

Why does my machine hunt or shake when sitting still? Is it the scales?

When an axis shakes while on scale feedback but not on encoder feedback many people think that it is the scale that is causing the shaking. This is not the case, because when you remove a machine from scale feedback you are also removing the mechanics from the control loop. Here is a simple explanation.

When a machine is on rotary encoder feedback, the control sends the command to the drive to move the axis which then moves the motor. The motor turns the encoder that is attached to the motor and the control immediately receives feedback that the motion has occurred and how much the slide has moved. This is called a semi closed loop system because the control really doesn't know where the slide is since it is only monitoring the motor's position.

When a machine is on scales, the control sends the command to the drive to move the axis which then moves the motor. The motor turns the ballscrew which then moves the nut. The nut moves the slide which moves the scale and the scale sends the feedback to the control that motion has occurred and how much the slide has moved. This is called a closed loop system because the control is monitoring the actual position of the slide.

When a machine is on scales and has excessive slop in the mechanics, the control will send the command to move and will not see an immediate response from the scale. Therefore the control will increase the current to the motor to get it to move. By the time the motor current has increased the axis has moved passed it's intended target and the control back's off the current and sometimes reverses direction because it has passed it's intended target position. This cycle occurs over and over again making the slide (table) shake as it moves. This excessive backlash or slop in the mechanics can sometimes be observed by watching the ballscrew hunt back and forth while the slide is standing still.

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