

# Inbox

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## Dissertation Notes

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### [liu2020CriticalMicrostructures](#)

explains that [recrystallization](#) delays [crack initiation](#) and blocks [crack propagation](#) by reducing local stresses at grain [triple junction](#) in the [heterostructure](#).

### [zhang2012InfluenceOfRecrystallization](#)

explains that [recrystallization](#) allows for [crack initiation](#) at the boundary to the matrix, which further allows for [intergranular crack propagation](#) toward the matrix.

### [todaka2004ComparingNanocrystallineSurfaceLayer](#)

depicts that sharp boundaries exist between the [nanocrystalline layer](#) and the [recrystallization layer](#) where the material matrix boundary to the [recrystallization layer](#) occurs further into the material.

[liu2020CriticalMicrostructures](#) observes a [heterostructure](#) of nickel with [coarse grain zones](#) in [ultrafine grain matrix](#) and [zhang2012InfluenceOfRecrystallization](#) observes a superalloy of nickel.

## 211012

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Team Council in *Dean's Conference Room*: 211012

Opening Comments:

- Tate introduces and recaps who we are, what we are responsible for, and goes over meeting outline.

## General Comments

- Minimize joke pictures on whiteboards.
- Present ourselves as the *Engineering department conscience* to the teams because we are first line of defense and first exposure to faculty feedback.
- Students draw to meet the design requirements. Criticism is given and the design is adjusted. During manufacturing, design is assessed for issues and modified as needed.

## Design

Objectives, constraints, and variables.

- Each team needs to be approved near beginning of semester because department (MFH) proposes next calendar year budget at end of October.
- Would be nice if all competition teams had same department deadlines.
- *No cannibalizing of former vehicles. Let us keep retired vehicles from each team at front of department.*
- Dr. Horstemeyer can reallocate money not used from competition teams to other engineering department ventures.
- The sooner we can get the forest of design understood, the less problematic the tree steps.
- **Workshop for *Creationeering* with Dr. Horstemeyer.**

## General Questions

- Should conceptual designs occur before the budget proposal? Absolutely.
- Where are each teams on their conceptual designs?
  - Baja: Preliminary (treating vehicle as Conceptual).
  - HPVC: Critical (final).
  - FSAE: planning for conceptual.
  - Rocket: Conceptual.
  - Vanguard: unknown.
- What is required for each design review?
  - Scope for competition
  - Engineering requirements (business presentation)
  - System-level design (objectives and constraints: engineering presentation)
  - Sub-system level design (design variables and their value through the process to quantitatively meet system-level objectives and fit within constraints)
  - Timeline
  - Budget
- Systems engineering (team structure) is laid out according to *Creationeering* framework.

## General Concerns

- **HPVC** is being spoon fed by the Ziebart; however, not all the other faculty may know what is expected of them.

- The competition teams do their own design: faculty filter the design to meet the engineering design template and process. We can attempt to enforce this with each team, and the enforced date could be uniform across the board despite the varying deadline dates for each team.
- Dr. Medina wants to off-load his competition teams.
- Students do not appear to possess good electrical safety: safety guidelines and standards for each team. This could be realized as subset in a sustainability document: what is next step in the process?
- Each team lead needs to be responsible for their own registration deadlines.
- So far, this design process is failing at the faculty level. Team leads may also be misrepresenting state of meeting strict deadlines: the deadlines kept getting moved. In industry, if deadlines are not met, the money is pulled.
- Students do appear to be taught the tools necessary to sustainable designs: therefore, Dr. Horstemeyer could meet during a convo time with team leads (10/25).

## HPVC

- Splitting into two teams for R&D and competition manufacturing.
- They are fairly well established in government and such.
- Having difficult meeting *Critical Design* deadline because of delay on approval to order waiting to meet with Dean. Dean wants to be involved with each step: 1) Conceptual Design, 2) Preliminary Design, and 3) Critical Design.
- Purchasing during manufacturing--e.g. sandpaper--has been slow: idea exists to give Faculty Advisor a *p-card*. Guestimate needs to be given to Valda to determine allotment.
- Perhaps only Stephen H. could hold a *p-card*; although, he may be difficult to get a hold of. The cardholder could even just buy a VISA gift card.
- Moving to "new" *Hudgins* building is without pressurized air and some rather unprofessional drawings on some of the whiteboards.

## Formula

- Intensely long learning process from unresolved issues.
- Better to move to combustion? Potentially, but this may go against Faculty Advisor. Mechanically, FSAE was ready, but did not compete because *Electrical* was not ready.
- Issues arose from lack of systems integration experience that mostly stemmed from Electrical requirements. However, combustion is an order of magnitude more straightforward.
- *Partner with Hendrick??*

- Alba was upset that we did not go to competition, and she has explained that most electrical teams do not pass *Tech Inspection*.
- Eric and Sam will email Dr. Horstemeyer, Faculty Advisor (Dr. Medina), and Team Captains of understanding to move to combustion. Propose that if some want to finish the electrical, fine, and if some want to make the combustion, fine. May be valuable to still experiment with: i.e. mechanically.
- If they want to finish by this year, they must present ASAP for spending money in this academic year.

## Rocket

- \$30k is an upcoming expense, but that may not be for a couple more years.

## Baja

- ~~Dr. Medina~~ Dr. Lugo is Faculty Advisor.
- 16 members were from last year, but 4 of these will graduate this year. These same 4 were on team during COVID.
- Before they can get into a building, they are being asked to design for a 2022-23 competition based from this car.
- Some tension from students because Dr. Medina has yet to respond to emails and attend their *Design Reviews*.
- Finishing the vehicle now allows them to visualize the "Death/Recycling".
- Likely not much money required from this year (21-22), but Dr. Horstemeyer wants to also know the following year's costs (22-23).

10<sup>th</sup> 6~seven~ asdf asdf

\*foo bar

The HTML specification is maintained by the W3C.

## 211109

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*Dr. Atwater's Office (CERE)*

## Moving Forward

- Actually fill out the Weekly Reports.
- Begin transition to recording physical, experimental data.

- Recompile the average velocity impact plate plot (remove the 35mm).
- The less people have to look at anything else, the better. The more you explain and show the necessity with a highlighted plot with the noisy and smoothed data.
- Figs appear to be missing ball position.
- Air holes were drilled into the tube to allow for air flow.
- Full data set should perhaps be supplemental material, and presented work is the highlighted plots.
- Pick the prettiest and most similar plots between data sets. The less the reader has to look elsewhere for clarity, the better.

## 211116 - Atwater Office (CERE)

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- Removed statement from abstract concerning making crank velocity perfectly sinusoidal: not focus of this paper.
- Updated ball positions in hybrid plot.
- Overwrote plate kinematic data for cleaner plots.
  - Find the error of the averaged impact velocities (looking at 7505).
  - Adjust the legend entries to be more delineating.

## Dr. Atwater's Thoughts

1. Compare to some basic kinematic equations for the ball. 1. Ideally, we want to measure just how far off this is *without* rolling to start. 2. This predictive element compares the methods and the necessity of a more comprehensive model. 3. This gives a roadmap for what we did and gives opportunity for future work with any crank-slider system.
2. Do not lose sight that the purpose is to predict the velocity of the ball on impact. Trackpy gives some data and we match this within certain error.
  - i. Compare with and without rolling effects for ball, which comes down to the momentum of the ball.
  - ii. Trackpy shows what is happening. We need an equation to predict this behavior.
3. The purpose is to give a generic equation for input parameters for Linear SMAT.

Dr. Atwater can fill in some of the introduction, motivation, and equipment setup.

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## 211207 - Team Council Working Lunch

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Dean's Conference Room

## General

- Encourage teams to form an accompanying club to cover administrative costs, etcetera.
- Help think through length scales for scopes of marketing.
- Move the design from system objectives, constraints, and variables down to the component(s) and repeat for marketing.
- So far, teams are aiming to present Conceptual Design end of spring such that the Conceptual Design can help recruit and guide the manufacturing when the rules come out.
  - The biggest risk of this is when seniors in leadership graduate.
  - The counter to this is to pick and train leaders the semester of graduation.
- Include advisors in the next working lunch meeting.
- Need president (s), vice president (j), treasurer (j), and secretary (sp) on each club according to each team: these do not need to be on competition teams.
  - E.g. SAE membership has many benefits and organizations.
- *Always include dean on email conversations to let keep everyone in the loop.*
- Get photo/videos of vehicle!! Send pub. worthy to Mr. J (of course, copy Dr. H).

## Takeaways

- Students are creating a product while running an organization that promises performance and predicts failure and learning to recruit and market that process.
- We need a culture shift to inspire students how to properly organize themselves and learn how to implement design strategies effectively.
- There is a difference between building something and designing something for manufacturing and assembly.

## Rocketry

### Representative: Reid

- Budget of \$30k being approved by Development Office
- They are anticipating that each rocket be ~\$15k.
- Some of this budget is startup costs.
- Open-source coding and off-the-shelf components: there is a difference between a list of components and an assimilated design.

Know the T-diagram and the steps!

- Much of this semester has been focusing on establishing understanding of rocket design and ruleset.
- Dr. H wants promo photo/video.

## Vanguard

Representative: Carson

- Nathaniel Huggins is difficult to get in contact with, but he is getting married. So some of his eccentricities may be ironed out.
- Get a hold of Sarah Stevens.
- Difficult to determine who a proper leader should be because of reclusive tendencies.

## Concrete Canoe

Representative: Unknown

- Dr. Vadnal is the advisor.
- Solid, professional initial design review.
- This type of presentation may be good example of recruitment.
- ASCE: harkens back to teams joining a club for SGA funding.

## HPVC

Representative: Jared

- Lacking in HPVC as hobbyists instead of creationeers.
- They have good grasp of iterative manufacturing but lack of design insights.
- Leadership transfer may be bumpy from young leaders with limited experience.
- None of the team members knew the rules!

*Rule 1) Read the rules!*

- Up to this point, designs have been made to match what was ordered.
- Decision matrices to select components but they did this is reverse by buying the component and biasing decision matrix to match what is being built.

- Decision matrix tables massaged with subjective data.
- Data shown is unsupported by sources nor linked to design objectives/constraints.
- Few simulations have been done.
- Difficulty getting access to Modeling/Simulation Lab and Hudgins building after normal working hours.

## FSAE

### Representative: Eric

- Team getting feet under them during switch of IC, and the EV will not be up and running in time for competition.
  - Much of the difficulty so far is software incompatibilities.
  - Now they have 3 leaders: Emily Schneidau, Trip Meredith, Jacob Walker.
- Much time spent in researching.
- Talk to Dr. Lugo about starting an FSAE chapter. Best done through SGA.
- Pittsburg Shootout could be great to volunteer/attend for networking and competition experience.

## Baja

### Representative: Joby.

- Team needs to recruit--many members are graduating seniors--and train electrical students.

## ICME Presentation

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- Talk to Aaron Malbuff about IC implications for ICME: how does this affect funding and full time status? If required, does this affect graduation dates?
- Email Dr. A and H slides, paper, and Mao 2016 paper.
  - Update figures...
  - Update Cause-Effect slide with connecting lines.

# Reliability Centered Asset Management

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Where: Demoss 3284

When: 220127 @ 10 AM



Who: Dr. Rich Overman

# Teaching With Tate Fonville

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220822 @ 10:30

- Pick six topics from the syllabus to lecture, rather than alternating class sections in the week.
- Tate has pre-made lectures and would just share with me the ones I would need.
- Tate will email Alex to add me to the Cengage course.
- Get the six topics to Tate by the end of the week.
- Come to 3422 tomorrow for class introductions.