

Design and Optimization of Overhead Transmission Lines using PLS-CADD and PLS-Tower Software

Theoretical and Practical PLS-CADD training Course General information and registration form

1 Date of course

March 23 to 27, 2009

2 Location

Best Western Ville Marie Hotel & Suites. 3407 Peel Street, Montreal, Quebec,

3 Who should attend

Engineers and technicians already using or planning to use computer software PLS-CADD and PLS-TOWER for design, optimization, assessment, upgrade and construction of Overhead Transmission Lines.

These software are currently the state-of-the-art and are the leading software in the world for design of overhead lines. For more details regarding these software, please visit our Web site www.powline.com.

4 Course outline

This course will cover the use and application of PLS-CADD and TOWER. This course also includes the theoretical basis of the engineering concepts upon which the above software is based that are widely used in transmission line design.

The course will last 5 days, during which the following aspects will be covered:

- Terrain modeling, survey data, and plan-profile
- Conductor design, modeling, and sag-tension calculations
- Structure modeling, geometry, strength, and spans
- Interactive line design and optimization
- Construction drawings and documents
- Assessment of existing lines and options for upgrade
Lattice towers modeling and optimization

The above points will be covered using practical examples and will involve active participation of trainees in order to increase the benefits of this session.

Details regarding the daily schedule are given hereafter.

5 Instructor

This course will be delivered by Mr. Elias Ghannoum, an internationally renowned expert having 38 years of experience in overhead transmission line design and an expert trainer of PLS software. He worked during 27 years with Hydro-Quebec, one of the most important transmission lines utility in the world. He was involved in design and construction of lines with voltage levels from 49 kV to 1200 kV as well as HVDC lines up to ± 800 kV.

Mr. Ghannoum is Fellow of the Institute of Electrical and Electronics Engineers (IEEE), and has received Awards from CIGRE and IEEE for outstanding contributions to technical work on transmission lines and best technical paper. He had also received the Order of Merit Award from the Canadian Standards Association for his contributions to international and national standards in lines and conductors.

He holds many titles and positions in International standard writing bodies and technical organizations such as:

- ⇒ Chairman of the International Electrotechnical Commission (IEC), Technical Committee 7 "Overhead Conductors"
- ⇒ Chairman of Working Group MT1 of IEC/TC11 responsible for updating all IEC/TC11 standards, including IEC 6-0826 "Loading and Strength of Overhead Transmission Lines".
- ⇒ Chairman of Canadian Standards Sub-Committee C22.3/RBD design responsible for CSA standard 22.3 on reliability based design of overhead lines

Mr. Ghannoum provided expertise to many international clients such as The World Bank, Electricité de France (RTE), Power Grid Corporation of India, Transelec (Chile), ESKOM (South-Africa), etc. He also lectured during 15 years a graduate course on transmission line design at the University Of Montreal, Canada.

Mr. Ghannoum is also an associate of Power Line Systems and has provided a large number of training seminars throughout the world on PLS software.

6 Language

This course is delivered in English (except if all attendees agree to French), but attendees can ask questions in French, Spanish, or Arabic. The Instructor will be available during lunch time to repeat parts of the course that were less understood by non English speaking trainees.

7 Detailed daily training program

DAY 1

Introduction of the Instructor Elias Ghannoum
Introduction of the attendees

Overview Of PLS software and evolution

Need to integrate and computerize all aspects of line design
PLS-CADD system overview
PLS Transmission Structure Programs overview
Presentation of completed projects

Terrain Data and Modeling in PLS-CADD

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
 Generate, edit or import XYZ terrain models
 Create alignments, profiles and side profiles
 Create TIN terrain models
 Break lines
 XYZ vs. user-defined data
 Filtering XYZ data
 Attach DXF and Bitmaps to plan, profile or sheet
 Generate, edit or import PFL terrain models
 Scan and digitize existing drawings

DAY 2

Conductor Design and Modeling

Various conductor types
Permanent deformation from overloading
Permanent deformation from creep
Effects of high temperature on creep and strength reduction
Effect of high temperature on aluminum in ACSR conductors
Conductor models in PLS-CADD
 Stress-strain charts
 Where to get conductor data
 Aeolian vibrations - design criteria to limit them

Temperature vs. ampacity – PLS-CADD implementation of IEEE 738
Line thermal rating
Live line rating – link to PLS-CADD

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 (loads generated using the ruling span concept)
Structure load, particularly non-uniform loads using the flexibility of attachment points of conductors
Conditions for checking clearances

Structures Modeling by Allowable Spans (Method 1)

Available structure models
Allowable spans method (Methods 1 or 2) - best for standardized designs
Full analysis method (Methods 3 or 4) - best for assessment and upgrade
Material lists, create and edit parts lists
Create and edit Allowable Span (Method 1) Structures

DAY 3

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
Modeling of lines crossing
Snap structures to surveyed attachment points

Automatic minimum cost spotting with PLS-CADD

Generate Construction Documents

Plan & Profile sheets, staking lists, stringing charts, offset clipping, etc.
Automatic generation of material lists
Export project data to other commercial databases

Files, backup and support

Project window
Backup / Restore backup
PLS site, news, forum, tech. support

Day 4

Modeling Existing Lines, Assessment and Refurbishing

Modeling existing lines and structures
Assessment, reconductoring, refurbishing, etc.
Links to SAPS
Limits of validity of ruling span concept
Unbalanced ice, RSL after broken conductor, marker balls,
structure deflection, etc.

TOWER - Steel Latticed Tower Analysis and Design

Modeling concepts
Joints, members, connections, tower wind load, conductor loads,
.....Modeling and optimizing a simple lattice tower

DAY 5

TOWER (continued)

Handling of planar joints, mechanisms, tension-only members, etc.
Checking and modifying older designs
Automatic member design
Joint transmission/ communication use of towers

Special topics

8 Acquisition of the software

Engineers can attend this course even if they have not yet acquired the subject software. The course can help them acquiring engineering knowledge in the field and understanding the capabilities provided by computer aided software PLS-CADD. For those who have not yet acquired the software, a special training version of PLS-CADD will be made available to them during the training period only.

Purchase of the software can be arranged any time; you need only to contact Elias Ghannoum for a quotation.

9 Registration

If you are interested in this course and would like to register, or would like more information on the subject, please contact Mr. Ghannoum at the address below and/or complete the registration form in this document.

Elias Ghannoum, Consultant

76 Ave. Claude Champagne
Outremont, Québec, Canada, H2V 2X1
Tel: 1-514-344 4127, Fax: 1-514-344 4724
email: elias@ghannoum.com

10 Cost

The registration fees for this seminar are 3200 \$ Can. Fees can also be paid in US \$ based on the ongoing exchange rate (approximately 2600 USD). This fee shall be paid in advance and confirmation to attend this course shall only be sent to those having paid in full this amount. This fee is not refundable, except in cases where the cancellation is received by us at least 14 days prior to the course and a replacement person is found or the course is cancelled.

This fee includes a copy of all the slides presented during the course, the morning continental breakfasts, coffee breaks, and lunches. It does not include the cost of a hotel room.

This fee also includes all applicable Canadian taxes (5% GST and 7.5% PST). Receipts will be given after receiving the payment.

Instructions for prepayment of the training fees will be provided to those registering by email.

11 Hotel details

Hotel expenses and meals other than those listed above are the responsibility of the attendees. A block of rooms is being reserved for this seminar and details will be provided during the registration process. The negotiated room rate is 145.33 \$ Can inclusive of all taxes.

12 Additional information

Please note that the number of attendees is very limited, and usually does not exceed the range of 12-15 persons in order to increase efficiency of the technology transfer. Thus registration is on a first come basis. Should the course be cancelled for reasons due to our side, full refund of the registration fees shall be made. The course will usually take place if there are at least 8 confirmed registrants.

Usually, attendees bring their own computer and the latest version of the software will be installed on these computers, to be used during the training week (each user will be handed a hardware key that will be made available during the training).

Note that Trainees can also follow the course on the screen. An LCD projector is used to image all the operations performed by the instructor, as well as a board and flip charts.

Please advise us at the earliest about your registration. Should you need any other information, please do not hesitate to contact me at the following phone number: 1-514-344 4127.

Registration sheet

Design and Optimization of Overhead Transmission Lines using PLS-CADD and PLS-Tower Software

Theoretical and Practical PLS-CADD training Course

Montreal, Canada, March 23 to 27, 2009

Name: _____

Company: _____

Complete Address:

Phone and fax numbers: _____

Email Address _____

PLS software: Please indicate if you have already purchased PLS Software, and the version of all software you have in hand.

PLS-CADD yes ___no ___ version _____

TOWER yes ___no ___ version _____

PLS-POLE yes ___no ___ version _____

Method of payment: Bank transfer _____ Date _____ amount _____

 Check or money draft ___ Date _____ Amount _____

 Certified check _____, Date _____, Amount _____

Date: _____

Signature _____

(Please return this registration form either by email to elias@Ghannoum.com or by fax to 1-514-344 4724)