15 Overall System Features

15.2 Find the expansion of a 3 m cylindrical bar of steel. The bar diameter is 40 mm.
a.) Over a temperature range of 0 C to 100 C.
b.) Over a temperature range of 30 C to 31 Celsius degrees.
c.) Over a temperature range of 68 F to 70 degrees Fahrenheit.

15.3.1 Backlash compensation is often misunderstood. Every system has backlash as a normal condition. Answer the following:
a.) How is a CNC system compensated for its backlash?
b.) What triggers backlash compensation?
c.) What are the units of backlash?
d.) How is the backlash compensation turned off?

15.3.2 The amount of existing mechanical backlash is found before any adjustments, mechanical or control-side. Answer the following:

a.) Why is backlash checked with feed, rather than handle moves ?

b.) Make a procedure for checking the linear backlash on a turning center. Include:

i.) A sketch showing axis movement and indicator placement.

ii.) A short incremental test program (with spindle off).

iii.) A blank chart for recording three trials of test data.

c.) Repeat Part b.) This time for checking the rotary backlash on a machining centers rotary 4th axis.

15.10 Starting with 12 Vdc, how much does the voltage drop:
a.) Across a closed set of switch contacts?
b.) Across 10 feet of 16 gauge copper wire.