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**Rockwell  
Automation**

June 7, 2002

To: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, DC 20555

Dear Sir or Madam:

In accordance with Title 10, Code of Federal Regulations, Part 21, Rockwell Automation/Power Systems is making formal notification as required by 10CFR21.21 for event #38909.

**A. Name and address of the individual informing the NRC.**

James Thigpen  
Quality Assurance Manager  
Rockwell Automation/Gainesville Motor Plant  
4349 Avery Drive  
Flowery Branch, Georgia

**B. Identification of Basic Component being Supplied.**

AC Motor

**C. Name of firm supplying basic component.**

Rockwell Automation/Gainesville Motor Plant  
4349 Avery Drive  
Flowery Branch, Georgia

**D. Nature of the defect, deviation, or failure to comply.**

Subject: Nuclear Nonconformance Event Number 38909

This notice was issued because of a motor failure experienced by Duke Power Company at the end of March in 2002. The sales order number for the motor that failed was 1KXV60125. The motor was examined by Reliance Electric and Duke Power personnel at the Westinghouse Service Center to



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determine the cause of failure. The cause of failure was the winding grounded to the frame. Based on the fact that the coil could be moved in the slot with hand pressure, it was concluded that the root cause of the failure was the coil moved inside the slot due to inadequate slot fill. This motor was a two-speed motor and failed when switching from low speed to high speed. The investigation concluded that a current surge caused during the speed change when voltage was re-applied resulted in the coil moving inside the slot.

Engineering focused on determining the reason for the low slot fill. The slot detail used on this motor is known as a "depressed slot" configuration. This means that there is a "wedge" notch in the slot recessed a certain distance below the top of the slot. The distance from the top of the slot to the wedge notch is dependent on the particular slot detail. The proper way to use this type of slot is to confine the wire beneath the wedge notch leaving the top portion of the slot open. It is believed that the motors built at the Gainesville facility were wound without using the wedge notch. This would not be a problem if filler material were added in the slot to take up space. We believe that filler material was only added to motors built on sales order #1KXV60247. Therefore, it is believed that the slot fill in the other motors built using this slot configuration at the Gainesville facility may be inadequate and coil movement inside the slot is possible.

A search of the corporate engineering database revealed each slot detail that uses this configuration. Once the particular slot details were identified, the engineering database at the Gainesville facility was searched to determine if any of these slots had been used. The results of the search identified four electrical designs that utilized a depressed slot. By using these electrical designs we determined specific sales orders that were built since the Nuclear product was transferred to Gainesville. The sales orders are 1KXV60028, 1KXV60084, 1KXV60125, 1KXV60133, 1KXV60228 and 1KXV60247. The customer(s) that purchased these motors has been notified of the potential problem. Rockwell Automation will work with the customer to determine the best feasible solution.

#### STEPS TAKEN TO PREVENT FUTURE OCCURRENCES



The depressed slot configuration was new to the Gainesville facility when the Nuclear product was transferred. Neither engineering personnel nor manufacturing personnel had ever seen this type of slot. Therefore, recognition of possible problems and proper winding techniques were not available. Since that time, engineering personnel have been taught the origination of the slot and typical uses. Engineering personnel have also been trained to recognize the slot and how to determine if the wedge notch is supposed to be used. We have learned that even if the slot has the wedge notch it is not always supposed to be used. A list of the stator slots with the expected use of the wedge notch has been obtained and distributed to engineering personnel. This list was used to assist with the training process and will not be a controlled document. A portion of the training included how to recognize if the wedge notch is supposed to be used which eliminates the need for the list used in training. There are insulation bills of material that dictate the insulation to be used for a particular motor. A major factor that determines the proper size for the insulation pieces is the slot detail. The insulation bills of material for the depressed slot stators where the wedge notch is supposed to be used have been changed where the insulation cannot be used if the wedge notch is not employed. The insulation pieces have been sized specifically for using the wedge notch. Also, a check sheet has been instituted during the design process per RSP 541&2-13. This is a controlled document and is part of the electrical design review. This check sheet will be added to the electrical design folder and specifically checks for slot fill and slot detail configuration. Finally, the plant personnel have been trained to recognize the depressed slot configuration and how to wind the stator properly utilizing the wedge notch.

#### CONCLUSION

The potential problem of inadequate slot fill is confined to motors built at the Gainesville facility using the depressed slot configuration. Other Rockwell Automation facilities (RSN and RST) that utilize the depressed slot configuration were consulted and assisted with training RGG personnel. These other facilities were cognizant of the depressed slot configuration and proper winding and insulation procedures. Even though there is no guarantee



that the motors will fail, we also cannot guarantee that the motors will not fail. Therefore, Rockwell Automation believed that customer notification of the potential failure was justified. All motors with a potential problem have been identified by sales order number and our customer has been notified. Our customer, HowdenBuffalo, has in turn notified each end user. Every effort will be made to satisfy the end user and to accommodate their timeframe to successfully eliminate potential premature motor failure due to inadequate slot fill. Personnel at the Gainesville facility have been trained to recognize and properly manufacture motors utilizing the depressed slot configuration.

**D. The Discovery Date.**

May 9, 2001.

**E. The Quantity and Location of Motors Affected.**

**PART/COMPONENT NUMBER:**

- 1) 1KXV60028 - HOWDEN P/N 600287-85R Qty. 1
- 2) 1KXV60084 - HOWDEN P/N 600287-52R Qty. 1
- 3) 1KXV60125 - HOWDEN P/N 600276-3R Qty. 1
- 4) 1KXV60133 - HOWDEN P/N 600276-17R Qty. 1
- 5) 1KXV60247 - HOWDEN P/N 600276-3R Qty. 2
- 6) 1KXV60228- HOWDEN P/N 600276-17R Qty. 1

	1	2	3	4	5	6	7
HowdenBuffalo PO #	NL7744	NL9794	NM1877	NM2193	2827	2827	1898
End User/Sold to:	Spain	ComEd	Duke	First Energy, Toledo Edison	Duke	Duke	First Energy, Toledo Edison
Station	Vandellos	Braidwood	Oconee	Davis Besse	Oconee	Oconee	Davis Besse
NPX #	NPX68917	NPX68203	NPX58761	NPX62423	NPX58761	NPX58761	NPX62423
Fan S/N	GF21943	GF21631-46	GF13705	GF16182	GF13705	GF13705	GF16182
Sales Order #	NPN31928	NPN32790	NPN33586	NPN33748	560085	560085	560055
Motor P/N	600287-85R	600287-52R	600276-3R	600276-17R	600276-3R	600276-3R	600276-17R
Motor S/N	1KXV60028	1KXV60084	1KXV60125-T1	1KXV60133	1KXV60247-T1	1KXV60247-T2	1KXV60228-T1
Customer PO#	6032497	48H310	ON26432	S 086669 D98	ON34982	ON34982	7D13315
Shipped On:	09/11/98	02/26/99	04/30/99	04/28/99	03/30/00	03/30/00	03/21/00
Contaminated	No	No		Contaminated	Contaminated	No	Contaminated
Status	In Storage, issued Return authorization #E347701	In Storage, issued Return authorization #E347701	At Westinghouse	Installed, currently down	At Westinghouse	In Storage	Installed, currently down



**F. The Corrective Action which has been completed.**

HowdenBuffalo initiated a request for corrective action CAM523 on 5/16/2002 which was completed, accepted and verified by Todd Gunvelson QA Manager HowdenBuffalo on 5/21/02.

**G. Other Information.**

Orders are in process to deliver two new motors as replacements for 1KXV60133 and 1KXV60228.

Return Authorizations are issued for 1KXV60028 and 1KXV60084 which were in storage. Orders for new windings and frame assembly are in process to be used in with the returned motors.

Replacement motors for 1KXV60125-T1 and 1KXV60247-T1 & T2 are not requested by end user.

Sincerely,

Mr. James Thigpen  
Quality Assurance Manager, Gainesville Motor Plant  
Rockwell Automation

