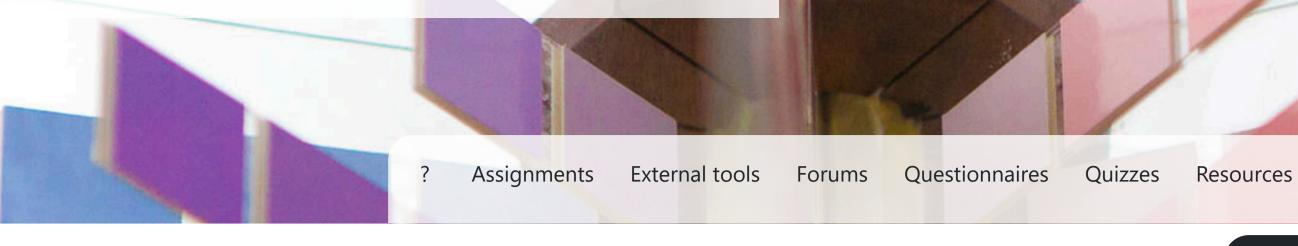


This course space end date is set to 12.12.2024 **Search Courses: KON-C2004** 



Course feedback

**Turnitin Assignments** 

/ Department of Mechanical Engineering / Sections / Additional exercises / Additional exercise 1

#### **Additional exercise 1**

**A?** 

**Due:** Tuesday, 1 July 2025, 11:55 PM

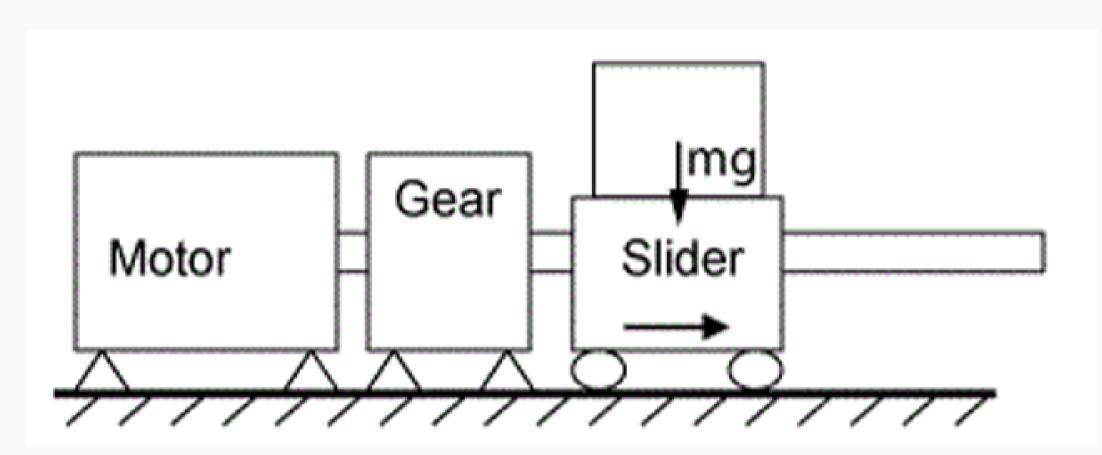
You have a positioning system where an electric motor rotates a ball screw which moves a slider linearly. There is a gear box with a gear ratio of 10 between the motor and the ball screw. The pitch of the ball screw is 5 mm. The length of the slider's movement from end to end is 400 mm and the maximum velocity of the slider is 200 mm/s.

You need to design a position measurement system with the best possible resolution using the following components.

- Linear 0-10 kOhm (linear scale) potentiometer with a 500 mm stroke
- Rotary optical incremental encoder with 150 pulses (slots) per revolution
- Linear optical incremental encoder with 10 pulses (slots) per millimeter
- A microcontroller with the following properties
  - o 12-bit AD-converter with ground as the lower reference voltage and an input pin where an upper reference voltage can be supplied
  - 16-bit counters with PWM output
  - General purpose input pins which can trigger interrupts from rising and falling edges
  - The microcontroller can process up to 15000 input interrupts per second

How would you realize the measurement system (explain with words or diagrams, no microcontroller code required)? Calculate the resolution in micrometers for each method of utilizing these sensors (one sensor at a time), taking to account the limitations of the measurement system. Explain the benefits and downsides of utilizing each sensor type.

Return your answer as .pdf into the box below. Include the equations in the .pdf in a readable format. A readable format is either made with equation editor or a Matlab script with very clearly named variables. If you are using matlab scripts, include also the script file.



Add submission

# **Submission status**

Submission status	No submissions have been made yet
Grading status	Not graded
Time remaining	129 days 11 hours remaining

**Previous activity** 

**Next activity** 

▼ Feedback round 6 - 1 point

Additional exercise 2 ►

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