

MOTORS SUPPORT NEWS:

In choosing the best motor to do any job, we must consider three essentials of what is called "Application Engineering"

- 1) Matching motor to load
- 2) Matching motor to its environment
- 3) Matching motor to power system

Selecting the voltage type (low or medium voltage) is one of the main components in your power system and could be selected based on the following understanding:

Governing Body Rules Some industry standards may dictate form-wound (used in medium voltage motors 'MV') to be used in 500 HP and larger (e.g. API-541).

Voltage Availability Low voltage (LV) may be the only available voltage at a site which is the most preferred voltage for smaller motors and projects.

Power System Capability The power system must be able to handle the starting inrush and additional continuous loading, which frequently directs using MV, costs to modify existing system capability may rule low voltage out and force using MV motors (form wound insulation).

Durability MV (form wound) coils are wrapped with epoxy (or polyester) impregnated mica tape layers which are far more durable against the environment than the random wound coils without such protection. They also have controlled/minimized turn-to-turn voltage which improve electrical durability.

Almost all LV motors are random wound using wires that only have varnish coating for insulation that are randomly located within the stator core slot with less coil protection. Sometimes a customer will prefer to use open motors (WPI or WP11) enclosure for MV where LV motors would need to be totally enclosed. Keep in mind that random wound coils varnish system is not as durable and may have unequal resin deposits that can cause hot spots or block air flow compared to vacuum pressure impregnation (VPI) form wound coils system.

Site Technician Adaptation or Experience Consider whether voltage selection requires added training or worker acceptability of perceived added safety risk.

Starting Considerations (e.g. Adjustable Speed Drive 'ASD') LV drives will cost significantly less, but have some added considerations (e.g. cable length limitation, line filters, etc.). Also, ASD solves any starting inrush issues and improve system efficiency.

Efficiency/Power Costs Be sure to consider power system transformer losses to step down to 460 V and adding costs when evaluating this factor.

Cable Expenses and Limitations Consider LV motors require larger diameter cables which cost more and require special site handling.

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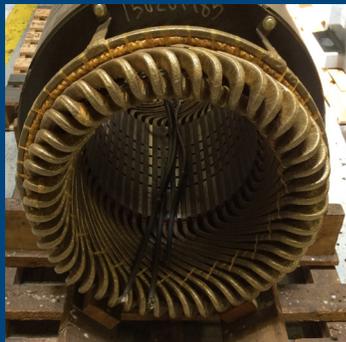
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MOTORS & DRIVES

LOW AND MEDIUM VOLTAGE MOTORS GROUP

Guide to Selecting Low vs. Medium Voltage Motors

Random vs. Form Wound Differences



Random Wound Coils (On LV Motor)

1. Round wire with 200° C heavy film is used. Fewer sizes need to be kept on hand, and the wire is more economically priced.
2. Turns have a random location; wires from a turn can touch any other turn.
3. Coils are not taped.
4. Wires may be loose and vibrate with respect to each other, depending upon the resin treatment.
5. Only phase connections are required.
6. End windings are completely covered. Excessive resin can build up and seal all openings. Moisture and contaminants can easily be accumulated.
7. Resin builds up unevenly based upon the looseness of the wires in the slots. Localized hot spots can occur due to internal voids.
8. Turn-to-turn voltage can be as high as (#of turns-1) x volts/turns.
9. There is a high potential of wire damage during assembly or disassembly.

Form Wound Coils (on MV Motor)

1. Magnet wire is rectangular or square with double dacron glass cover or mica turn tape over 200° C heavy film. The wire is more costly and inventory costs are increased because many different sized wire are used.
2. Individual turns are systematically arranged throughout the coil.
3. Coils employ insulation tapes.
4. The slots have uniform copper fill. Individual wires are tightly held in the slot.
5. Coil-to-coil connections are usually required.
6. End windings are shaped to form a basket with large openings between the coils to promote cooling and reduce coil contamination.
7. There is uniform resin build up in VPI and uniform temperature distribution.
8. There is uniform turn-to-turn voltage stress.
9. There is minimum potential for wire damage during assembly or disassembly.

Decision Process

- What voltages does project spec allow?
- Which voltages available at site?
- Which voltages are acceptable to the workers at site?
- What kind of starter is needed?
- Verify if fixed speed or ASD controlled.
- Determine type of starter (Across-the-line, soft start, autotransformer, ASD)
- What is the environment? (Form wound MV motors are better protected)

