

*A practical course in transmission line design software for design engineers and technicians...*

## **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

**A specialized course focusing on computer-aided design**

**July 18-22, 2005  
Madison, Wisconsin**

**November 7-11, 2005  
Madison, Wisconsin**

*Printed on recycled paper.*



**COLLEGE OF ENGINEERING  
UNIVERSITY OF WISCONSIN-MADISON**

**Department of Engineering Professional Development  
432 North Lake Street · Madison, Wisconsin 53706**

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THE UNIVERSITY  
*of*  
**WISCONSIN**  
MADISON

**COLLEGE OF ENGINEERING ■ DEPARTMENT OF ENGINEERING PROFESSIONAL DEVELOPMENT**



## **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

- Applying and using PLS-CADD software
- Terrain modeling
- Conductor design and modeling
- Structures modeling by allowable spans or full analysis
- Modeling, assessment and refurbishment of existing lines
- Interactive design of new transmission lines
- Modeling for analysis and design of wood, tubular steel, and latticed steel structures

**A practical course that applies to the design of new transmission lines and the upgrading of existing ones**

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# Computerized Transmission Line Design: PLS-CADD Hands-On Training

July 18–22, 2005 in Madison, Wisconsin

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Save time and money!  
Inquire about our on-site courses.  
Call 800-462-0876 today!

## **Learn How to Use PLS-CADD Through Computer Exercises**

The purpose of this course is to teach you how to use the PLS-CADD computer program. The course emphasizes hands-on computer modeling. Your instructor will first explain a basic transmission design concept and then demonstrate how to implement that design principle using the PLS-CADD software. Students will then execute the same design principles on their own computers. Numerous case studies will provide a range of real-life examples.

## **Benefit from Modern Computer Technology**

### **Advanced software aids transmission design process**

Advanced computer programs are available to aid the transmission design engineer in the structural and geometric design of electric power lines. Computer software also makes it possible to more easily produce related construction documents such as plan-and-profile drawings and material lists.

### **Software not always used to full potential**

While computer tools are available to greatly increase the design engineer's productivity and work quality, they are often not used to their full potential. One reason is a lack of training or understanding of modern survey techniques, proper design criteria, line behavior, structural analysis, and drafting. A second reason is an ineffective integration of these new design tools.

### **Learn how to use integrated software**

At this course you will have hands-on training on how to use advanced transmission design software that has integrated the various surveying, engineering, drafting, and material management functions. Your training will help you become proficient at using this advanced software and help you be more productive when using it in your work.

### **For Related Course Descriptions**

[http://epd.egr.wisc.edu/  
catalogs/electrical.lasso](http://epd.egr.wisc.edu/catalogs/electrical.lasso)

## **Get the Training You Need To Be More Effective on Your Job**

The purpose of this course is to teach design engineers and technicians how to use the PLS-CADD computer program. Case studies will provide real-life examples. This course will provide you with the training you need to more effectively use PLS-CADD software on your job.

## **Special Features of This Course**

- Background theory and computer exercises
- Review of basic line design concepts
- Modern integrated software
- Case studies

## **Hands-On Training...Limited Enrollment**

Because this course features intensive hands-on computer training, we limit enrollment to 20 students. Enroll early to ensure your place in the class.

## **Who Should Attend**

This course is intended for transmission engineers, technicians, and managers who are using or planning to use computerized line design tools. This includes:

- Transmission line design engineers
- Structural and consulting engineers
- Design and drafting technicians
- CAD technicians
- Surveyors

## **Computer Software Used in This Course**

The computerized design tool capabilities presented in this course will be illustrated through design examples using the programs PLS-CADD, PLS-POLE and TOWER, developed by Power Line Systems, Inc. These programs and classroom example files will be installed on each classroom computer for students to use during class. Computers will be provided in the classroom.

**Course outline inside...**

# Computerized Transmission Line Design: PLS-CADD Hands-On Training

July 18–22, 2005 in Madison, Wisconsin

November 7–11, 2005 in Madison, Wisconsin

## Course Instructors

**Dr. Alain H. Peyrot PE**, president of Power Line Systems, Inc., Madison, Wisconsin, has a broad range of experience in structural engineering and design. As a professor of civil engineering at the University of Wisconsin–Madison, he has taught courses on the design of steel, reinforced concrete and wood structures, finite elements and probabilistic methods, structural dynamics and optimization, wind and earthquake engineering, and design of transmission lines. Dr. Peyrot is the developer of the computer programs PLS-CADD, SAGSEC, PLS-POLE, and TOWER, which will be used throughout the course.

**Otto J. Lynch PE**, vice president of Power Line Systems, Inc., Madison, Wisconsin, is responsible for technical sales and development of overhead line software. An expert in PLS-CADD, he has conducted numerous seminars on its use and applications. He has designed several families of lattice steel transmission towers and has worked worldwide on transmission projects ranging from 69kV to 500kV utilizing wood, tapered tubular steel, lattice steel, concrete, and laminated wood structures. A pioneer in integrating LiDAR aerial survey data into the PLS-CADD program, he is an expert in the PLS-CADD, SAGSEC, PLS-POLE, and TOWER computer programs.

**Scott J. Piernot PE** is co-founder and vice president of Realtime Utility Engineers, a consulting engineering firm serving electric utilities nationwide with offices in Madison,

Wisconsin. He has more than 20 years of design experience in mechanical, civil and surveying disciplines. His experience in transmission line design includes new construction, 69kV through 345kV, reconductoring and retrofitting of existing lines, elevated temperature studies and the use of aerial LiDAR survey data for design work.

## Course Outline

### Monday

#### 7:30 Registration

The Pyle Center  
702 Langdon Street  
Madison, Wisconsin

#### 8:00 Welcome

John A. Raksany PE  
Program Director  
Department of Engineering  
Professional Development  
University of Wisconsin–Madison

#### 8:15 Instruction Begins

Dr. Alain H. Peyrot PE/Otto J. Lynch PE

#### 1. Overview and Terrain Modeling

- PLS-CADD system overview
- Presentation of projects
- How to organize project files
- View commands, opening of windows, viewing of phases and sags
- Needed terrain data and surveying techniques

- Prepare a terrain model
  - generate and edit feature codes data
  - import/generate and edit terrain files: XYZ or PFL models
  - digitize existing drawings

#### 1.1 LiDAR Aerial Surveying

Scott J. Piernot PE

- How to use 3-dimensional survey data
- Building design models from LiDAR data
- Identifying clearance limits and potential for clearance upgrades

#### 5:00 Adjournment

### Tuesday

#### 8:00 Instruction Continues

Dr. Alain H. Peyrot PE/Otto J. Lynch PE

#### 2. Conductor Design and Modeling

- Various conductor types
- Conductor properties: advantages and disadvantages
- Permanent deformation from overloading and creep
- Effects of high temperature on creep and strength reduction
- Conductor models in PLS-CADD
  - stress-strain charts
  - where to get conductor data
- Aeolian vibrations: how to limit
- Temperature vs. ampacity
- Line thermal rating

#### 3. Design Criteria

- Weather data
- Wind and ice loads: gust response factors, etc.
- Conductor limits of use
- Conditions for automatic sagging
- Structure loads and safety factors

- Conditions for checking clearances
- PLS-CADD/LITE: simplified PLS-CADD module
  - quick sag/tension calculations
  - various sagging methods
  - create load files for TOWER and PLS-POLE

#### 5:00 Adjournment

### Wednesday

#### 8:00 Instruction Continues

Dr. Alain H. Peyrot PE/Otto J. Lynch PE

#### 4. Structures Modeling by Allowable Spans

- Available structure models
  - allowable spans method
  - full analysis method
- Material lists, create and edit parts lists
- Create and edit allowable span structures

#### 5. Interactive Line Design

- Spot structures interactively
- String and sag conductors: demonstrate four sagging methods
- Check clearances: vertical, between phases, galloping, etc.
- Check overall design efficiency

#### 6. Generate Construction Documents

- Plan-and-profile sheets, staking lists, stringing charts, offset clipping, etc.

#### 5:00 Adjournment

## Four Easy Ways to Enroll

### Need to Know More?

Call toll free **800-462-0876** and ask for  
**Program Director:** John A. Raksany PE  
 raksany@engr.wisc.edu

**Program Assistant:** Mary Danielson  
**Or e-mail:** custserv@epd.engr.wisc.edu

### General Information

**Fees Both Courses:** Fee of \$1995 (early enrollment) covers course materials, computer for use in the classroom training, continental breakfasts, break refreshments, lunches, and certificate.

**Cancellation Both Courses:** \*This limited enrollment course requires fee payment at time of enrollment. If you cannot attend, please notify us at least 7 days prior to the start of the course, and we will refund your fee. Cancellations received within 7 days of the course start and no-shows will be charged the full course fee. You may enroll a substitute at any time before the course starts.

**Location Both Courses:** The Pyle Center, 702 Langdon Street, Madison, Wisconsin. If you must be contacted during the course, phone messages may be left for you at 608-262-1122.

### Accommodations

**July Course:** We have reserved a block of rooms for course participants (\$97 sgl/\$112 dbl) at the Campus Inn, 601 Langdon Street, Madison, Wisconsin. To reserve a room, call the Campus Inn at 800-589-6285 or 608-257-4391 by June 25 and mention this course.

**November Course:** We have reserved a block of rooms for course participants (\$95 sgl/\$105 dbl) at the Campus Inn, 601 Langdon Street, Madison, Wisconsin. To reserve a room, call the Campus Inn at 800-589-6285 or 608-257-4391 by October 15 and mention this course. Your enrollment confirmation will include other hotel/motel information.

**Continuing Education Credit** By participating in one of these courses, you will earn 3.4 Continuing Education Units (CEU).



**Phone:**  
**800-462-0876** or  
 608-262-1299 (TDD 265-2370)



**Internet:**  
<http://epd.engr.wisc.edu/webG751>

**Mail to:**

Engineering Registration, The Pyle Center  
 702 Langdon Street, Dept. 108  
 Madison, Wisconsin 53706



**Fax:**

**800-442-4214** or 608-265-3448



### Course Information

Please enroll me in **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

**Course #G918** July 18–22, 2005 in Madison, WI **Enrollment limited to 20: fee payment required at time of enrollment;** see \*cancellation policy at left

Fee: (by June 20): \$1995

Fee: (after June 20): \$2095 **Enroll Early. Save \$100!**

**Course #G751** November 7–11, 2005 in Madison, WI **Enrollment limited to 20: fee payment required at time of enrollment;** see \*cancellation policy at left

Fee: (by October 10): \$1995

Fee: (after October 10): \$2095 **Enroll Early. Save \$100!**

I cannot attend at this time. Please send me brochures on future courses.

### Personal Information (Please print clearly.)

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ Fax (\_\_\_\_) \_\_\_\_\_

E-mail \_\_\_\_\_

### Additional Enrollee

Name \_\_\_\_\_

Title \_\_\_\_\_

E-mail \_\_\_\_\_

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## Thursday

### 8:00 Instruction Continues

Dr. Alain H. Peyrot PE/Otto J. Lynch PE

### 7. Modeling of Poles and Frames by Analysis

- Overview of structure programs; PLS-POLE
- Create and edit wood, steel and concrete poles/frames
- Determining allowable spans of existing structure designs

### 8. Modeling Existing Lines, Assessment and Refurbishing

- Modeling existing lines and structures
- Assessment, reconductoring, refurbishing, etc.
- Joint use issues and modeling
- Links to SAPS and SAGSEC
  - limits of validity of ruling span concept
  - unbalanced ice, RSL after broken conductor, marker balls, structure deflection, etc.

### 5:00 Adjournment

## Friday

### 8:00 Instruction Continues

Dr. Alain H. Peyrot PE/Otto J. Lynch PE

### 9. Automatic Optimum Spotting

- Theory and examples

### 10. Steel Latticed Tower Analysis and Design

- Modeling towers in TOWER
- Joints, members, connections, tower wind load, conductor loads, etc.
- Checking and modifying older designs

### 3:00 Final Adjournment