



PADEE Electric Power Distribution Network Analysis, Design and planning in low and medium voltage based on CAD-CAE-GIS SOFTWARE

This Tool is for Designing, Planning, Operation, Maintenance, Loss Reduction and Inventories in distribution networks systems, it is mostly used by utilities and consultants who work in Electric Power Distribution Systems. It analyzes the medium voltage, Low voltage and Customers systems under in consolidation software.

This Software takes the electric data directly from distribution networks maps in CAD and analyzes them (running a load flow analysis), placing the results directly on maps automatically and interactively.

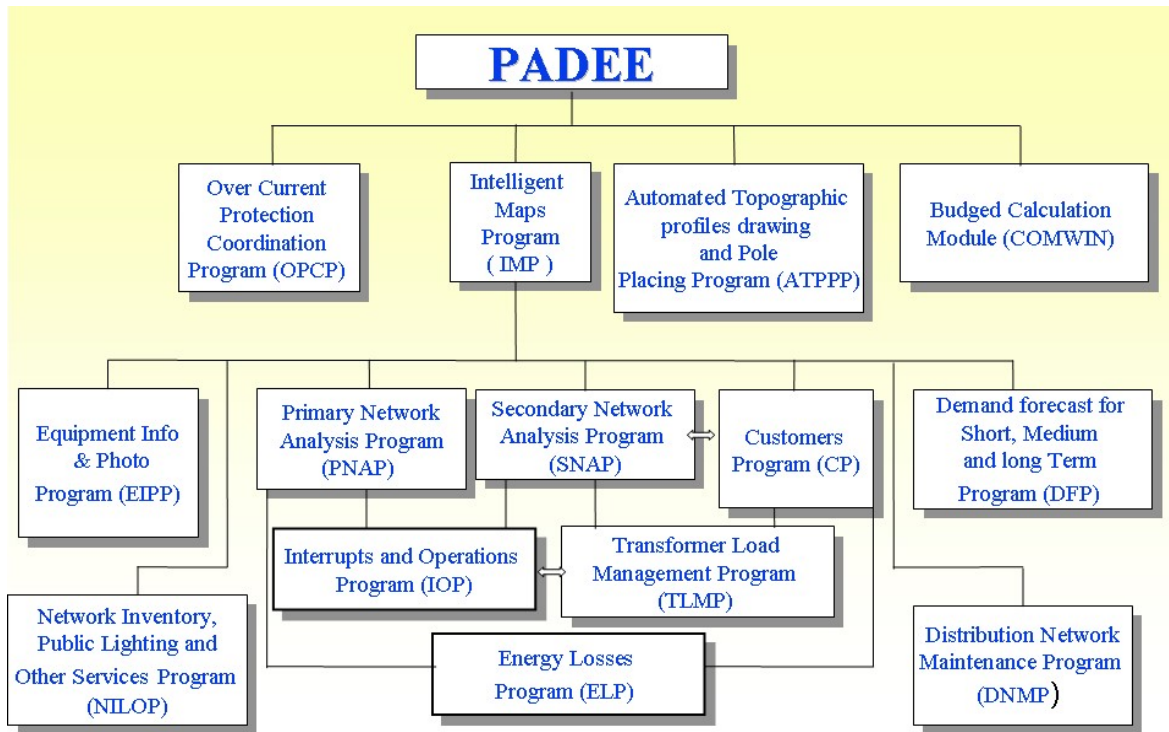
Power Distribution Networks Program (PADEE 2025) software uses ZWCAD Front – End, over Windows Vista, WIN 7, WIN 8, Win 10 or Win 11) to perform load flow calculations, analysis on electric distribution networks.

It is also an information system to support works and Customer location and behavior. It uses CAD - CAE (Computer Aid Design) – (Computer Aid Engineering) and GIS (Geographic Information System), technology so all activities are carried out graphically, inside the electric feeder map in CAD.

Inputs for calculations are taken automatically and the output is presented over the map, with color graphics or signs that highlight the most relevant aspects of the analysis. The detailed results can be printed out.

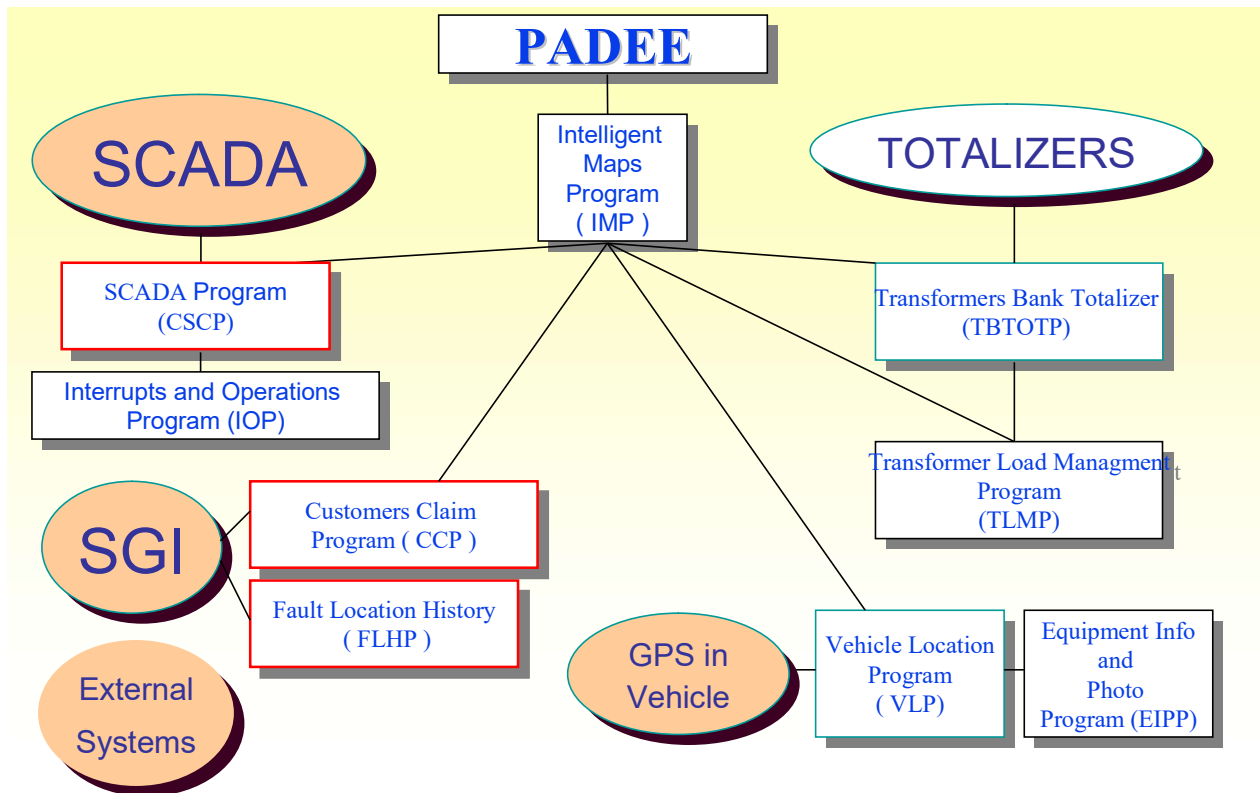
This software makes load flow calculations in medium and low voltages systems, and link customers directly to medium voltage substation, so customers can be located geographically and traced up to their feeder's or substations in forward or backward queries.

The next figure presents PADEE basic modules.



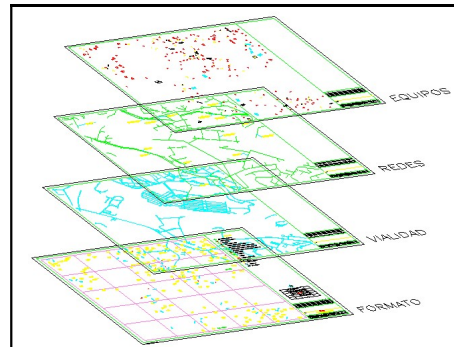
Please see more information at <https://padeepro.com/padeeing.html>

There are some other higher end modules that require custom made interfaces for each individual Utility, which must be made at additional cost. These modules are shown in the following figure.

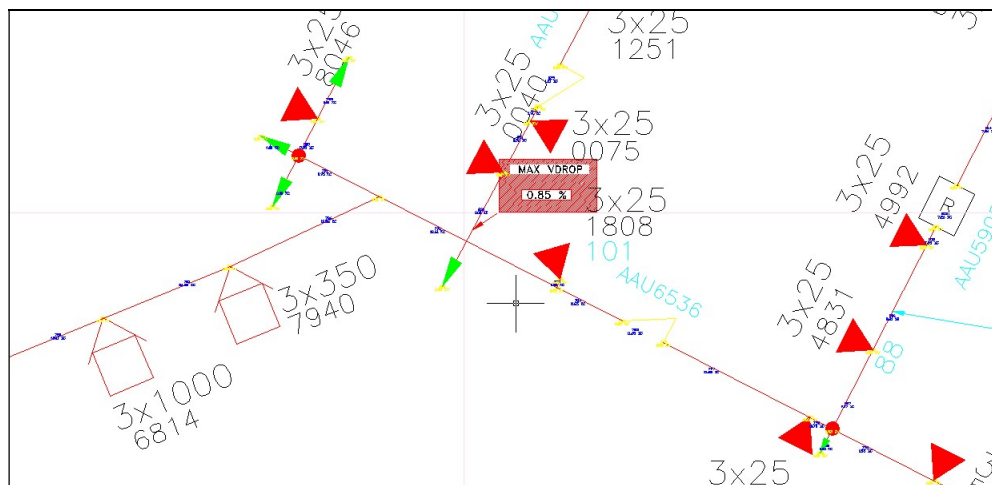


All these packages or modules are described below:

- **Intelligent Maps Program (IMP).** Contains standards symbols (blocks) and layers specification to make maps and all the networks' drawings. These programs help users to draw maps systematically and standardized making them easily to analysis program to get the input data in an automatically way. It has automated libraries; to enter symbols and filters to avoid any possible data enter error, which aids the maps drawing step. Also, the user's manual explains how everything is done. It introduces the data to use GIS technology and easily locate every network element



- **Primary Network Analysis Programs (PNAP).** It calculates voltage drop, losses, short circuit levels and reactive compensation optimization on medium voltage feeders. It has intelligent algorithms to build the topology of the circuit based on the graphic conventions or drawing standards without the intervention of users. There is a demo video on this link https://padeepro.com/parp_en.htm



- **Secondary Network Analysis Program (SNAP).** Makes load flow for voltages drop, loads in conductors, losses on low voltage distribution network (secondary network). It also creates additional files to link the customers affected by the disruption of service with the distribution transformer bank outage, parts off feeder or complete feeder outages. The output can be directly on CAD but also printed reports. See a demo video on this link https://padeepro.com/pars_en.htm

LOW VOLTAGE NETWORK ANALYSIS									
SECTOR CODE: AAA6428MUM		CITY: MUMBAI		MAP: AAA		BANK CAP: 1437.5 Block Reference			
NOMINAL V.: 208/120		P.F.: 0.80		Ing. y Const. MATMOR, C.A. Cold- <input type="checkbox"/> White					
NODE No.	LOAD KVA	VOLTAGE (Vpn)	% V	SECTION INI-END	CONDUCTOR	LONG. (M)	AMP (A)	LOAD (KVA)	LOSSES (W)
1	4.45	117.73	1.96	1- 2	4# 1/0 ARV	40.60	77.14	27.79	134.76
2	3.97	115.32	3.97	2- 3	4# 1/0 ARV	38.20	77.14	27.79	134.76
3	8.55	113.33	5.63	3- 4	4# 1/0 ARV	37.90	53.40	19.24	64.10
4	4.12	111.97	6.76	4- 5	4# 1/0 ARV	59.40	41.97	15.12	62.04
5	14.02	110.29	8.16	5- 6	4# 1/0 ARV	31.10	3.05	1.10	0.17
6	1.10	110.22	8.21	6- 7	4# 1/0 ARV	30.20	0.00	0.00	0.00
7	0.00	110.22	8.21	8- 9	4# 1/0 ARV	41.50	77.19	27.81	146.65
8	0.00	118.24	1.54	9-10	4# 1/0 ARV	28.00	64.81	23.35	69.75
9	3.56	116.08	3.34	10-11	4# 1/0 ARV	36.80	41.97	15.12	38.44
10	8.23	114.85	4.36	11-12	4# 1/0 ARV	28.80	41.97	15.12	30.08
11	0.00	115.81	5.23	12-13	4# 1/0 ARV	30.00	28.67	10.33	14.63
12	4.79	113.00	5.90	13-14	4# 1/0 ARV	37.60	10.41	3.75	2.42
13	6.58	112.42	6.39	9-15	4# 1/0 ARV	18.30	2.50	0.90	0.07
14	3.75	112.15	6.61	16-17	4# 1/0 ARV	31.60	48.21	17.37	43.56
15	0.90	116.05	3.37	17-18	4# 1/0 ARV	39.50	40.77	14.69	38.94
16	1.00	118.79	1.08	18-19	4# 1/0 ARV	39.40	26.90	9.69	16.90
17	2.68	117.76	1.94	19-20	4# 1/0 ARV	43.20	26.90	9.69	18.53

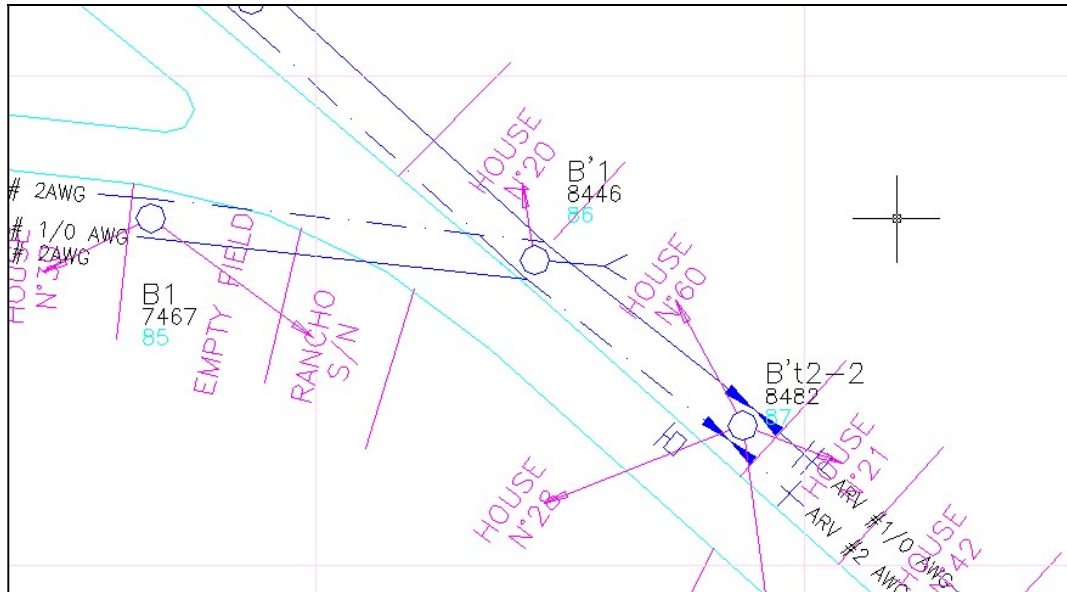
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SECTOR CODE AAA6428MUM CONTINUATION									
NODE No.	LOAD KVA	VOLTAGE (Vpn)	% V	SECTION INI-END	CONDUCTOR	LONG. (M)	AMP (A)	LOAD (KVA)	LOSSES (W)
18	0.83	116.67	2.84	18-21	4# 1/0 ARV	27.20	11.57	4.17	2.16
19	0.00	115.96	3.44	0- 1	4# 1/0 ARV	34.80	100.51	36.21	208.47
20	9.69	115.18	4.09	0- 8	4# 1/0 ARV	35.60	77.19	27.81	125.80
21	4.17	116.46	3.02	0-16	4# 1/0 ARV	37.90	50.99	18.37	58.43

TOTAL LOSSES (W) 1263.03

TOTAL LOAD WITHOUT S.L. (EVA) 82.39 + 4.60 = 86.99 LOAD = 231.97 %
 MAXIMUM VOLTAGE DROP (%) 8.21
 MAXIMUM AMP DROP NODE 7
 MAX CURRENT (A) BETWEEN NODES 100.51
 MAX LOAD IN SECTION 44.67 %

- **Customers Program (CP)**, allows the connection/link of customers or subscribers data with the electrical system structures or poles, allowing obtaining the billing data and energy sold, located at each point in the network grid. It also works as an information system to support the customer's location (applications and claims) and / or routes of meter reading collection, analysis and characterization of energy consumption by loading zone types, and others. It uses SQL command to query customer database. This module complies with the first step to smart-meters technology implementation.

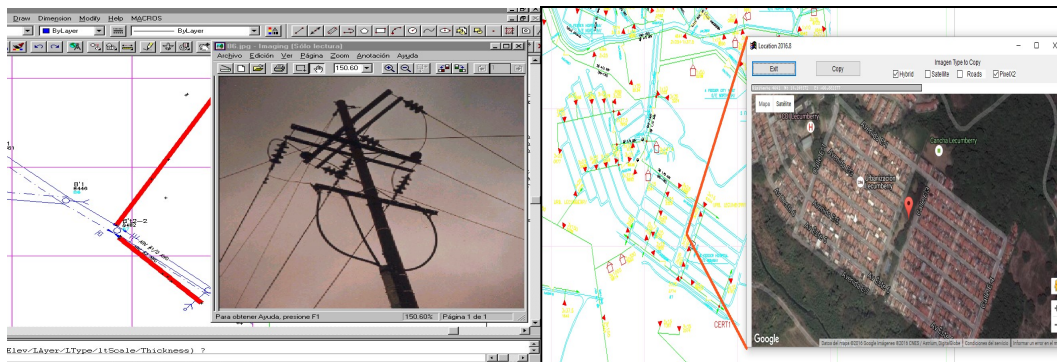


- **Transformer Load Management Program (TLMP)** has dual function, one is summation of energy served by a transformer bank, totalizing the output energy, convert it to demand and get load levels vs the maximum capacity, resulting in an important distribution transformers loading monitoring (TLM) in banks that have no other kind of measurement.

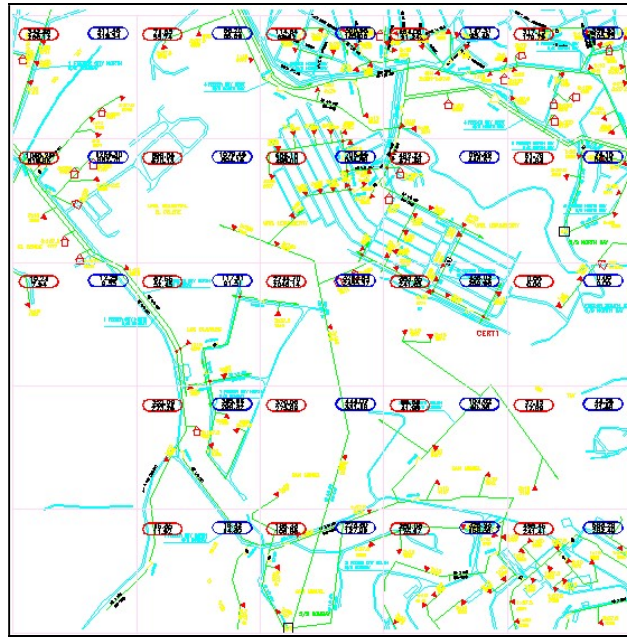
The other function is let the engineers input a metered demand recorded in the field to verify or establish the conversion factor energy-demand. This option allows a very important analysis for the detection of non-technical energy losses, because compare the billed energy with the theoretical energy dispatched by the transformer bank.

Licensed to: CORPOELEC		FACTOR K 0.00239		MUMBAY				
TRANSFORMERS BANK LIST				Pag. 1				
TRANSFORMER No	CAPACITY (KVA)	ENERGY (KWHR)	CALC. DEMAND (KVA)	MES. DEMAND (KVA)	CALC. ENERGY (KWHR)	ENERGY DIFF. (KWHR)	% LOAD	
AAA2980	30.00	13798.01	32.98				109.92	LOAD GREATER THAN 90
AAA6428	37.50	1283.33	3.07				8.18	LOAD LESS THAN 10 %
AAA6428	37.50	28436.17		40.00	16736.40	11699.77	106.67	LOAD GREATER THAN 90
AAA7867	45.00	3581.34	8.56				19.02	
AAN1808	112.50	2261.67	5.41				4.80	LOAD LESS THAN 10 %

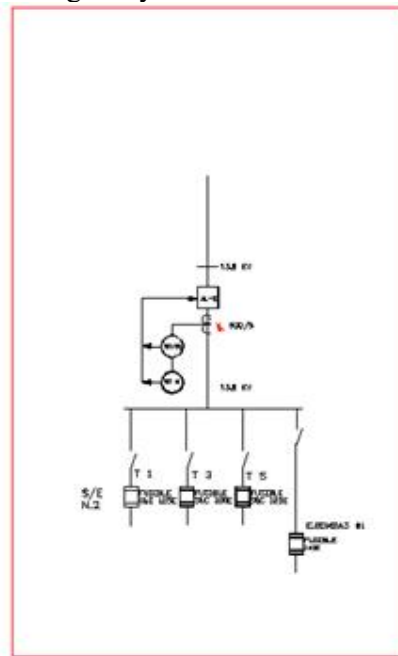
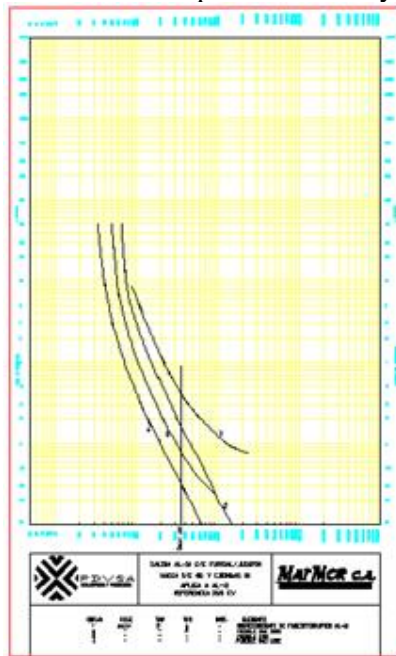
- **Equipment Information and Photo Program (EIPP):** This module allows link any maps element to any multimedia file. For example, photos of equipment, measured records, thermo vision videos, diagrams or details, other one-line diagram in other CAD files, etc. It also brings Google maps to have a view of customers type serves by the network, and could find street's name not available in the network maps but are in the Google maps. Please see demo. https://padeepro.com/gmapgstr_en.htm



- **Demand Forecast for Short, Medium and long Term Program (DFP)** This module helps in the demand spatial allocation for the grid. Takes the load of regular areas, totalize the demand for distribution transformers of each regular area and produce an Excel file with the loads. The load for each regular area are processed with Excel using whatever mathematical analysis of demand forecasting you prefer, then performs the reverse process, allowing to allocate the load depending on the areas with more possibilities to grow. After the mathematical analysis produce the spatial load forecast results and the values are incorporated into the network, in each regular area in proportion to the installed capacity. The Users Manual presents a typical example using “Land Use Based methodology” to calculate demand forecast, but users can developed other methods with the help of this module. The resulting demand file per regular area can be read by Microsoft Excel or another spreadsheet, allowing the user to perform any calculation or using any kind of extrapolation formulas and to add new EV loads or PV generation.



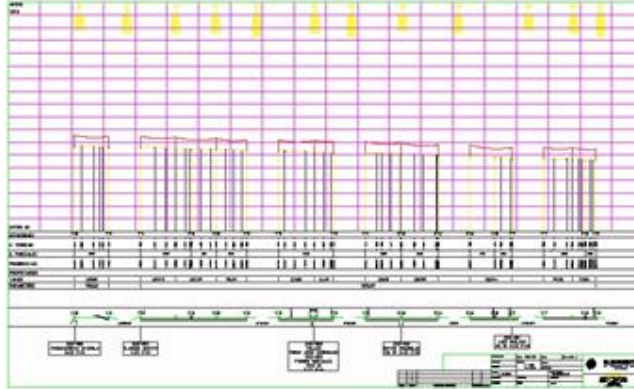
- **Overcurrent Protection Coordination Program (OPCP)** This module is a tool to draw log-log curves for overcurrent protections coordination. Contains a series of data curves of multiple relays and fuses used for overcurrent coordination, plus the electronic relays. It has special help tools easily make One-Line diagrams of the system associated with protection study through automated libraries of symbols, and also has simple short circuit levels calculations of the portion of the systems being study.



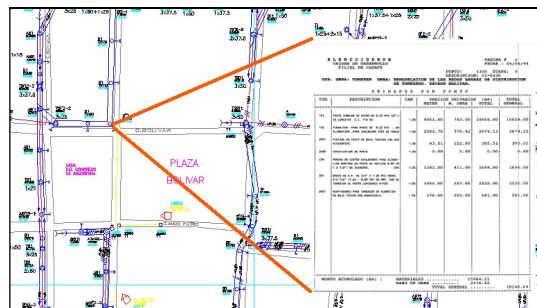
- **Automated Topographic profiles drawing and Pole Placing Program (ATPPP)** Its function is to calculate and draw the topographic profile for distribution power lines, it uses the topographic survey book typesetter to make the draw in AutoCAD. It also offers all the tools, to draw catenaries curves for manual placing of poles or supports structures.

This module consists of several programs for each of the sub-activities performed: data capture module of the surveyor's book, module calculation of books, drawing module topographic profile, placement of structures, drawing catenaries, subscriber ID, Automatic Data Collection for the poles location, and program for calculating weigh, medium a fictitious span (weight span), sag and tension resulting from pole placing.

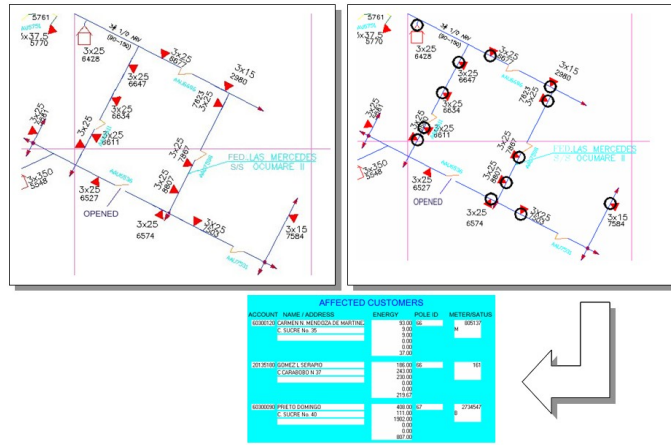
For more information visit https://padeepro.com/pptl_en2.htm



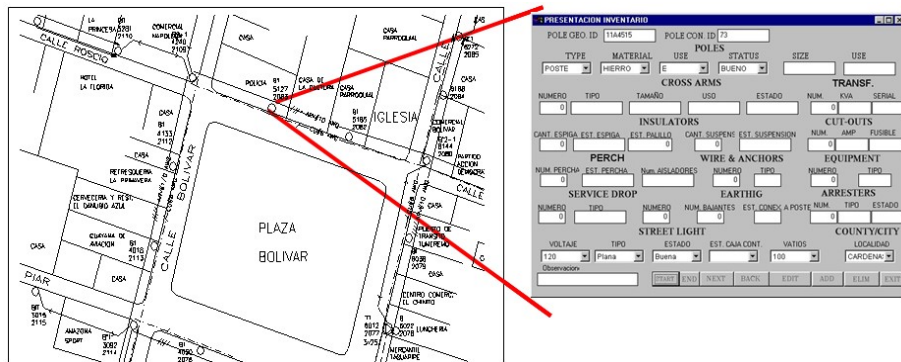
- **Budgeted Calculation Module (COMWIN)** This system is running since 1985 and was upgraded for Windows and multi-user. The system helps budgets, analysis of unit prices, valuations of inventories of electrical works.



- **Interrupts and Operations Program (IOP):** This module simulates the transfer of loads when there is a maneuver in the network. It has the tools to quantify the interrupted load during an operation or maneuver and can identify exactly which subscribers are affected by an interruption. The system stores the outages and can provide the total time of interruption (TTI) or the total KWH interrupted. Presents the length of lines affected and interrupted installed KVA in distribution transformers affected.



- **Energy Loss program (ELP)** This module allows the detection of non-technical losses, making the comparison of the energy dispatched by feeders and billed energy. It presents various types of calculations and results depending on user needs, such as circuit losses for micro areas, macro areas, etc. Calculate total energy losses, taking into account the total energy imported to the system and the energy sold. It also produces a complete summary of network elements, such total of transformers, circuit length, etc. <https://padeepro.com/energy.htm>
- **Distribution Network Maintenance Program (DNMP)** This system keeps a record of all the maintenance work done or to be done. The carried-out work statistics in a period of time, can determine whether the maintenance work is becoming more frequent compared to earlier periods, and indicate the need for a massive change of some elements in the distribution system. The system allows the identification of planned maintenance work without need to be done.
- **Network Inventory, Public Lighting and Other Services Program (NILOP):** This module makes pole inventory database for the electric distribution network, improving the knowledge of the network and provision of purchase of components and materials. Additionally allows discriminate the supports being used by other utilities such as communication services, Cable Tv, lighting and advertising.

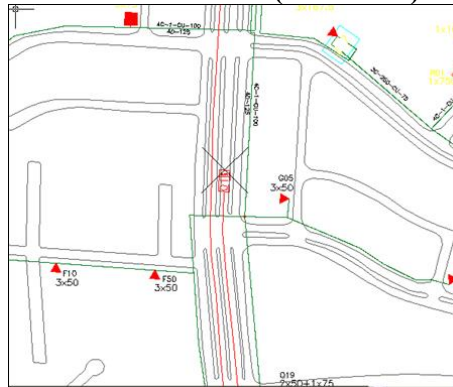


- **Connection with the SCADA Program (CSCP):** Performs the interface with the SCADA system, it can display in ZWCAD maps the remote network operations, indicating recloser operation and out of service transformer bank. It can also produce a history of operations and equipment states (open or closed) of reclosers. Need an existing SCADA system to interface with.

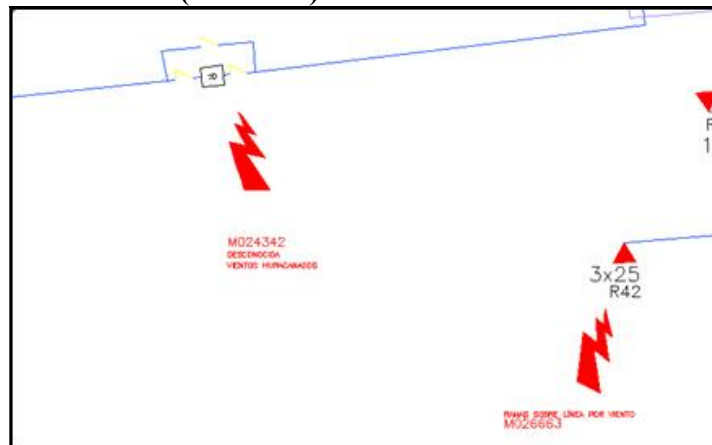
- **Transformers Bank Totalizer Program (TBTOTP):** This module works with energy meters installed on every transformer banks. During the meter reading cycle transformers are include in the reading route as any other customer, then are separated filtering the customer's database to produces an estimate load. Finally, it calculates the Utilization Factor of each transformer. It is important for the visualization and information management to reduce losses.



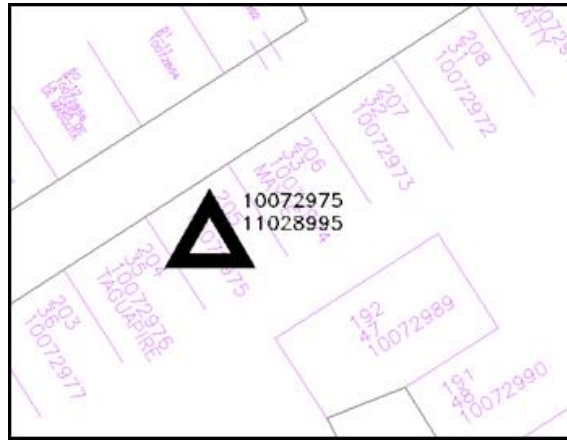
- **Technical losses and Information of distribution system network elements Module (PTTEIS)**
- **Satellite Crew Vehicle Location Module. (PUVSAT)**



- **Failure Location Record (PUBFAL)**



- **Clients Claim Location Record (PACREC)**



PADEE takes advantage of the important and necessary work needed to keep Electric Distribution networks maps updated, and obtain the input data for load flow studies directly from these maps. The Maps constitute the main database for all the modules or subsystems, because either information or analysis data are taken automatically and directly from the maps as they just have all the information to perform electrical studies. Drawings are prepared with ZWCAD and GIS technology and the maps produce with PADEE can be plotted and interpreted by any personnel or any other software because is a standard way of presenting data of feeders maps. There are no hidden data.

As MAPS are the database that centralizes all the information, they should be standardized and developed under the drawing standard of the utility company, using aids or tools that CAD technology gives us. PADEE has these tools to make a correct use of "layers" and "blocks" of symbols. In addition to make ease standardization, CAD technology incorporates "intelligence" to provide all the information required by engineers to perform network analysis.

Information systems and analysis modules use these data obtained by examining the maps, and took the values and calculations results directly from the drawings prepared on CAD, giving a graphic capability such as geographic information system analysis and unmatched high capacity and calculations performed in a few second or minutes.

Hardware requirements are:

Description	Minimum Requirement	Recommended
Processor	Pentium IV 2.0 Ghz	Intel I9 or better
RAM memory	2 Gigabytes	16 Gigabytes or more for X64 systems
Hard Drive	200 Gigabytes	1 Terabyte or more / Solid HD
Monitor and Video Card	XVGA, 17	XVGA, 19 or 21 inches
Mouse	Optical 3-button and wheel	Optical 3-button and wheel
Printer	Inkjet or laser	inkjet 600 dpi
Plotter	Color inkjet 600 dpi, Color	inkjet 600 dpi, Color
Windows	Windows 7	Win 7, Win 8 32 or 64 bits, Server 2008, Win 10, Win 11
CAD program	Autocad 2006, Bricscad V23	Autocad 2010 to 2025 Bricscad V23 or ZWCAD 2025
Video Resolution	1024 * 768 and 256 colors	1080 x 1024 and 32-bit color
Internet Explorer	Version IE10 or Opera	Version EDGE, Chrome, Firefox
Excel and Power Point, Office	Version 2003 or Open Office	Version 2010 or newer

Win XP don't support IE10. In this case use opera. Some modules using Google may present a message to upgrade your Internet Explorer, but it will work fine by now.

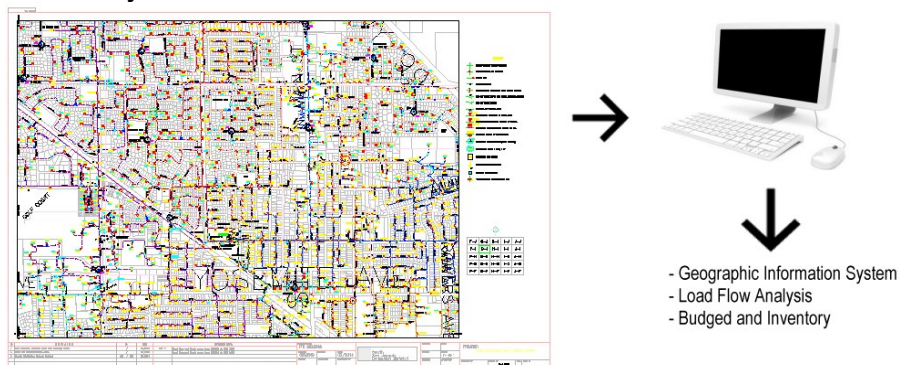
Windows XP is only supported for Corporative users under special request. For others no longer supported because has arrived to his "End of Life"

Installation needs administrator privileges to enable users to write on the Windows system directory, Windows registry and program folder. In all cases, please download all critical updates from Microsoft®.

The hardware requirement is rule by ZWCAD drawings size, not because PADEE Software. Normally computer with ZWCAD software than can handle maps easily, will handle the PADEE software without problems.

As simple rule, you must use the ZWCAD version of according with the hardware performance, new ZWCAD Version needs more hardware requirements, but can it can manage bigger maps easily.

If the client wishes, the data can be exported, allowing compatibility with other Power Distribution analysis software.



There has been enough pass evidence to think that PADEE can be ported to newer operating systems based on Windows. OPEN SOURCE, however, needs further development in applications interface to gain strength and a greater degree of standardization that can be easily applied in the electricity distribution companies.

The retail price of PADEE per license is:

Module	\$ US
Intelligent Maps Program (IMP)	400.00
Primary Network Analysis Programs (PNAP)	700.00
Secondary Network Analysis Program (SNAP)	400.00
Customers Program (CP)	450.00
Transformer Load Control Program (TLMP)	450.00
Equipment Information and Photo Program (EIPP)	450.00
Demand Forecast for Short-, Medium- and long-Term Program (DFP)	450.00
Overcurrent Protection Coordination Program (OPP)	200.00
Automated Topographic profiles drawing and Pole Placing Module (ATPPP)	900.00

Budged Calculation Module (COMWIN)	400.00
Interruptions and Operations Program (IOP)	900.00
Distribution Network Maintenance Program (DNMP)	400.00
Network Inventory, Public Lighting and Other Services Program (NILOP):	400.00
Energy loss program (ELP):	400.00
Total	6.900.00

1 license – all modules 1,000.00 US \$ (Training Course is not included) (sales offer may go down to 400 \$)

2 licenses 1,500.00 US \$ (include training Course in our office in Caracas)

15 licenses and more (Corporate version) 30,000.00 US \$. This license is required to install PADEE in a Virtual Server.

Please check our web site <https://padeepro.com/padeeing.html#price> to see offers and discounts. Write us and ask for a commercial proposition best fitted to your business. jorgematheus@gmail.com

Note: AutoCAD, BricsCAD, ZWCAD, Google Map and Windows are trade marks of Autodesk, Bricsys, ZWSOFT, Google, and Microsoft respectively.

Today PADEE can be exported and imported to ArcGIS and SINCAL from Esri and SIEMENS respectively,