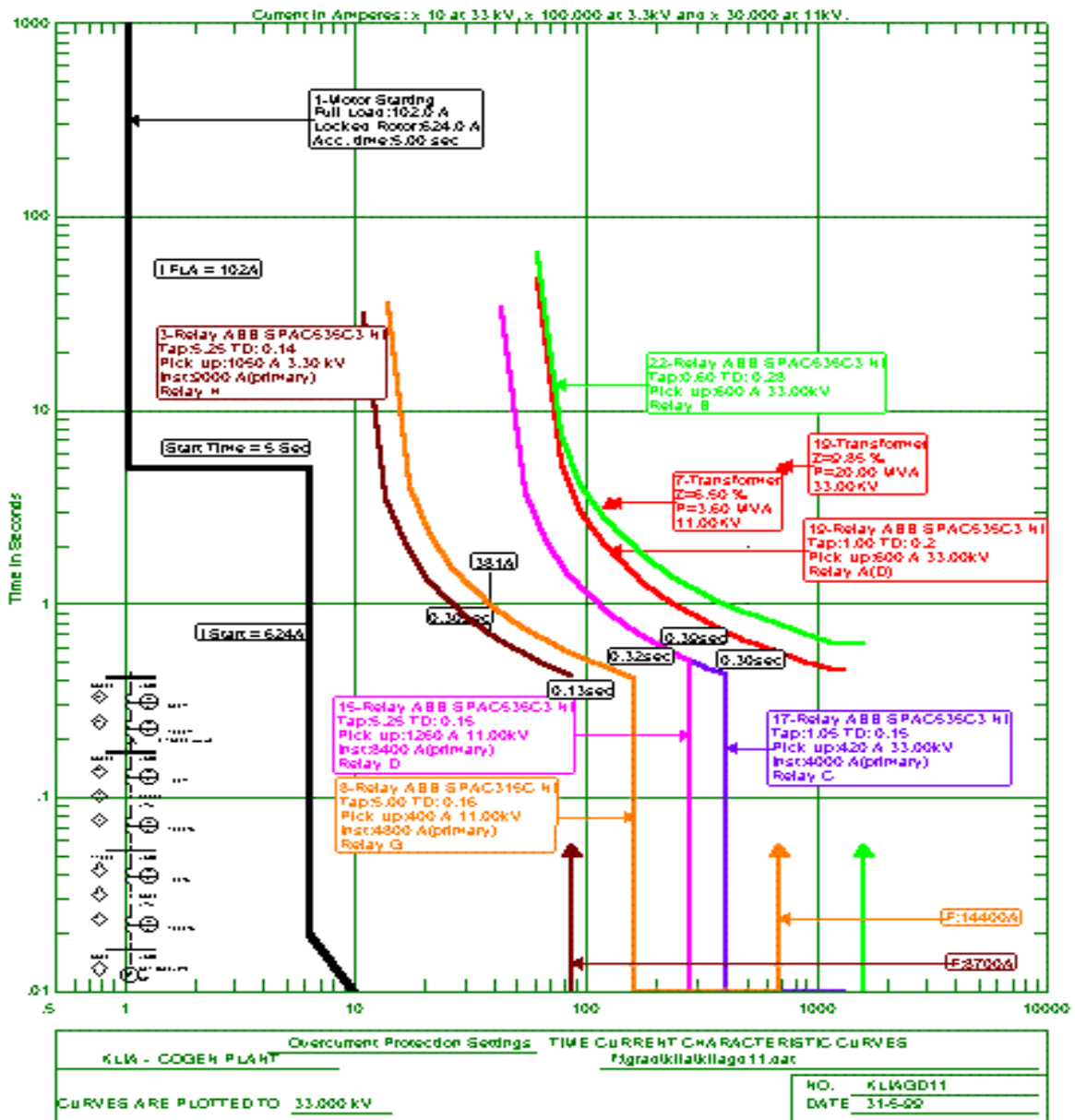


**Protection Coordination Calculations**

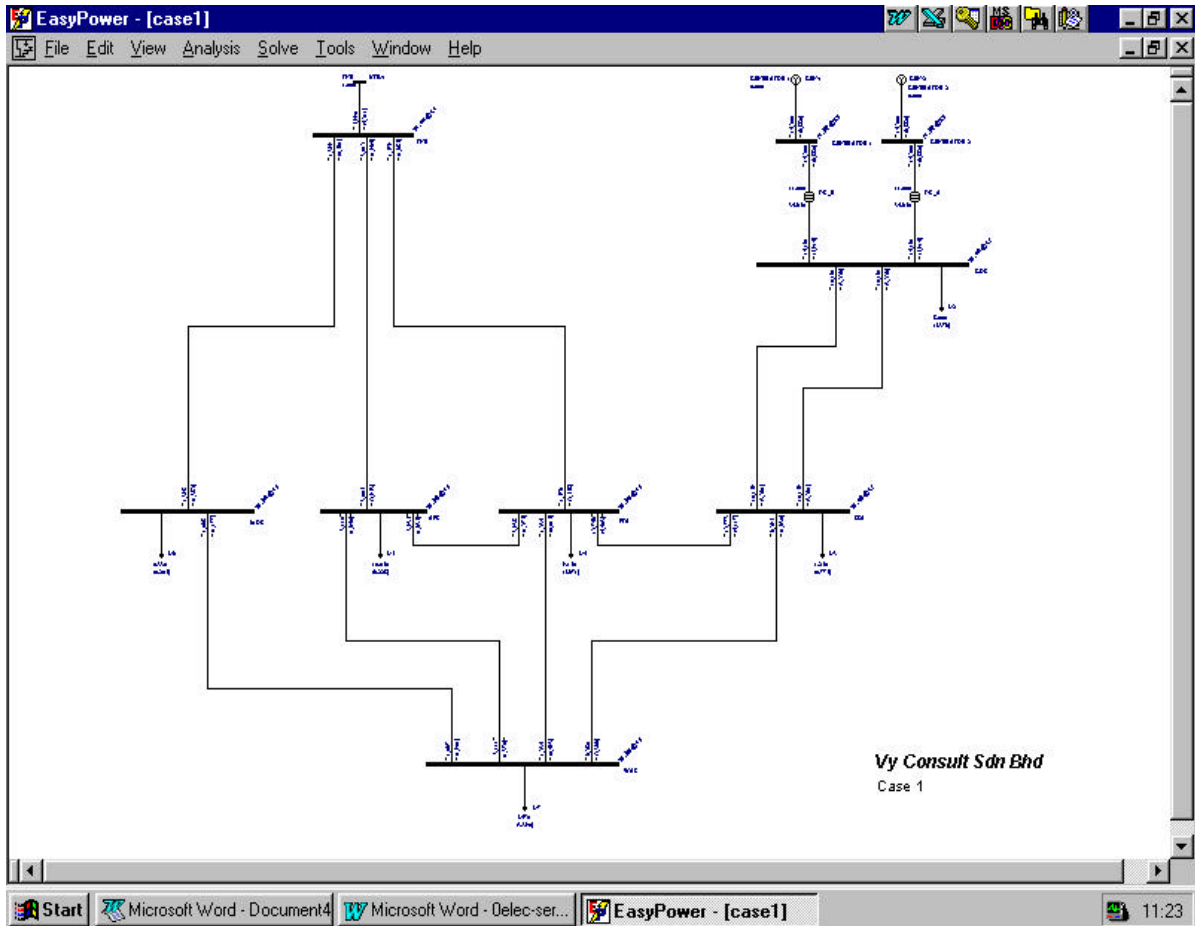
Protection Coordination Studies should be carried out for all electrical networks to ensure that the protection relays have discrimination between downstream relays right up to the Utility impose limit.

The primary purpose is to ensure the fastest fault isolation time whilst maintaining reliability of power supply by isolating the affected part of the network and thus avoiding unnecessary disruptions in operations. Using the multi-inverse characteristics of the modern numerical relays, it is possible to provide protection for a wide range of configurations.



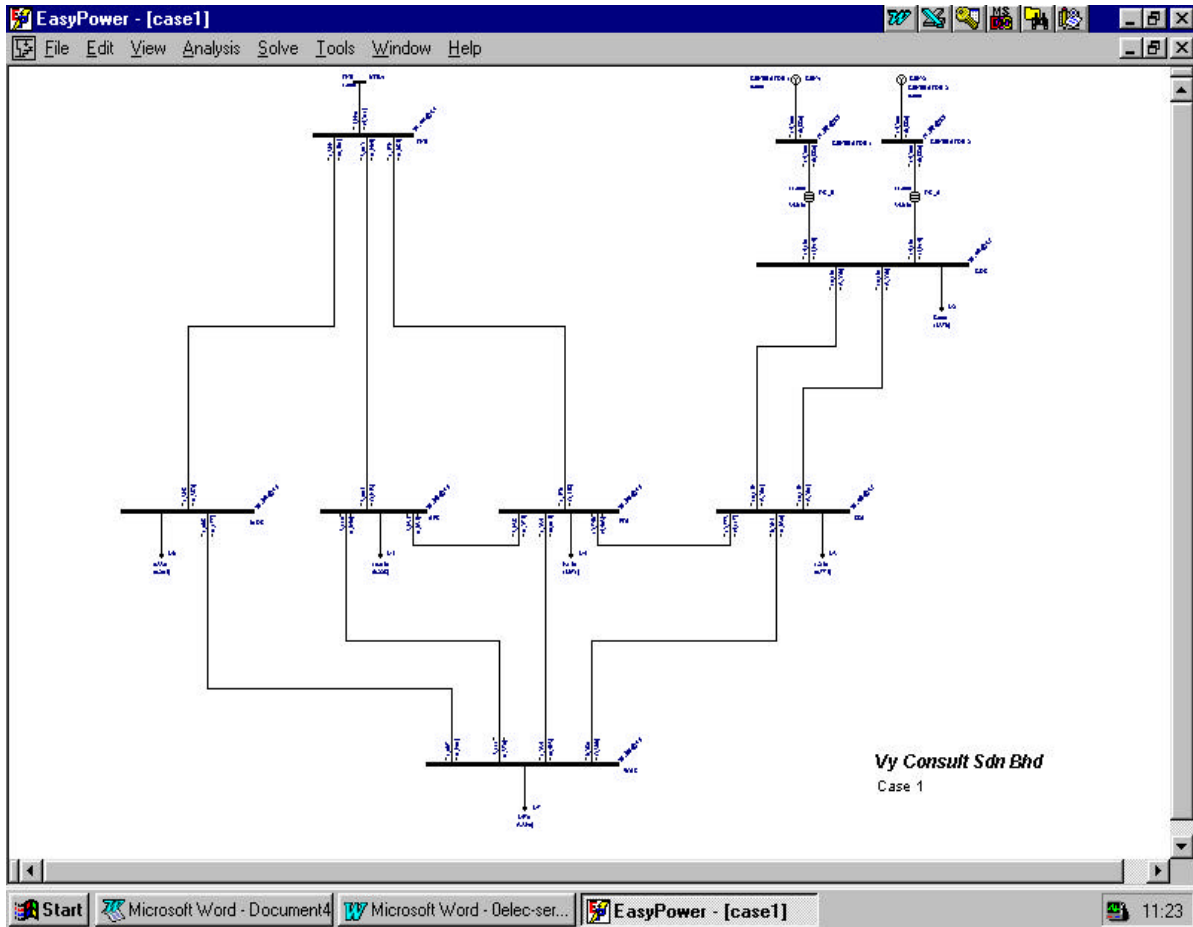
**Load Flow Calculations**

Load Flow Studies should be carried out for all electrical networks to ensure that the design of transformers and cables are able to cater for the desired demand load under all operating conditions. To ensure reliability of the network, it would be necessary to determine the voltage level at various busbar locations and the impact of the motor starting current to the system. The loadflow study will determine the active/reactive power flow under specified steady state load conditions and the voltages throughout the network.



**Shortcircuit calculations**

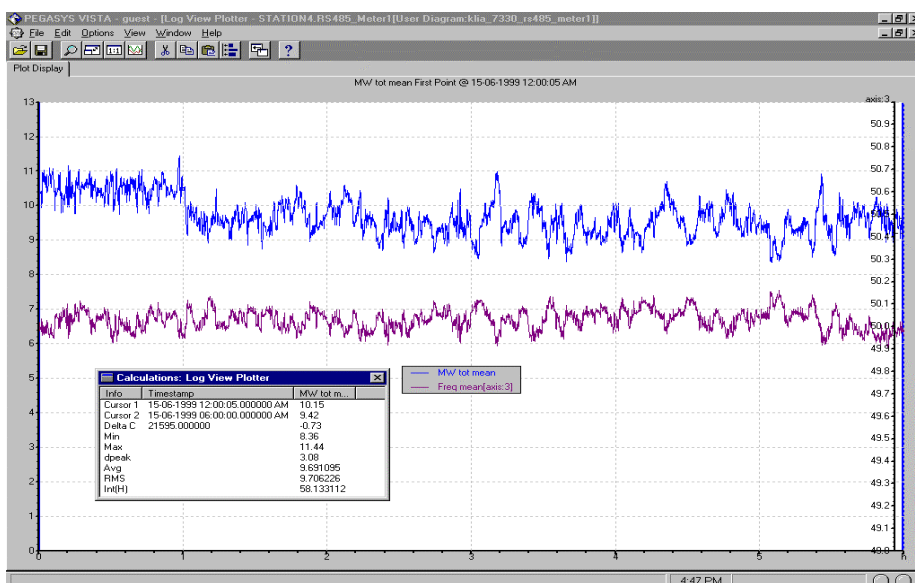
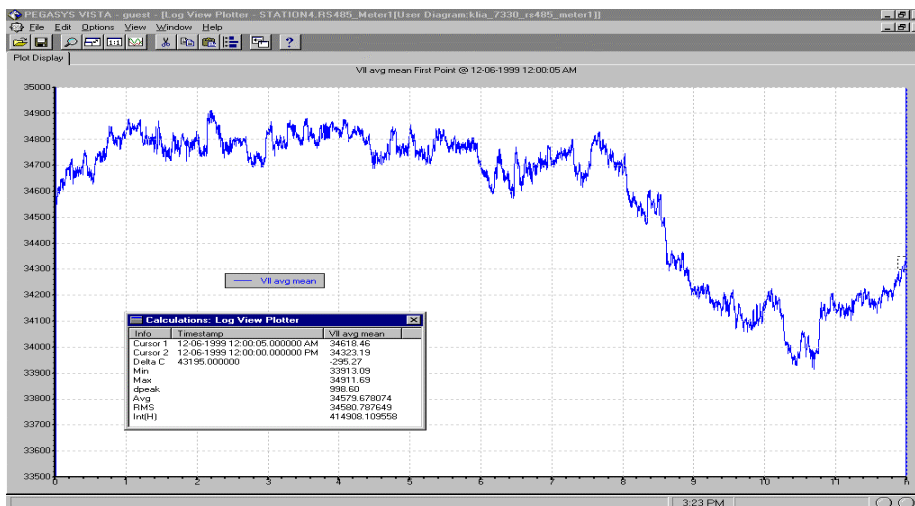
Shortcircuit calculations should be calculated for all networks to ensure the correct specification of the switchgears ratings and transformers impedances. The symmetrical and asymmetrical 3 phase fault currents as well as earthfault currents are calculated. These fault currents are also used in the protection coordination calculations.

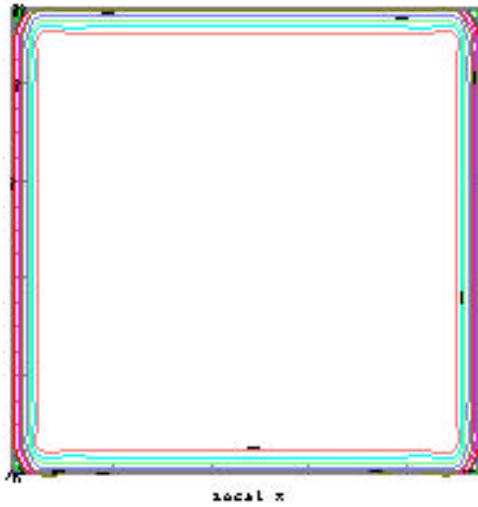


**Electrical system monitoring**

Turnkey system implementation of electrical system monitoring for any network. All electrical parameters such as voltage, current, active and reactive power, frequency, etc could be monitored and recorded for analysis to very fine time resolution. System perturbation on the network could also be captured on a high speed waveform basis for further diagnostic and investigation – this is called the ‘watchdog’ mode.

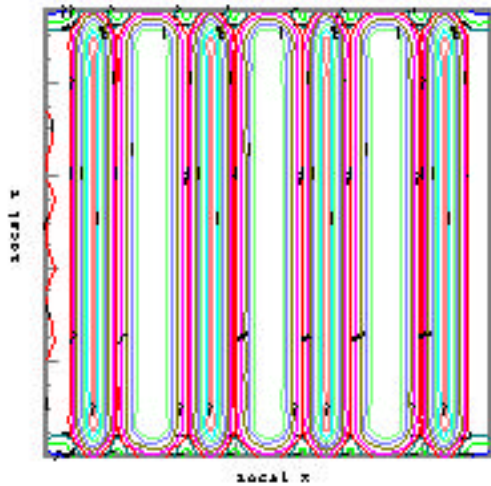
The centralised monitoring system could be located remotely if required and the real-time information could be transmitted via fixed line modems or GSM modems. The system could be designed to poll the site installation on regular intervals to update the information automatically.





FJ/DF, Whole Room Horizontal Grid, Horizontal Illuminance  
Color Scale: 0%

Typical Lighting Calculation with 2.4m x 2.4m spacing



FJ/DF, Whole Room Horizontal Grid, Horizontal Illuminance  
Color Scale: 0%

Typical Lighting Calculation with 2.4m x 3m spacing