Report Format

- Formatted using Word
- Technical White-Paper

- Conference Paper Format
  - Brief Abstract
  - Nomenclature
  - Numbered Chapters
  - References
    - external sources
    - appendices

- Minimal Overhead
  - No TOC, LOF, etc.

Pendulum Control System

White-Paper **Updated – Jan 31, 2021**

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Abstract

A direct-drive pendulum motion control system is developed. The pendulum consists of a custom logo on the end of an arm that is rotated by an OTS mechanically commutated DC motor. The …

In this paper, Section 1 describes motor selection. Section 2 describes the mechanical design of the pendulum. Section 3 describes the electronics interfacing the micro-controller and motor. Section 4 describes how it is simulated using Simulink / Simulation-X co-simulation. Section 5 describes …

Nomenclature

OTS	Off-the-shelf
AL	Arm length (mm)
LR	Logo radius (mm)
SR	Shaft radius (mm)
COM	Centre of Mass (mm)
ϕ	Diameter

1. Motor Selection

The motor is customer-specified and is not a free design parameter. The specified motor is found on p. 86 of the Maxon™ Motor catalog [1].

The motor is a Maxon 32mm DC motor which may be mated with a GPX32 planetary gear-head. The motor is 72mm long x 32mm ϕ and has a 6mm ϕ output shaft. The 18V program has a maximum speed of 8630 RPM and a stall torque of 2.12 Nm.

The motor and gear-head are shown in Fig. 1.

White-Paper

- Spelling & Grammar **MATTERS**
  - Unclear = Ignored

- Less is More
  - Brief as possible
    - Efficient
    - Non-repetitive
  - Say it with pictures

- Introduce **ALL** figures in the text
  - No Reference = Decoration = Ignored

- Include
  - Design work
  - Technical details

- Do not include
  - Unsubstantiated claims
    - Can't Prove It = Never Happened
  - Discarded ideas
  - What you wanted to do but didn't
  - What you learned
    - Report is about your work, not about you

Appendix

- Optional
- Additional Detail
- Avoids Disturbing Flow of Report
- Hand-Written OK

- Typically
  - Final Result ONLY repeated in body of report

- Include
  - Drawings
  - Circuits
  - Mathematics
  - Excerpts (1 page from data sheet)

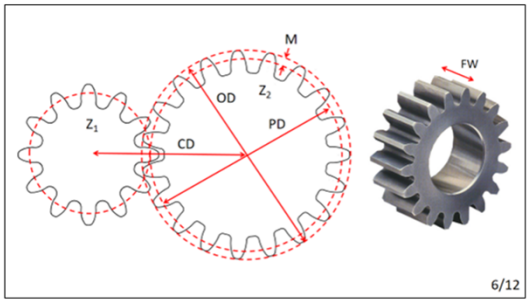
- Do not include
  - Lengthy Documents
  - Referenced Material

Slide-Deck

- Formatted using PowerPoint
- Integrated Presentation & Hand-Out

- Slide contains
  - Figures & Graphs
  - Equations
  - Annotations
  - **MINIMAL TEXT** (labels only)

- Notes Page
  - Your **SCRIPT** during a presentation
  - Reading report is like watching presentation
  - May include **SIMPLE** equations

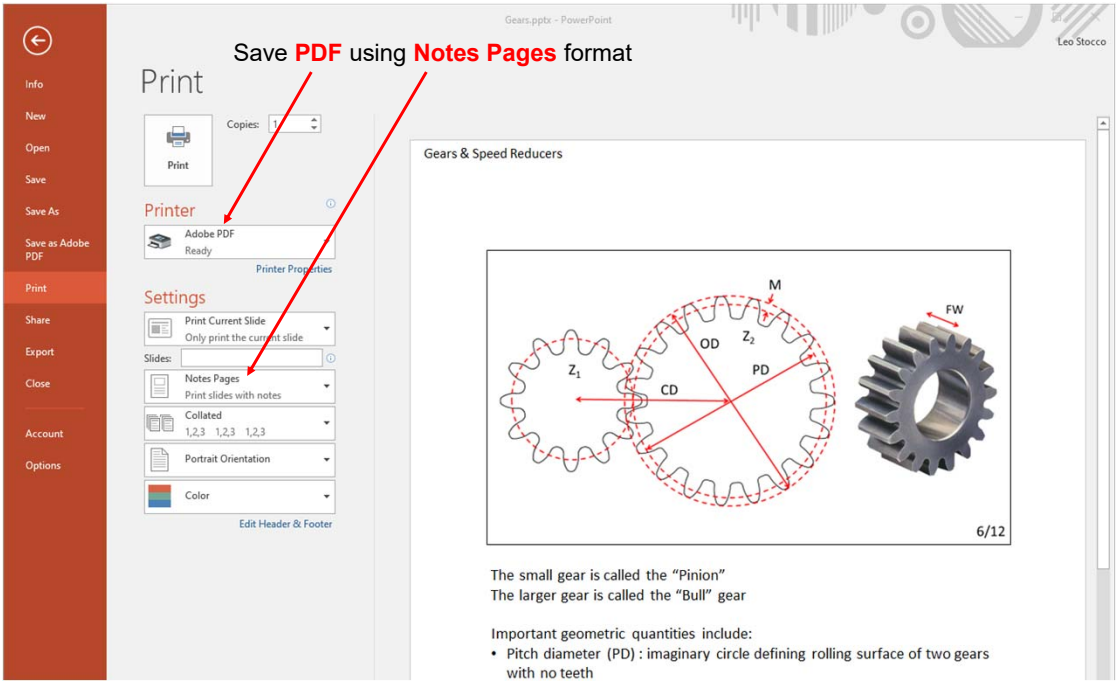


The small gear is called the "Pinion"
The larger gear is called the "Bull" gear

Important geometric quantities include:
- Pitch diameter (PD) : imaginary circle defining rolling surface of two gears with no teeth
- Outer diameter (OD) : imaginary circle containing entire gear
- Centre distance (CD) : distance between gear axes for proper engagement
- Module (M) : ½ the height of each tooth
- Face Width (FW) : linear width of tooth face

Speed ratio is the ratio between the number of teeth
Note that the direction is also reversed resulting in a negative ratio
- i = -Z2 / Z1

The speed ratio is the factor by which
- Speed is decreased
- Torque is increased



Slide-Deck Format

- THE SAME PowerPoint file is used …
  - during the presentation.
  - to generate the hand-out.

- Helps you to plan what you are going to SAY during presentation.
- Detail (words) absent during presentation …
  - since everyone is listening to YOU.
- Detail present for people who missed the presentation …
  - and are reading the slides after the presentation is over.