TB055 (Rev1) - Quick Acceleration Resulting in Jerky Motion

Overview

This document describes the procedure to correct bumps, thunks and rapping sounds at turns, arc's and even small velocity changes during lines or rapids that result form too quick or "harsh" of an acceleration (ACCEL) time. This is especially true for the new version of Autotune that appears in software versions 6.00, 6.01, and 6.02.

Problem

The reason is that Autotune is producing high Ka values, often in the 50-60 range, along with very short ACCEL times often less than 0.1 seconds. This condition is made worse by the latest high torque windings of the SEM motors having the -57 and -59 suffix. The -57 or -59 refers to 57 Volts /Krpm. While these motors produce maximum torque with very little current required, they also produce very quick acceleration times. This may be too much for smaller, lighter milling machines, lathes, and in the case of routing tables, may produce too much shock and vibration at velocity changes.

Solution

Reduce Ka and increase ACCEL proportionally as described in TB045. These parameters are accessible in the PID Configuration menu. For example: If an Autotune has produced harsh accelerations such as ACCEL= 0.05 sec and Ka=60, then divide Ka by 3 and multiply ACCEL by 3 giving Ka = 20 and ACCEL = 0.15. These values will smooth out the velocity changes. Remember that you have to redo this reduction in Ka after every Autotune.

Notes: A software feature in v6.03 allows the maximum Ka to be set by parameters 87-90 for axes XYZW. The default value is 48. After updating to v6.03, an autotune should be re-run and the Ka and Accel times checked. If a new Autotune using v6.03 software does not result in the desired Ka and Accel, lower the values in parameters 87-90 and re-autotune.

Document History

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