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DOCU-SHOW - A MODERN WAY TO PRESENT RESULTS



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DOCU-SHOW - A Modern Way to Present Results

Synopsis:

A replacement for the “formal report” is presented which may be used in project courses or research assignments. It combines detailed descriptions with uncluttered presentation slides so that both the final report and final presentation are integrated into a single document.

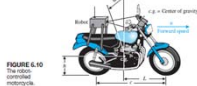
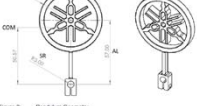
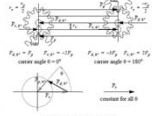
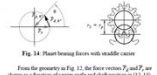
Docu-Show

The Evolution of Technical Communication

Motivation

The conventional forms of technical communication are well suited to conventional business practices. But modern industrial relationships are collaborative and require technical documentation that is digestible by a more diverse audience. It is shown here how a new form of technical communication can be introduced into the curriculum to better prepare students for modern business practices, and be used by educators to optimize the efficiency of lecture hours.

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| Text Book | Formal Report | Publication |
|---|---|---|
| <p>where</p> $K_c = \frac{\lim_{s \rightarrow 0} sG(s)}{K_p(0)}$ <p>Therefore, we have</p> $c_m = \frac{0.04}{42} \quad (6.30)$ <p>When c_m is equal to 23.8% of A, we require that $K_c = 42$. This can be satisfied by the selected point in the stable region when $K = 70$ and $a = 0.6$, as shown in Figure 6.9. Another acceptable design would be attained when $K = 70$ and $a = 0.62$. We can calculate a series of possible combinations of K and a that can satisfy $K_c = 42$ and that lie within the stable region, and all will be acceptable design solutions. However, not all selected values of K and a will be within the stable region. Note that K cannot exceed 28.</p> <p>EXAMPLE 6.10 Robot-controlled motorcycle</p> <p>Consider the robot-controlled motorcycle shown in Figure 6.10. The motorcycle will move in a straight line at constant forward speed v. Let $\phi(t)$ denote the angle between the plane of symmetry of the motorcycle and the vertical. The desired angle $\phi_d(t)$ is equal to zero, that is,</p> $\phi_d(t) = 0.$ <p>The design elements highlighted in this example are illustrated in Figure 6.11. Using the Root-Locus stability criterion will allow us to get to the heart of the matter, that is, to develop a strategy for computing the controller gains while ensuring closed-loop stability. The control goal is</p> <p>Control Goal Control the motorcycle in the vertical position, and maintain the prescribed position in the presence of disturbances.</p> <p>The variable to be controlled is</p> <p>Variable to Be Controlled The motorcycle position from vertical, $\phi(t)$.</p>  <p>FIGURE 6.10 The robot-controlled motorcycle.</p> | <p>DCX 02 L Graphite Brushes DC motor 112 mm</p> <p>Nextion 107616, 166065, 167000</p> <p>SPX 32 Planetary Gearbox 112 mm</p> <p>Figure 1: Mason Motor & Optimal Gearbox</p> <p>2. Pendulum Design</p> <p>The pendulum is designed using SolidWorks and is composed of a Yamaha™ logo on the rim of a wheel. The dimensions of the pendulum are shown in Fig. 2 where h_0 is the length between the part and logo center, LR is the logo radius, SR is the steel radius, and CCM is the distance between the part center and the center of mass.</p>  <p>Figure 2: Pendulum Geometry</p> <p>The pendulum is constructed from Kyocera™ which has a material density...</p> <p>References</p> <p>[1] Mason motor catalog, 2020(2021). https://library.flippenbook.com/view/1942687/</p> <p>[2] ...</p> | <p>Radial Bearing Load</p> <p>Bearing load is dependent on many factors [1] that include geometry and contact angle. Although the load will vary over the bearing surface as the planet, the average considered here corresponds to the load at available configurations of the planet.</p> <p>The radial load varies as a function of planet position from the planet center. As two contact angles which are 120° apart, the contact angle will vary as a function of planet position as shown in Fig. 11. The distances r_1 and r_2 are the radii of the drive and driving shafts and the pitch radii respectively. The forces F_1 and F_2 are the bearing forces applied by the centers of r_1 and r_2 and F_3 is the weight force applied by the gear r_3. All forces are perpendicular to the radial vector, and may be related to a value F_0. Combining the force equations (1) with the torque equations (2) produce the perpendicular force equations (3). (3) which are simplified to represent the force relationships used in the example.</p>  <p>Fig. 11 Planet bearing forces</p> <p>different contact angles 60° and 120° (3). The reaction forces applied to the planet are equal in magnitude and directed in the same plane as the contact angle. For an equal circumferential speed, the results in an net torque which is relative to the reaction force due to contact load.</p> <p>The drive carrier has a radius of r_0 and always applies a load at angle 60° to the planet. A fixed period condition F_0 for the carrier radius while in position 5, the bottom period condition F_0 while the drive is in the other two positions are given by the following equations:</p> <p>The reaction carrier bearing forces (F_{01}) are equal to planet bearing forces (Fig. 11) that the drive bearing forces are positive. Dependent with a maximum magnitude of F_0 which is 1/3 larger than Planet bearing forces.</p> <p>A small carrier (Fig. 14) diameter for r_0 is assumed as a practical for r_0 as illustrated in Fig. 14. The reaction forces bearing load on large r_0 and drive carrier forces have a maximum magnitude of F_0 due to the fixed contact angle (Fig. 11). The reaction forces bearing load on the use of a small carrier carrier are negligible.</p>  <p>Fig. 14 Planet bearing forces with variable carrier</p> <p>From the geometry in Fig. 11, the force vectors F_1 and F_2 are directed in a direction of contact angle and their position are shown which correspond to a drive with 1/3 gears as in Fig. 11.</p> <p>Copyright © 2016 by ASME</p> |

Students exposed to 3 conventional forms of Technical Communication.

Text Books

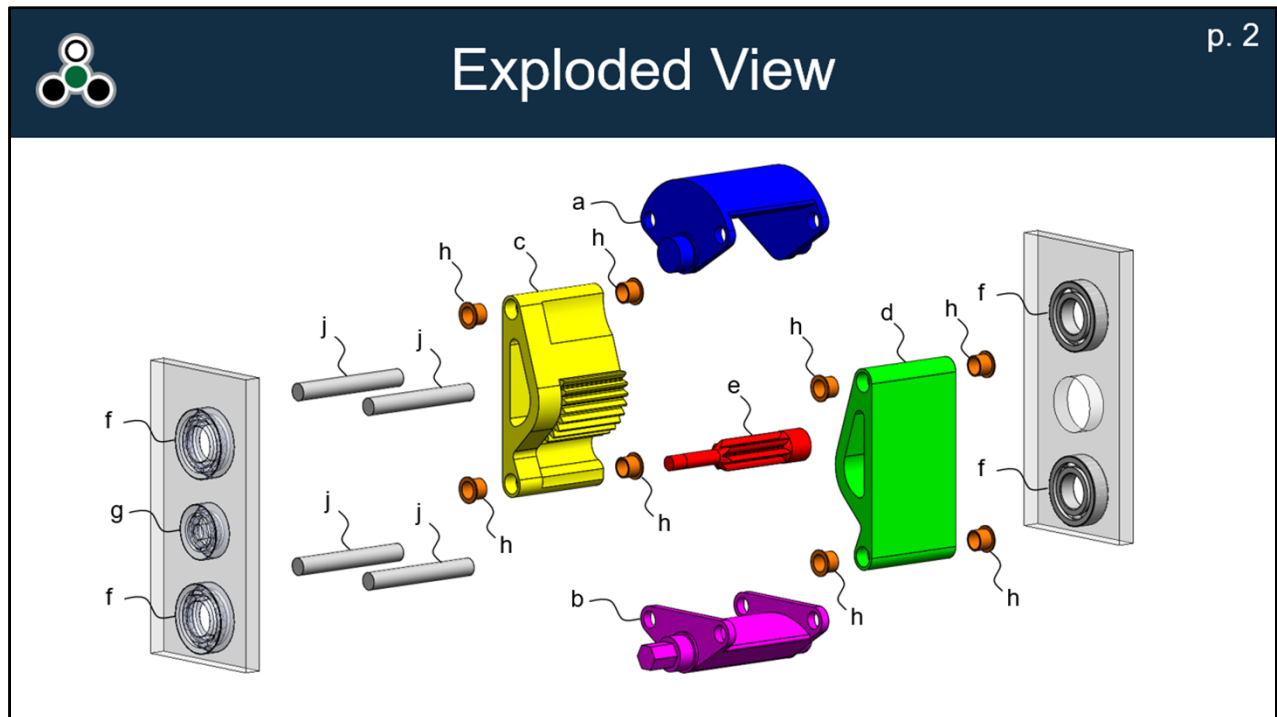
- General Topics
- Complete
- Exposure in all education channels

Formal Reports

- Specific applications of technology
- References to background material
- Taught in High-School & Under-Graduate education

Technical Publications & Whitepapers

- Innovations
- Assumed expert reader
- Learned “on-the-job” in Graduate education



Busy professionals prefer to **DISCUSS**, not **READ**.

Slide Decks

- Online meetings
- Investor pitches
- Technical Presentations (with handouts)

Diverse Audience

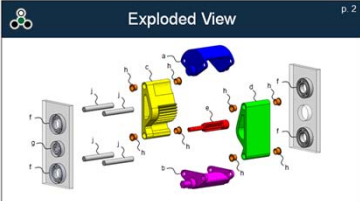
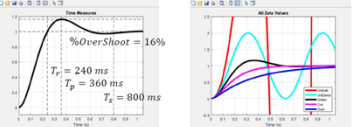
- Engineers
- Project Managers
- Investors

Format

- Pictures only at meeting
- Explanations in handout (for absent participants)

Students benefit from exposure to this approach.

DOCU-SHOW - A Modern Way to Present Results

| Student Presentation / Report | Lecture Slides |
|--|---|
|  <p>Exploded View p. 2</p> <ul style="list-style-type: none">5 Unique Parts:<ul style="list-style-type: none">1 top rocker (a)1 bottom rocker (b)1 left planet gear (c)1 right planet gear (d)1 sun gear (e)4 OTS Parts:<ul style="list-style-type: none">4 large ball bearings (f) supporting top and bottom rockers1 Small ball bearing (g) supporting sun8 Bushings (h) mounted in planet bores4 Pins (i) connecting planets to rockers <p>2</p> | <p>Systems & Control - Supplementary Notes</p> <p>2nd Order Approximations: Damping Coefficient, ζ</p>  <p>2nd Order Xfer Funs</p> $TF(s) = \frac{s^2 + \omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2} = \frac{s^2 + \omega_n^2}{s^2 + 2\beta\omega_n s + \omega_n^2}$ $\omega_n = \sqrt{\omega_n^2 - \beta^2}$ $\zeta = \frac{\beta}{\omega_n}$ $\beta = \zeta\omega_n$ <p>© Leo Stocco 2022</p> <p>1</p> |

Student reports can be aligned to prepare them for industry collaboration. A similar approach can be used to provide effective learning material. The difference addresses the requirements of the intended audience.

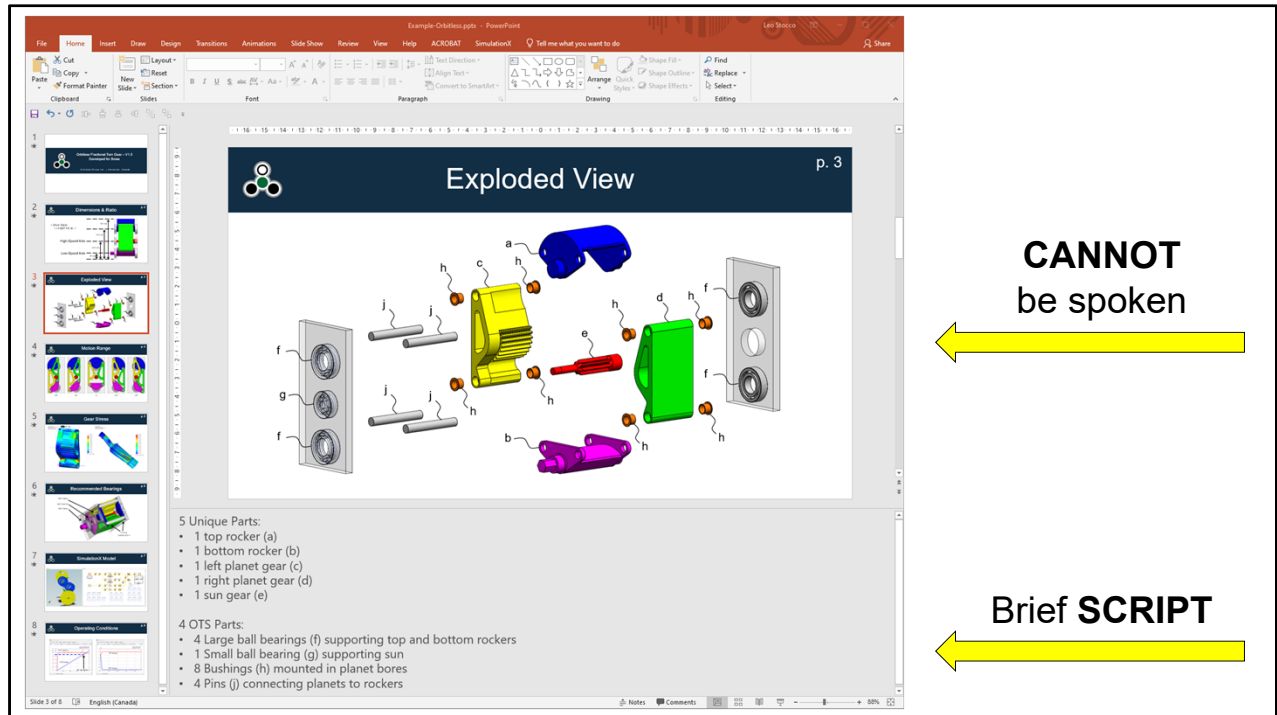
Industry Collaborator

- Needs to **UNDERSTAND** your work
- Will ask **YOU** to solve similar problems, if needed
- More interested in **RESULTS** than **PROCESS**

Student

- Needs to **REPRODUCE** your work
- Must solve similar problems **THEMSELVES**
- More interested in **PROCESS** than **RESULTS**

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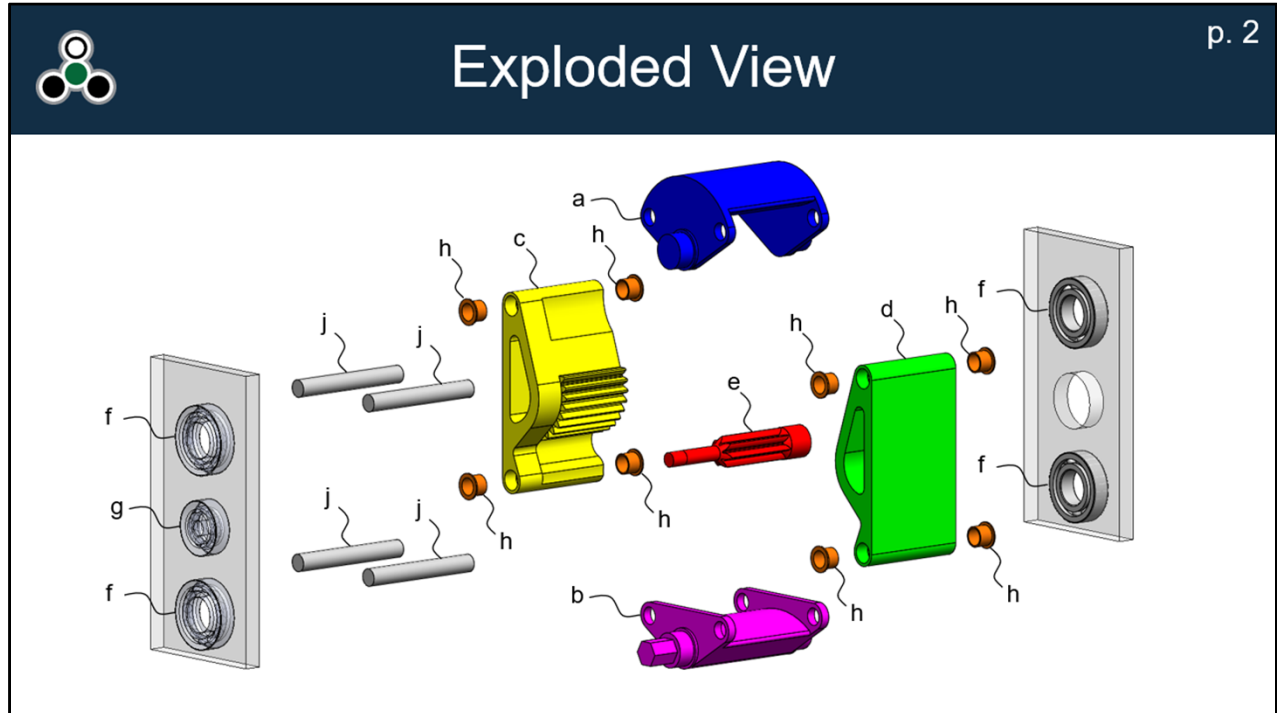
Notes do not appear during presentation.

Advantages

- No difference between slides & handouts
- Promotes good presentation methods
 - Excessive text on Slide leaves nothing for Notes
 - Audience not distracted by reading
 - No picture to show → is slide needed at all?
 - Focus on presenter

Disadvantages

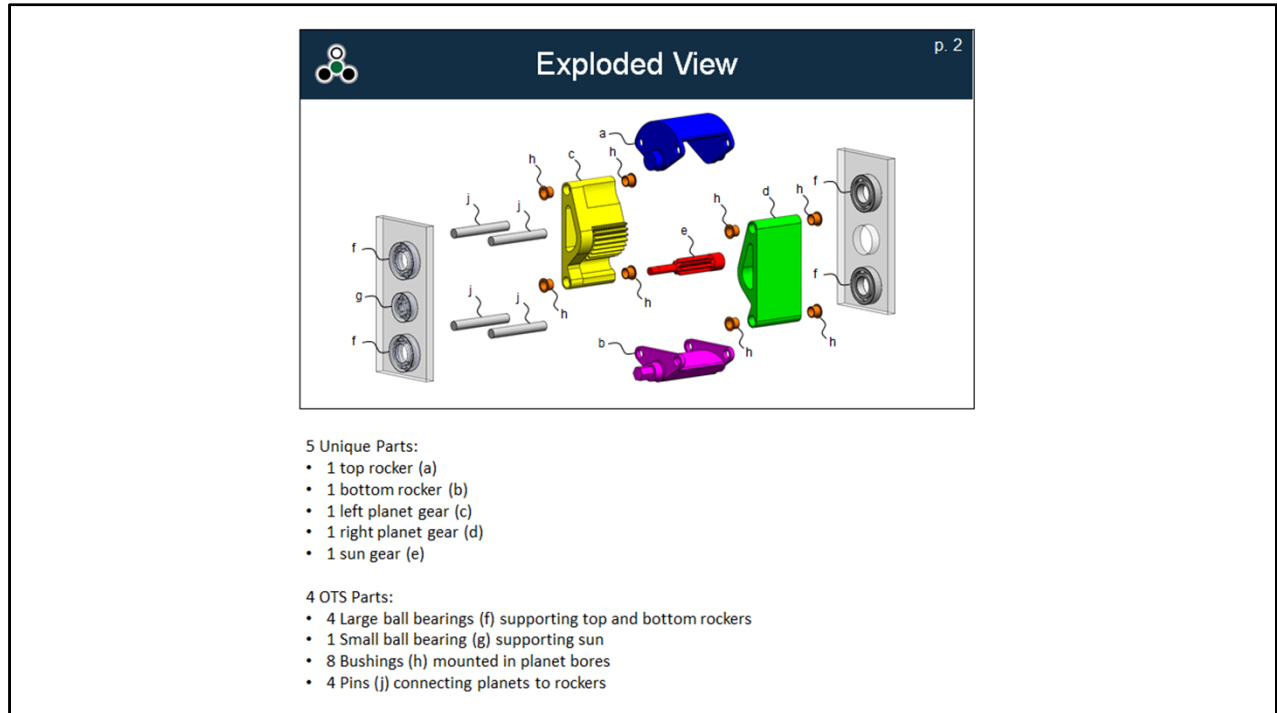
- Not ideal crib-notes for presentation
- Too detailed → use **BOLD** print
- Requires additional preparation



Slide

- Used during presentation.
- All words are **SPOKEN**.
- You want participants to **LISTEN**, and **CONVERSE**,
- You do not want participants to **READ**.

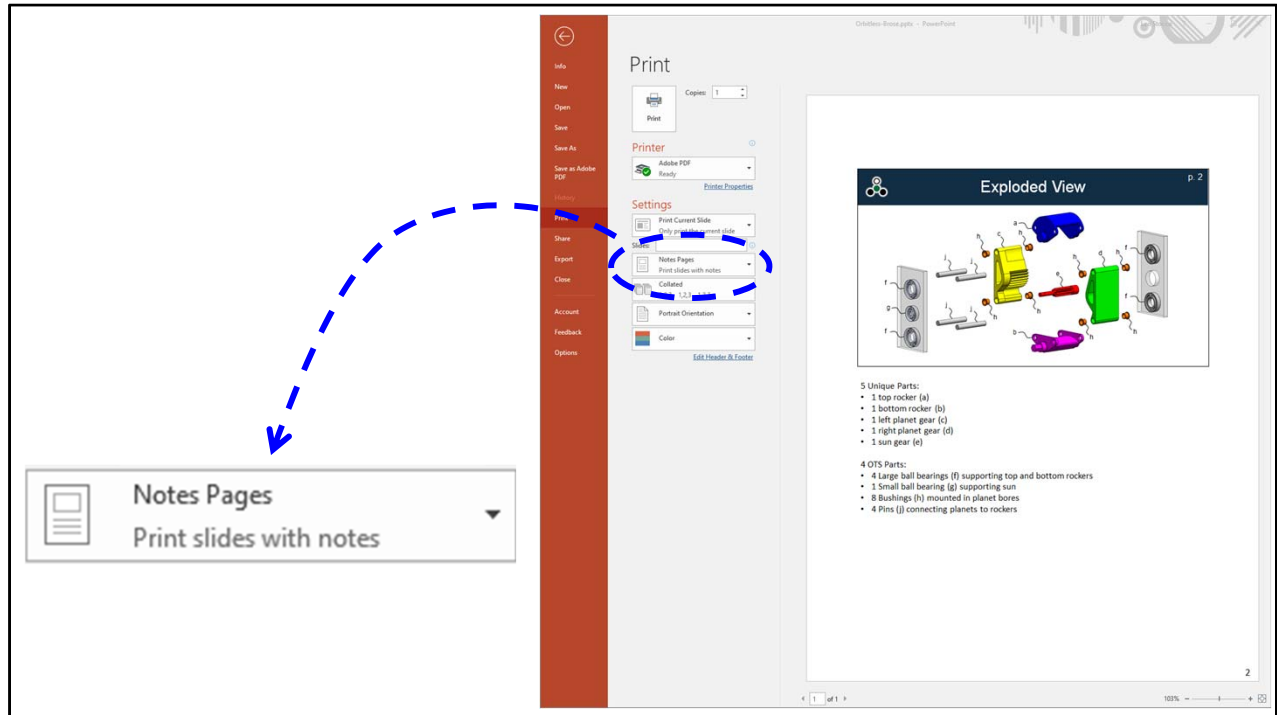
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Handout

- Intended for participants who:
 - Preparing ahead for the talk.
 - Missed the talk.
- Text is **NECESSARY**.
- Stands on its own.

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Generate Handout

- **Print** menu
- **Notes Pages** option

Time Efficiency

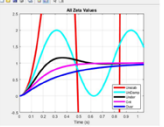
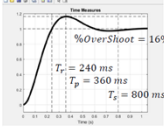
- 1 document → 2 functions
- More time devoted to technical work
- Less time devoted to documentation

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Lecture Slides

Systems & Control - Supplementary Notes

2nd Order Approximations: Damping Coefficient ζ



2nd Order Xfer Funcs

$$TF(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$$
$$TF(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$$
$$\omega_n = \sqrt{\omega_n^2 - \zeta^2\omega_n^2}$$
$$\zeta = \frac{\beta}{\omega_n}$$
$$\beta = \zeta\omega_n$$

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During lecture
←

After lecture
(equations)
←

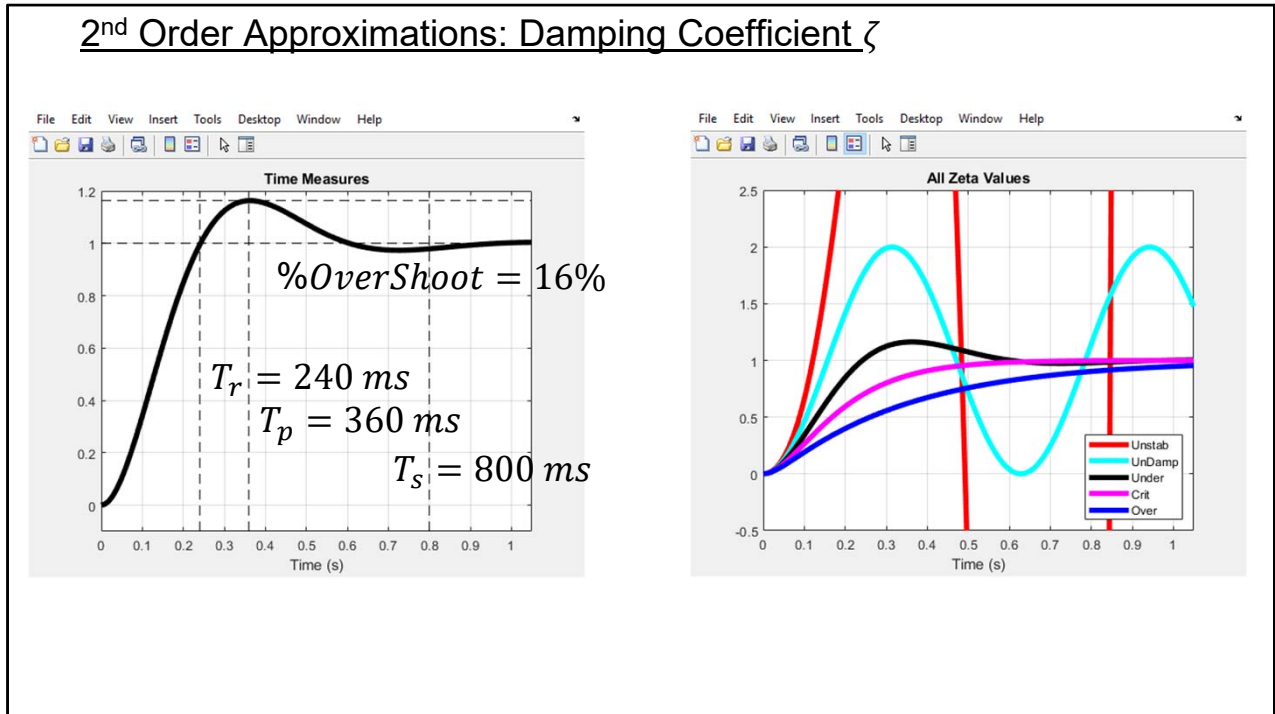
Follow-Up Slide

- Seen briefly during presentation
- Clean record of hand-written lecture material

Benefits

- Full PowerPoint editing capabilities
- Typos OK during lectures
- Students made aware of posted material
- Promotes effective lecture habits
 - Human involvement with “boring” elements

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Demonstration slide.

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2nd Order Xfer Funcs

$$TF(s) = \frac{\sigma^2 + \omega^2}{(s + \sigma)^2 + \omega^2} = \frac{\sigma^2 + \omega^2}{s^2 + 2\sigma s + \sigma^2 + \omega^2}$$

$$TF(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$$

$$\sigma = \zeta\omega_n$$

$$\omega = \beta\omega_n$$

$$\omega_n = \sqrt{\sigma^2 + \omega^2}$$

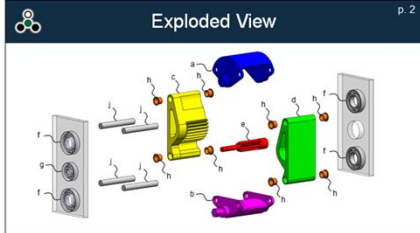
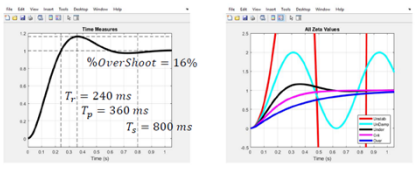
$$\zeta = \frac{\sigma}{\sqrt{\sigma^2 + \omega^2}}$$

$$\beta = \sqrt{1 - \zeta^2}$$

Blank space for personal notes

Demonstration slide.

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| | |
|--|--|
|  <p>Exploded View p. 2</p> <p>5 Unique Parts:</p> <ul style="list-style-type: none">• 1 top rocker (a)• 1 bottom rocker (b)• 1 left planet gear (c)• 1 right planet gear (d)• 1 sun gear (e) <p>4 OTS Parts:</p> <ul style="list-style-type: none">• 4 Large ball bearings (f) supporting top and bottom rockers• 1 Small ball bearing (g) supporting sun• 8 Bushings (h) mounted in planet bores• 4 Pins (j) connecting planets to rockers | <p>Systems & Control - Supplementary Notes</p> <p>2nd Order Approximations: Damping Coefficient ζ</p>  <p>2nd Order Xfer Funcs</p> $TF(s) = \frac{\omega_n^2}{(s + \sigma)^2 + \omega_d^2} = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$ $TF(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$ <p>$\sigma = \zeta\omega_n$ $\omega_d = \beta\omega_n$ $\omega_n = \sqrt{\sigma^2 + \omega_d^2}$ $\zeta = \frac{\sigma}{\omega_n} = \frac{\sigma}{\sqrt{\sigma^2 + \omega_d^2}}$ $\beta = \sqrt{1 - \zeta^2}$</p> <p>© Leo Stocco 2022</p> |
|--|--|

Summary

Report can be read and understood but leaves questions.
One document for both presentation and report.

Lecture notes do not stand on their own.

Enough information provided to:

- Encourage engagement during lecture
- Encourage annotation
- Discourage copying
- Avoid typos in student notes

Both formats:

- Optimize the time of both author & reader
- Maximize effective use of presentation time