# Design and Optimization of Overhead Transmission Lines using PLS-CADD and TOWER software

#### **Theoretical and Practical Training Course**

#### **Dates**

PLS-CADD training: Dec. 10 to 13, 2011

• TOWER training Dec. 14-15, 2011

#### Location

Hotel Holiday International, Sharjah, United Arab Emirates.

#### Who should attend

Engineers and technicians using or planning to use computer software PLS-CADD and PLS-TOWER for design, optimization, assessment, upgrade and construction of Overhead Transmission Lines. This software is currently the state-of-the-art in the industry and well over 1000 major companies in over 100 countries around the world currently use our software. For more details regarding the software, please visit our Web site <a href="http://www.powline.com">http://www.powline.com</a>, please visit our Web site also found on <a href="http://www.powline.com/rss/news.xml">http://www.powline.com/rss/news.xml</a>.

Many new features have been added to PLS-CADD and TOWER versions 10, thus increasing substantially their capabilities. All these improvements will be reviewed during this course for the benefit of previous and new users.

#### Course outline

The PLS-CADD course will last 4 days, during which the following aspects will be covered in details

- Terrain modeling, survey data, and plan-profile
- Conductor design, modeling, and sag-tension calculations
- Interactive line design and optimization
- Construction drawings and documents
- · Assessment of existing lines and options for upgrade

The TOWER course will last 2 days and will cover:

- Structure modeling, geometry, strength, and spans,
- load files
- Optimizing a structure
- Checking existing structures
- Generating wind and weight spans of existing transmission structure.

This course will cover in details the use and application of PLS-CADD and TOWER software. This course also includes the theoretical basis of the

engineering concepts upon which the above software is based and that are widely used in transmission line design.

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.

#### Instructor

This course will be delivered by Mr. Elias Ghannoum, an internationally renowned expert having 40 years of experience in overhead transmission line design. He worked during 27 years with Hydro-Quebec one of the most important transmission lines utilities in the world. His career involved the design and construction of lines with voltage levels from 49 kV to 800 kV as well as UHVDC lines up to  $\pm$  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 and the IEC 1906 Award for his exceptional technical work.

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"
- Past Chairman of Working Group 8 of IEC/TC11 "Loading and Strength of Overhead Transmission Lines", the Technical Group responsible for writing IEC 60826
- Current chairman of Working Group MT1 responsible for maintenance of all IEC/TC11 standards
- Past Chairman of Working Group 4 of IEC/TC7 "Aluminum and Aluminum alloy stranded Conductors
- Chair of the Canadian Standards Subcommittee C22.3 responsible for OHL standards based on reliability principles.

Mr. Ghannoum was chief transmission Engineer for Hydro-Quebec during 20 years before starting his own consultancy practice in 1997. He provided consultancy services to many international clients such as The World Bank, Electricité de France (EDF/RTE), ESKOM, Power Grid Corporation of India, Transelec (Chile), Manitoba Hydro, etc. He also lectured during 15 years a graduate course on transmission line design at the University of Montreal (Polytechnique), and currently lectures special transmission courses at this university.

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

6-day Training course on Theoretical and Practical aspects of PLS-CADD and TOWER

## **Detailed Daily 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

Multiple alignment options

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

#### Design criteria

Weather data

Wind and ice loads - gust response factors, etc.

Conductor tension limits

Conductor and tower automatic loading based on international standards such as IEC 60826, CENELEC EN50341, ASCE 74, etc.

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

#### PLS-CADD/ LITE - simplified PLS-CADD module

Quick sag/ tension calculations

Illustration of various sagging methods

Create load files for structures modeled with TOWER, PLS-POLE and PLS-CADD

Clearance between lines

Loads on towers with many cables attached in various directions

#### 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 points

#### **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

#### <u>Day 4</u>

### 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.

#### Automatic minimum cost spotting with PLS-CADD

#### DAY 5

### **TOWER - Steel Latticed Tower Analysis and Design**

Modeling concepts
Joints, members, connections, tower wind load, conductor loads, etc.
Handling of planar joints, mechanisms, tension-only members, etc.
Checking and modifying older designs
Automatic member design
Joint transmission/ communication use of towers

#### DAY 6

Batch modification of structures
Batch structural analysis and compilation of results
Determining allowable spans of existing structure designs
Link of POLE and TOWER structures with PLS-CADD
Generating structure loads using PLS-CADD

#### Special topics

# Registration to the training course

#### **Date**

December 10 to 15, 2011

#### Location

This 6-day training session will take place in the Holiday International hotel Sharjah, UAE (hotel and personal expenses are the responsibility of trainees).

## Registration

If you are interested in this course and would like to register, or would like more information on the subject, you will find all the necessary details at the end of this document. You can also contact Mr. Ghannoum at the address below if you need more information about this course. Please note that the number of attendees is generally limited to about 15 participants in order to maximize the transfer of knowledge.

It is possible to register for either to the complete 6-day course (PLS-CADD and TOWER) or to the 4-day PLS-CADD course. Registration to the 2-day TOWER course alone can also be accepted pending on available space.

The registration fees per person for this seminar are the following: 3600 USD for the 6 day course (PLS-CADD and TOWER). 2800 USD for the 4-day PLS-CADD course 1600 USD for the 2-day TOWER course

This price includes buffet lunch at the hotel as well as two coffee breaks with juice and snacks per day.

<u>Prepayment of the training course is required</u>. Details about modes of payment and bank transfer will be sent to all persons who register. The registration will not be considered final unless full payment is received.

Trainees are required to check if visas are required for them to enter the UAE and to make the required applications. Please note that no refunds will be made if any trainee cannot attend the course for personal reasons or for visa problems. Visas are the responsibilities of the trainees and those attending the course should consult with the UAE consulates for conditions. The Hotel can also help to obtain a UAE visa against the payment of a fee, but the Consultant cannot be held responsible for any problems that may occur if a visa is rejected.

## **Hotel details**

Hotel expenses and meals are the responsibility of the attendees, except for lunch and coffee breaks during training days.

The seminar will be held at the hotel Holiday International, Sharjah, UAE. Reservations shall be made by the trainees directly with the hotel. Please refer to 'Ghannoum Seminar' when reserving in order to get the agreed rates:

- Single room @Dhs 375/- on Bed & Breakfast Basis at Oasis Restaurant per room per night.
- Double room @Dhs 425/- on Bed & Breakfast Basis at Oasis Restaurant per room per night

Hotel contact person:

Mrs Saida Majdi
Hotel Holiday International
P.O. Box 5802 Sharjah,UAE

Mob +971 50 108 7 553

Tel +971 6 573 6666 Ext. 4103

Fax +971 6 572 5060/+971 6 572 5443 e-mail: smajdi@hhi.ae /reservation@hhi.ae Website: www.holidayinternational.com

Location: Hotel Holiday International is situated on edge of Sharjah's Khalid Lagoon-a mere 20 minutes drive from Sharjah souk(market)-shopping malls and near to the exhibition centre-Expo and beautiful corniche.

# Additional information

Please note that the number of attendees is limited (usually about 15) persons in order to increase efficiency of the technology transfer. Thus registration is on a first come basis. Once this number is reached we will not be able to accept any new registration. Should the course be cancelled for reasons due to the lecturer, full refund of registration fees shall be made to all registrants.

If you have not yet arranged to purchase the software, we will gladly take care of the same, being the PLS agent in the area. Purchased software can be delivered to the purchaser during the training session and installed on the purchaser computer. Thus payment for the course and software can be combined.

Attendees should bring their own laptop computer and the latest version of the software will be installed on these computers, to be used only during the training week (each user will given a hardware key for use during the training session). Note that Trainees who do not have access to a laptop, can follow the course on the screen (I will be using an LCD projector that will image all the operations on my own laptop), as well as a board and flip charts. Alternatively, laptops can be rented in many locations in Sharjah.

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

## **Registration sheet**

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

# Theoretical and Practical Training Course Sharjah(UAE), Dec. 10 to 15, 2011

Name:	<del>-</del>
Company:	
Registration for PLS-CADD TOWER	
Complete Address:	
Phone and fax numbers: Phone:	Fax:
Email address	
PLS software: Please indicate if you have alread and the version of all software you have in hand.  PLS-CADD yesno version  TOWER yesno version  PLS-POLE yesno version	dy purchased PLS Software,
Method of payment: Bank transfer Da	te amount
Check or money draftDateAmount	
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)