

# Load Flow Analysis

One Program, One Database, One Solution



## Create & Validate System Models with Ease & Accuracy

With ETAP's advanced Load Flow module, you can create and validate your system model with ease and obtain accurate and reliable results. Built-in features like automatic device evaluation, summary alarms / warnings, result analyzer, and intelligent graphics make it the most efficient Load Flow program available today.

ETAP calculates bus voltages, branch power factors, currents, and power flows throughout the electrical system. ETAP allows for swing, voltage regulated, and unregulated power sources with multiple power grids and generator connections. It is capable of performing analysis on both radial and loop systems. ETAP allows you to select from several different methods in order to achieve the best calculation efficiency and accuracy.

**Voltage Drop**

**Power Factor Correction**

**Automatic Device Evaluation**

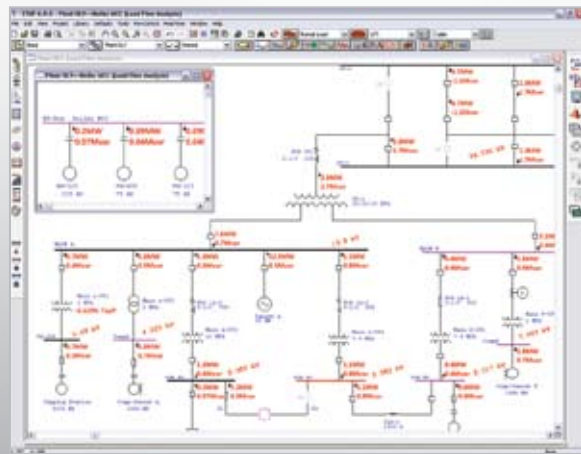
**Automatic Temperature Correction**

**2W & 3W Transformer LTC / Regulator Actions**

**Real & Reactive Power Losses**

**Extensive Violation Alerts**

**Multi-Report Result Analyzer**

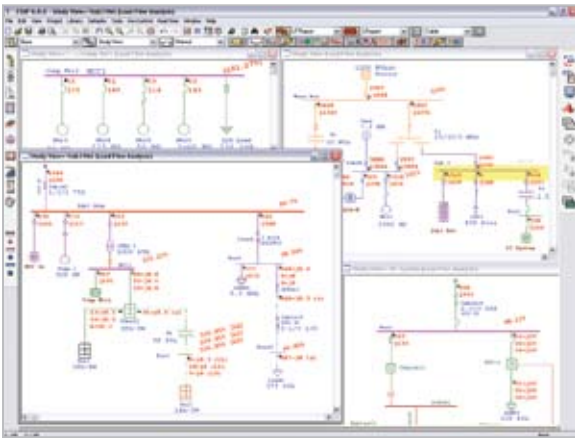


**Intelligent Graphics:** State-of-the-art graphical display of results including voltage drop, load terminal voltage, branch losses, and transformer LTC settings

# Most Efficient Load Flow Program Available

## Study Options

- Option to update initial conditions
- Phase-shifting transformers
- Auto-adjust LTC / regulator settings
- Power factor correction
- Saves solution control parameters for each scenario
- Make changes to your system & re-run studies instantly
- Conduct unlimited “what if” studies within one database
- Calculate bus voltages, currents, & power factors
- Bus / transformer / cable reactor overload warnings
- Calculate power flows
- Update loading for DC load flow
- Voltage drop calculations
- Five levels of automatic error checking



**3-Phase and 1-Phase Power Flow:** Calculate power flow for 3-phase, 1-phase, panel, and UPS systems simultaneously

## Capabilities

- Simulate multiple loading & generation conditions
- Automatically adjust transformer tap & LTC / regulator settings
- User-controlled convergence parameters
- Compare & analyze multiple reports using result analyzer
- Include effect of phase-shifting transformers
- View results graphically
- Evaluate critical & marginal limit violations
- Solve 3-phase & 1-phase system load flow simultaneously

## Flexible Operation

- Diverse operating conditions
- Multiple loading categories
- Multiple demand factors
- Different model of lumped loading
- Unlimited configurations
- Different nameplate data
- Global & individual bus diversity factors

Critical Report						
Device ID	Type	Condition	Rating/Units	Val	Opening	No. Opening
Bus 1	Bus	Overload	388.000	Amp	443.000	113.6
Bus 3 Dept	Bus	Overload	337.000	Amp	373.425	113.8

Marginal Report						
Device ID	Type	Condition	Rating/Units	Val	Opening	No. Opening
Bus 1	Bus	Under Voltage	3.400	kV	3.340	97.8
Bus 1	Bus	Under Voltage	3.400	kV	3.400	99.1
MS21	Bus	Over Voltage	9.400	kV	9.486	113.3
Bus 32	Bus	Under Voltage	3.400	kV	3.324	98.4

Critical						
Device ID	Type	Condition	Rating/Units	Opening	% Opening	Phase Type
Bus 1	Bus	Under Voltage	3.400 kV	3.340	98.2	3-Phase
Bus 1	Bus	Under Voltage	2.400 kV	2.201	91.7	A
Bus 1	Bus	Under Voltage	3.400 kV	3.400	100.0	3-Phase
Bus 1	Bus	Under Voltage	3.400 kV	3.400	100.0	3-Phase
Overload	Overload	388.000 Amp	388.000	100.0	100.0	3-Phase
Overload	Overload	337.000 Amp	337.000	100.0	100.0	3-Phase
Over Voltage	Over Voltage	9.486 kV	9.400	101.0	107.5	3-Phase
Over Voltage	Over Voltage	3.340 kV	3.400	97.1	99.1	3-Phase
Over Voltage	Over Voltage	3.324 kV	3.400	97.8	98.4	3-Phase

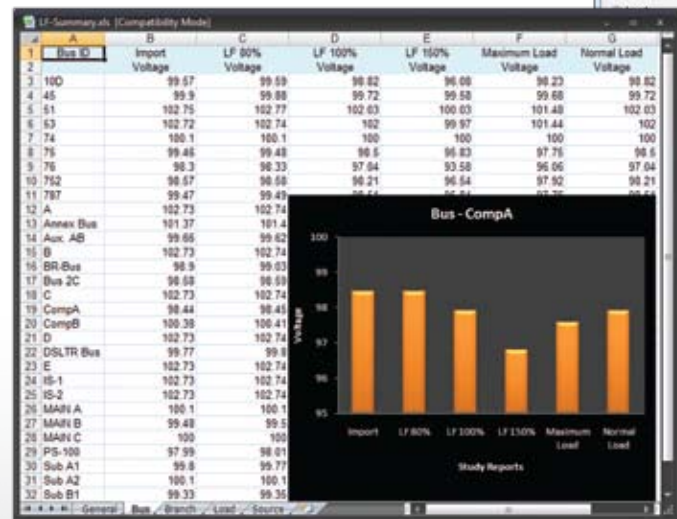
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Condition	Rating/Units	Opening	% Opening	Phase Type		
Under Voltage	3.400 kV	3.340	97.8	3-Phase		
Under Voltage	2.400 kV	2.201	91.7	A		
Under Voltage	3.400 kV	3.400	100.0	3-Phase		
Under Voltage	3.400 kV	3.400	100.0	3-Phase		
Over Voltage	9.486 kV	9.400	101.0	3-Phase		
Over Voltage	3.340 kV	3.400	97.1	3-Phase		
Over Voltage	3.324 kV	3.400	97.8	3-Phase		

**Automatic Device Evaluation:** Automatically generate critical and marginal alerts for overstressed 3-phase and 1-phase systems

# Simultaneous Analysis of Different Scenarios

## Load Flow Result Analyzer

ETAP Load Flow Result Analyzer is a time-saving tool that compares and analyzes multiple reports in a single view. You can compare the results of general information about a project or more specific information such as the load flow results for buses, branches, loads, or sources.



- Understand results of multiple studies in one glance
- Compare & view multiple load flow results in a single view
- Analyze & compare reports from multiple projects
- Create a base line report & quickly identify deviations for all cases
- View multiple bus, branch, load, & source results
- Advanced alert & warning feature identifies & highlights overstressed components
- Easily find components on one-line diagrams from the analyzer view
- Export summary view into Microsoft® Excel for maximum data flexibility & visualization

# Detailed Modeling with Accurate Results



**Extensive Reporting:** Detailed load flow reports and indispensable summaries including branch losses, voltage drop, and loading

## Features

- Newton-Raphson, fast decoupled, & accelerated Gauss Seidel
- Generator governors with isochronous or droop mode
- Generator exciters with AVR or Mvar / PF controllers
- Transformer load tap changers (LTC / regulators)
- Advanced solution techniques for fast convergence
- Multiple loading conditions
- Multiple generation conditions
- Swing, voltage regulated, & unregulated power sources
- Voltage drop calculations
- Load forecasting
- Alert view to display critical & marginal limit violations
- Bus / transformer / cable overload warning
- Single-phase load flow display
- Global & individual bus diversity factors
- Individual demand factors for continuous, intermittent, & spare operating conditions
- Option to update the initial condition from load flow solutions
- Phase-shifting transformer
- Power factor correction
- Multi-report result analyzer
- 10,000+ bus capability

## Reporting

- State-of-the-art graphic display of results
- Customize output reports using Crystal Reports®
- Generate output reports in any language
- Voltage drops, losses, power flows, power factor, etc.
- Input data, detailed load flows, & summaries
- Export reports to your favorite word processing program
- Graphically display device evaluation results
- Graphically display buses with marginal or critical under / over voltage
- Export one-line diagrams including results to third party CAD systems
- Alert view to display critical & marginal limit violations