



LEXSECO

Electromagnetic Test Equipment
"We Set the Standard"

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President's Message

Most businesspeople are pretty nervous right now. Given the state of the economy, they feel they have no choice but to circle the wagons and prepare for a bad year. The economy has slowed significantly and will probably get worse, but the informed entrepreneur can have a respectable year. You probably are asking how this is possible. Well...my answer is *look for the opportunities*. Economic downturns & even recessions always offer great opportunities for growth.

These opportunities present themselves in a couple of basic ways. First, your customers are looking for ways to save money. They're open to change. As a result, you can get through to a lot of prospective customers who wouldn't listen to you when times were good. Second, there is a good possibility that you will have less competition for their business. This is due to the strong probability that some of your competitors will make a common mistake of companies heading into an economic downturn. In an effort to reduce expenses, they cut back in the one area they should be expanding -- namely, sales and marketing. They advertise less, or they take salespeople off the street. If you do the opposite, there's a good chance you'll be able to pick up market share.

Now let's relate the *saving money* opportunity to selling your business's capabilities...specifically Core Loss Testing. First, you must inform your customer why Core Loss Testing is important...Not all power applied to an electric motor is converted to work. Principle sources of wasted energy include (I²R loss, windage, friction, stray load loss & Core Loss in stator, rotor and armature cores). Core loss, essentially, is the energy required to magnetize the core. Studies have shown that depending on load, **core loss is the first or second leading cause of energy waste in rewound motors, and can account for 25% or more of motor inefficiency.**

Second, you must show how these losses are costing your customer money...Core Loss is dissipated in the form of heat. The dissipated heat increases the operating temperature of the motor which causes more core loss and more heat. **A vicious cycle of increasing inefficiency is established leading to higher operational costs and premature motor failure.** Core testing not only identifies motors that should be replaced versus repaired, but also reveals repairable problems.

Third, use your specific information and abilities to differentiate your company from the competition...As you are aware, Lexseco has been collecting core loss test

data for repair shops around the world for the past 10 to 15 years. Analysis of our test database establishes that a significant portion of motors tested, as high as 20% for some categories, experience core loss exceeding statistical acceptability. Your ability with the Lexseco tester doesn't stop there, you also have the unique ability to differentiate between the specific frames in terms of acceptable losses. Since we have been discussing wasting energy, it should be easy to see that a high efficiency motor will have a different set of acceptable losses than a Pre-Nema or U-Frame.

Fourth, give an example...Let us assume that we are dealing with **one** 50 HP motor operating at 75% load with an efficiency of 91% which is operated for approximately 7200 hours per year at a cost of .065 @ kilowatt hour. The annual cost of operation for that motor would be approximately \$1,735. Now let us assume that the losses on that motor account for a loss of 2% efficiency for a total efficiency of 89%. At 89% efficiency the cost of operation increases to \$2,169. The increased annual cost of operation of operation on that **one motor** would be \$434. Where did the extra energy go? It was converted into heat which in turns leads to premature motor failure, increased operating costs, and puts an extra load on your plant's cooling system. If you are using 10 similar motors, you are throwing away almost \$5000 a year just in increased energy costs without even considering premature motor failures & downtime!

Calibration

The question "*How do I have my Core Loss Tester calibrated?*" is often asked of us. Calibration of test equipment has always been a critical issue and is often misunderstood. It has been brought to the forefront as companies put appropriate emphasis on quality, quality control, repair & efficiency standards (such as the EASA Quality Standards & the ISO-9000 Standards). Often key customers will require proof that your test equipment is performing within specifications. The best "proof" is a certificate of compliance verifying the equipment has been calibrated to an accepted standard and *not just a sticker indicating that the equipment has been calibrated.*

A Certificate of Compliance traceable to the requirements of the National Institute of Standards and Technology (NIST) is the best proof that can be provided. In fact, it is the only acceptable standard in

the United States (& is accepted around the world). The US government, most quality programs, ISO standards,... require certificates of compliance traceable to the requirements of the NIST. So, the next time your test equipment requires calibration (which is normally on an annual basis), make sure you receive a certificate of compliance traceable to the requirements of the National Institute of Standards and Technology (NIST).

Lexseco's flux metering system takes advantage of the many years of R & D and advances in metering technology. The system measures actual lines of flux, true RMS current, and watts at the highest accuracy level available on the market today. It is certified in conformity with the National Institute of Standards and Technology (NIST) to be of the highest accuracy.

Well, back to the question "How do I have my Core Loss Tester calibrated? ". Lexseco provides a very simple, effective, and inexpensive answer...the Flux Metering Exchange program. This program is designed to address calibration requirements for Lexseco Core Loss Testers with virtually zero equipment down time. The Flux Metering System is a self-enclosed modular component, which provides for a quick removal and installation process. *It is as simple as 1, 2, 3.*

1. Fax or E-mail us your purchase order noting your Core Loss Tester model, Core Loss Tester serial number, and your Flux Metering System model number .
2. Upon receipt of your order, Lexseco will schedule & ship a Flux Metering System , which includes installation/removal instructions, and a certificate in conformity with the National Institute of Standards and Technology (NIST), directly to your plant.
3. Upon receipt of the calibrated metering system, you remove the old meter, install the new meter, and ship the old meter to Lexseco.

How often should you have the tester calibrated? Like most test equipment, the equipment should be calibrated annually.

Lexseco's Comprehensive Upgrade Program

Lexseco has dramatically advanced Core Loss Testing technology over the past 20 years. But, the original equipment we manufactured in 1980 is still operating and still in use. In fact, Lexseco uses a sophisticated, patented, Variable Reactance Transformer (VRT) as the Core Loss Tester power source. The VRT is inherently current limiting and will not experience an over current failure. Instead of obsoleting otherwise good and functional machines in the face of advancements in metering, computers and software, we developed an affordable upgrade option, which allows Lexseco users to have the latest test technology for a fraction of the cost of a new machine.

*Lexseco's comprehensive upgrade utilizes our unique **Flux Metering System** which measures actual lines of flux, true RMS current, and watts (in place of kilowatts). It is certified in conformity with the National Institute of Standards and Technology (NIST) to be of the highest accuracy. In conjunction with the Flux Metering System,*

*the **MP6.0™ Multiparameter Hardware/Software system** enhances test accuracy through the use of frame and efficiency test discrimination, **RS232 meter data retrieval**, and **winding verification** with a Pentium® notebook computer and bubble-jet printer. Mounted in a rugged steel enclosure with locking lid, the new upgrade package can be retrofitted by the Lexseco engineering staff to any Lexseco Core Loss Tester.*

*Also included in the package is one year free membership in the Lexseco **MP™ Software Users Group**, new control components, refurbishment of existing cabinet, and a thorough checkout/ evaluation of the key tester components. This quality Lexseco product comes with a 1 year warranty, top quality components, and an accessible engineering staff for aftermarket support.*

Additional items to consider;

- **The comprehensive upgrade brings your tester into YEAR 2000 compliance.**
- **The comprehensive upgrade will enhance your test accuracy, automate the testing process, add the power and flexibility of a "state of the art" portable computer system.**
- **Lexseco's Flux metering system, included in the comprehensive upgrade, is a highly advanced modular metering system that was specifically designed for the Core Loss Tester. Our Flux meter recalibration/exchange program allows you to exchange your current flux meter system for a recalibrated flux metering system. The metering system is serially interfaced with the computer system which enhances the accuracy & efficiency of the testing process.**
- **The Flux metering system will allow you to test stators down to the fractional horse power range.**

*The Multiparameter™ Software, included in the comprehensive upgrade, allows you to discriminate between frame types, produce comprehensive test reports for your customers, save the test results to a database, and much more. **We can even add the automation package while we are upgrading your tester. With the automation feature, the operation of the tester is much simpler since the testing process is controlled by the software & computer system. A simpler test process can reduce your training time and labor costs.** Contact us for more information on the program.*

Lexseco's MultiParameter Software- MP 6.0™

Lexseco's MP 6.0™ is the next generation in a series of Windows based motor test programs that utilizes the latest metering technology. MP 6.0™ offers a user-friendly interface mechanism, simplified retesting of previous database entries, and a comprehensive DC test sheet. MP 6.0™ enables you to unlock the enormous computing potential of the IBM compatible computer for use in core loss testing, winding verification, and other mechanical and electrical testing fields.

Here are just a few of MP6.0™ new features and Benefits:

- Built on a Microsoft Programming Language – utilizing Windows™ 32 bit technology and taking full advantage of the Windows™ GUI interface & 32 bit operating systems.
- Built in Help System that basically provides on-line access to the MP6.0™ software manual.
- New *quick fill* technology reduces data entry time and errors.
- Built in Security System, which allows easy customization of access to MP6.0™'s powerful features based on the user's needs.
- New Graphical interface which allows the user to graphically identify & save Hot Spots as **Axial and Radial** location of each Hot Spot.
- Expanded **General Test** functionality, data retention, & reporting which allows the user to record other test results (Hi-Pot, Surge, Vibration,...). The General Test reports can also be printed separately (without the Core Loss Test reports).
- Separate Test Procedures & Reports for **Squirrel Cage Rotors**.
- Expanded Documentation – Allowing the user to document the entire repair process in one place, thereby assisted the user with documenting requirements for ISO & Quality programs).
- Expanded Data Retention - MP6.0™ not only saves Core Loss Test Results but also automatically saves Hot Spot, Winding Verification, Squirrel Cage Rotor, & General Test results.
- Add a virtually unlimited number & variation of tests to a job/component.
- Copy nameplate and dimension information from one job to save time when starting another like job.
- New Export Functionality – allows users to easily export data to other software package formats such as Excel, Lotus, Multiplan, DBF,...
- On Line monitoring of Calibration – notifying the user when the tester is due for calibration.
- Built in Calendar & Calculator.
- **New Import Functionality – allows users to import other test data.**
- Much More.

Contact us for more information and pricing on our software upgrade program.

New – Lexseco's Small Stator Test Package

Lexseco recently introduced a new Small Stator Test Package *which allows testing of stators with less than a one inch bore (ID)*. The Small Stator Test Package is designed to attached your existing main test cable (or extension cable) connectors. The following pictures show how easy it is to test the *really small* stators.



Contact us for more information and pricing on our Small Stator Test Package.

New – Lexseco's 40 & 200 KVA Core Loss Testers

Lexseco is proud to introduce two new Core Loss Tester models:

- Model 2040 - Depending on core impedance, the 40 KVA tester could enable you to test from fractional to 1750 horsepower.
- Model 2200 - Depending on core impedance, the 200 KVA tester could enable you to test from fractional to 7500 horsepower.

Lexseco's Winding Verification Program ©

Lexseco's robust Multiparameter™ Software Package includes a Winding Verification program. This program is a valuable tool in the rewind process, but too often it is not used. The Winding Verification program is designed, as the name infers, to assist in verifying that the motor is rewound properly. It is relatively simple to use since the nameplate data and the applicable dimension data are brought forward from the Core Loss Test. Lexseco recommends that any motor that is tested for core loss & scheduled to be rewound be processed through our Winding Verification program. The applicable Tooth density, Backiron density, Air Gap density, & Circular mils per Amperes are automatically calculated by the software. These calculations are then compared to industry standards. The Winding Verification program is an excellent quality control tool, which will save you money. In fact, our research indicates that this program could reduce errors in your rewind process by 10% or more on average. Additionally, our newest Multiparameter™ Software release, MP6.0™, automatically saves the applicable winding details to a database.

In specifying the replacement winding, to ensure that the motor performance will match that of the original winding, there is always one obvious choice, namely to copy exactly the original in every particular. This would include not only the conductor size and the number of turns, but also the style of the winding, its configuration, and the exact shape of the coils. This approach virtually guarantees satisfactory results, but it is not always the most convenient & there are exceptions. There are two key factors that greatly effect this specification process: 1st – If the motor has been rewound previously, using the current winding as a guideline is perilous at best.

2nd – There are differences between the manufacturer’s methods of winding stators and those used by repair shops. The highly automated and capital-intensive modern manufacturing methods are often impractical in the repair environment.

Core Loss Repair Techniques

In many cases, the core loss tester will determine that a core is "marginal" which usually indicates that it may be salvaged with some work. This column will detail one or more repair techniques in each issue in an attempt to further educate our users. While none of these techniques is foolproof, each technique or combination of techniques may prove beneficial in improving a marginal core. We also encourage our readers to propose other similar repair procedures so that all of our users may benefit from them.

GRINDING

Grinding is a destructive repair technique which should only be used to remove unwanted tooth surface damage which cannot be cleared by cracking or spreading and shorting produced by copper blown in the slots.

Destructive techniques are those techniques which alter the construction of the core through the removal of the original lamination material. Using a grinder or metal file, grind visually damaged tooth surfaces or the copper in the slots until the hot spots are cleared. Care should be taken to minimize the amount of original material removed from the core as any changes in the original design will yield a less efficient motor.

Core Loss Solutions

Q: When testing a motor that does not have hot spots or visual damage, what do you do if the Core Loss Tester determines that the watts per pound loss is marginal or bad?

A: As a matter of routine practice, it is best to double check your entry data whenever the results of the test do not agree with your assessment of the core condition. If you have correctly entered the data, you should verify that you have chosen the proper frame classification from the selections given, or in the case of a special application, you should contact Lexseco for assistance. Next, examine the core construction for large welds across the back iron, bolts or rivets through the back iron or anything that could qualify as irregular construction. When all else fails, we recommend that you contact Lexseco. The problem you may be witnessing is often referred to as uniform degradation. In the case of uniform degradation, the core is experiencing changes in the quality of the lamination steel instead of insulation breakdown commonly associated with hot spots. This general core failure is primarily due to excessive overheating of the entire core stack which alters the heat treatment and chemical properties of the steel.

Q: What does the normal core test process entail?

A: Core Loss testing is generally a two-phase process. The **average** watts-per-pound losses are established in the first phase. **The watts-per-pound losses should be compared to standard parameters for the motor’s specific frame classification.** This comparison should identify the core as acceptable (good), marginal, or unacceptable (bad).

The second phase of the test is called hot spot testing. The phase of the test identifies problem areas (areas of the core where losses, dissipated in the form of heat, are higher than the rest of the core).

Q: When testing an Armature or Wound Rotor, how should the small red & black (flux measurement) cables be attached?

A: Place the flux measurement cable through spokes or vent holes in larger machines when possible. If this is not possible, the induced flux can be measured accurately by affixing the flux measurement cables to the braided copper straps on the shaft clamps.

Q: Should you make a backup of the test data saved via the Lexseco MultiParameter™ software?

A: Yes. You should make a weekly backup copy of a file named database.db (which is normally located in the LEXMP directory) in the MP 3.2™ & MP4.0™ software series. The MP6.0™ users should backup the entire MP60\DATA directory.

Q: While testing a stator with the windings installed, the pre-burnout dimension data was different from the post-burnout dimension data. How can I compare pre-burnout & post-burnout core losses.

A: It is difficult to get accurate dimension data taken while windings are installed. Often, more accurate data is obtained after the windings are removed (or post-burnout). When comparing pre-burnout & post-burnout core losses it is best to use consistent dimension data. This is accomplished by entering pre-burnout dimension data into the software when performing a post-burnout comparison test. A third test should than be performed using the correct post-burnout dimension data.

We hope this newsletter is helpful by providing information on Lexseco, The Core Loss Tester, and core loss in general. **If you would like to receive our future newsletters via email, please forward your email address to: Sales@Lexseco.com**. If you have any questions or suggestions for future topics, please write, fax, or e-mail us.

Thank You

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