Process Change Notice – PCN040317-01

Date Issued
04/03/2017

Part Numbers Affected
 28xxx-x-xxx
 x**28**xxx-x-xxx
 35xxx-x-xxx
 x**35**xxx-x-xxx
 43xxx-x-xxx
 x**43**xxx-x-xxx

Description of Change
Change to a lower viscosity epoxy material to allow the use of an automated machine instead of a manual application

Reason for Change
Operational excellence continuous improvement

Date Of Change
06/01/2017

Dear Valued Customer,

We are sending you this letter and attached test data as notification of a change to Haydon Kerk's hybrid linear actuator line, specifically, 28000, 35000, and 43000 series frame sizes.

The subject material is illustrated in the photo below. During motor manufacturing, a gray epoxy is added to the outside of the magnetic rotor to aid in a final turning process of the rotor using a grinding machine. The gray epoxy is added to allow steel chips to cleanly "sheer" from the surface of the individual rotor teeth. The epoxy is used to aid in the manufacturing process only, and serves no purpose in the performance or structural integrity of the final product.
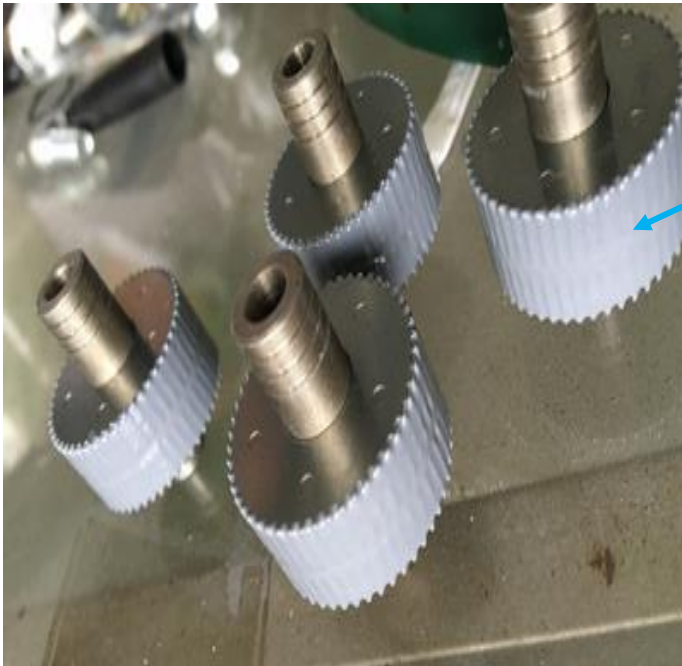
The gray epoxy material added and cured on the motor rotor just prior to turning operation

The current process requires that the gray epoxy be spread onto the motor rotor just prior to curing. This is a manual process requiring the operator to add the material using a brush applicator. The new process will use an automated application machine that will increase throughput, allow higher product consistency, and result in less wasted material. Due to the operation of the automated application machine, the epoxy needed to be changed from Loctite E214-HP to Loctite E214-HP-1. The new material is a lower viscosity material that is more compatible with an automated application process. Comparison photos can be seen below.

Appearance After Manual Application Using Existing Epoxy Material
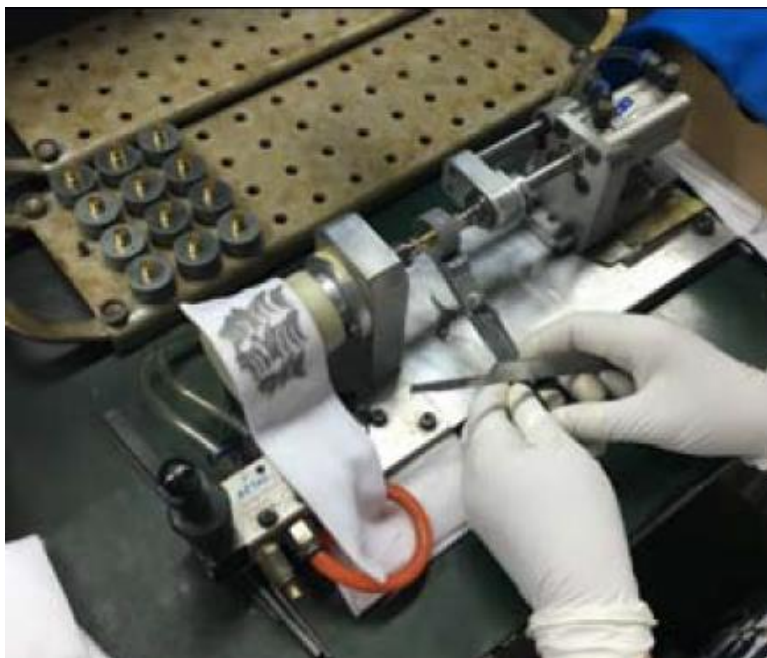
Appearance After Automated Application Using New Epoxy Material
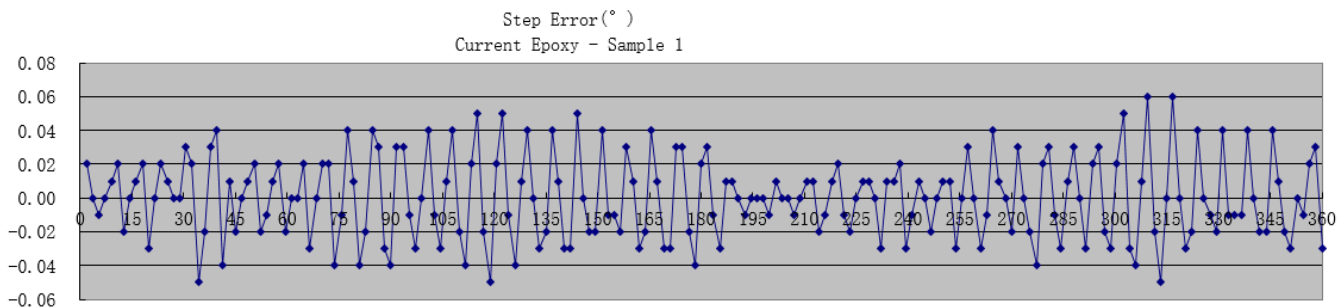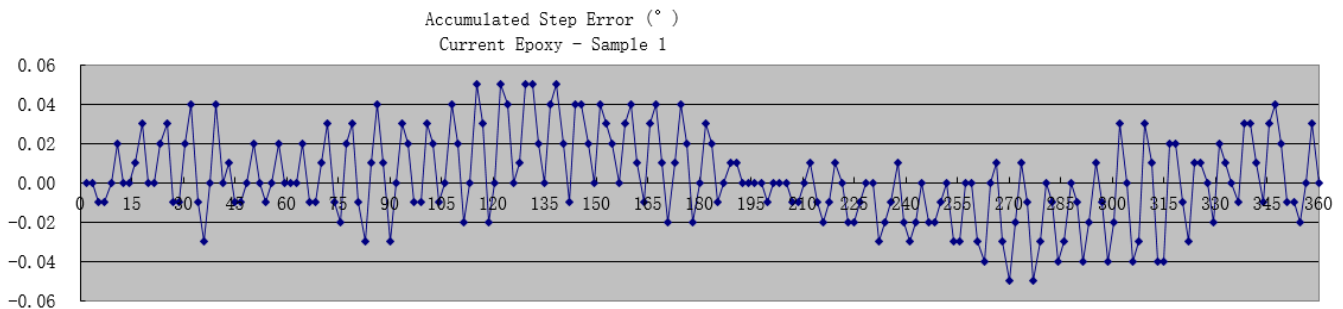
Temperature Shock Test

Test procedure:
1. Measure the max diameter of the rotors at room temperature and record it, look at t the glue under a microscope to see if there is any cracking or voids.
2. Take the rotors and place them in the cold chamber at -40C for 1 hour
3. Remove the rotors and place them immediately in the oven at +120C for 1 hour
4. Repeat steps 1 and 2, two additional times (3 cold and 3 hot cycles total)
5. Let the rotors return to room temperature and measure the outside diameter again.
6. look at the rotors under the microscope to see if any voids or cracking had occurred.

Test result:

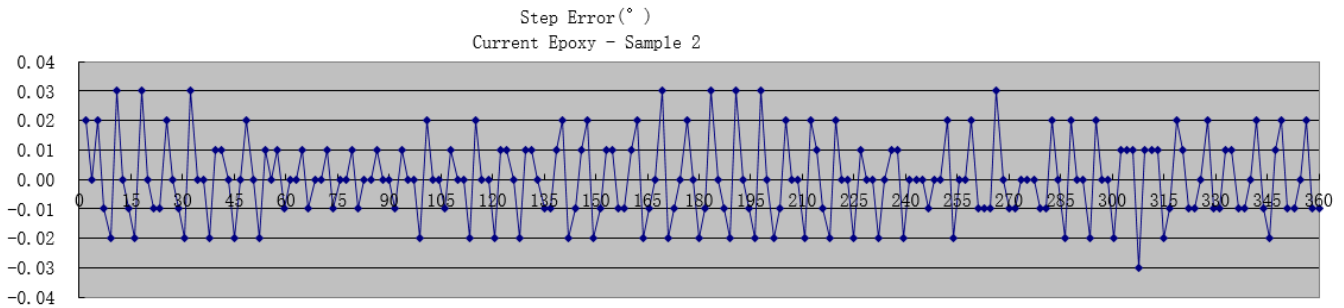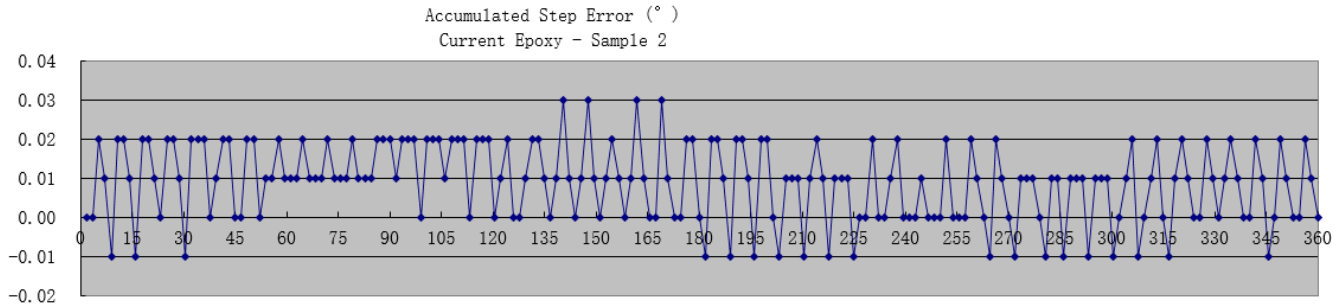| Glue model	Color	Viscosity	Drip hanging	Air bubbles after cured	Air bubbles after grinding	Dimensional change after temperature shock test			Crack
						Before	After	Variance	
E214HP-1	Gray	50% of E214HP	NO	Very few	Very few	25.86	25.86	0	NO
						25.86	25.85	0.01	
						25.87	25.875	0.005	
						25.865	25.865	0	
						25.87	25.865	0.005	

Step Accuracy Test Data

Current Epoxy – Sample 1

Accumulated Step Error (°)
Current Epoxy – Sample 1

Step Error (°)
Current Epoxy – Sample 1

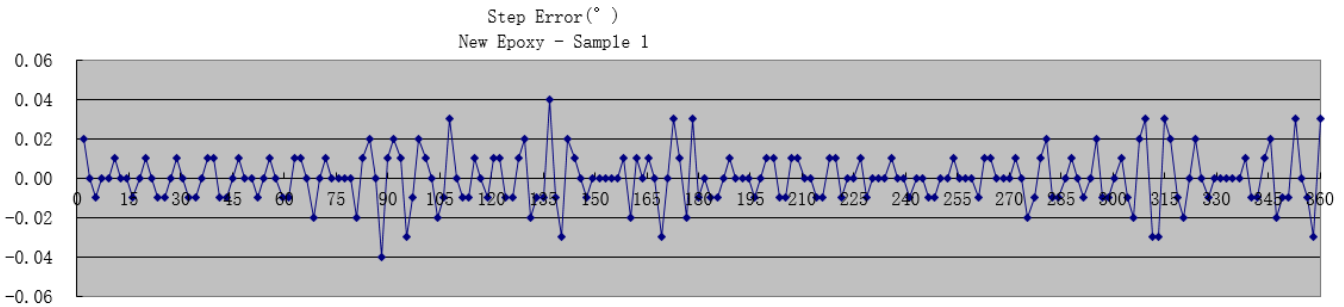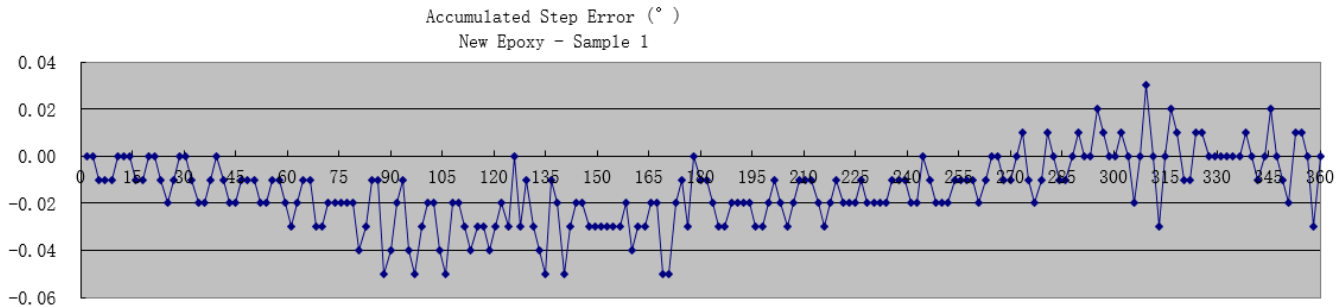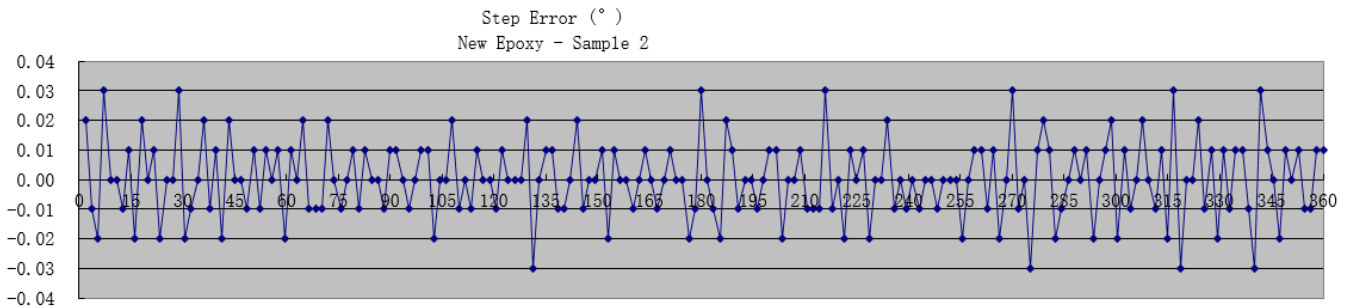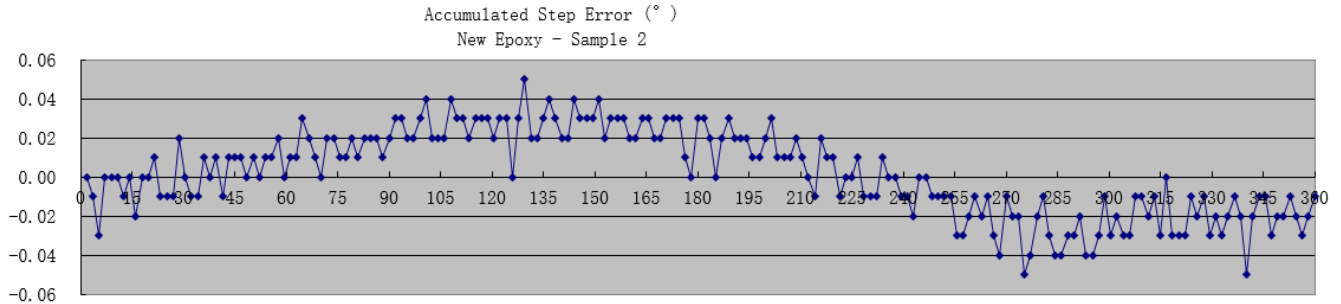## Current Epoxy – Sample 2

Accumulated Step Error (°)
Current Epoxy – Sample 2

Step Error(°)
Current Epoxy – Sample 2

New Epoxy – Sample 1

Accumulated Step Error (°)
New Epoxy – Sample 1

Step Error(°)
New Epoxy – Sample 1

New Epoxy – Sample 2

Accumulated Step Error (°)
New Epoxy – Sample 2

Step Error (°)
New Epoxy – Sample 2
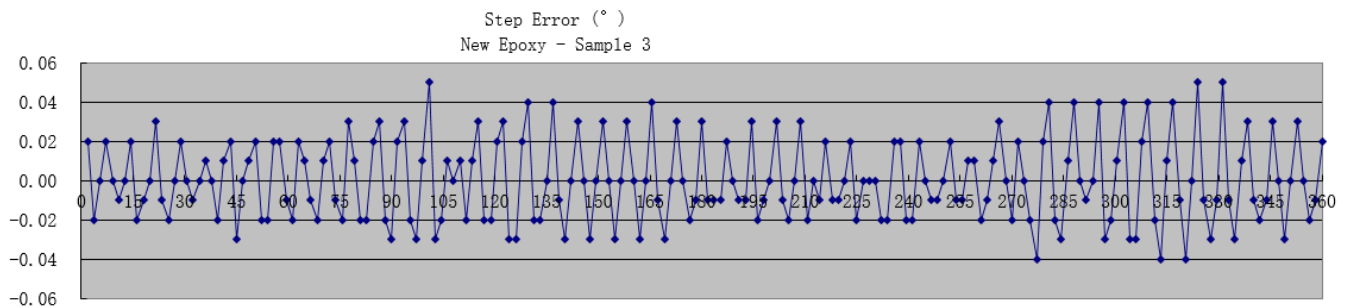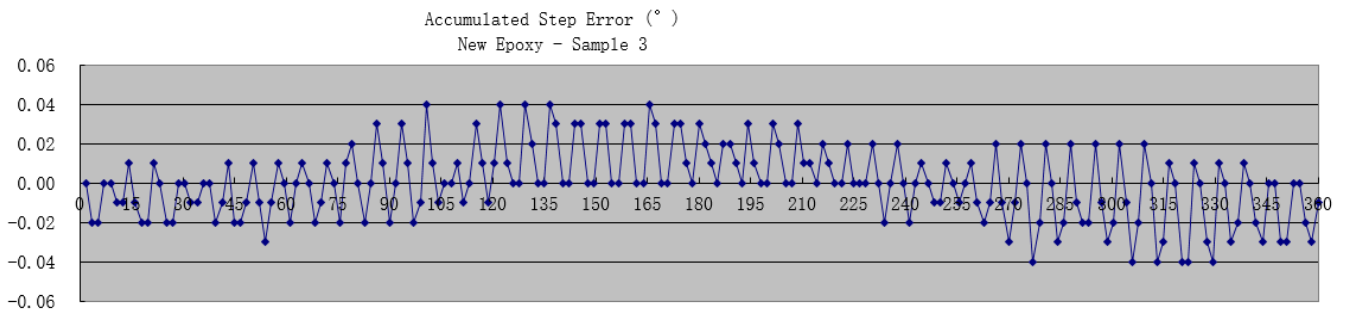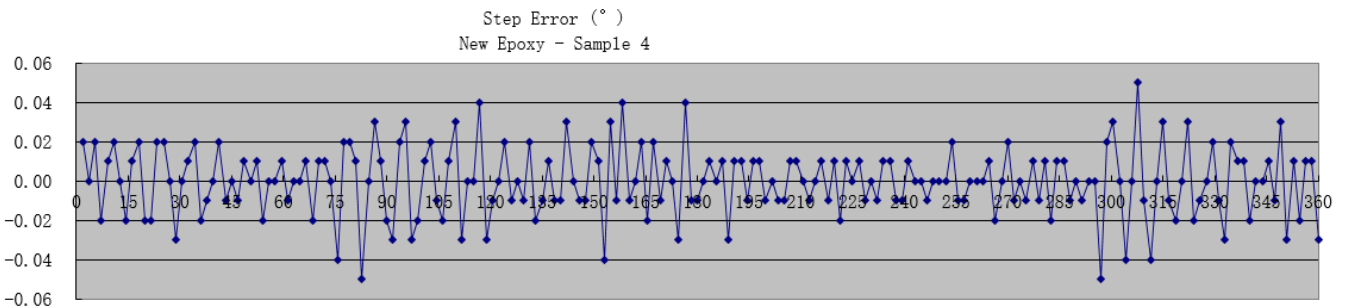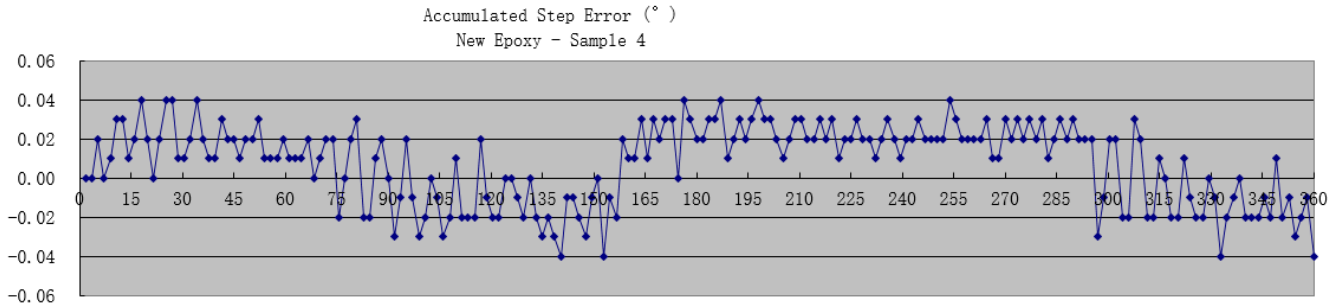

New Epoxy – Sample 3

Accumulated Step Error (°)
New Epoxy – Sample 3

Step Error (°)
New Epoxy – Sample 3

New Epoxy – Sample 4

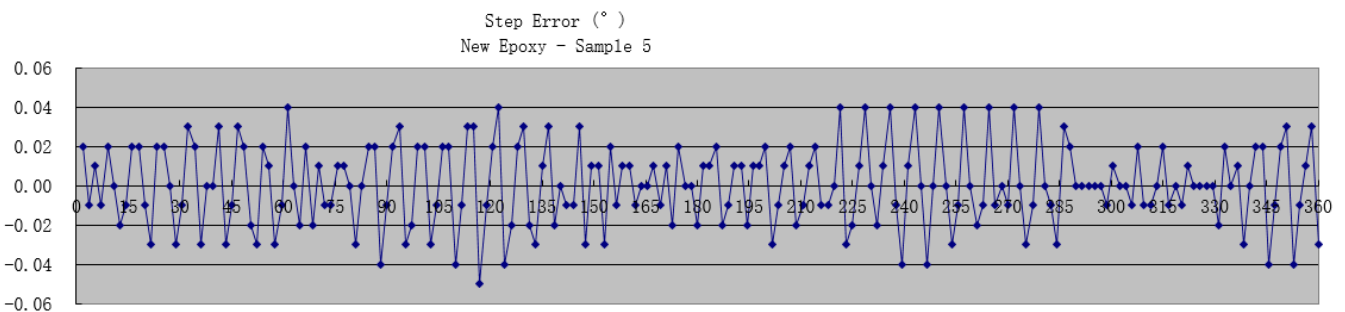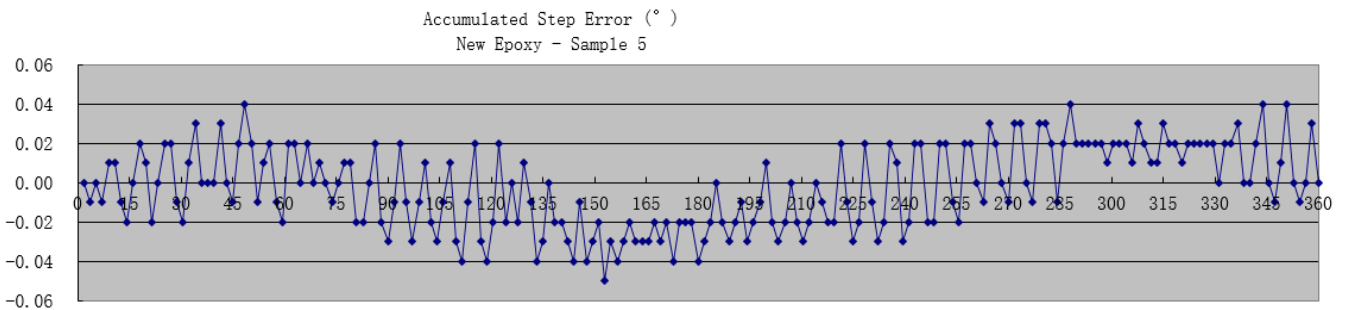
Accumulated Step Error (°)
New Epoxy – Sample 4

Step Error (°)
New Epoxy – Sample 4

New Epoxy – Sample 5

Accumulated Step Error (°)
New Epoxy – Sample 5

Step Error (°)
New Epoxy – Sample 5

In conclusion, no specifications are impacted and no action is required by you. Unless we hear from you within (45) days in the event further discussion and clarification is needed, we will be making this change to the bills of materials for your motor(s).

Questions regarding this matter – please contact:
     Frank Morton
     Director of Engineering
     Frank.Morton@Ametek.com
     203-756-7441 Ext: 288

We appreciate your business and strive to provide exceptional performance and value. Please contact your Haydon Kerk sales representative for your motion control needs.

Sincerely,
AMETEK   Advanced Motion Solutions
Haydon Kerk Motion Solutions