

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

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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

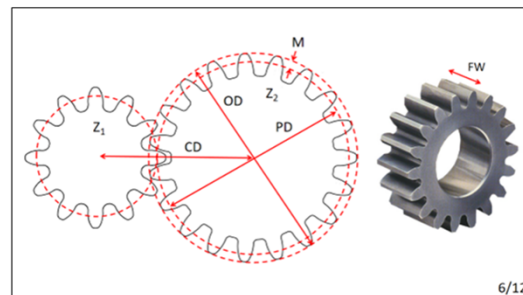
- Spelling & Grammar **MATTERS**
 - Unclear = Ignored
- Less is More
 - Brief as possible
 - Efficient
 - Non-repetitive
 - Say it with pictures
- Introduce **ALL** figures in the text
 - No Reference = Decoration = Ignored
- Include
 - Design work
 - Technical details
- Do not include
 - Unsubstantiated 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) : $\frac{1}{2}$ the height of each tooth
- Face Width (FW) : linear width of tooth face

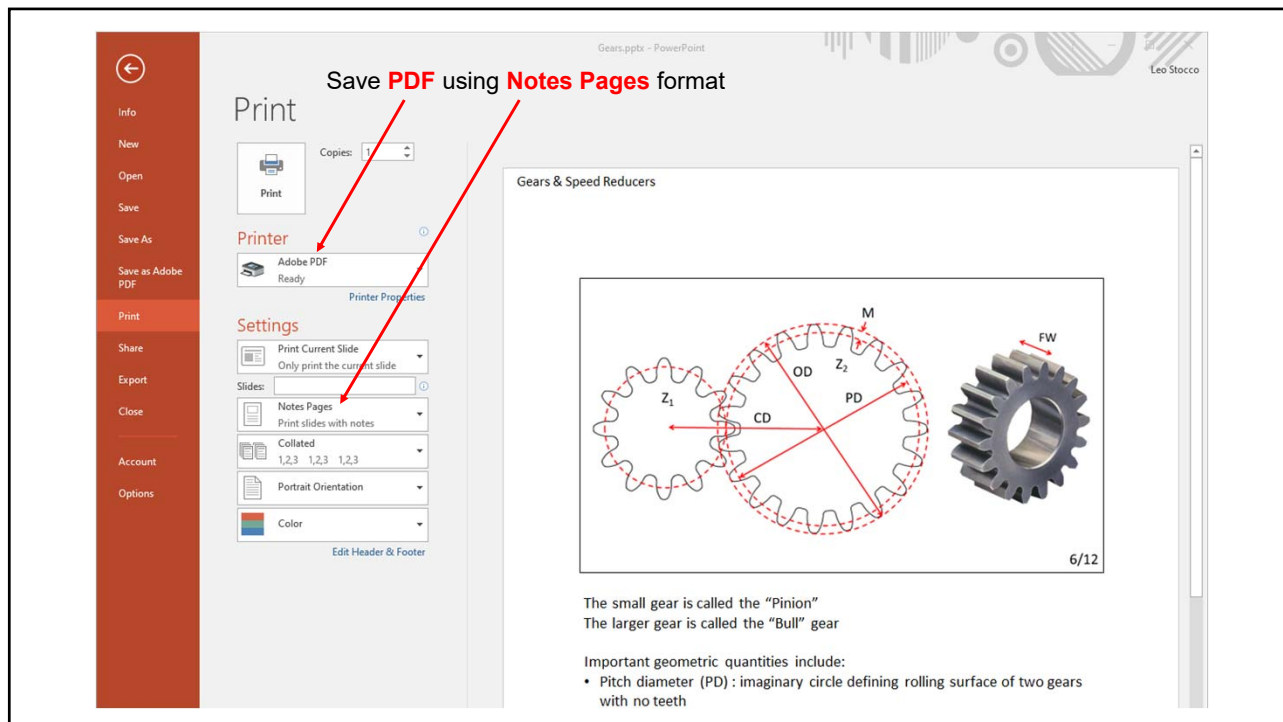
Speed ratio is the ratio between the number of teeth

Note that the direction is also reversed resulting in a negative ratio

$$i = -Z_2 / Z_1$$

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.