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Root Cause Failure Analysis

This book was developed to help electric motor technicians and engineers prevent repeated failures because the root cause of failure was never determined. There are numerous reasons for not pursuing the actual cause of failure including:

- A lack of time.
- Failure to understand the total cost.
- A lack of experience.
- A lack of useful facts needed to determine the root cause.

The purpose of this book is to address the lack of experience in identifying the root cause of motor failures. By using a proven methodology combined with extensive lists of known causes of failures, one can identify the actual cause of failure without being an "industry expert." In fact, when properly used, this material, will polish one's diagnostic skills that would qualify one as an industry expert.

The book is divided into the various components of an electric motor. In addition to a brief explanation of the function of each component and the stresses that act upon them, numerous examples of the most common causes of failure are also presented.

Since it is not always possible to pinpoint the exact cause of failure, some examples are used more than once. Due to a lack of all the necessary facts associated with the application and history of a given machine, it is only possible to assign the root cause to the most probable scenario.

A reference section is included at the back of this book for those wanting to further research root cause failure analysis.

EDITOR'S NOTE

Many of the pictures in this book are of failures that have occurred where the actual cause was identified. However, in some cases the exact cause was never verified, nonetheless they are included along with the author's opinion of the most likely cause. In other cases, the pictures are of parts that have not failed, but the pictures are useful in illustrating how and where the part could fail.

It is difficult to segregate each type of failure into nice distinct categories and to do so would require jumping back and forth from section to section which would cause some amount of discontinuity. Hence, there is a certain amount of overlap and duplication of photos to clarify specific points.

There is no attempt to single out a particular motor manufacturer or to suggest that one product has more defects or failures than another. For this reason, we have not identified the manufacturer of the parts or motors. In some cases, the failed part is not even an original equipment part. Also, we have made no effort to identify who may have repaired a particular motor. The intent of this book is not to place blame but to assist in a correct diagnostic procedure that will prevent repetitive failures.

The authors would like to express our appreciation to all those who have donated pictures for this edition and hope that we will continue to receive more pictures of unique types of failures to fill the gaps.

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