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MOLD COUNTER DURABILITY TESTING

Progressive Components
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Attn: Ken Rumore

Date:	August 7, 2015
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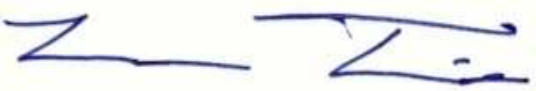
Prepared by:



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INTRODUCTION

Two (2) samples of mold counters were received from Progressive Components, located in Wauconda, Illinois. The mold counters were submitted for durability testing, to determine at what point each counter would stop counting properly. The following report documents this testing.

SAMPLE IDENTIFICATION

Sample	Manufacturer	Specimen ID's
1	Progressive Components	1,3,5,7
2	PCS	2,4,6,8

CONCLUSIONS

- Counters from Sample 1 (specimens 1, 3, 5, and 7) exceeded 3,000,000 cycles without failure.
- Counters from Sample 2 (specimens 2, 4, 6, and 8) showed numbers that were misaligned as early as 22,751 cycles

TEST METHOD

The mold counters were first inspected for cracks in the odometer window or housing, proper alignment of the digits in the odometer window, and the ability of the plunger to depress and count forward. The plungers on the mold counters were depressed at a rate of 1 Hz, using air actuated cylinders, and a test fixture that was created to hold the mold counters in place. The plunger on the test fixture compressed the plungers on the mold counters to a point where all of the counters would click over to the next number, but without damaging the plastic body of any of the counters. Three digital counters were used to keep track of the number of cycles completed during the testing, one on each end of the test fixture, and one counting the number of times the air cylinders were activated. The counters were checked every two hours during normal business hours to ensure they were working properly. A photograph of the test setup can be seen in Figure 1. A counter was considered to have failed if any one of the following criteria was met:

1. The counter is no longer able to advance numerically. Each time the plunger is depressed no reaction is seen at the odometer.
2. The counter indexes partially forward, but does not advance in value. The odometer reading stays the same.
3. The counter indexes forward but does not advance at every cycle, only at random (skipping).
4. The row of numbers in a counter can no longer be easily read due to being off the center of the window
5. The counter counts backward. Instead of advancing the overall numerical value is reducing.

TEST RESULTS

The setup was run to 3,000,000+ cycles with all counters in place. The cycles completed at failure in the table below denotes the time which any of the conditions of failure (#1-5 in the test method) were met. If the numbers on a counter were misaligned, it was still cycled until a second failure mode was noticed.

Counter Number	Cycles Completed at Failure	Cycles Completed	Failure Type, or Reason for Stopping
1	n/a	3,000,000+	Stopped at 3M cycles, no failure observed
2	22,751	2,529,911	The 10s place was observed to be sitting half way between numbers at 22,751 cycles. Counter stopped advancing at 2,529,911 cycles.
3	n/a	3,000,000+	Stopped at 3M cycles, no failure observed
4	22,805	1,648,994	The 10s place was observed to be sitting half way between numbers at 22,805 cycles. Counter stopped advancing at 1,648,994 cycles.
5	n/a	3,000,000+	Stopped at 3M cycles, no failure observed
6	22,833	3,000,000+	The 10s place was observed to be sitting half way between numbers at 22,833 cycles. Stopped at 3M cycles, no other failure observed
7	n/a	3,000,000+	Stopped at 3M cycles, no failure observed
8	22,864	152,559	The 10s place was observed to be sitting half way between numbers at 22,864 cycles. At 152,559 cycles the counter had counted approximately 8,000 extra cycles. Random skipping was observed.

REMARKS

Test specimens will be held for 30 days and then disposed of unless directed otherwise by the customer.

RECORD OF REVISIONS

Revision Number	Date	Description of Changes
0	7/22/2015	Original
1	8/7/2015	Added figures 2-13. Updated the test results to include information about Sample 2 at noticed points where the numbers had shifted. Added the conclusions section.

DIGITAL PHOTOS

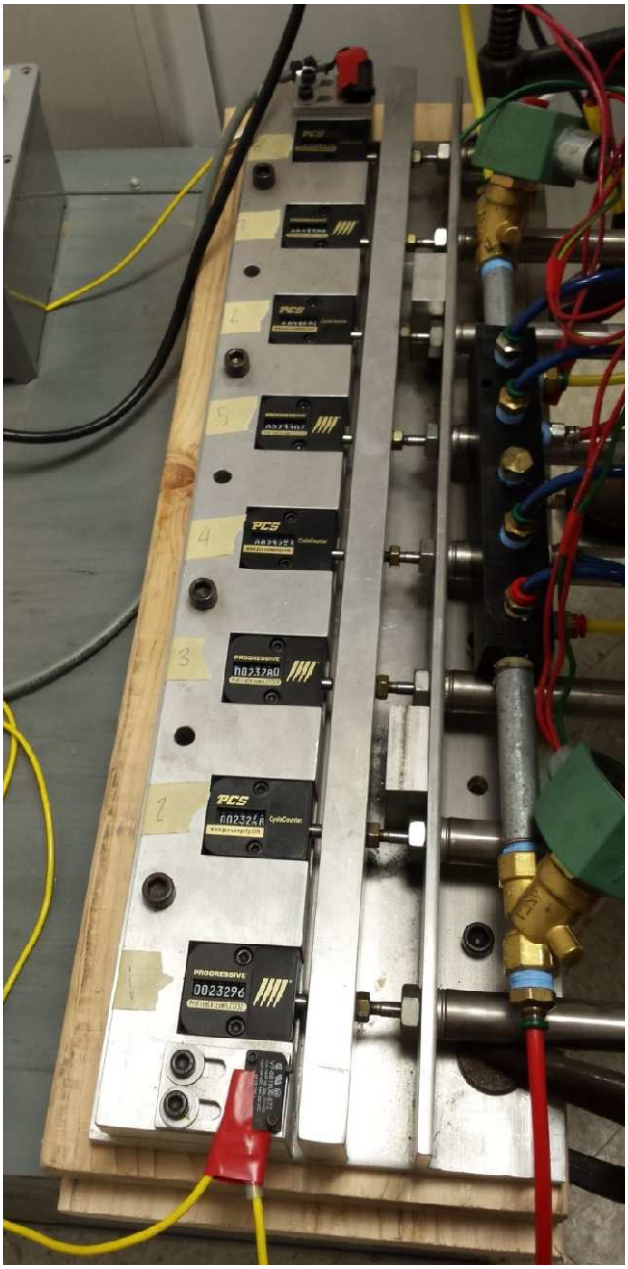

Figure 1 – Test setup.

Figure 2 – Counter 1 before and after testing.

Figure 3 – Counter 2 before and after testing.

Figure 4 – Counter 2 at failure.

Figure 5 – Counter 3 before and after testing.

Figure 6 – Counter 4 before and after testing.

Figure 7 – Counter 4 at failure.

Figure 8 – Counter 5 before and after testing.

Figure 9 – Counter 6 before and after testing.

Figure 10 – Counter 6 at failure.

Figure 11 – Counter 7 before and after testing.

Figure 12 – Counter 8 before and after testing.

Figure 13 – Counter 8 at failure.