



## E Source Drivepower Atlas

[Back](#)

---

This Atlas is a comprehensive guide to energy efficient motors and drives, highlighting practical implementation issues based on field experience. Topics featured include DSM program design, adjustable-speed drives, cube-law loads, power quality, measuring motor performance, and maintenance and monitoring, as well as load types, motor sizing and selection, and motor repair. Motor efficiency is discussed in detail, along with several energy-saving designs and techniques. The resources section contains a bibliography, lists of motor and ASD manufacturers, a list of associations related to motors and drives throughout the U.S. and Canada, and a glossary.

### Contents

#### **1 Five basic concepts**

- 1.1 Drivepower is huge
- 1.2 System boundaries
- 1.3 Start with the task
- 1.4 The leverage of downstream savings
- 1.5 Whole-system design

#### **2 Market structure and standards**

- 2.1 Motor manufacturers
- 2.2 Motor purchasers
- 2.3 Market events
- 2.4 Motor efficiency standards

#### **3 End-use data and market penetration**

- 3.1 Motor population and energy input by sector and end use
- 3.2 Penetration of energy efficient motors and ASDs
- 3.3 Duty factors
- 3.4 Load profiles

#### **4 Strategies for drivepower programs**

- 4.1 Equipment manufacturers
- 4.2 End users
- 4.3 Utility drivepower programs
- 4.4 Motor challenge programs

#### **5 Motor-driven loads**

- 5.1 Load types
- 5.2 System interactions
- 5.3 Fans and pumps: a special look

- 5.4 Cycling
- 5.5 Load profile and duty factor

## **6 Drivetrain and connection methods**

- 6.1 Gears
- 6.2 Linear drives: Chain and belt couplings
- 6.3 Bearings
- 6.4 Alignment
- 6.5 Lubrication

## **7 Motor technology**

- 7.1 How a motor works
- 7.2 Induction motors
- 7.3 Synchronous motors
- 7.4 Direct current motors
- 7.5 Other motor technologies

## **8 Induction motor efficiency**

- 8.1 The economics of energy efficient versus standard efficiency motors
- 8.2 What are standard and energy efficient motors?
- 8.3 How to purchase energy efficient motors
- 8.4 What price efficiency?
- 8.5 Savings under varying load with energy efficient motors
- 8.6 Calculating savings from improved motor efficiency
- 8.7 How accurate are nameplate efficiency ratings?
- 8.8 Slip, starting current, torque, and service life in energy efficient motors
- 8.9 Motor losses
- 8.10 Efficiency test procedures and definitions

## **9 Motor sizing and selection**

- 9.1 The widespread oversizing of induction motors
- 9.2 Consequences of motor oversizing
- 9.3 Replacing existing motors with smaller energy efficient motors
- 9.4 Replacing existing motors with same-sized energy efficient motors
- 9.5 Assessing motor performance in the field
- 9.6 Selecting the right motor

## **10 Motor repair**

- 10.1 Repairing versus replacement
- 10.2 The anatomy of a motor rewind
- 10.3 Causes of performance degradation from motor rewinding
- 10.4 Consequences of performance degradation
- 10.5 Alternatives to burnout ovens
- 10.6 The potential for improved performance after rewinding
- 10.7 Measured impacts of rewinding on efficiency
- 10.8 Prevalence and nature of rewinding practice
- 10.9 Quality assurance in motor repair

## **11 ASDs and other induction motor controls**

- 11.1 Why use controls?
- 11.2 Adjustable-speed drives
- 11.3 Adjustable-speed drives: a technology primer
- 11.4 Alternative methods for varying motor speed
- 11.5 Soft-start devices
- 11.6 Power factor controllers
- 11.7 "Fast controllers"
- 11.8 Load management controls

## **12 Motor system maintenance**

- 12.1 Economic benefits
- 12.2 Installation methods
- 12.3 Conventional maintenance methods
- 12.4 Motor circuit analysis
- 12.5 Recordkeeping

## **13 Power quality**

- 13.1 Power factor
- 13.2 Phase voltage unbalance
- 13.3 Harmonics
- 13.4 Transient power problems

## **Appendices**

- A: Glossary
- B: Bibliography
- C: Motor manufacturers
- D: ASD manufacturers
- E: Trade, professional, and governmental organizations related to motors and drives

TA-DP-99; October 1999; 347 pages

---

## **To Subscribe or for Additional Information**

For more information on the E Source Technology Atlases, call 303-444-7788 or e-mail us at [esource@esource.com](mailto:esource@esource.com).