



TSCONNEX

STRUCTURAL ANALYSIS SOFTWARE FOR ANGLE LEG SPLICES

USER'S MANUAL

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Chapter 1 INTRODUCTION

TSConnex is a general computer program for the analysis and design of splice connections of angle legs for communication towers. Towers can either have triangular or square cross sections. The program will solve using the American codes TIA/EIA 222-F, TIA/222-G and the Canadian CSA S37-01. Capacity assessments follow the applicable codes.

HARDWARE REQUIRMENTS

The following minimum system requirements to run TSConnex:

- An IBM compatible PC equipped with a Pentium processor running under Windows 2000, or XP
- 5 MB free disk space
- 256 MB RAM
- 14 inch SVGA monitor with (800 x 600 min resolution)
- A pointing device, a mouse or graphical tablet configured to work under windows.
- An optional printer that is set from windows

INSTALLING TSCONNEX

The TSConnex installation is initiated from windows. From start menu choose run, and choose file setup.exe

The setup program will create a TSConnex directory on the hard drive at a location designated by the user. The user may change the name of the folder in which the program will copy all necessary files required to run TSConnex.

Choose the folder name and click OK, the installation program will copy all necessary files into the different directories of your system. Follow the program instructions and place the subsequent disks into the disk drive.

At the end of the installation the program will notify you that the installation was completed successfully. Refer to the purchasers agreement regarding the number of authorized users allowed to run the program.

DISCLAIMER

Extensive care has been taken during the development and testing of TSTower program to ensure that both the source code and the underlying engineering principles comply with standard engineering practice. Should any discrepancies or possible program errors occur, please notify TowerSoft immediately.

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User's comments and suggestions are welcomed. Please forward all your comments to support@towersft.com.

Chapter 2 INPUT

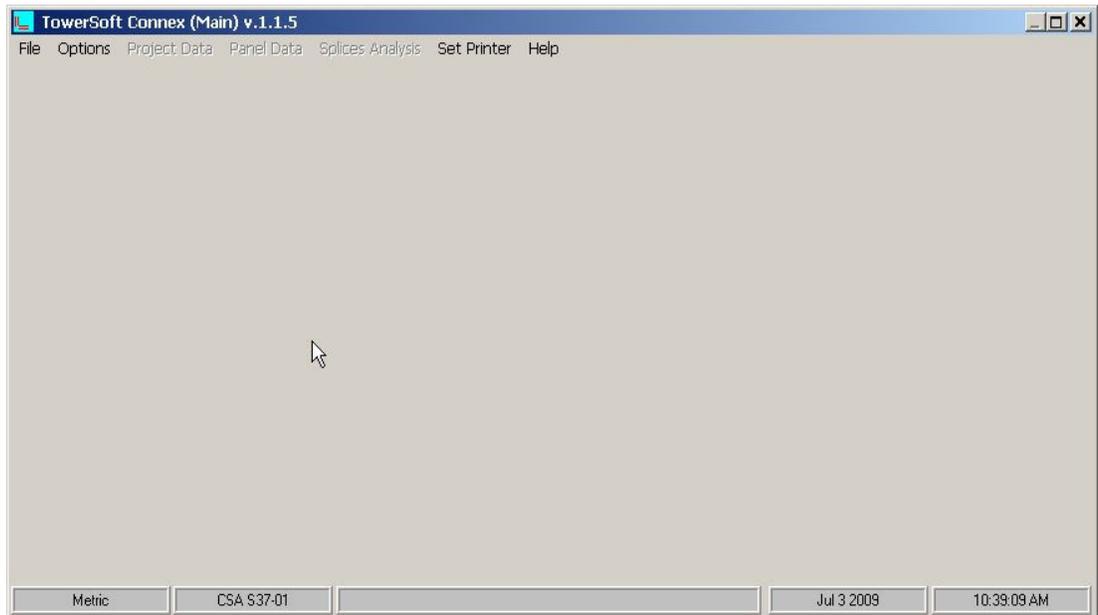
TSConnex is an analysis software program. The user inputs all the necessary information required to perform the splice analysis, the analysis program is run, and the results are shown in a tabular and graphical format on the screen.

For design purpose, the user decides on a tentative geometry and performs an analysis. The user examines the results of the preliminary selection and modifies any of the design parameters before reanalyzing the splice. Using successive runs, the user can quickly arrive at an optimum solution. The designer makes the choices, interprets the output and has full control on the design process.

This Chapter illustrates how *TSConnex* works by explaining the input screens. The input values and screens are shown on the figures in this chapter utilizing an example. This example may not use all the features of the software, however it gives the user a quick introduction to the main features and the use of the program. Features available in the program that are not used for this example are explained in the context.

START THE PROGRAM

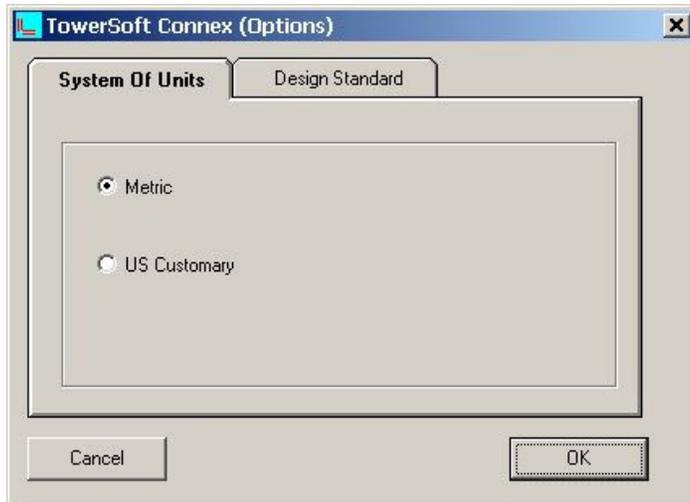
When TSConnex starts, the main screen shows a blank page.



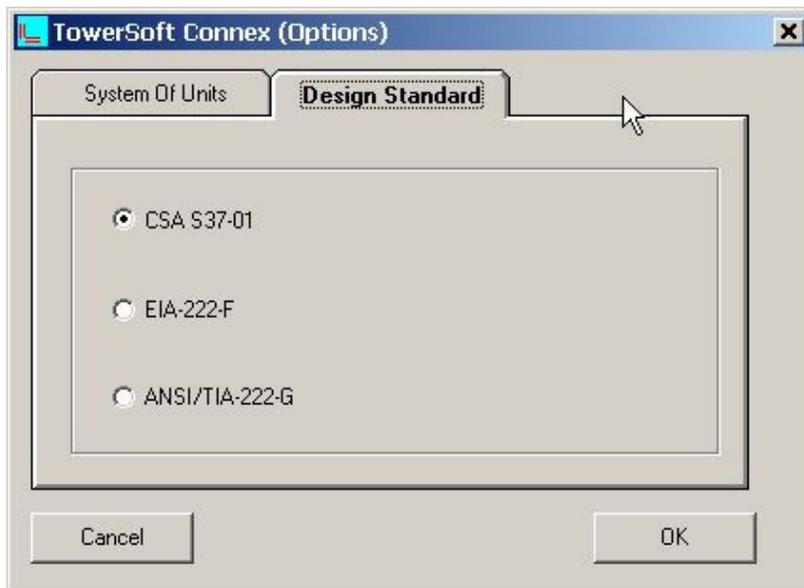
Note the status bar at the bottom of the windows showing the following data in order:

- 1- The current mode of units (metric or US Customary)
- 2- The applicable code of design (CSA S37-01, EIA 222-F, ANSI/TIA 222-G)
- 3- The problem file name, and path

Select **Options** from the main menu and from the list choose the required code and the system of units.



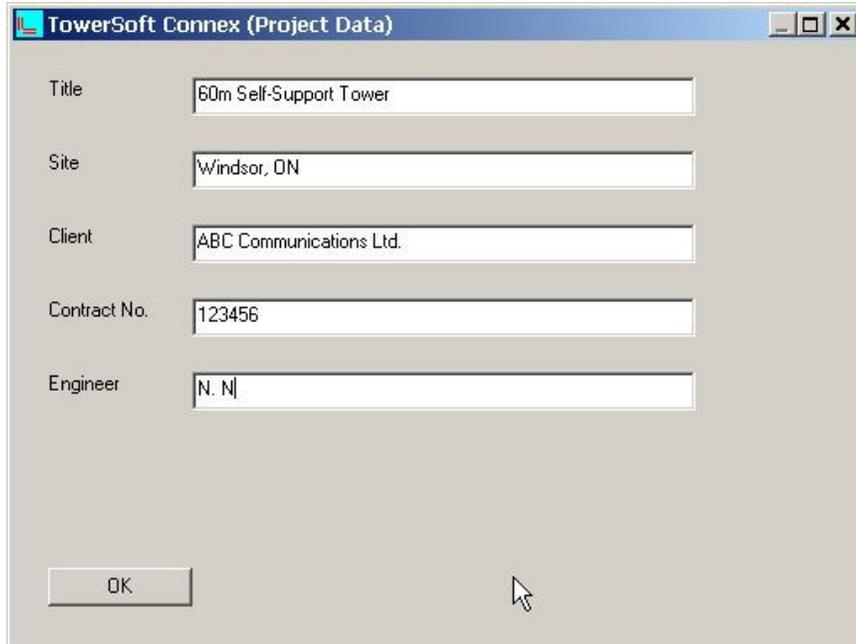
Selection of units



Selection of design standard

PROJECT DEFINITION

Select **Project Data** from the **Options** menu. Type in any identification data required as shown.



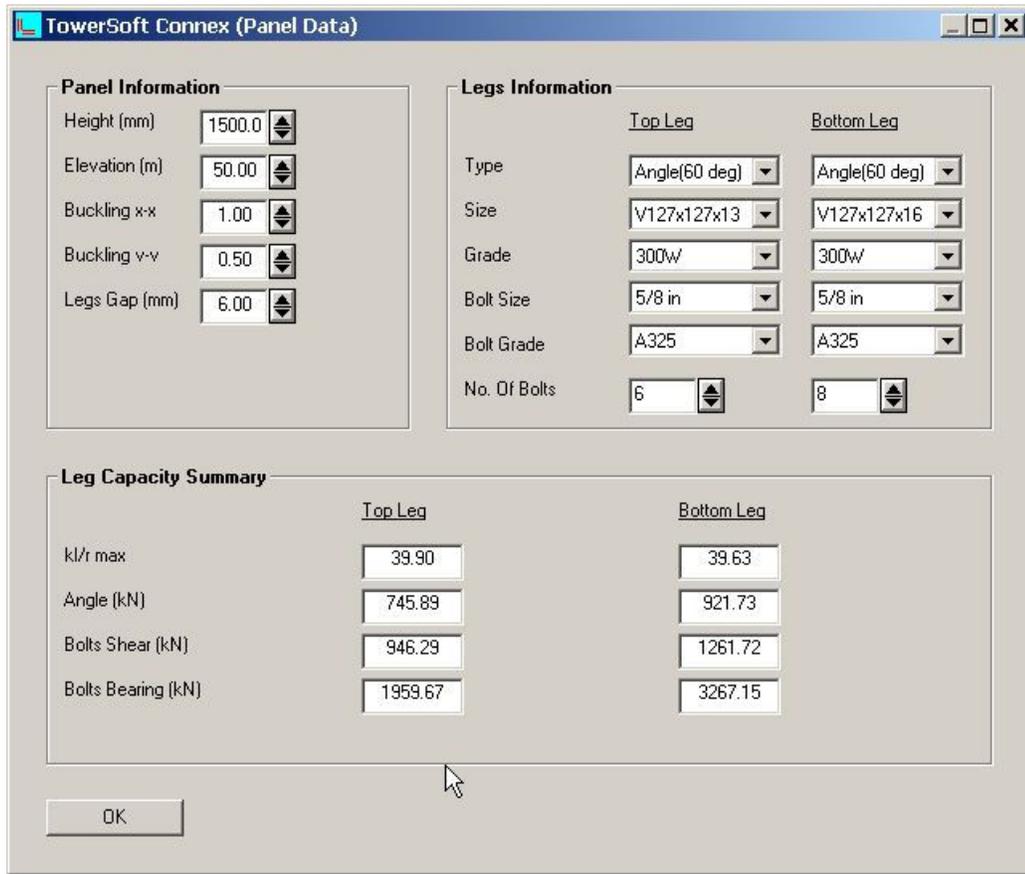
The screenshot shows a Windows-style dialog box titled "TowerSoft Connex (Project Data)". It contains five text input fields, each with a label to its left:

- Title: 60m Self-Support Tower
- Site: Windsor, ON
- Client: ABC Communications Ltd.
- Contract No.: 123456
- Engineer: N. N

An "OK" button is located at the bottom left of the dialog box. A mouse cursor is visible over the "Engineer" field.

To add data to any box, move the cursor into the box, click inside the box and type in the data using the keyboard. To change any existing data in an edit box, delete the entry using the key or the <Backspace> key. Alternatively, highlight the existing characters by pressing and dragging the left mouse button, then type over the existing entry. This is a standard Windows feature.

PANEL DATA DEFINITION



Panel Information Definitions:

Height Height of panel for determination of leg's buckling length
 Elevation Elevation of the panel above tower base
 Buckling x-x K factor for slenderness due to L / r-xx
 Buckling v-v K factor for slenderness due to L / r-min
 Legs Gap connection Gap between top and bottom leg in the splice

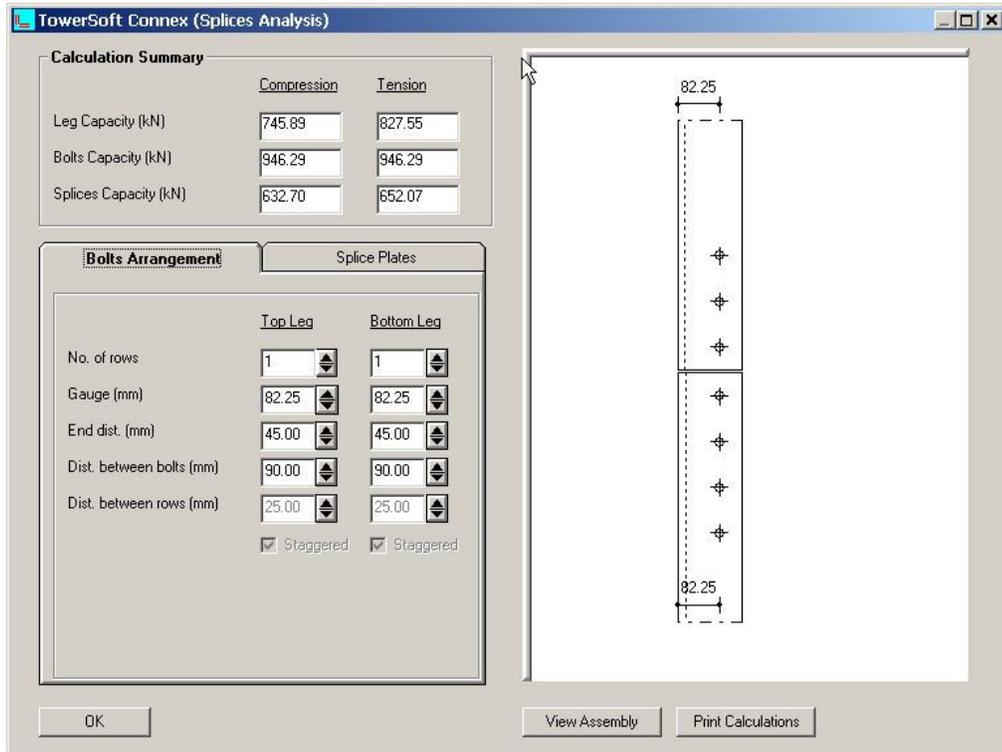
Legs Information Definitions:

Type Leg size selected from database table (either 60 deg. or 90 deg. angle)
 Size Angle size selected from database table
 Grade Grade of leg's steel selected from database table
 Bolt Size: Size of bolt selected from database table
 Bolt Grade: Grade of bolt selected from database table
 No. of Bolts: Number of bolts selected from combo box

Leg Capacity Summary is calculated and displayed. It reflects changes made by User in both Panel and Leg data.

Chapter 3 ANALYSIS

Bolts Data

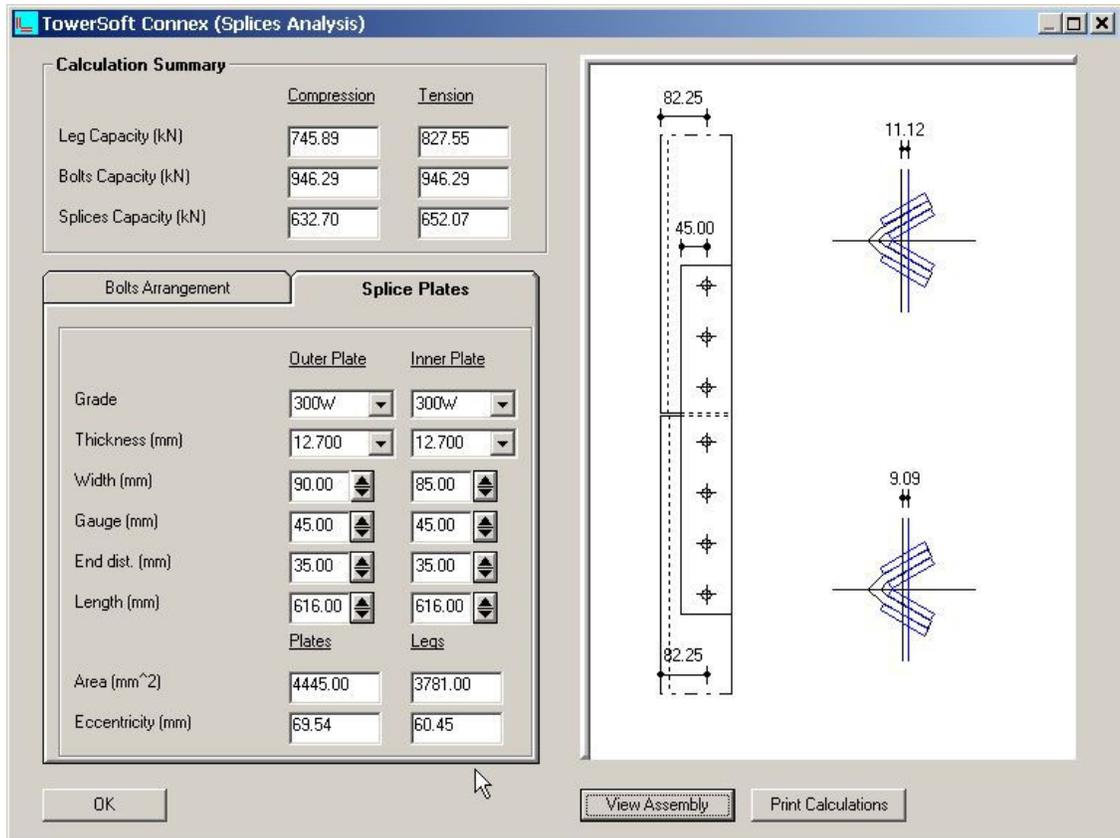


Number of Rows	One or two
Gauge	Distance from the heel of the leg to first row of bolts
End dist.	Distance from the first bolthole to the gap between legs
Distance between bolts	Distance between bolts of the same row
Distance between rows	Applicable for more than one row of bolts

Note: The User entries above are controlled by the program, which imposes certain minima and maxima as dictated by general rules of bolt connections.

Default view of the splice plates is as shown above. In order to view Assembly click on "View Assembly" button and the view changes as shown below.

Assembly View



After the entries are completed the input can be saved in a file stored on the hard disk. Please select File/Save from the main menu and enter the file name. The extension is always ".tsc".

ANALYSIS THEORY

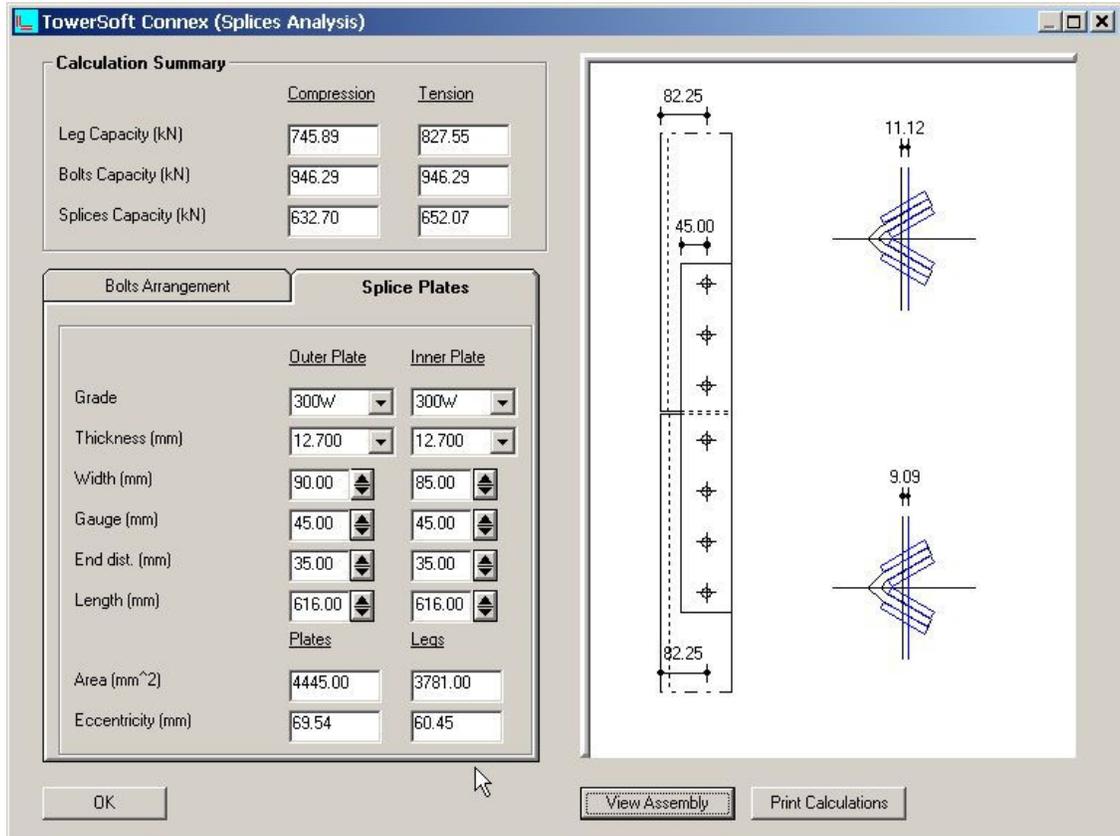
The splice connection analysis is based on applicable formulae from relevant standards (ANSI/TIA-222-G, EIA-222-F and CSA-S37-01). The program calculates capacities of legs, bolts and splice plates both in tension and compression.

Calculations and Assumptions

1. The splice capacity is calculated based on the difference between the center of gravity of the legs and the splices plates group. The additional induced moments in the splice plates due to the eccentricity between the leg member and the splice plates group are accounted for in the calculations.
2. The tension capacity of the splice is calculated based on the governing capacity of bolts, yield, or rupture at net cross section area or block shear calculation of the member and/or splice plates.
3. The compression capacities of the legs are calculated based on the grade of steel, the un-braced length (panel height).
4. Bolts are assumed to have the threads excluded from the shear planes.
5. The governing leg capacity, bolt capacity or plates capacity are calculated and shown for comparison.
6. The tower legs are assumed to be subjected to axial loads only.

Chapter 4 OUTPUT

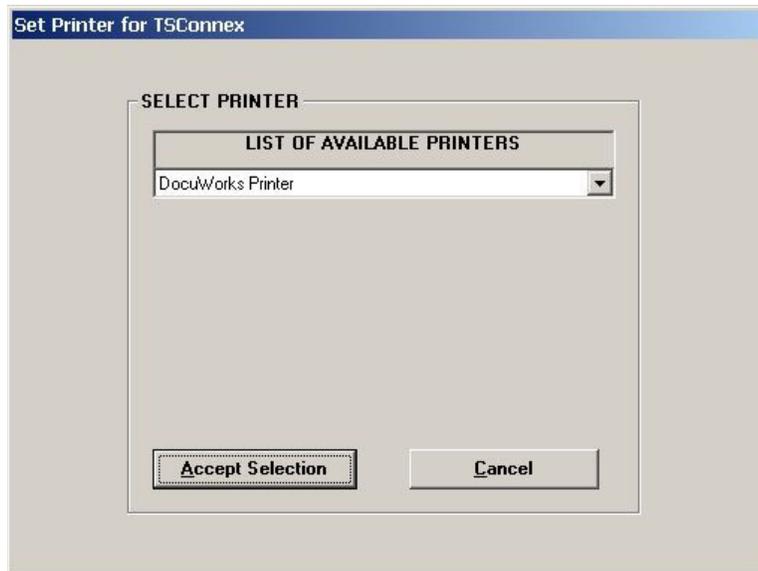
Printout



Print Calculations will output the data entered and splice analysis calculation results to the selected printer.

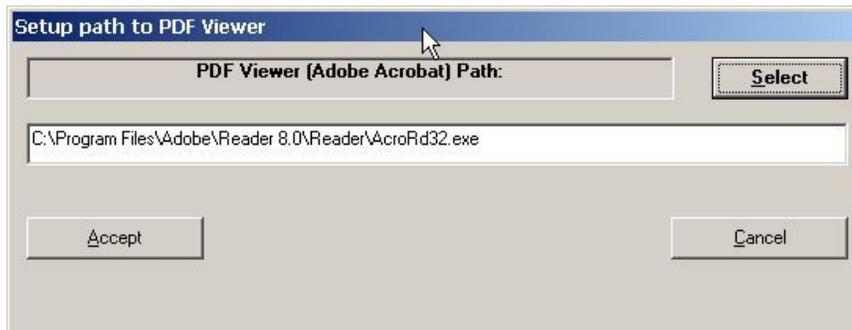
Chapter 5 SETUP

SET PRINTER



Select printer for the analysis output from the list.

SELECT PDF VIEWER



Click on "Select" button. A browser will appear allowing you to select the path to executable file capable of reading PDF files (typically Adobe Reader). This selection is necessary to use the TSConnex User manual (available in Help menus selection).

LICENSE RENEWAL FORM (LICENSE REQUEST FILE)

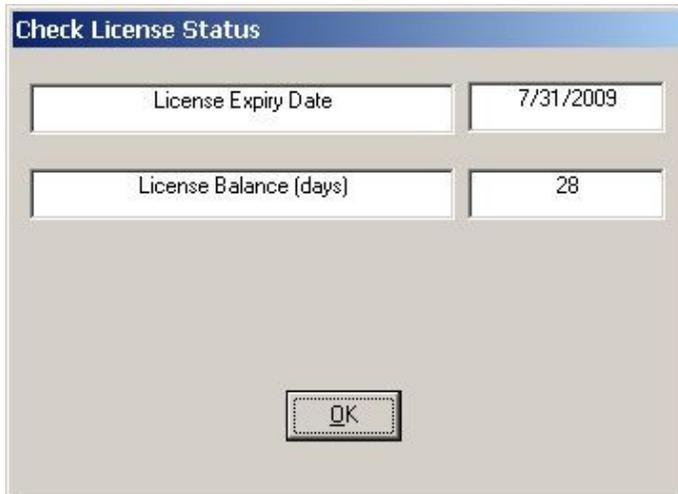
The screenshot shows a dialog box titled "TSConnex Program License Renewal Form". It contains two input fields: "Enter Company Name:" with the value "ABC Consulting Inc." and "Company Location" with the value "Mississauga, ON, CANADA". Below these fields is a section titled "You agree with the following Terms and Conditions when submitting the request for new license or for license renewal." This section contains a text area with the following disclaimer text:

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Below the text area is a paragraph of instructions: "After you click on Generate Request File button the program will create file 'TSCnLicReq.txt' in the application folder C:\Development2\TSConnex. Please, send e-mail with your request and attach the above mentioned file to it."

At the bottom of the dialog box are two buttons: "Generate Request File" and "Cancel". A mouse cursor is pointing at the "Generate Request File" button.

Fill in the requested entries: Your Company name and Company location as illustrated above and click on "Generate Request File". Attach the request file "TSCnLicReq.txt" to an e-mail sent to TowerSoft. Your License file (new or license renewal) will be sent back to you.

CHECK LICENSE STATUS

Check License Status	
License Expiry Date	7/31/2009
License Balance (days)	28
OK	

This will show you the expiry date and balance days for your license.

USER MANUAL

User Manual is available from Menu "Help/TSConnex User Manual".