

Developing Motor Repair Specifications



Dreisilker Electric Motors, Inc.
Engineering and Reliability Services

Who Are We?

- In business since 1955
- Headquarters in Glen Ellyn, Illinois
- 70,000 sq ft in Glen Ellyn, IL
- 15,000 sq ft in McHenry, IL
- 8 Branch Counters from McHenry, IL to Marietta, GA
- ~120 Employees
- Field Services – Global
- Repair Services – Global
- New Product and Parts – Global
- Engineering and Design – Global
- Training - Global



In this Presentation

- An overview of the impact of motor repair
- Studies and History
- Cost of Quality
- Review of IEEE Std 1068-2010

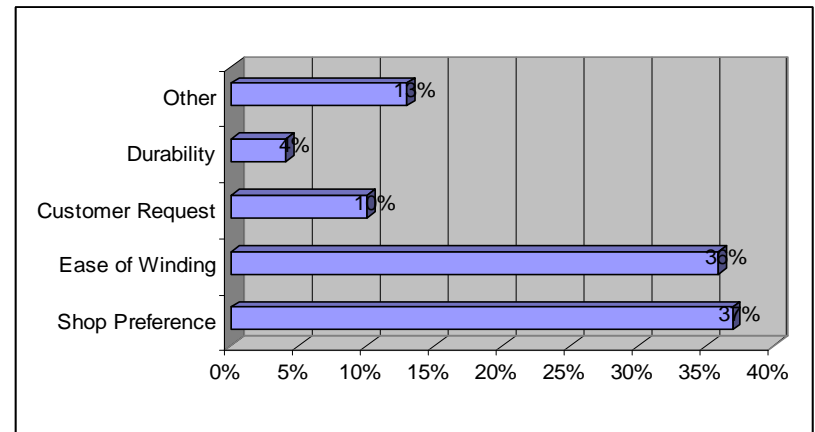


Impact of Motor Repair

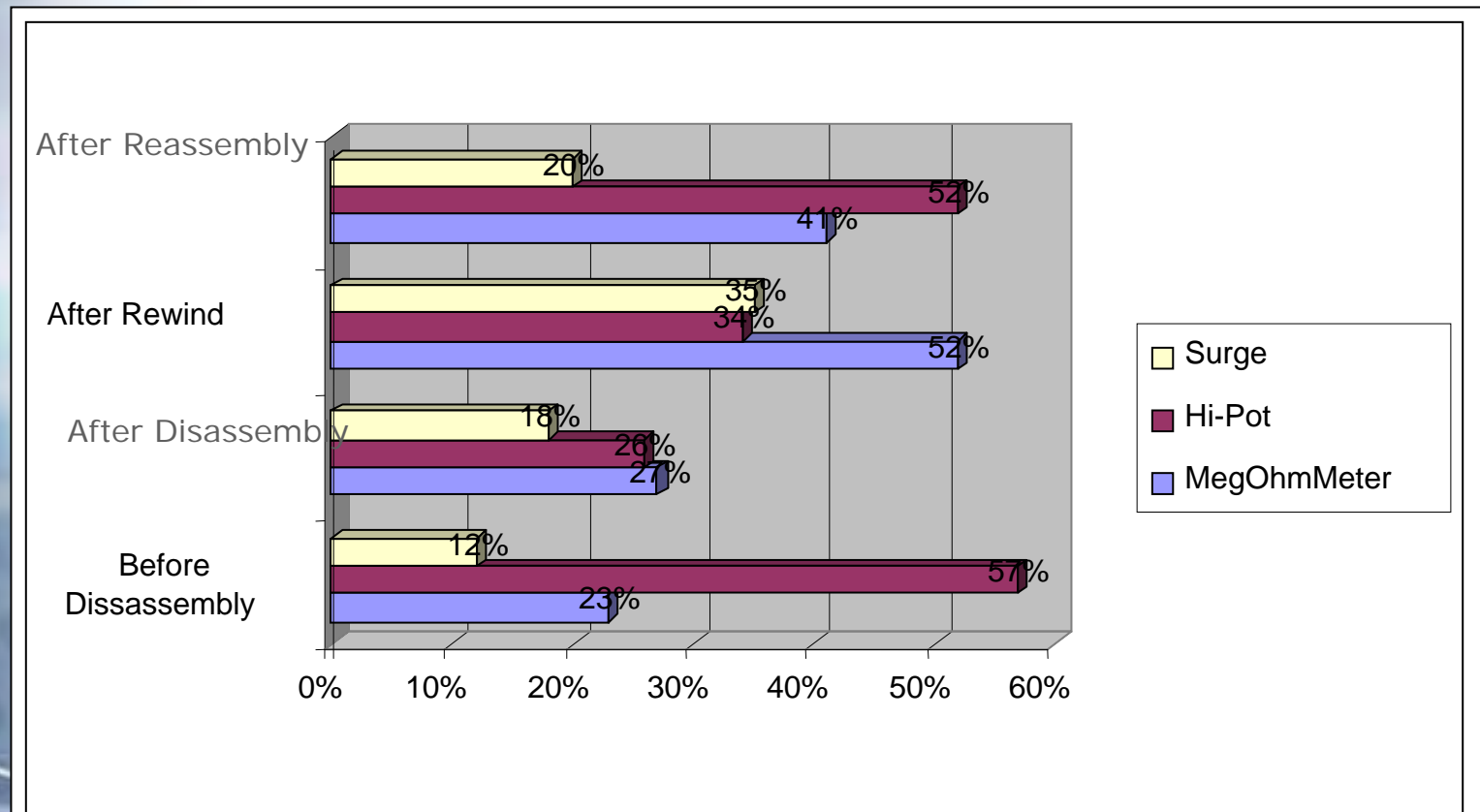
- Reduced Efficiency when Not Performed Properly
 - 0.5-4% per rewind
 - Electrical and Mechanical Impacts
- Decreased Reliability (Advanced Energy Study)
 - 50% of new motors fail in seven years
 - 50% of repaired motors fail in 3.5 years
 - Due to not following standards
 - Recent survey of motors in storage found 22% had issues (MCA testing and visual inspection)

Review of Electric Motor Repair Industry: BPA, WSU, EASA Survey for US DOE

- 81% of shops change windings
- Possible Increased I²R losses and reduced reliability
- Commission repaired motors

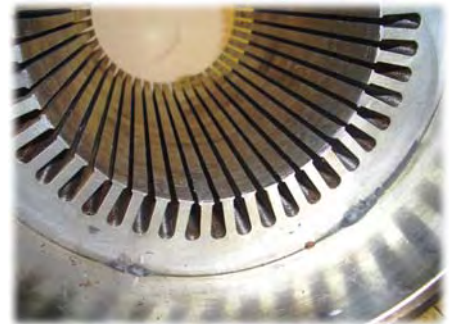


Before and After Verification from Repair Shops: EASA Survey



Additional Issues

- 1984 EASA Core Loss Study (response to previous GE study)- Set oven temp to 650F has less effect on core iron. Allowable increase of 10% losses w/ burnout.
- 1995 CEA Study found newer steels less than 10% increase in core losses up to 750F (~8% per repair) versus 0% increase with mechanical stripping.
- All previous and future studies – Requested mechanical study refused per protest from EASA. Finally performed in joint project between Dreisilker and the University of Illinois at Chicago's Energy Resources Center published 1997 IEEE EIC Conference (next slide).
- 2000 EASA/AEMT Study response to CEA Study. Refused third party oversight by UIC ERC funded through US DOE. Results conflicted with previous third party studies. Used as evidence of no damage in repair using high temps by same organization.



Mechanical Frame Impact Study: IEEE EIC 2007 Presentation

- 410 F
 - Cast Iron - No Change
 - Rolled Steel - No Change
- 650 F
 - Aluminum - Twisting up to 8% - Soft Foot up to 60 Mil
 - Cast Iron - Twisting up to 2% - Soft Foot up to 12 Mil
- 800 F
 - Rolled Steel - Twisting up to 4% - Soft Foot up to 12 Mil
 - Cast Iron - Twisting up to 3% - Soft Foot up to 12 Mil



Cost of Quality: CEA Study

The Cost of Quality in Motor Rebuilding

A quality motor repair includes many additional quality features that provide more value for the customer often at a higher price. However, any user who is concerned about the electrical operating cost of a motor and cost of downtime due to premature motor failure is willing to pay more for higher quality.

Ref: CEA Study, 1995



Seven Steps to Quality Motor Repairs

1. Become better informed about motor repair and maintenance
2. Prequalify and select a quality electric motor repair facility before you need it
3. Acquire or write a set of motor rebuilding standards
4. Establish a spare motor inventory system
5. Request a completed motor repair report of each repaired motor
6. Test new and rebuilt motor when they are received at your plant
7. Maintain communication system and relationship with your repair shop

Motor Repair Standard

- IEEE Standard 1068-2010: "Standard for the Repair and Rewinding of AC Electric Motors in the Petroleum, Chemical and Process Industries"
- To be publicly available Spring 2010 (~May)



What is Covered in Standard?

- Covers reconditioning, repair and rewind of horizontal and vertical induction motors and synchronous machines. It applies to all voltages 15kV and less and all ratings above 1 horsepower;
- Sets responsibilities and definitions;
- Sets inspection stop points;
- Identifies pass/fail for electrical and mechanical tests, visual inspections, and tolerances.

Splits Repairs into 5 Categories

Level	Clean	Brgs	Dip and Bake	Rewind	Machining	Rebar	New Shaft	Alt Replace
1	X	X						
2	X	X	X					
3	X	X		X	X			
4	X	X		X	X	X	X	
5								X

Repair Specifications

- Incoming tests and inspections including visual
- Detailed disassembly and test procedures including pass/fail electrical tests. Special test values for such tests as surge testing dramatically different from past standards
- Detailed rebuild processes, inspections and cautions
- Final tests
- All testing includes mechanical, repair, etc.
- Recommended test reports
- Objective motor repair facility qualification report and scoring method.

For More Information

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