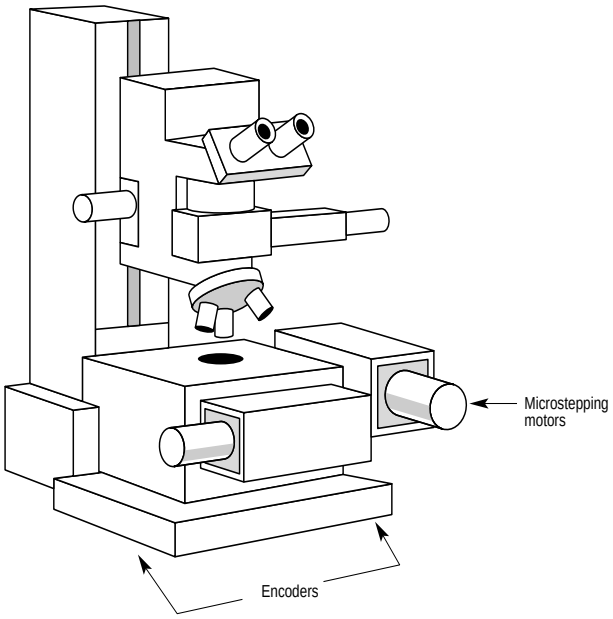
System Calculations

Microscope Positioning

Application Type: X/Y Point to Point
Motion: Linear
Description: A medical research lab automated their visual inspection process. Each specimen has an origin imprinted on the slide with all other positions referenced from that point. The system uses a HMI for data input from the operator, and determines the next data point based on previous readings. Each data point must be accurate to within 0.1 microns.



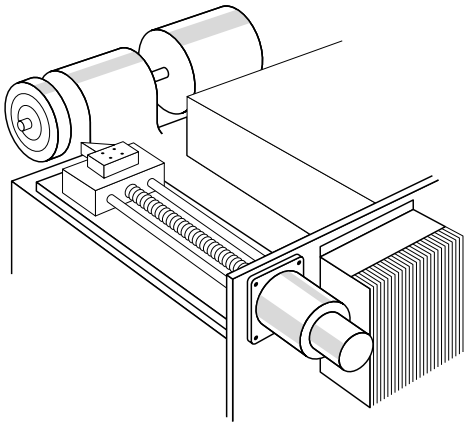
Machine Objectives

- Sub-micron positioning
- Specimen to remain still during inspection
- Low-speed smoothness (delicate equipment)
- Fast communications to the HMI

Motion Control Requirements

- High resolution
- Stepper (zero speed stability)
- Microstepping
- High speed interface

Compumotor Solution: Microstepping motors and drives, in conjunction with a precision ground 40 pitch leadscrew table, provide a means of sub-micron positioning with zero speed stability. To provide full X, Y, Z micro-scope control, it is necessary to use the 6K4 Controller which utilizes high speed ethernet communications to the HMI.



Other Leadscrew Drive Applications

- XY Plotters
- Facsimile transmission
- Tool bit positioning
- Cut-to-length machinery
- Back gauging
- Microscope drives
- Coil winders
- Slides
- Pick-and-Place machines
- Articulated arms

Precision Grinder

A bearing manufacturer replaced a bearing race finishing machine. The old machine utilized a two-stage grinding arrangement where one motor and gearbox provided a rough cut and a second motor with a higher ratio gearbox performed the finishing cut. The designer simplified the mechanics and eliminated one motor. He used a single leadscrew and exploited the wide speed range available with servos to perform both cuts. This was accomplished by moving a cutting tool mounted on the end of the leadscrew into the workpiece at two velocities; an initial velocity for the rough cut and a much reduced final velocity for the finish cut.

The torque required to accelerate the load and overcome the inertia of the load and the rotational inertia of the leadscrew varies, but does not exceed 80 oz-in. The torque necessary to overcome friction was measured with a torque wrench and found to be 20 oz-in. A servo motor with 144 oz-in of continuous torque was selected and provided adequate torque margin.

This grinder is controlled by a programmable controller (PC) and theenvironment requires that the electronics withstand a 60° C environment. A Gemini GV6 drive/controller provides the necessary velocities and accelerations. The speed change in the middle of the grinding operation is signaled to the PC via a limit switch at which time the PC programs the new velocity into the servo controller.

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