2016
Customer Training Schedule
TECHNICAL MANUALS ON ELECTRONIC MEDIA

Manuals for most Fives Giddings & Lewis machines can be provided on CD-ROM in printable Adobe® Acrobat® PDF format. Consult the Training & Documentation Department for the availability of the desired operator, programming, electrical maintenance, or mechanical maintenance (less layout drawings) manuals. Cost is $250.00 per set of manuals on CD for each machine. Additional CD copies are $25.00 each.

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FOND DU LAC TRAINING COURSE POLICY & FEE SCHEDULE

TRAINING AT FOND DU LAC:

One training credit allows a person to attend a Training Course at the Fond du Lac factory training facility. The customer has from the date the order was placed until one year after shipment to use the credits. All travel and living expenses are the responsibility of the customer. Contact the Training Department to check on the status of the remaining credits.

Fives Giddings & Lewis reserves the right to modify or cancel a course if there is insufficient enrollment. In the event a course is changed, enrollees will be given first priority in a rescheduled course. Fives Giddings & Lewis is not responsible for additional customer's transportation charges due to cancellation.

If training credits were not part of the machine transaction or not used during the specified time period, the training cost for current products and controls is $2100 per student for a 4-1/2 day course and $1400 per student for a 3 day course.

ON-SITE TRAINING AT THE CUSTOMER'S FACILITY

1. STANDARD TRAINING COURSES

   All the regularly published training courses can be conducted in the customer's facility. Dates will be scheduled based on instructor availability.

2. SPECIAL TRAINING

   Special training courses can be established to suit a customer's needs and conducted either in Fond du Lac or at the customer's facility.

3. LEGACY Training

   Special training courses can be established to suit a customer's needs and conducted either in Fond du Lac or at the customer's facility. The following courses are subject to Instructor availability:
   - G&L NumeriPath 800
   - G&L NumeriPath 8000
   - Fanuc 15B
   - Fanuc 15i
   - Fanuc 16i

4. COST OF TRAINING

   Cost for Domestic On-site training (held at the customer’s facility) is as follows:
   - 4-½ Day course $9800
   - 3-½ Day course $8500
   - 3 Day course $8000

   Travel and lodging expenses of the instructor are included.

   All prices are based on a maximum of six students per class; the cost for each additional student is $400.

   Cost for Foreign On-Site training will be quoted upon request.

   Prices for In-House and On-Site classes are subject to change without prior notification.

   Each training credit can be used towards customer On-Site training at the rate of $450 per credit.
2015 TRAINING SCHOOL SCHEDULE

4 1/2 Day School
Monday - Thursday: 8:00 A.M. - 4:00 P.M.
Friday: 8:00 A.M. - 12:00 P.M.

3 Day School
Tuesday - Thursday: 8:00 A.M. - 4:00 P.M.

ON-SITE PROBE TRAINING SCHOOL
Probe training classes are to be conducted at the customer facility on your machine(s). Care and maintenance of the probe hardware, programming of the probe and probing results processing is covered. Consult the factory to schedule a class.

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<thead>
<tr>
<th>Probe Training</th>
<th>Course length (days)</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
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<td>Siemens</td>
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2016 Training Schedule (Fond du Lac, WI)

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<td>18-22</td>
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COURSE OUTLINES
All outlines shown are for typical schools and can be altered to suit customer requirements

Course Name: Programming - Fanuc Series 30i / 31i Controls
Course Length: 4 ½ days
Target Audience: Machine Operators & Part Programmers
Course Description: This course will introduce the programming techniques required to efficiently utilize the features and capabilities of Fives Giddings & Lewis machine tools equipped with Fanuc controls.

Day 1 - Monday
1. GENERAL INTRODUCTION
   a. Instructor / student introduction
   b. Class introduction
2. PRODUCT AWARENESS
   a. Safety
   b. Machine descriptions
   c. Cover individual machine specifications
3. CONTROL DESCRIPTION
   a. Explain general control information
   b. Explain the operator CRT display pages
   c. Explain buttons on the operator station
   d. Explain & demonstrate transfer / edit of programs

Day 2 - Tuesday
4. GIDDINGS & LEWIS CUSTOM SCREENS
   a. Explain custom screens
5. COORDINATE SYSTEMS
   a. Explain Cartesian / polar coordinate systems
6. PROGRAM CODES
   a. Programming data
   b. Letter address codes
   c. Preparatory codes (G codes)
   d. Miscellaneous codes (M codes)
   e. Canned cycles

Day 3 - Wednesday
7. DISCUSS BASIC APPLICATIONS
   a. References
   b. Tool selection / tool changer operation
   c. Tool compensation
   d. Rotary axes
8. PROGRAMMING EXAMPLES
9. SPECIAL FUNCTIONS
   a. Variables
   b. Mathematics
   c. Decision making/branching
   d. Printing
   e. Subprograms & macros

Day 4 - Thursday
10. PROGRAMMING EXAMPLES
11. OPTIONS
   a. Tool management
   b. Spindle load monitor
   c. Probing
      i. Part probing
      ii. Tool probing

Day 5 - Friday
12. PROGRAMMING EXAMPLES
13. CLASS WRAP-UP
Course Name: Advanced Programming - Fanuc Series 30i / 31i Control
Course Length: 3 days
Target Audience: Advanced Machine Operators & Part Programmers
Course Description: This course will introduce the experienced programmer to the unique features and capabilities available on Fives Giddings & Lewis machine tools equipped with Fanuc controls. This course deals with Custom Macro B programming. Class content may vary depending upon the needs of the class, but may include any or all of the following topics.
Prerequisite: Attended Fanuc Program training or have a working knowledge in G-Code programming.

Day 1 - Tuesday
1. GENERAL INTRODUCTION
   a. Instructor / student introduction
   b. Class introduction
2. CNC SYSTEM REVIEW
   a. The CNC function
   b. The PMC function
   c. The Machine function
3. CNC OPERATION
   a. Mode selection
   b. Macro program protection
      i. Checking parameters
      ii. Setting parameter write enable
   c. Start a new program
   d. Inserting, altering & deleting program lines
   e. Program directory list
4. MACRO VARIABLES
   a. Referencing commands with macro
      i. Limitations of macro commands
      ii. Specifying a system variable by name
      iii. Using the SETVN function to set a common variable
   b. Local, common & system variables
   c. Storing values into variables
   d. Referencing a variable with another variable

Day 2 - Wednesday
5. MACRO ARITHMETIC INSTRUCTIONS
   a. Simple arithmetic functions
   b. Mathematics equations
   c. Trigonometric functions
   d. Scientific functions
6. DECISIONS & LOOPS
   a. IF statement
   b. IF/WHEN statement
   c. If/THEN statement
   d. Complex conditional expressions
   e. WHILE/DO statement
7. MACRO / SUBPROGRAM CALLS
   a. M98 Subprogram call
   b. G65 simple call
   c. G66 & G66.1 modal call
   d. Macro and subprogram calls using G & M codes

Day 3 - Thursday
8. EXTERNAL OUTPUT / INPUT COMMANDS
   a. External output commands
      i. DPRNT
      ii. POPEN
      iii. PCLOS
   b. External input commands

9. PARAMETERS OF INTEREST
10. MACRO PROGRAMMING EXAMPLES
## Course Name:
Programming - Siemens 840D Control

## Course Length:
4 ½ days

## Target Audience:
Machine Operators & Part Programmers

## Course Description:
This course will introduce the programming techniques required to efficiently utilize the features and capabilities of Fives Giddings & Lewis machine tools equipped with Siemens controls.

### Day 1 - Monday
1. **GENERAL INTRODUCTION**
   - a. Instructor / student introduction
   - b. Class introduction
2. **PRODUCT AWARENESS**
   - a. Safety
   - b. Machine descriptions
3. **CONTROL DESCRIPTION**
4. **MACHINE ZERO POSITIONS**
5. **FOUR AXIS CONTROL** (if applicable)
6. **CHUCKING** (if applicable)
7. **LIVE SPINDLE OPTION** (if applicable)
8. **ROTARY TABLE** (if applicable)
9. **POLAR COORDINATE & PERIPHERAL SURFACE TRANSFORMATIONS** (if applicable)
10. **PALLET CONTROL** (if applicable)

### Day 2 - Tuesday
11. **CONTROL PANEL LAYOUT**
12. **MACHINE OPERATOR DEVICES**
13. **OPERATING PROCEDURES**
14. **PART PROGRAM OPERATIONS**
15. **BLOCK SEARCH**
16. **TOOL OFFSETS**
17. **TOOL MANAGEMENT**
18. **TOOL CHANGER**

### Day 3 - Wednesday
19. **REFERENCE OFFSETS**
20. **PROGRAM DATA**
21. **PROGRAMMING CODES**

### Day 4 - Thursday
22. **SPECIAL PROGRAMMING FUNCTIONS**
23. **PROGRAMMING EXAMPLES**
24. **HAND HELD UNIT**
25. **CAMERA SETUP**
26. **COOLANT**
27. **CHIP CONVEYOR**

### Day 5 - Friday
28. **PROBING**
29. **PROBING OPERATIONS**
30. **ATTACHMENTS** (if applicable)
Course Name: Electrical Maintenance - Fanuc 30i & 31i Control
Course Length: 4 ½ days
Target Audience: Electrical Maintenance Personnel
Course Description: This course gives an overview of the material in the electrical manual and the machine electrical prints. Material is covered in a progressive manner. A primary goal of the class is to familiarize each student with the documentation provided with the machine. This will enable the student to use the documentation effectively for troubleshooting control or machine problems.

Prerequisites: Electronics or electrical maintenance background and good working knowledge of CNC equipment.

Day 1 - Monday
1. GENERAL INTRODUCTION
   a. Welcome and class introduction
   b. Electrical service manual overview
2. MACHINE & CONTROL DESCRIPTIONS
   a. Work order review
   b. Machine description
   c. Block diagram of control
3. SOFTWARE ORGANIZATION
   a. Saving SRAM
   b. Loading part programs
   c. Backup battery information
   d. NC parameters
   e. PMC D word organization

Day 2 - Tuesday
4. CONTROL & MACHINE OPERATIONS
   a. The position page
   b. Control operations modes
   c. Manual data input
   d. System security & passwords
   e. Referencing the axes
   f. Referencing tooling
5. EXPLANATION OF THE PRINTS
   a. How to read prints
   b. Use of table of contents
   c. Grounding and power requirements
   d. Page by page review of the prints

Day 3 - Wednesday
6. EXPLANATION OF THE PRINTS
   a. Page by page review of the prints
   b. Coolant & chiller systems
   c. Probing systems
7. SERVO SYSTEM
   a. Block diagram of servo system
   b. Troubleshooting encoder feedback
   c. Spindle and axis drives

Day 4 - Thursday
8. SETUP INFORMATION
   a. Machine reference setup procedures
   b. Software end limit information
   c. Communications
   d. Probing information
9. TOOL CHANGER & PALLET CHANGING
   a. Hardware descriptions
   b. Setups & maintenance procedures

Day 5 - Friday
10. COMPENSATION INFORMATION
    a. Pitch compensation
    b. Backlash compensation
    c. Thermal compensation
11. TWENTY QUESTION POST TEST
12. CLASS WRAP-UP
Course Name: Electrical Maintenance - Siemens 840D Control
Course Length: 4 ½ days
Target Audience: Electrical Maintenance Personnel
Course Description: This course gives an overview of the material in the electrical manual and the machine electrical prints. Material is covered in a progressive manner. A primary goal of the class is to familiarize each student with the documentation provided with the machine. This will enable the student to use the documentation effectively for troubleshooting control or machine problems.

Prerequisites: Electronics or electrical maintenance background and good working knowledge of CNC equipment.

Day 1 - Monday
1. GENERAL INTRODUCTION
   a. Welcome and class introduction
   b. Electrical service manual overview
   c. 840D control system block diagram
2. DIAGNOSTICS DESCRIPTION
   a. Types of diagnostics
   b. CNC diagnostics
   c. Troubleshooting with the diagnostics
3. SOFTWARE ORGANIZATION
   a. System software loading
   b. Loading part programs
   c. Backup battery information

Day 2 - Tuesday
4. CONTROL & MACHINE OPERATIONS
   a. The active data page
   b. Control operations modes
   c. Manual data input
   d. System security & passwords
   e. Referencing the axes
5. EXPLANATION OF THE PRINTS
   a. How to read prints
   b. Use of table of contents
   c. Grounding and power requirements
   d. Page by page review of the prints
   e. Page by page review of the prints

Day 3 - Wednesday
6. EXPLANATION OF THE PRINTS (cont.)

7. SERVO SYSTEM
   a. Block diagram of servo system
   b. Troubleshooting the feedback system
   c. Theory and operation of axis drives
   d. Theory and operation of spindle drive
   e. Using the servo trace function

Day 4 - Thursday
8. SETUP INFORMATION
   a. Overview safety integrated
   b. Clearing safety integrated messages
   c. Machine reference setup
   d. Software end limit information
   e. Communications
   f. Probing Information
9. TOOL CHANGER & PALLET CHANGING
   a. Hardware descriptions
   b. Setups & maintenance procedures

Day 5 - Friday
10. COMPENSATION INFORMATION
    a. Interpolary compensation
    b. Backlash compensation
    c. Thermal compensation

11. TWENTY QUESTION POST TEST
12. CLASS WRAP-UP
Course Name: Mechanical Maintenance
Course Length: 4 ½ days
Target Audience: Mechanical Maintenance Personnel
Course Description: This course provides an overview of the material in the mechanical maintenance manual. A primary goal of the class is to familiarize each student with the documentation provided with the machines. This will enable the student to use the documentation effectively for troubleshooting, ordering the proper part(s) when needed and for doing machine repair.

Prerequisites: Basic understanding of how to read mechanical drawings and hydraulic schematics.

Day 1 - Monday
1. GENERAL INTRODUCTION
   a. Instructor / student introduction
   b. Class introduction
2. PRODUCT AWARENESS
   a. Safety
   b. Machine descriptions
   c. Cover individual work orders
3. MAJOR MACHINE AXIS
   a. Major components
   b. Common components
   c. Maintenance procedures
   d. Review prints

Day 2 - Tuesday
4. HEADSTOCK
   a. Description of headstocks
   b. Components
   c. Maintenance procedures
   d. Review prints
5. SERVICE SYSTEMS
   a. Maintenance note plates
   b. Hydraulics
   c. Pneumatics
   d. Lubrication
   e. Coolant system

Day 3 - Wednesday
6. TABLE
   a. Description
   b. Components
   c. Maintenance procedures
   d. Review prints
7. PALLET CHANGER
   a. Description
   b. Components
   c. Maintenance procedures
   d. Review prints

Day 4 - Thursday
8. TOOL CHANGER
   a. Description
   b. Components
   c. Maintenance procedures
9. SCALES
   a. Description
   b. Components
   c. Assembly procedures
   d. Maintenance

Day 5 - Friday
10. INSTALLATION
11. ALIGNMENTS
**Course Name:** Combined Mechanical & Electrical Maintenance  
**Course Length:** 4 ½ days  
**Target Audience:** Maintenance personnel that perform both mechanical and electrical duties.  
**Course Description:** This course gives an overview of the material in both the Mechanical and Electrical manuals and the Mechanical and Electrical prints. Material is covered in a progressive manner. A primary goal of the class is to familiarize each student with the documentation provided with the machine. This will enable the student to use the documentation effectively for troubleshooting control or machine problems.  
**Prerequisites:** A CNC machine tool maintenance background and good working knowledge of CNC equipment, hydraulic and pneumatic systems.

**Day 1 - Monday**  
1. **GENERAL INTRODUCTION**  
   a. Welcome and class introduction  
   b. Documentation overview  
2. **MACHINE & CONTROL DESCRIPTIONS**  
   a. Work order review  
   b. Machine description  
3. **CONTROL ORGANIZATION**  
   a. Viewing the control screens  
   b. Backing up the system software  
   c. Loading part programs  

**Day 2 - Tuesday**  
4. **EXPLANATION OF THE PRINTS**  
   a. How to read the mechanical prints  
   b. How to read the electrical prints  
   c. Machine note plates  
   d. Page by page review of the prints  
   e. Vendor documentation  

**Day 3 - Wednesday**  
5. **SERVICE SYSTEMS**  
   a. Hydraulics  
   b. Lubrication systems  
   c. Coolant system & chip conveyors  
   d. Oil & glycol chiller systems  
   e. Probing systems  
   f. Pitch & backlash compensation  
   g. Thermal compensation system  

**Day 4 - Thursday**  
6. **SERVO SYSTEM & FEEDBACKS**  
   a. Block diagram of servo system  
   b. Spindle and axis drives  
   c. Encoder feedbacks  
7. **SETUP PROCEDURES**  
   a. Machine reference setup procedures  
   b. Software end limit information  
   c. Tool changer information & setups  
   d. Pallet changer information & setups  

**Day 5 - Friday**  
8. **MACHINE ALIGNMENTS**  
   a. Alignments to check  
   b. Machine adjustments  
   c. Post collision recommendations  
9. **TWENTY QUESTION POST TEST**  
10. **CLASS WRAP-UP**
Course Name: Probing
Control: Fanuc with Renishaw Cycles
Siemens with Siemens Probe Cycles
Course Length: 3 ½ Days
Target Audience: Machine Operators & Part Programmers
Course Description: This course will show students how to set-up, operate, calibrate, and measure using the part probe on your machine. The training is control specific. The outline is the same for both the Fanuc and Siemens controls.

Day 1 - Tuesday
1. GENERAL INTRODUCTION
   a. Instructor / student introduction
2. PROBE INTRODUCTION
   a. Stylus installation
   b. Batteries installation
   c. Reviewing the current probe settings
   d. Changing the probe settings / partnering the probe and RMI unit
   e. Cleanliness
3. INDICATING THE PROBE STYLUS
4. PROBE OFFSETS
5. PROBE CONFIGURATION BITS
6. PROBE FUNCTIONS
7. PROBE M-CODES
8. PROBE PROTECTION
9. PROBE CALIBRATION
   a. Offsets
   b. Procedure
   c. Input variables
   d. Program example
10. MEASURING CYCLES
   a. Input variables
   b. Surface condition alarms
   c. Program examples
11. PROBE OUTPUT VARIABLES
   a. Output variables capabilities
12. PROBING DIAGNOSTICS
13. CALIBRATE THE PROBE ON THE MACHINE

Day 2 - Wednesday
9. PROBE CALIBRATION
   a. Offsets
   b. Procedure
   c. Input variables
   d. Program example
10. MEASURING CYCLES
   a. Input variables
   b. Surface condition alarms
   c. Program examples
11. PROBE OUTPUT VARIABLES
   a. Output variables capabilities
12. PROBING DIAGNOSTICS
13. CALIBRATE THE PROBE ON THE MACHINE
14. PROBE MEASURING EXAMPLE IN THE WORKBOOK
15. PROBE A SURFACE ON THE MACHINE
16. PROBE AN INSIDE DIAMETER ON THE MACHINE
17. PROBE AN OUTSIDE DIAMETER ON THE MACHINE
18. VIEW CUSTOMERS EXAMPLE PART
19. PROGRAM CUSTOMERS EXAMPLE PART

Day 3 - Thursday
14. PROBE MEASURING EXAMPLE IN THE WORKBOOK
15. PROBE A SURFACE ON THE MACHINE
16. PROBE AN INSIDE DIAMETER ON THE MACHINE
17. PROBE AN OUTSIDE DIAMETER ON THE MACHINE
18. VIEW CUSTOMERS EXAMPLE PART
19. PROGRAM CUSTOMERS EXAMPLE PART

Day 4 - Friday
20. PROBE CUSTOMERS EXAMPLE PART
21. QUESTIONS
ENROLLMENT INFORMATION

1. Class size is limited to maximize the benefit to our students. It is advisable to enroll early as registration is accepted on a first come, first serve basis. Contact the Training Administrator at the Fives Giddings & Lewis, LLC Fond du Lac Training & Documentation Department. Phone: (920) 906-2437
   Have available the Model, Serial Number and type of Control for your machine(s).

2. An enrollment form (see page 15) should be completed and returned to:
   Training & Documentation Department
   Attn: Training Administrator
   Fives Giddings & Lewis, LLC
   142 Doty Street, P.O. Box 590
   Fond du Lac, WI 54936-0590
   Email: fivesmsi-train@fivesgoup.com
   Fax: (920) 906-2066

3. A letter of confirmation will be sent to the customer prior to each school and will include details regarding class time, location, and a map.

4. Fives Giddings & Lewis has negotiated corporate rates with the Retlaw Hotel, Holiday Inn, Comfort Inn, and Country Inn & Suites. Please present your confirmation letter at check-in to obtain the preferred rate.

5. Classes are conducted from 8:00 A.M. to 4:00 P.M. Monday through Thursday and 8:00 A.M. to Noon on Friday. Classes with duration of 3 days will start on Tuesday. Return reservations should be made for mid-afternoon flights on Friday.

TUITION POLICY

If training was included in the purchase price of your machine(s), the customer has from the date the order was placed until one year after shipment to use the course credits and receive training at no charge. If course credits were not part of the machine transaction or not used during the specified time period, the training cost for current products and controls is $2100 per student in a 4-1/2 day course and $1400 per student in a 3 day course.

PAYMENT OF FEES

If a tuition fee is applicable, a purchase order, credit card information, or a check must accompany the enrollment form. Invoices for course fees will be submitted the week of the training session. If you prefer to pay in advance, checks should be made payable to Fives Giddings & Lewis, LLC and sent directly to the Training & Documentation Department in Fond du Lac, WI.

CANCELLATIONS

Fives Giddings & Lewis reserves the right to modify the schedule and cancel schools. In the event a school is canceled, enrollees will be given first priority in the next regularly scheduled school. Customers who have prepaid will be given the option of a refund or accrual for the next class.

OTHER EXPENSES

Fees include tuition and course materials. The customer is responsible for expenses such as travel, lodging, food, cabs, car rentals, and any incidental expenses.

CLOTHING REQUIREMENTS

A portion of the student's time will be spent on the manufacturing floor. Attire while in school is casual but the students must wear safety toe shoes in the manufacturing area. Tennis shoes and other soft-soled shoes are not allowed. Students should bring their own safety glasses, or Fives Giddings & Lewis will issue plastic glasses for temporary use.

FOR MORE INFORMATION CONTACT:

Training & Documentation Department
Attn: Training Administrator
Fives Giddings & Lewis, LLC
142 Doty Street, P.O. Box 590
Fond du Lac, WI 54936-0590
Phone: (920) 906-2437
Email: fivesmsi-train@fivesgoup.com
Fax: (920) 906-2066
Fives Giddings & Lewis
142 Doty St
Fond du Lac, WI 54935-0560 USA
(920) 821-8400

HOTELS:

A) Retlaw Plaza Hotel
   1 North Main St
   Fond du Lac, WI 54935
   (920) 923-3000

B) Holiday Inn
   625 South Rolling Meadows Dr
   Fond du Lac, WI 54935
   (920) 923-1440

C) Comfort Inn & Suites
   77 Holiday Lane
   Fond du Lac, WI 54935
   (920) 921-4000

D) Country Inn & Suites
   121 Merwin Way
   Fond du Lac, WI 54935
   (920) 924-8800

E) Microtel
   920 South Military Road
   Fond du Lac, WI 54935
   (920) 924-4000

F) South Hills Country Club
   1175 Fond du Lac Avenue (Hwy 45)
   Fond du Lac, WI 54935
   (920) 921-3630

Fond du Lac, Wisconsin
FIVES GIDDINGS & LEWIS ENROLLMENT FORM

PLEASE PRINT ALL ENTRIES AND RETURN TO: TRAINING ADMINISTRATOR
fivesmsi-train@fivesgroup.com
PHONE: (920) 906-2437
FAX: (920) 906-2066

TYPE OF SCHOOL (CHECK ONLY ONE)

___ ELECTRICAL  ___ MECHANICAL  ___ PROGRAMMING

COURSE TITLE ________________________________________________________________
STARTING DATE ____________________________________________________________

MACHINE SERIAL NUMBER (Must be included) ______________________________________

STUDENT NAMES ____________________________________________________________
TITLE __________________________________________________________________________
DEPARTMENT NAME __________________________________________________________

COMPANY _________________________________________________________________
ADDRESS _________________________________________________________________
CITY & STATE ___________________________ ZIP CODE _________________________
CONTACT NAME __________________________________________________________
TITLE __________________________________________________________________________
DEPARTMENT NAME __________________________________________________________
E-MAIL ADDRESS ____________________________
PHONE NUMBER __________________________ FAX ____________________________

Fives Giddings & Lewis, LLC
142 Doty Street, P.O. Box 590
Fond du Lac, WI 54936-0590