction in what the Bank of England has described as a "zigzag" path to recovery." (BBC News, January 25, 2013) Since 1992, the United Kingdom was in a long expansion. Then in 2008 during the financial crisis, it hit one of its worst recessions. Ever since 2008, the economy has been struggling to reach its next expansion.

Currency

The United Kingdom's currency is very similar to that of the United States. The symbol to represent the British pound is £. The most common banknotes that are used are the five, ten, twenty, and fifty. The rarely used note, but still acceptable as money, is the one. They also use pennies which count as one one-hundredth of a pound, just as our pennies count as one one-hundredth of a dollar. The plural of penny is pence and they adopted the symbol p to represent pence. Also similar is the portrayal of famous figures on the bank notes. On the five is Elizabeth Fry, the ten is Charles Darwin, the twenty is Adam Smith, and the fifty used to be Sir John Houblon until recent changes in the banknote which now has Matthew Boulton and James Watt on it. Also, like the new United States dollars, there are new security measures that are beyond intricate such as an ultra-violet feature and see-through register to help decrease counterfeit banknotes.



Figure 6: Banknotes

Step back and look at your poster and ask yourself if YOU would stop and read your own poster. Make sure the answer is yes.

Dithering Algorithm Developed to Present the Stimulus on the LCD Monitor

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Department of Psychology
University of New Hampshire

Introduction

- The human visual system can distinguish 2^{15} grey levels; a computer screen can only generate 2^8 grey levels.
- Using a Cathode Ray Tube (CRT) monitor you can tie the red, blue and green wires together can create 2^{24} grey levels.
- Liquid Crystal Display (LCD) monitor do not allow for this
- The goal of this research is to test the results generated by this algorithm against the results from prior research (Pokorny & Smith, 1997).



Cathode Ray Tube Monitors

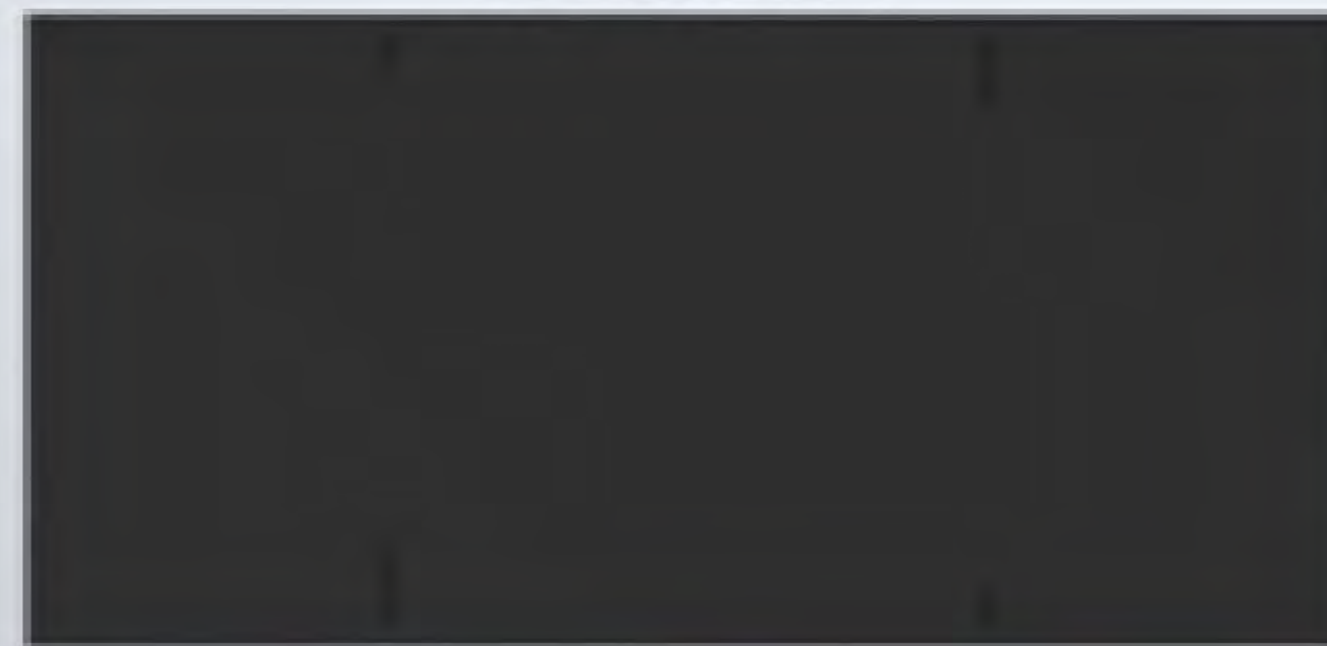


LCD Monitor

Methods

- In order to achieve 2^{24} grey levels on an LCD one can use dithering
- Dithering:** Randomly distributing the RGB pixel intensities across the stimulus surface creating 2^{24} possible average grey levels on a LCD screen

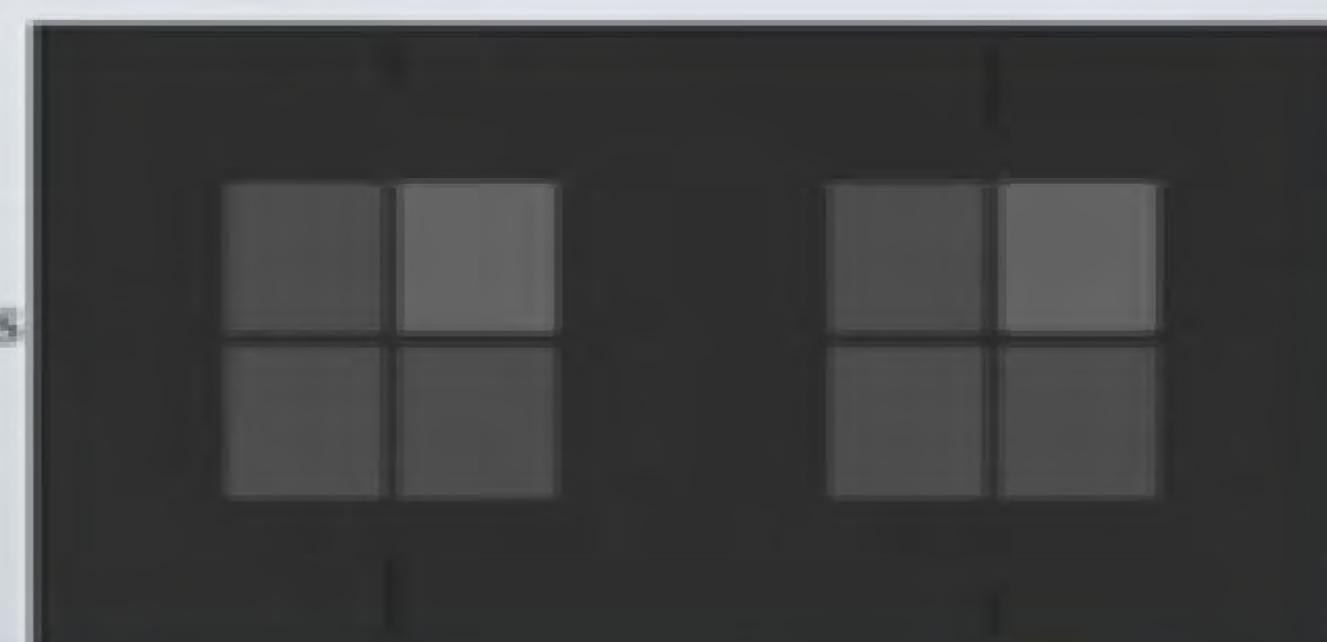
Low Luminance Adaptation Parvocellular



Low Luminance Adaption Magnocellular



Low Luminance Stimulus



High Luminance Adaptation Parvocellular



High Luminance Adaption Magnocellular



High Luminance Stimulus:



Methods (continued)

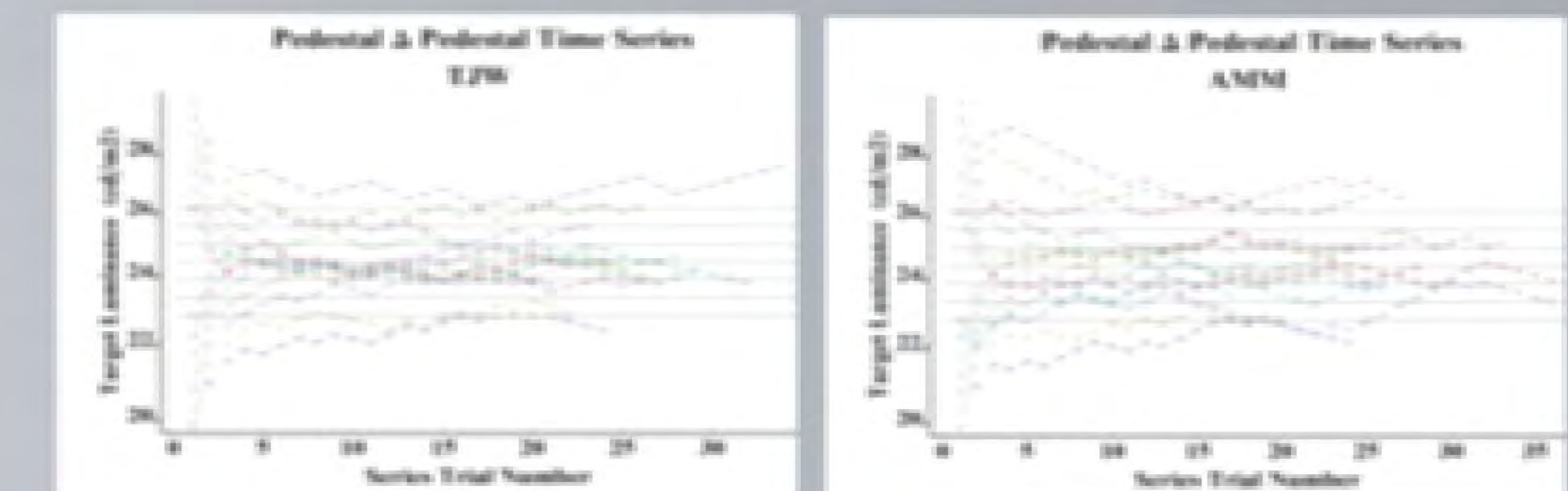


- This depicts the delta pedestal conditions within the magnocellular and parvocellular protocols.
- Within each protocol are 7 conditions: three below adaptation pedestal, three above adaption pedestal, and the zero point.
- The magnocellular protocol spans .03 log units and the parvocellular protocol spans .15 log units on either side of the adaptation pedestal.
- Without the algorithm, increments to luminance were made in larger steps. With it, we can present any increment luminance (e.g. .015) between these conditions.
- The algorithm may enable researchers to measure pathway differences in binocular summation below and above the adaptation pedestal.

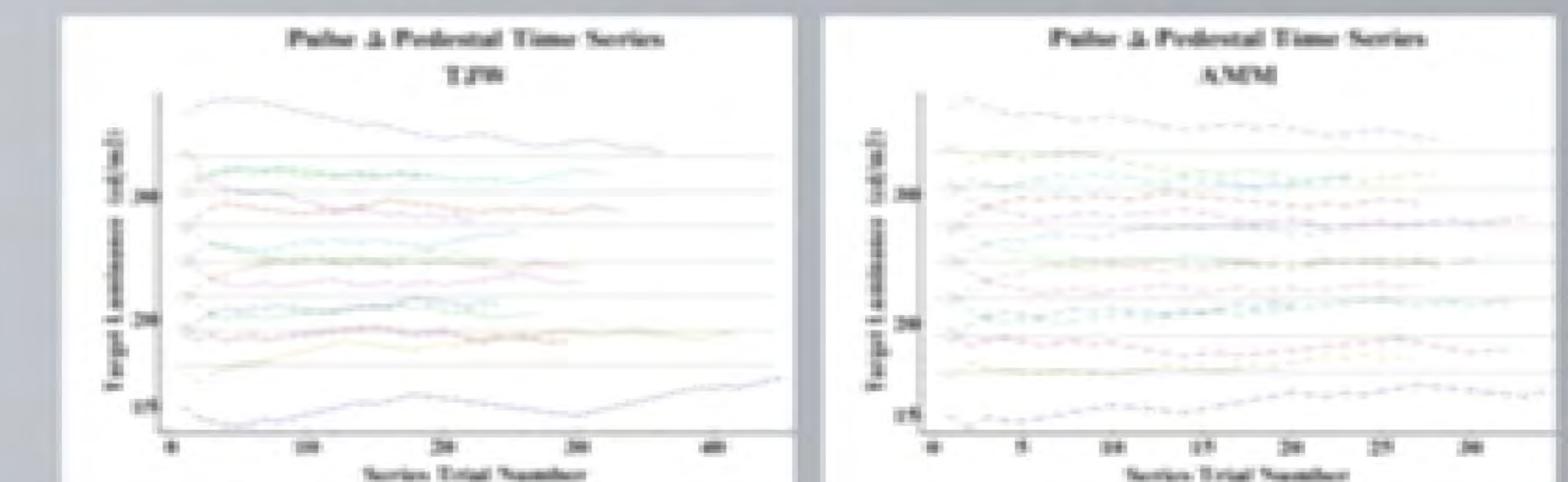
Results

- If dithering on an LCD monitor generates contrast like a CRT monitor does, we should be able to replicate previous research results for magnocellular and parvocellular contrast gain functions.
- We found that the LCDs can generate 2.5x greater intensities than the CRTS which can enable us to explore larger ranges of visual phenomena.
- This time series analysis enabled us to examine the level of contrast generated on the monitor as well as observer response.
- The time series indicate that the monitor was able to generate many small steps in between the LCD grey levels.
- We replicated Pokorny & Smith (1997) using an LCD with the dithering algorithm.
- The dithering algorithm generated systematic responses among observers which means that the algorithm is working like it should.

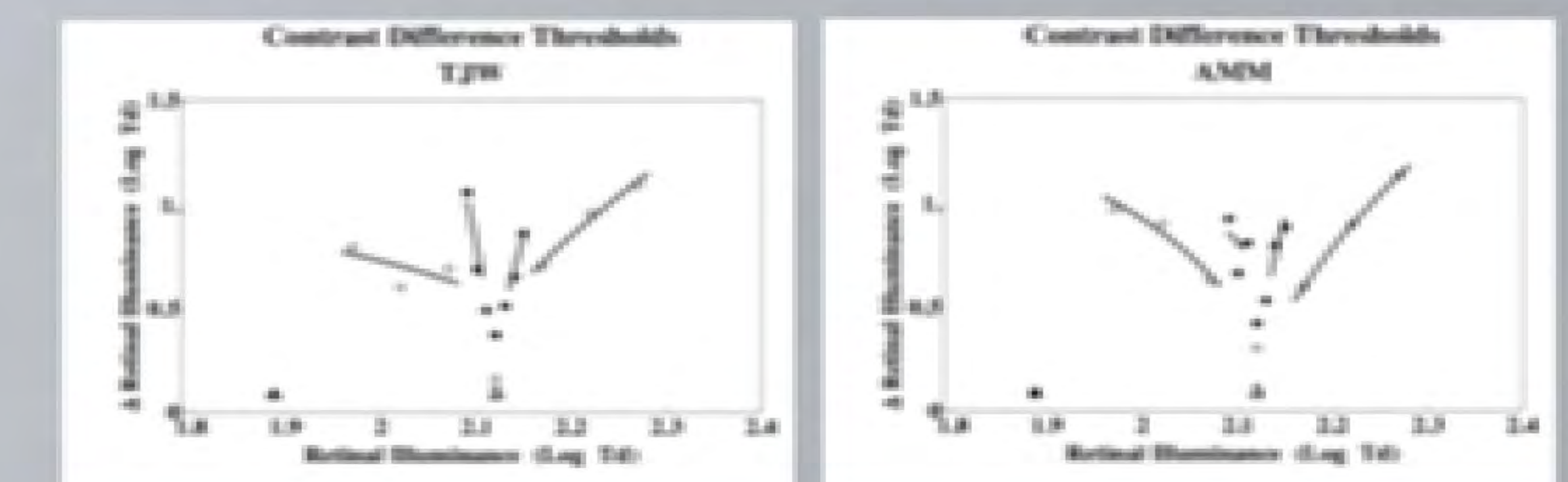
Results (continued)



- Time series analysis for the Magnocellular pathway protocol demonstrates a measurement precision of luminance over a narrow range



- Time series analysis for the Parvocellular pathway protocol demonstrates a measurement precision over a slightly larger range



- These show the results of those two protocols combined. Showing Magnocellular and Parvocellular pathways for each participant.

Conclusion

- Dithering allowed the LCD to achieve 2^{24} grey levels
- It would be impossible to test someone's contrast discrimination threshold on an LCD without the dithering algorithm.
- The dithering algorithm gives us the ability to present a stimulus of any luminance in between the preset LCD levels.
- An LCD with dithering was able to create systematic responses replicating the results of Pokorny & Smith (1997).

References

1. Allard, R., & Fendley, J. (2006). The new-bit method for digital displays: Converting a 256-luminance resolution into a continuous resolution. *Behavior Research Methods*, 40, 735-743.
2. Pokorny, J., & Smith, V.C. (1997). Psychophysical signatures associated with magnocellular and parvocellular pathway contrast gain. *Journal of the Optical Society of America A*, 14, 2477-2486.
3. Mellis, John P. "Apple Updates iMac, Mac Pro, and Display Lineup." *PCWorld*. N.p., n.d. Web. 22 Apr. 2013.
4. Yang, Justin. "CRT Monitor Display Shrank At Both Sides." *Electronics Repair And Technology News*. N.p., n.d. Web. 22 Apr. 2013.

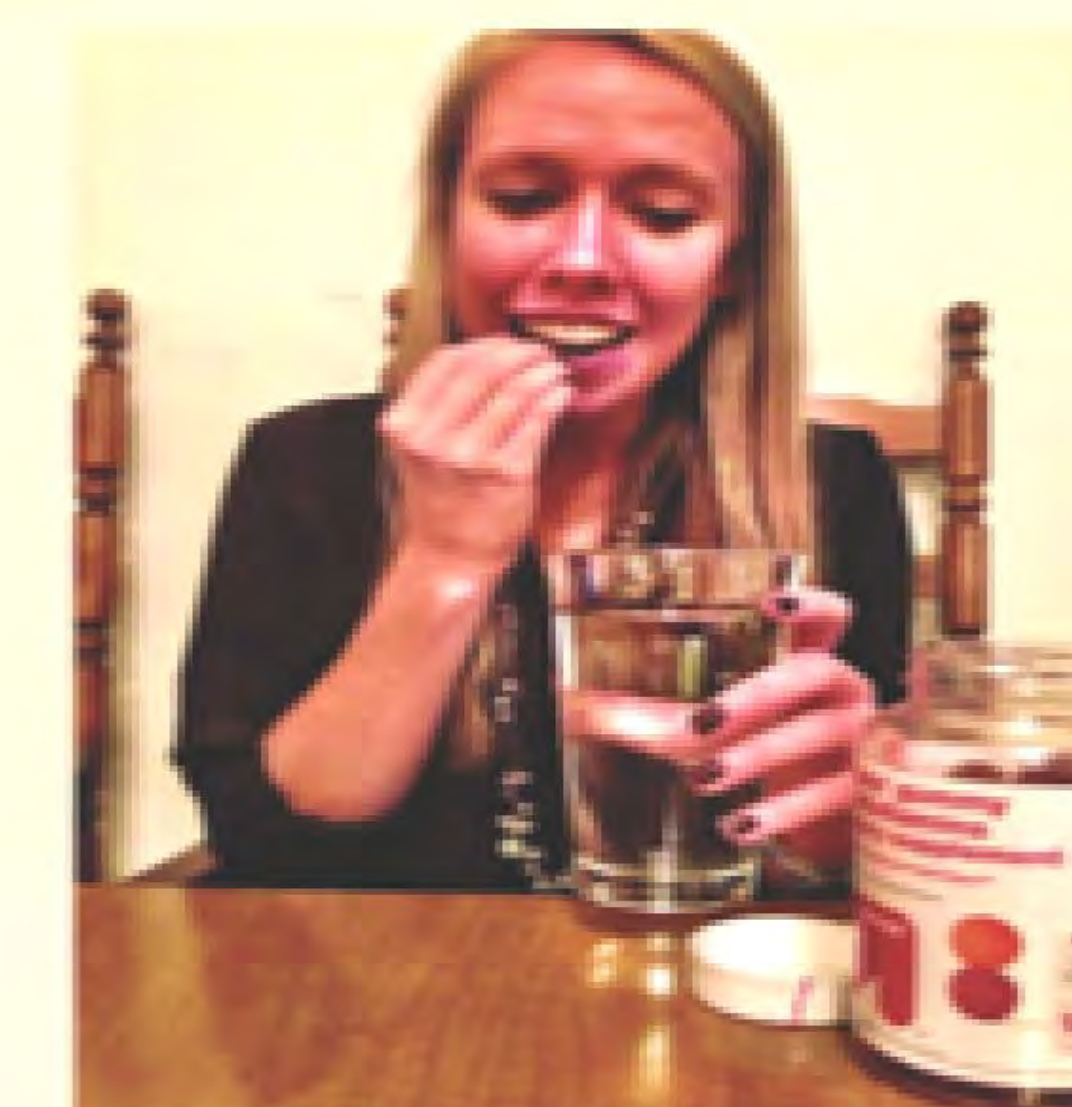
You want someone other than your advisor to be interested in your project.

Program #LB255

Little is known about multivitamin/mineral supplement (MVM) usage among college students. The purpose of this study is to investigate MVM usage and its relationship to overall dietary quality. Initiated in 2005, College Health and Nutrition Assessment Survey (CHANAS) is an ongoing cross sectional survey of the health of young adults (18-24 yrs). Participants (n=4,351; 26% men) completed a 3-day nutrient analysis and a wellness questionnaire. Dietary quality was based upon MyPlate guidelines for the average male (19 yrs; 5'8"; 174 lbs; 30-60 mins mod-intense activity/day) and female (19 yrs; 5'4"; 139 lbs; 30-60 mins mod-intense activity/day) participant. Subjects were separated into 4 groups according to the number of MyPlate categories they met (0, 1, 2, ≥ 3). One-third of all students reported MVM usage. Men were more likely than women to meet MyPlate recommendations (≥ 3 categories) (23% vs. 12% $p < 0.05$). MVM users were more likely than non-users to meet MyPlate recommendations (17% vs. 13% $p < 0.05$). Data suggests that among college students MVM usage is associated with greater MyPlate adherence. Further, college men are more likely than college women to meet MyPlate guidelines. Supported by NHAES grant NH00541.

Multivitamin/Mineral Usage, MyPlate Adherence and Diet Quality Among College Students

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Department of Molecular, Cellular, and Biomedical Sciences
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Problem

Diet and nutrition play an important role in health maintenance and disease prevention [1]. As Americans seek new strategies to achieve good health, the supplement industry offers many claims to fulfill that desire. The CDC estimates that 40% of U.S. adults use supplements [2]. Ironically, populations that are at the highest risk for nutritional shortcomings, i.e. those who might benefit the most from a multivitamin supplement, are among the least likely to use MVM [1]. What still remains unknown is if users are at risk for malnutrition and need to supplement their diet. Further, little is known about college age supplement consumption.

Purpose & Hypothesis

- Using cross-sectional data, we aim to characterize MVM usage among college aged students at the University of New Hampshire.
- Further we explore if college aged students who take MVM are meeting MyPlate guidelines.
- We hypothesize that college aged students who are taking MVM supplements are more likely to be meeting MyPlate guidelines, as compared to students who are not taking MVM supplements.



Key Findings

- One-third of UNH students reported multivitamin/mineral usage.
- Only 23% of college aged men, and 12% of college aged women consumed ≥ 3 MyPlate categories ($p < .05$).
- College students who reported using MVM had greater adherence overall to MyPlate recommendations than those who did not report MVM usage ($p < .05$).

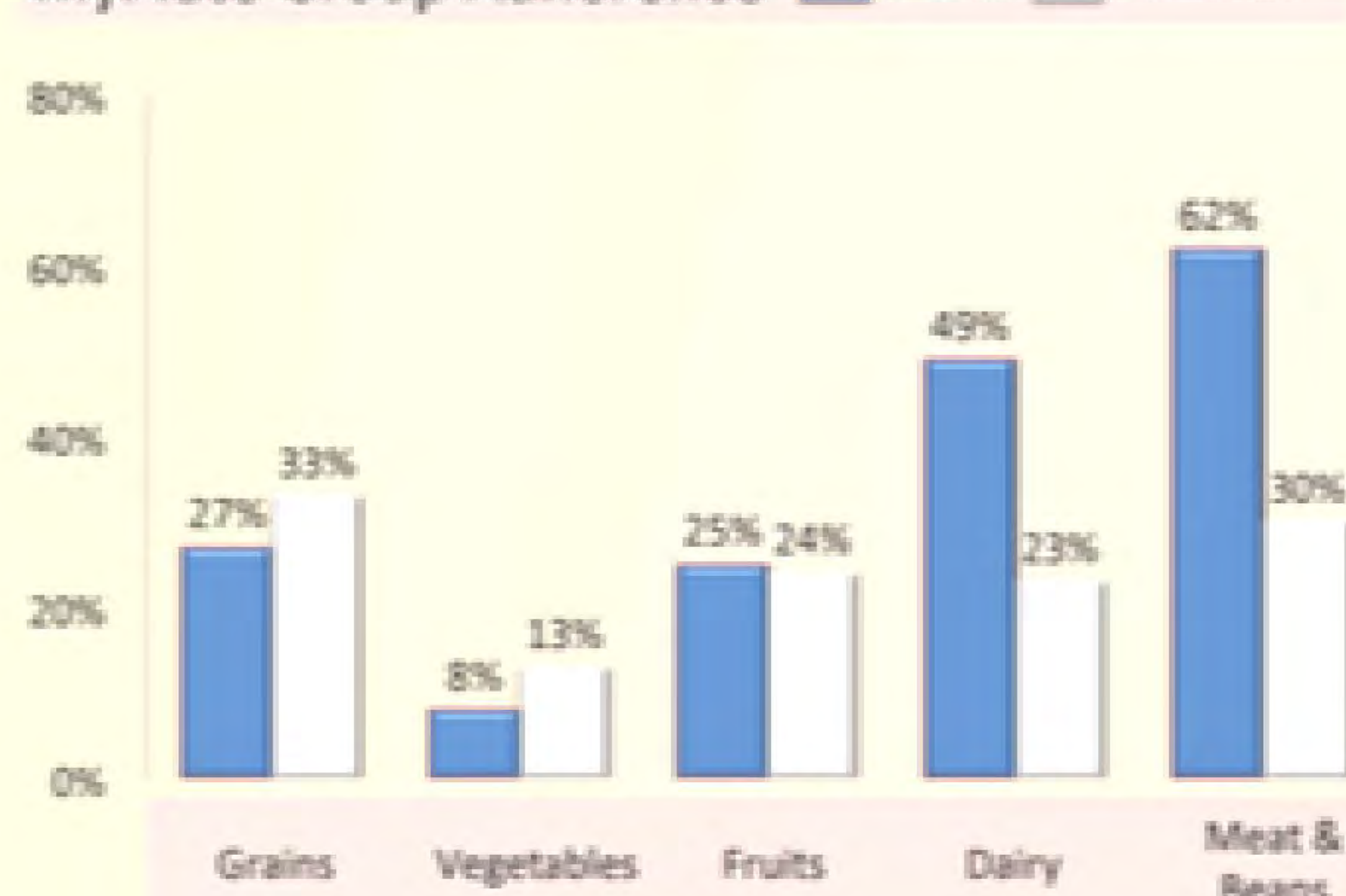
Table 1. Subject Characteristics

	Male	Female
n	1,131	3,220
Age (yrs)	19 \pm 1	19 \pm 1
Height (in)	68 \pm 3	64 \pm 3
Weight (lbs)	174 \pm 31	139 \pm 24
% MVM Users	34.2	32.4

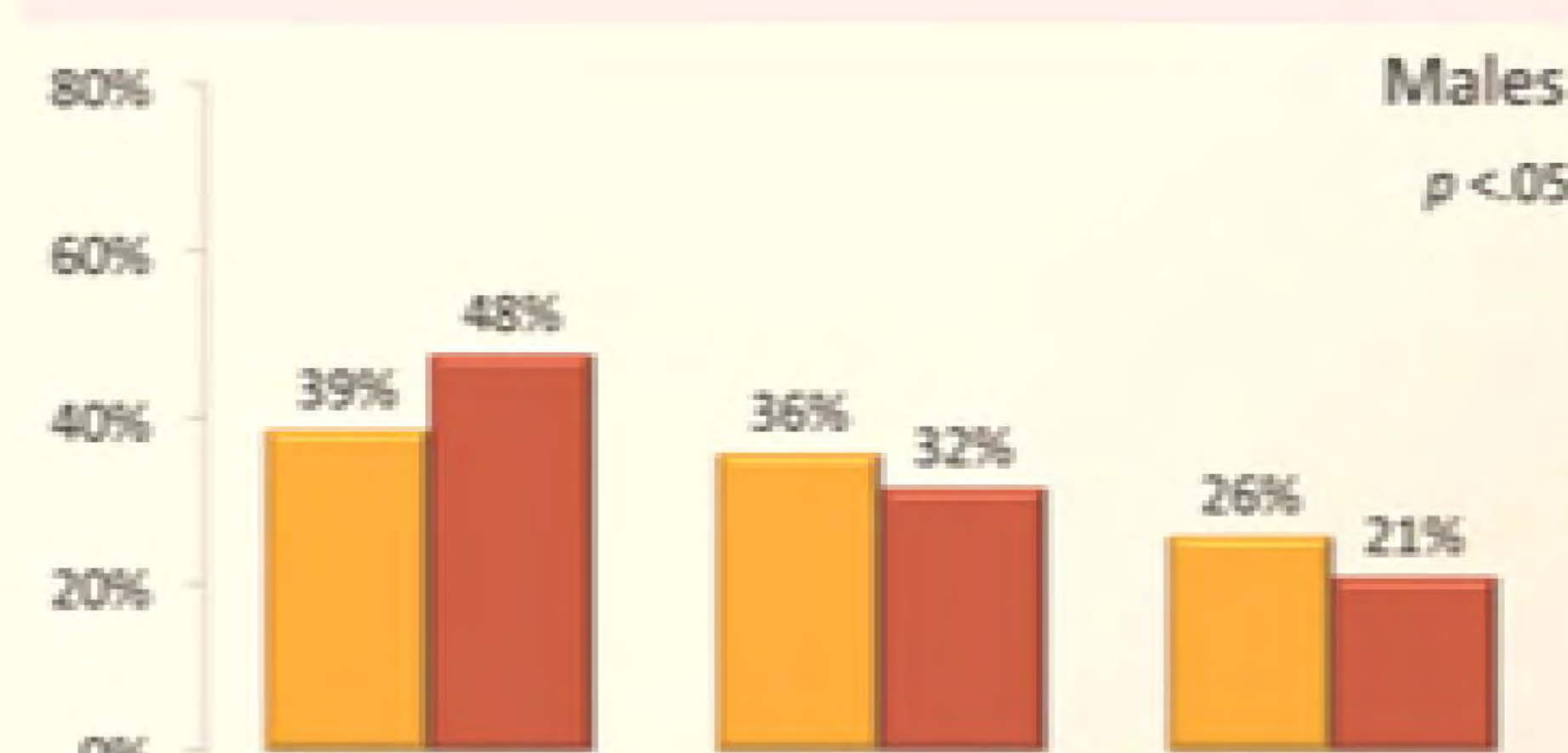
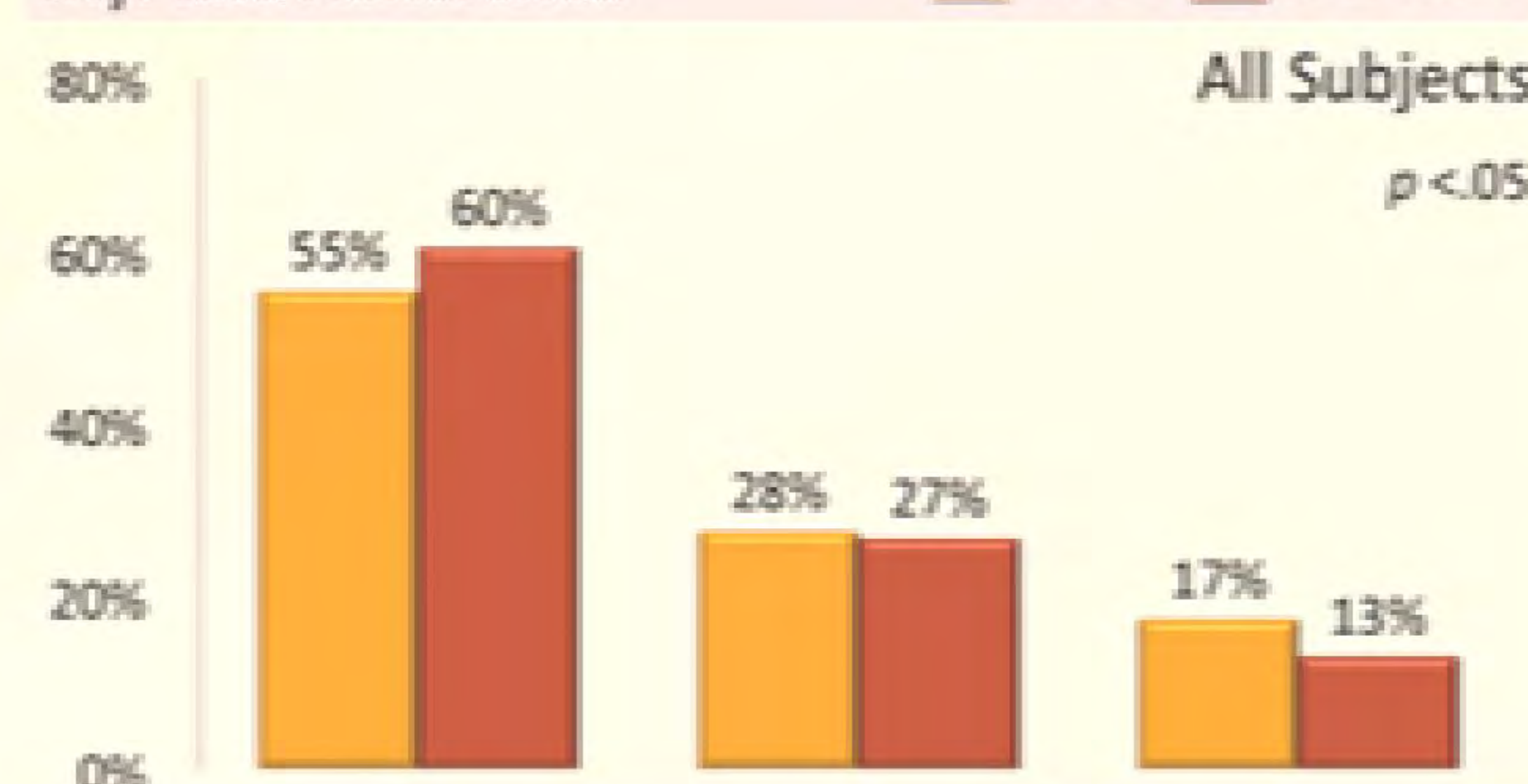
Table 2. Daily MyPlate Recommendations

	Male		Female	
	Recommended	Actual	Recommended	Actual
Grains (oz.)	10	8.4 \pm 3.4	7	6.8 \pm 2.5
Vegetables (cups)	4	1.9 \pm 1.3	3	1.7 \pm 1.2
Fruit (cups)	2.5	1.7 \pm 1.3	≥ 2	1.3 \pm 1.0
Dairy (cups)	3	3.2 \pm 2.1	3	2.2 \pm 1.3
Meat & Beans (oz.)	7	9.3 \pm 5.5	6	5.0 \pm 3.0

MyPlate Group Adherence Males Females



MyPlate Adherence



Materials & Methods

Participants

- From 2005-2011 young adults, ages 18-24, were recruited from an introductory nutrition course at the University of New Hampshire (UNH) from the on-going College Health and Nutrition Assessment Survey [3].
- All subjects provided informed consent to participate in the study (n= 4,351).

Procedure

- Self-recorded 3-day dietary records were analyzed using Diet Analysis+ 10.
- Subjects were separated into 3 groups according to the number of MyPlate categories they met (0-1, 2, ≥ 3).
- Dietary quality was based upon MyPlate guidelines for the average male and female subject (Table 1).
- Data analysis were performed via SPSS (v.21). Chi-square tests evaluated differences between MVM users and non-users; $p < 0.05$ were considered significant.

References

1. Bellizzi, K. S., Okoro, C. A., Bowman, B. A., Sensiba, M. K., & Mokdad, A. H. (2005). Public Health Reports, 120(2), 117-123.
2. Block, G., Jensen, C. D., Norusis, E. P., Delai, T. B., Wong, L. G., McManus, J. F., & Hudes, M. L. (2007). Nutr J, 6, 30-30.
3. Burke, J. D., Reilly, R. A., Morrell, J. J., Lofgren, I. E. (2009). JADA, 109: 1751-1758.

Acknowledgements

This undergraduate research project was made possible with the support of the New Hampshire Agricultural Experiment Station and the Department of Molecular, Cellular and Biomedical Sciences at the University of New Hampshire. A special thanks to Anne Ronan (data collection), Evangelia Georgakias and Danielle Dubois for their guidance and collaboration.

Contact

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Good planning yields good posters.

Company Facts

- Founded in 1908 by William Durant
- World's largest automobile manufacturer for 77 years
- In 1960's had a 50% market share of the world automobile market
- Employs over 200,000 people worldwide
- Employed over 90,000 people in U.S. at the end of 2008
- Declined after the turn of the 21st century due to its inability to compete with foreign manufacturers
- Forced to declare bankruptcy on June 1, 2009

2008 Financial Information per Annual Report

- Pre Tax Loss - \$30.86 billion
- Current Assets - \$41.224 billion
- Total Assets - \$91.047 billion
- Current Liabilities - \$73.91 billion
- Total Liabilities - \$176.387 billion

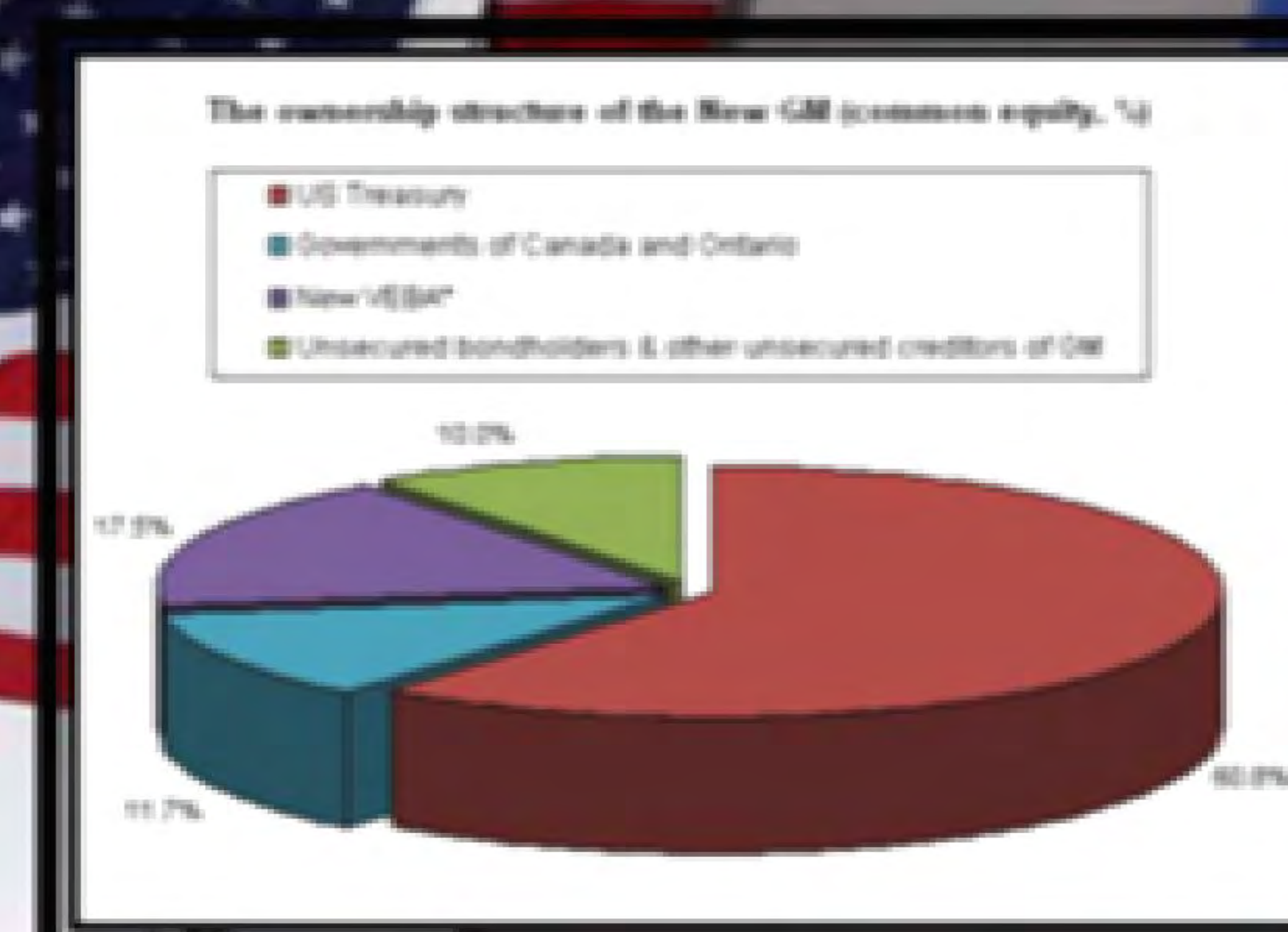
Other Key Debts before Bankruptcy

- \$20 billion obligation to VEBA trust for UAW retiree benefits
- \$27.2 in unsecured bonds

THE GENERAL MOTORS BANKRUPTCY

Assistance from United States Government

- \$13.4 billion given as a Treasury Prepetition Loan on December 31, 2008 to help the company restructure
- \$2 billion given on April 22, 2009 to provide working capital while working on bankruptcy plan
- \$4 billion given on May 20, 2009 to provide working capital while working on bankruptcy plan
- \$30.1 billion given while in bankruptcy as debtor financing to help the company restructure
- Total Government Assistance – over \$50 billion



Bankruptcy Results

- U.S. Government receives 60.8% equity in restructured GM
- Canadian Government receives 11.7% equity in restructured GM
- UAW receives 17.5% equity in restructured GM
- General Unsecured Bondholders receive 10% equity in restructured GM and warrants to purchase additional 15%
- Warrantee obligations taken on by restructured GM
- Litigation claims would not be handled by restructured company, this includes both product liability and liability for employee asbestos exposure
- Non UAW employee retirement benefit obligations not honored by restructured company

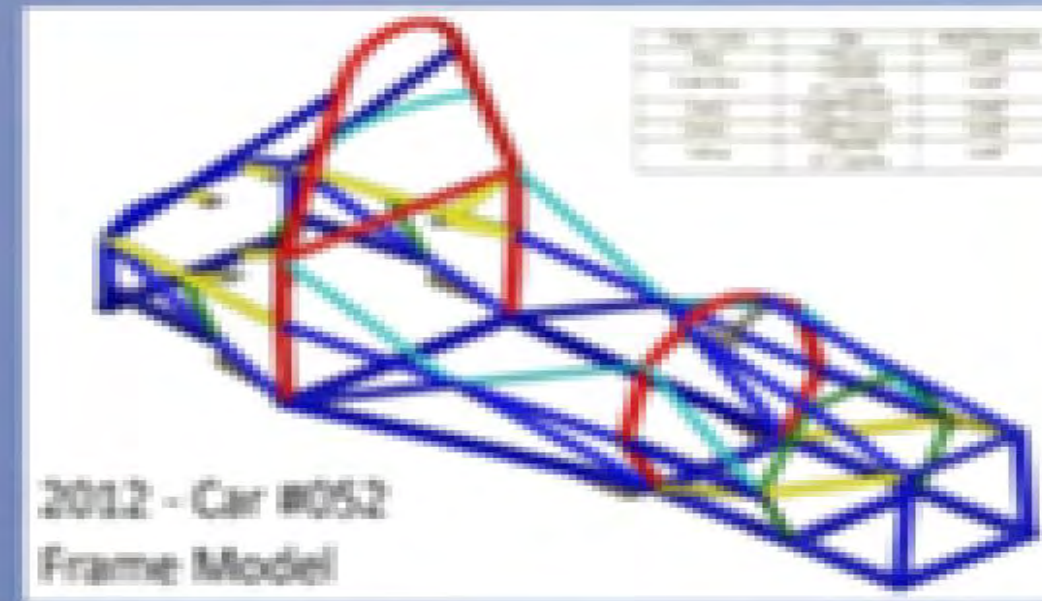
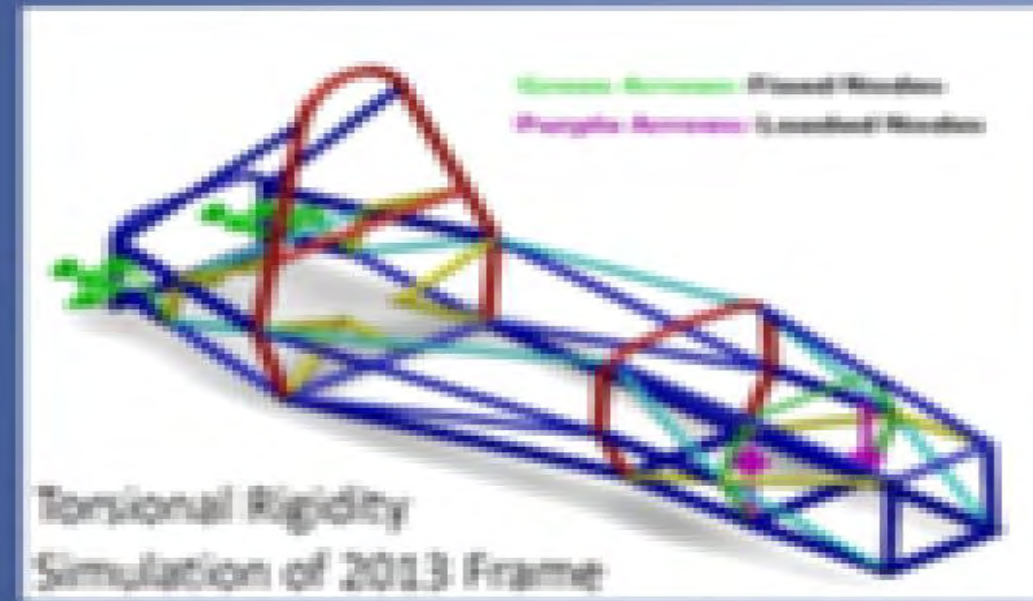
Conclusions: Was the Bankruptcy Cost Effective?

- Benefit: Bankruptcy saved at least hundreds of thousands of U.S. jobs
- Cost: People injured by product defect and asbestos exposure receive limited compensation
- Cost: Non UAW employees do not have their retirements guaranteed
- Answer: What is the economic value of a human life?

The opposite is true as well.

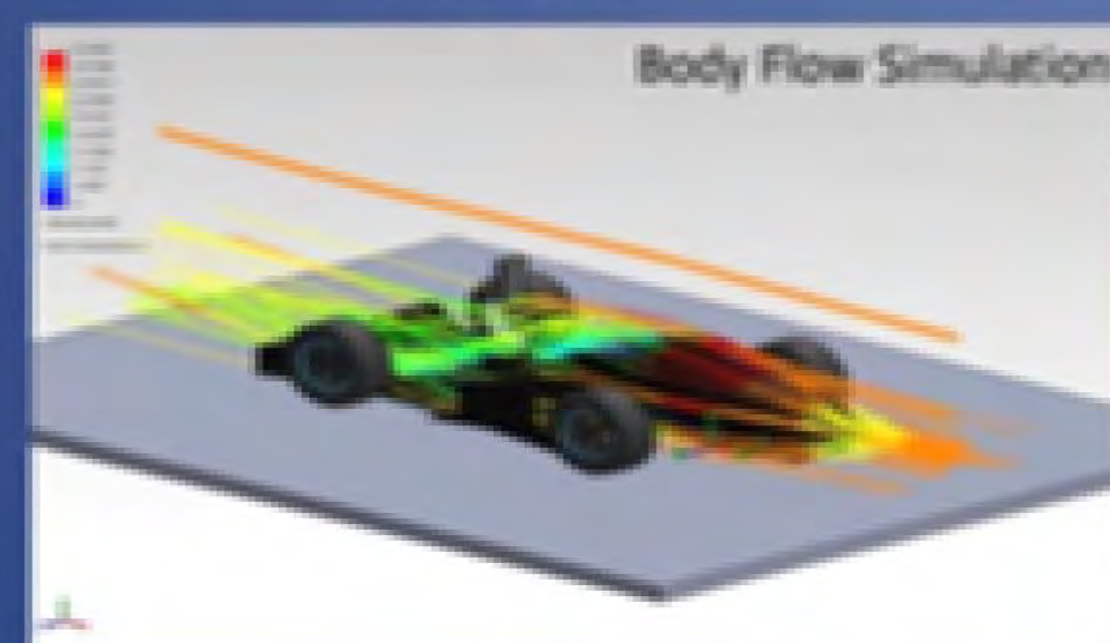
Frame

- Rear Design:
 - Redesign of rear to accommodate the smaller engine size of the Yamaha YFZ-450R compared to the Suzuki GSXR-600 of previous race cars
 - Lowered the center of gravity by adjusting driver position backwards and lowering of roll hoops
- Torsional Rigidity:
 - Increased torsional rigidity by 1.2% from 2012 race car



Aerodynamics

- Body Design
 - Decrease weight of overall carbon fiber body by 15% from 2012 race car
 - Increase lift to drag ratio by 10%
- Nose Cone Design
 - Reduced the drag by creating less surface area
 - Nose cone is 7.0 inches shorter than the 2012 race car
- Side Pods
 - Vents added to reduce drag by guiding airflow over the rear tires



Controls

- Development of paddle shifters:
 - Increase speed of gear change
 - Maintained drivers control over race car
- Creation of shifter-force & shifter-angle profiles:
 - Experimentally determined required shift force and angle for each gear change
- Adjustable pedal placements:
 - Three pedal system: Throttle, Brake, Clutch
 - Improved ergonomics for different drivers



College of Engineering and Physical Sciences
Department of Mechanical Engineering
04/24/2013
Faculty Advisor: Todd Gross

Presented By:

Drummond Biles
Ryan Carlson
Ben Gardell
George Hotton
Thomas Kimsey
Michael Lorenzo
Sean McCann

Newell Moser
Trevor Much
Alex Rich
Kyle Seike
Michael Stevens
Goran Vidic
Tyler Young



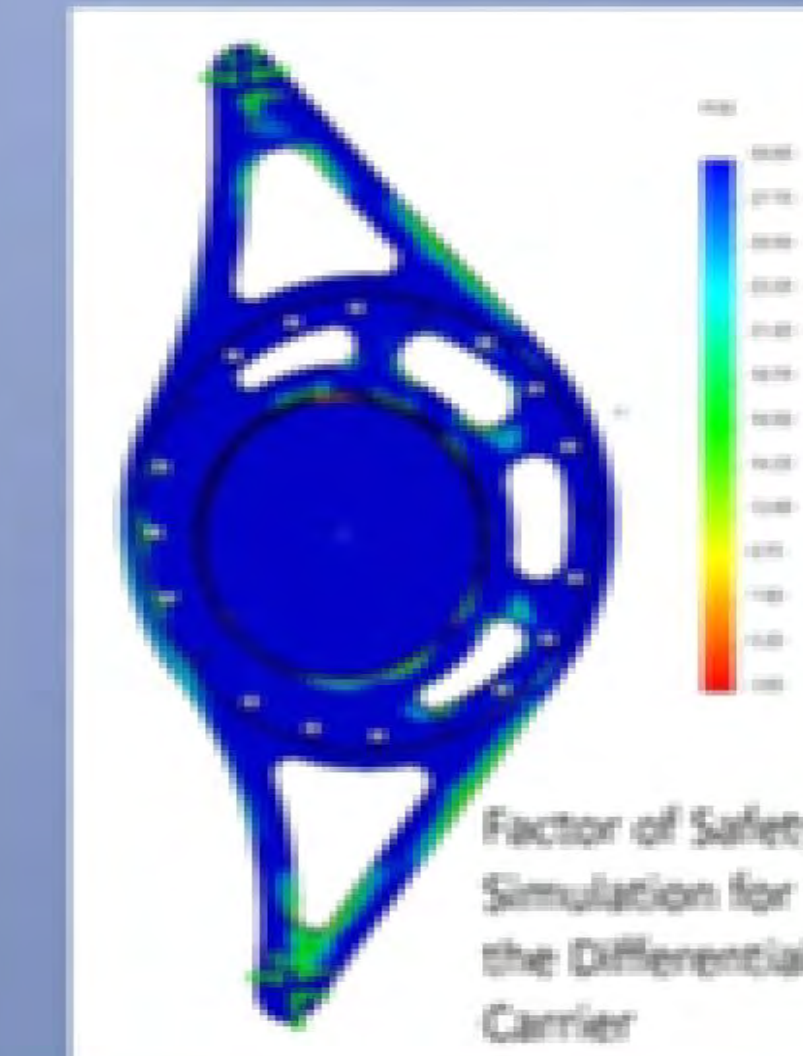
Electronics

- Wireless Data Acquisition System:
 - Based on a Cypress PSoC® 5 processor
 - Wireless range of one mile
 - Live feedback
 - Onboard data storage via SD card
- Monitors:
 - Engine parameters, suspension position, tire temp., brake pressure, oil pressure, throttle position, three axis of acceleration
- Data analysis software package developed in JAVA
 - GUI interface system
- Integrated digital dashboard display



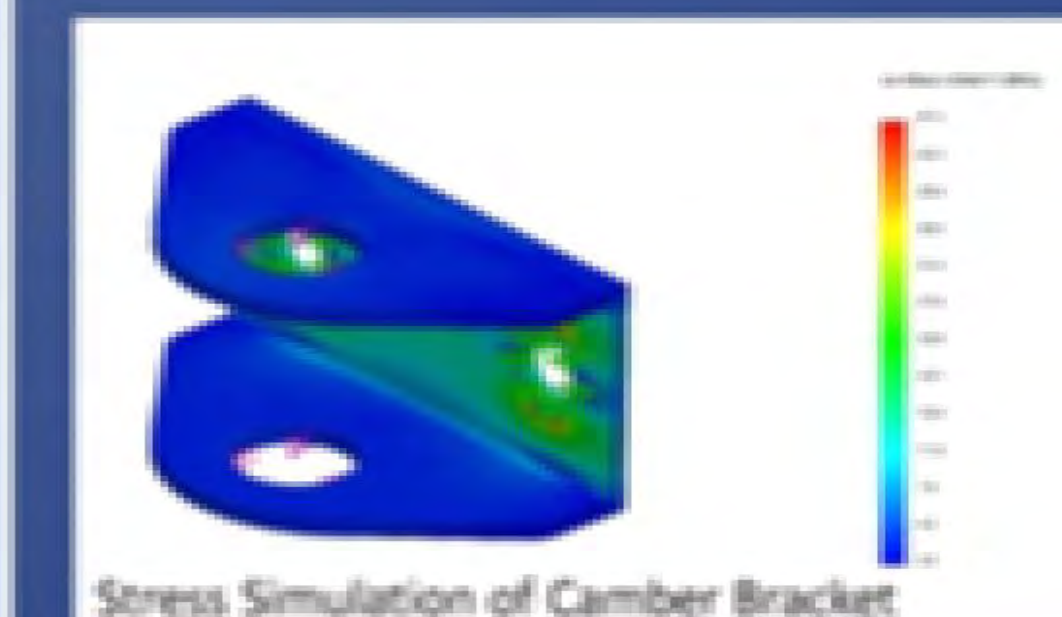
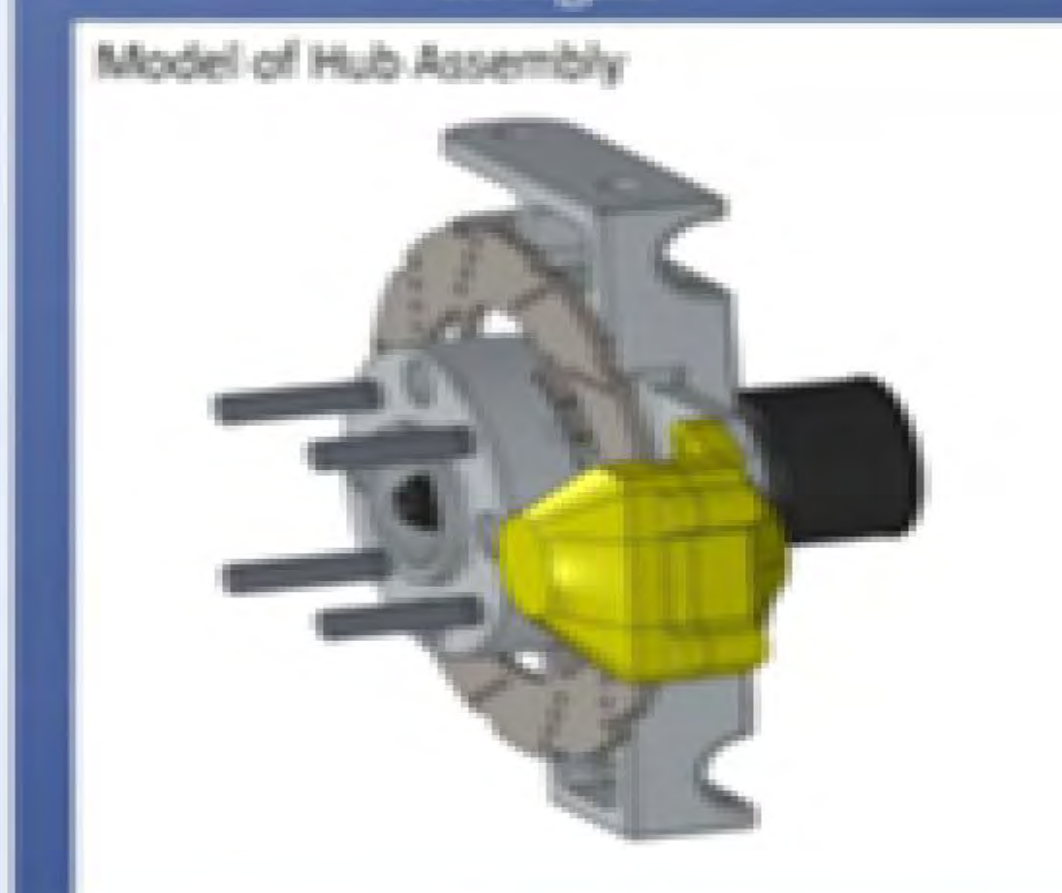
Engine & Drivetrain

- Engine: 2011 Yamaha YFZ-450r:
 - Single cylinder engine reduced weight and lowered center of gravity from 2012 race car
 - Spherical plenum design, 2.94 L, incorporated velocity stack to increase airflow
 - AT Power Throttle Body, incorporated 20 mm restrictor per competition rules
- Drivetrain:
 - Adjustable differential carrier for chain tension
 - 14/50 Tooth Rear Drive ratio chosen to increase power over gearing range



Suspension

- Reduced un-sprung weight to the four suspension corners
 - Uprights made from one piece of 6061-T6 Al. (reduced weight while increasing strength)
- Incorporated rear outboard brakes with a weight increase of only 10% (1.5lb)
- Incorporated camber plates to adjust ride camber, (safer and more practical than rod ends)
- Improved cornering
 - Widen rear track width by 2.0 inches
 - Encompass correct geometry for the front and rear A-Arm designs



Special Thanks: Tucker Engineering, Burndy, EFI Express, UNH Parents Association, Whelen, Wilcox, UNH CEPS, Todd Gross, May-Win Thein, Bob Chaplin, Tracey Harvey, Sheldon Parent, Sheri Millette

Create something you are proud to show off.

IN CLOSING

- ▶ Remember – make your poster visually appealing, draw your audience in, and make them curious about your research.
- ▶ It is a **summary** of information!
- ▶ Your file should include your name. **DO NOT** name it “URC poster”
- ▶ If you don’t understand how the information on your poster flows, neither will your visitors.
- ▶ Use this opportunity to get creative and experiment.
- ▶ Color is not your enemy!
- ▶ Use a **GOOD**, HI-RESOLUTION UNH Logo, **NOT** the round UNH seal.
- ▶ Don’t forget your name, title and college.
- ▶ Have Fun!