

Synchronous,
Technology, & Online

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Presented to WWU ENGR Dept. 2020

Observations

1. Microsoft Teams/Class time
2. PowerPoints
 - Shortcuts
 - Equations
 - Graphics
3. Digital Writing Tablet
 - Grading homework/Exams
 - Class or one on one with students
4. Video Recording/Editing
5. Future Improvements
6. Questions

1. Microsoft Teams (Synchronous)



- Practice Suggestion
 - Practice using MS Teams with a colleague
 - It is possible to practice alone with two screens
 - Create a link to your session, click link to start browser
 - MS Teams on one screen, your “audience” will be in the browser



1. Microsoft Teams (Synchronous)

- My general approach

- PowerPoint slides for lecture
- Slides made available to students
- Theory can be covered fairly quickly this way
- Very helpful to have two screens



1. Microsoft Teams (Synchronous)



- My general approach (continued)
 - Class periods for students to do homework
 - Helped students during homework classes
 - All students get to hear homework coaching
 - Students even interact with each other

1. Microsoft Teams (Synchronous)



- My general approach (continued)
 - I get the sense that student morale is improved by professor giving them homework time
 - Homework time seems to provide a better sense of being connected rather than just all lecture
 - Intermittently complimented students for being on time, being in school, pursuing a challenging major

1. Microsoft Teams (outside of class)

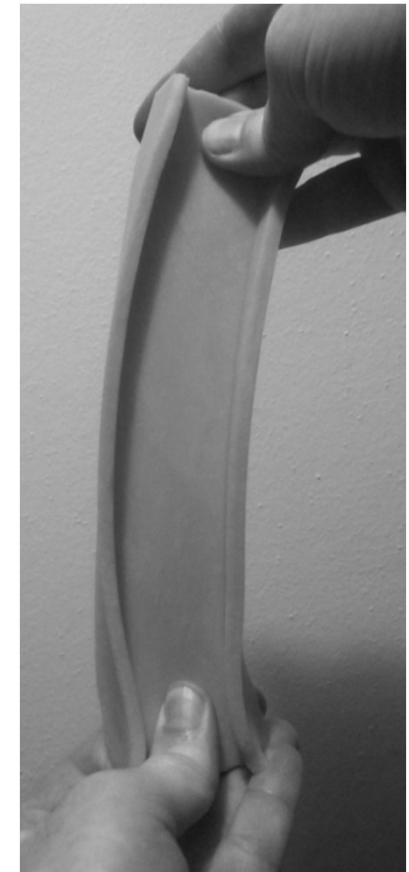
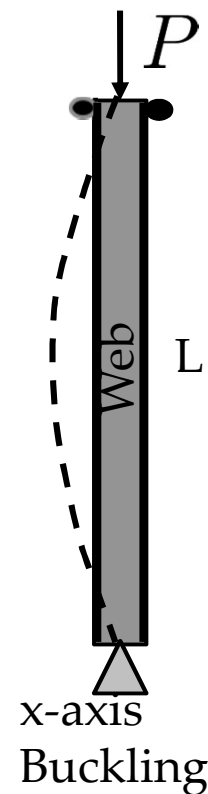
- My general approach (continued)
 - Met with individual students as needed
 - Gave homework help
 - Explained course content again as needed
 - Draw as needed on tablet in MS OneNote



2. PowerPoints



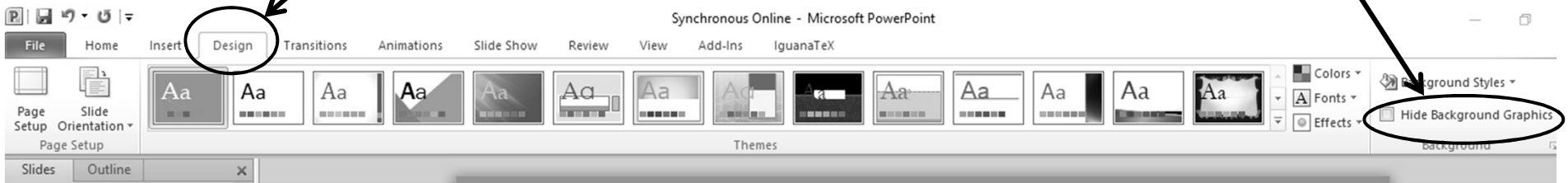
- Choose sensible background color and text
- Include relevant pictures and illustrations as much as possible



2. PowerPoint



- Print friendly recommendations
 - PowerPoint's White or Black text prints black to printer in gray scale.
 - Black LaTeX formulas (with appropriate background)
 - Select "Design" menu, at right choose "hide background" graphics



2. PowerPoint



- **Shortcut keys**
 - Superscripts - Ctrl+Shift+Plus, repeat to get out of superscript mode, Example: 10^{456}
 - Subscripts - Ctrl+Plus, repeat to get out of subscript mode, Example: X_1 , B_{ij} , C_{ijkl}
 - Examples: A_{req} , S_{req} , I_{req} in units of in^2 , in^3 , in^4
- **Equations**
 - PowerPoint equation editor, I never used it
 - Much can be done with regular text and subscripts/superscripts
 - My preference is LaTeX in PowerPoint

2. Using LaTeX in MS PowerPoint



- Equations (continued)

- LaTeX equations can be included by using an add-in to PowerPoint called IguanaTeX
- See <http://www.jonathanleroux.org/software/iguanatex/>
- See website to install IguanaTex into PowerPoint
- MikTeX must be installed to use IguanaTeX
- A very good resource, see: Downes, Michael, *Short Math Guide for LaTeX*, American Mathematical Society.
<http://www.highpoint.edu/physics/files/2014/08/short-math-guide.pdf>

$$e = \sum_{k=0}^{\infty} \frac{1}{k!}$$
$$A = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix}$$
$$R_b = \sqrt{\frac{\ell_e d}{b^2}} \leq 50$$
$$A = \frac{\tau}{2} r^2$$
$$ax^2 + bx + c$$

2. PowerPoint

- Graphics

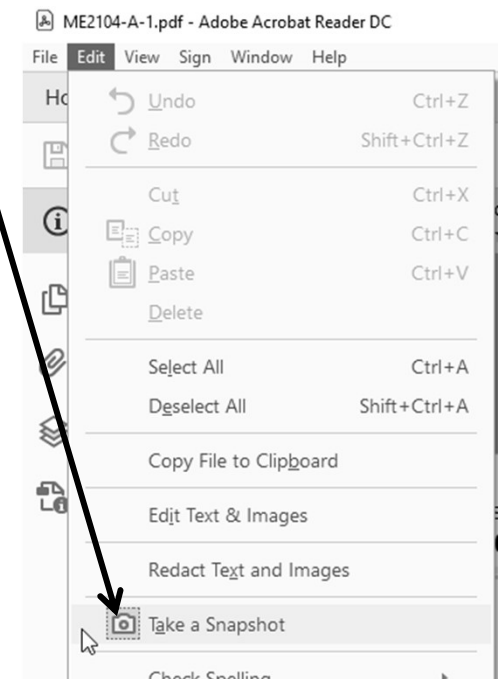
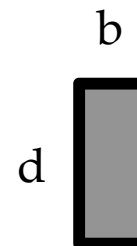
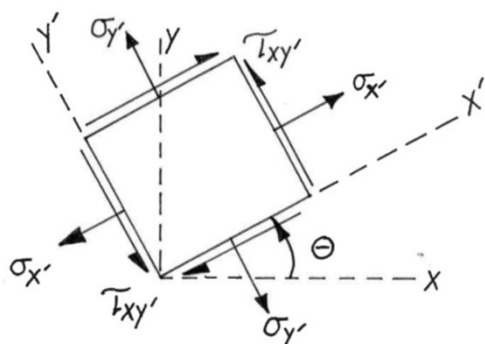
- Greenshot – screen capture tool (free open source download, <https://getgreenshot.org/>)



- PDF – select “Edit” menu, choose “Take a snapshot”, drag snapshot tool to select region
- To reduce blurriness of pdf snapshot, magnify the pdf before taking the snapshot

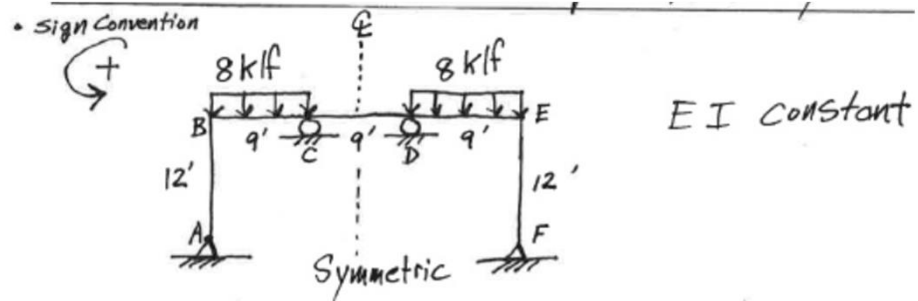
- Hand drawings – scan to PDF, use Snapshot, then paste in PowerPoint

- PowerPoint drawing tools are an option



2. PowerPoint

- Graphics – in a pinch just copy in written notes from pdf scan



$$DF_{BA} = \frac{\frac{I}{12} \left(\frac{3}{4} \right)}{\frac{3I}{4(12)} + \frac{I}{9}} = 0.36, \quad DF_{BC} = 1 - 0.36 = 0.64$$

$$DF_{CB} = \frac{\frac{I}{9}}{\frac{I}{9} + \frac{1}{2} \frac{I}{9}} = 0.667, \quad DF_{CD} = 0.333$$

$$FEM_{BC} = \frac{WL^2}{12} = \frac{8(9)^2}{12} = 54 \text{ k-ft}$$

Point	A	B	C
DF		0.36 0.64	0.667 0.333
FEM		0 54 -54	0
Dist		-19.44 -34.56 36.0	17.98
CO		0 18 -17.28	0
Dist		-6.48 -11.52 11.53	5.75
CO		0 5.77 -5.76	0
Dist		-2.08 -3.69 3.84	1.92
CO		0 1.92 -1.85	0
Dist		-0.69 -1.23 1.23	0.62
Σ		-28.69 28.69 -26.29	26.27
* Exact Computer Results For Comparison		-28.17 28.17 -27.24	27.24

Lines always come right below a "Dist" step!

3. Digital writing tablet

- Tablet I used => Wacom – Intuous pen small, Model CTL-480



(Doesn't seem to be available anymore. Cheaper options available on Amazon.)

- Many other options on Amazon, such as Huion Inspiroy H640P Graphics Drawing Tablet with Battery-free Stylus (\$40)
- I have this tablet also



3. Digital writing tablet



Uses for tablet

- Grade electronic homework/exams/reports
 - a) Print any document to MS OneNote as if it is a printer
 - b) Grade/write on document in MS OneNote with tablet
 - c) Print result to pdf, return document to student

- During class or one on one session with student via MS Teams draw and write in MS OneNote as you explain and discuss problems

3. Digital writing tablet - Example

**Homework
or exam feedback
using MS OneNote

Strong Axis

Weak Axis

($C_D = 1.0$)
D+L is actually the worst load combination when C_D is considered

Load combination
 $D + 0.75L + 0.75L_r$, $C_D = 1.25$ from construction loads
 $20 + 0.75(20) + 0.75(40) = 117.5^k$

Solution (X-axis governs)
 $L_e = L(K_e) = 22(1.0) = 22 \text{ ft}$
 $d = 15.0 \text{ in.}, K_e = 1.0$
 $F_{cE} = \frac{0.822 E_{min}}{(\frac{L_e}{d})^2} = \frac{0.822(0.85)10^6}{(\frac{22 \times 12}{15.0})^2} = 2062.5 \text{ psi}$ *correct*
 $F_c^* = F_c C_D = 1650(1.25) = 2062.5 \text{ psi}$
 $c = 0.9$ for Glulam columns
 $F_{cE} / F_c^* = 2062.5 / 2062.5 = 1.0941$
 Column Stability
 $C_p = \frac{1 + F_{cE} / F_c^*}{2c} - \sqrt{\left(\frac{1 + F_{cE} / F_c^*}{2c}\right)^2 - \frac{F_{cE} / F_c^*}{c}} \leq 1.0$
 $\frac{0.9921}{0.827} \leq 1.0$ ok ✓
 $F_c' = F_c C_D C_p = 1650(1.25)(0.9921) = 1706 \text{ psi}$
 Allowable $P_a = F_c' A = 1706(131.3) = 224.5^k \geq 117.5^k$ ok
 $f_c = \frac{117.5(1000)}{131.3} = 895 \text{ psi}$ $\frac{f_c}{F_c'} = \frac{895}{1706} = 0.525$

For D+L $f_c = 838 \text{ psi}$
 $C_D = 1.0$
 $F_c' = 1453 \text{ psi} \Rightarrow \frac{f_c}{F_c'} = \frac{838}{1453} = 0.577$ *worse*

3. Digital writing tablet - Example

Drawing/Writing discussion with student (MS Teams and using MS OneNote), I like this better than MS Teams drawing

Monday, June 08, 2020 8:22 PM

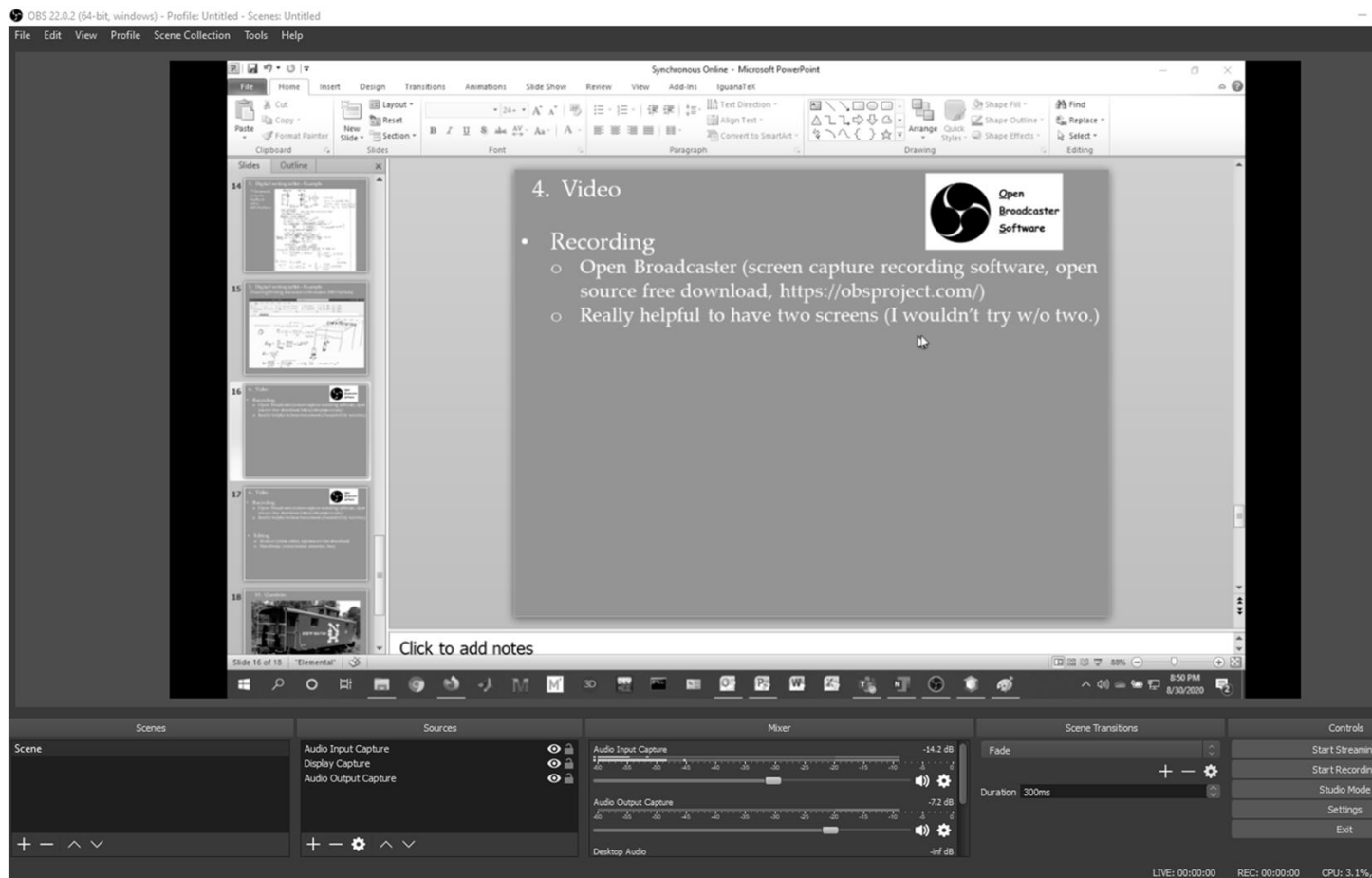
$$w = 14 \left(\frac{D + L_r}{2} \right) = 504 \text{ plf}$$
$$P_v = \frac{wL}{2} = \frac{504(20)}{2} = 5040 \text{ lbs}$$
$$A_{req} = \frac{P_v}{\gamma_{allow}} = \frac{5040}{3000} = 1.68 \text{ ft}^2$$
$$A = \frac{\pi b^2}{4}$$
$$b = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4(1.68)}{\pi}} = 1.46 \text{ ft} \rightarrow \text{use } 1'-6''$$

The diagram shows a vertical cylindrical member of length $L = 20'$ supported by a base. A downward force P_v is applied at the top. A horizontal section above the member shows a distributed load w acting over a length L .

4. Video

- Recording

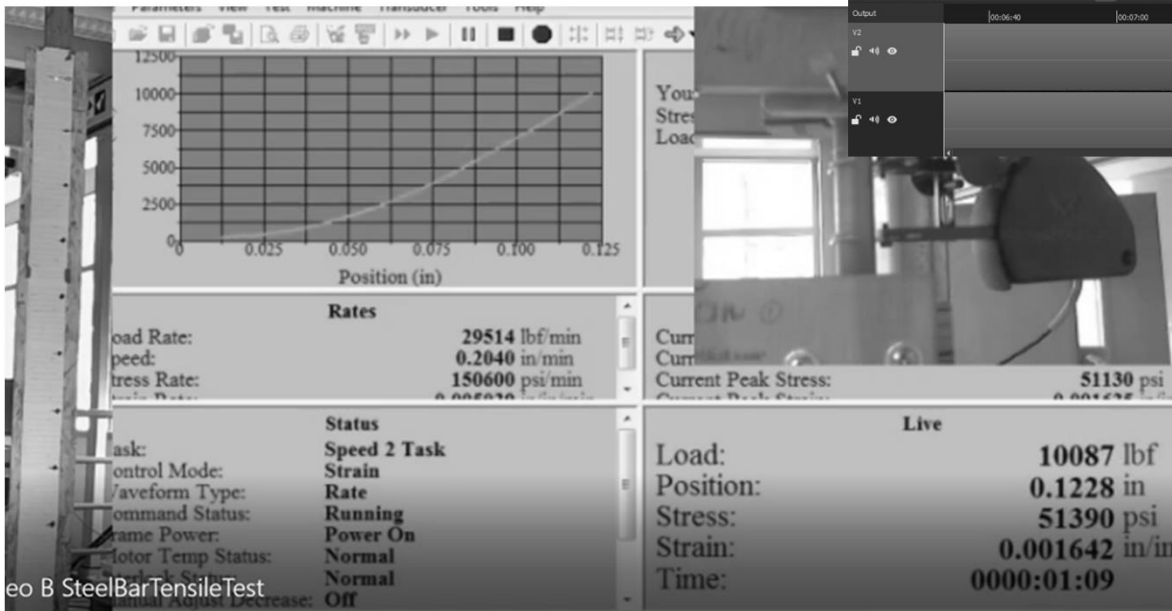
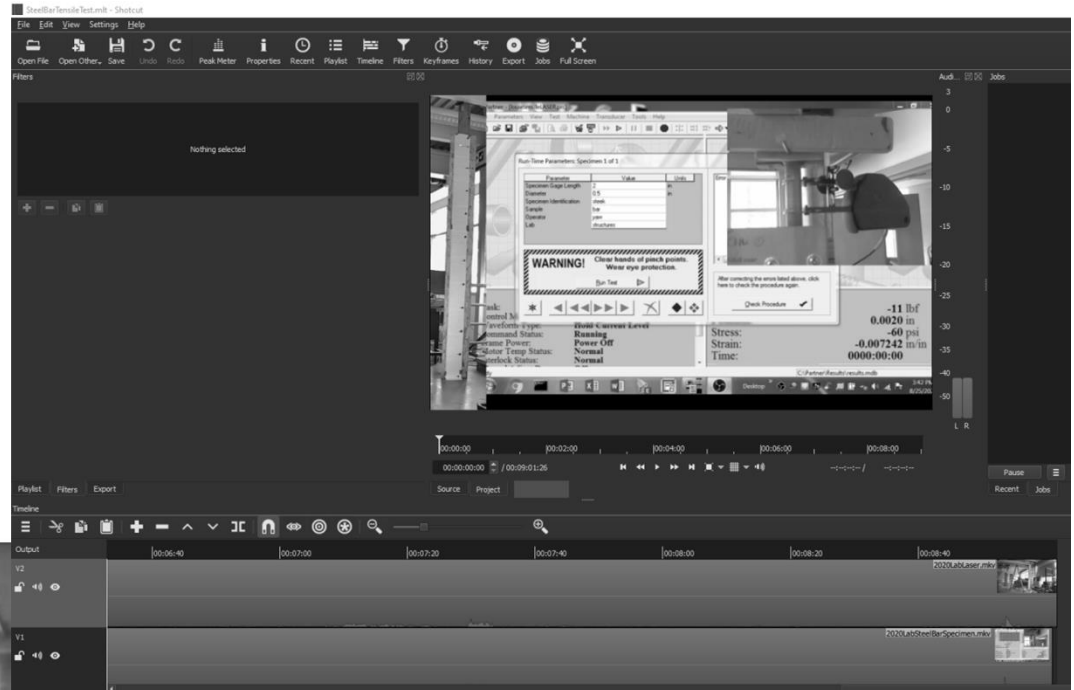
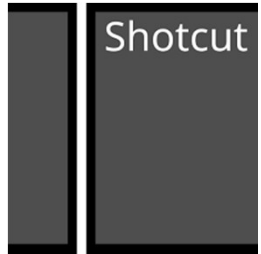
- Open Broadcaster (screen capture recording software, open source free download, <https://obsproject.com/>)
- Really helpful to have two screens (I wouldn't try w/o two.)
- Recorded my PowerPoint lectures, available to students



4. Video

- Editing

- Shotcut (video editor, opensource free download, <https://shotcut.org/>)
- Recently found
- Still Learning



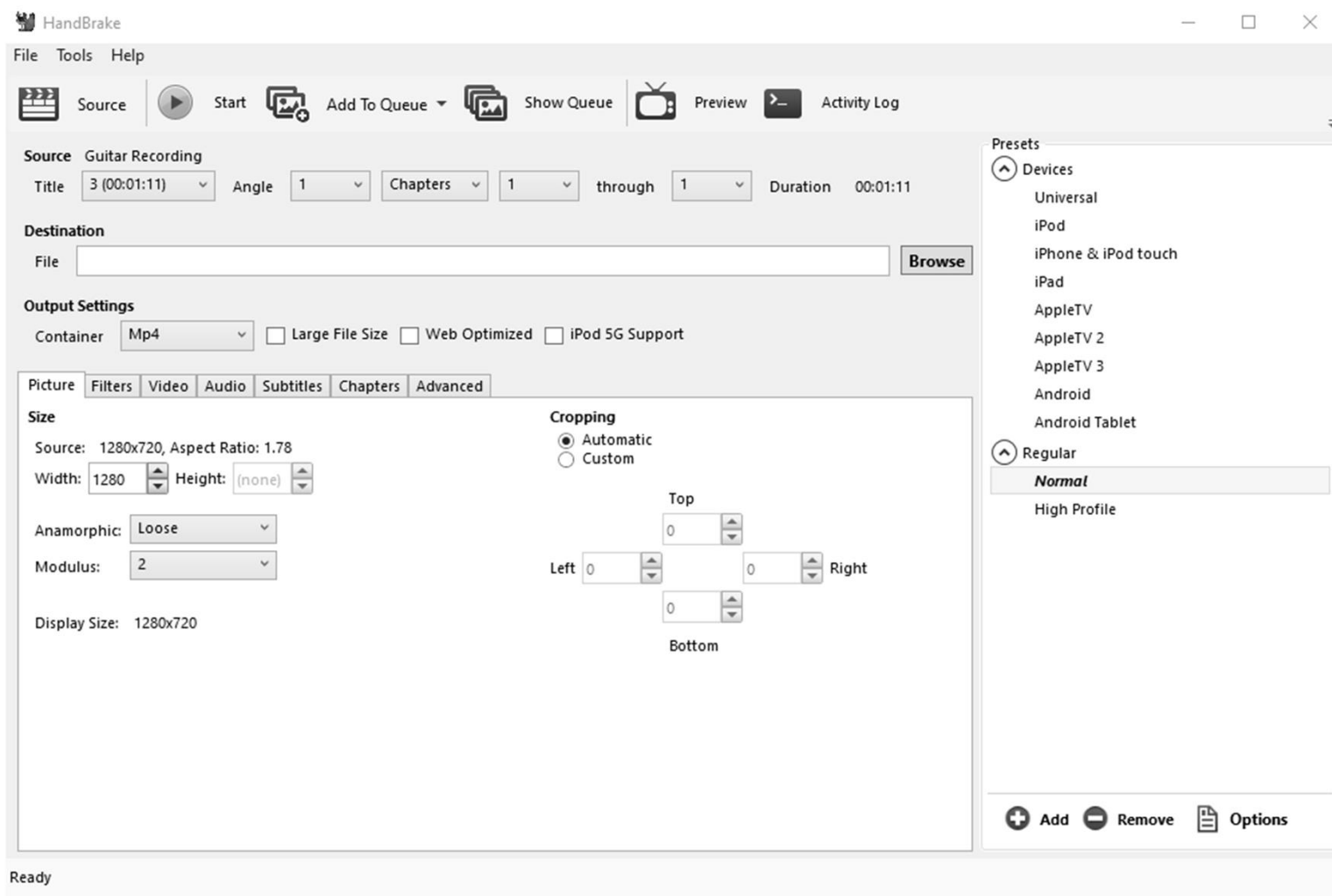
Geo B SteelBarTensileTest

4. Video



- Editing

- Handbrake (open source video format converter, free, <https://handbrake.fr/>)



5. Future Improvements

- Use application directly in Teams rather than just sharing my screen?
- Use drop box in D2L instead of having students email homework
- Use D2L to return homework, papers, exams instead of emailing?
- Others?

6. Questions



7. Bonus Comment – Regarding Open Broadcaster

- If you download and install Open Broadcaster, and you add a display capture source, you may get a black screen (i.e., it's not capturing anything).
- Here is the solution:
 - a) In windows go to settings
 - b) Choose "system"
 - c) Choose "display"
 - d) Scroll down and select "graphics settings" link
 - e) Choose "browse"
 - f) Go to `c:\program files (x86)\obs-studio\bin\obs64.exe`
 - g) Select options, choose power saving
 - h) Exit open broadcaster and restart it

7. Bonus Comment – PDFsam Basic

- A free tool to split pdf files or merge pdf files
- <https://pdfsam.org/download-pdfsam-basic/>
- Use the free version, it generally does all you will need

7. Bonus Comment – Regarding MikTeX

- MikTeX is the engine that translates LaTeX commands into the finished formulas
- It is free, <https://miktex.org/download>
- During install, When it asks for paper size select “letter”
- When it asks if you want it to install packages automatically without asking you choose yes.