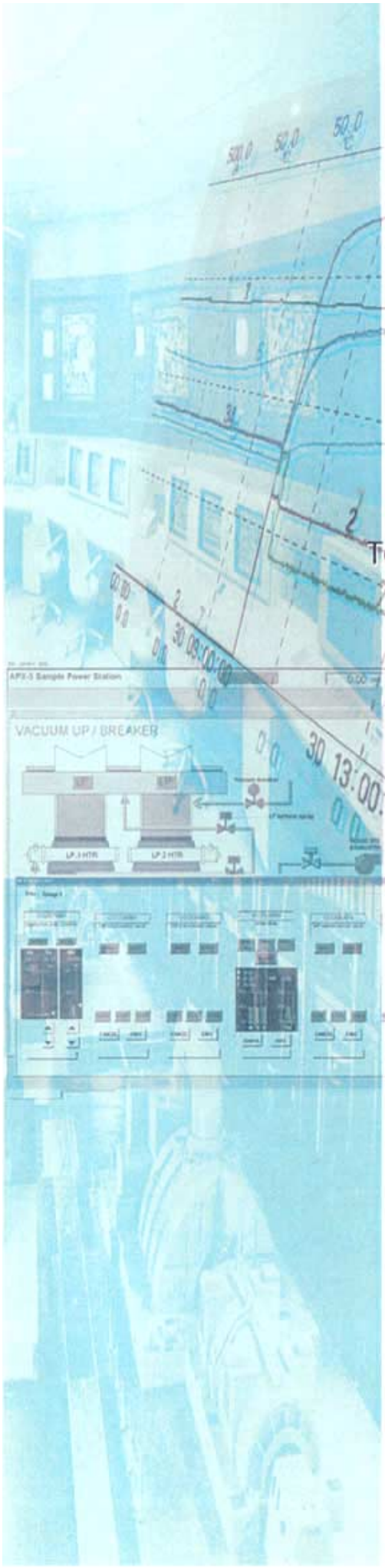


TOSHIBA

TOSMAP-DS

Toshiba's sophisticated power plant control system

Introduction

Toshiba offers *dynamic stream* for the 21st century, the TOSMAP-DS: Toshiba Microprocessor Aided Power system control-DynaStream, which is a state-of-the-art Distributed Control System (DCS) developed for total power plant control.

Toshiba, as a total plant supplier, form a component (semi-conductor) to stream turbine, proposes the best solution for power plant control.

TOSMAP-DS

System evolution for the 21st century
Toshiba Microprocessor Aided Power system control - DynaStream

Technical Advantages

Comprehensive integration of plant controls

Toshiba offers totally uniformed plant control system, covering boiler, turbine and generator auxiliary controls, including turbine control system (D-EHC) and generator control system (AVR). The system integration is possible because the TOSMAP-DS covers high-speed controls necessary for the D-EHC and AVR. Also, Toshiba can provide total plant engineering based on the decades of comprehensive experiences of power plant equipment including control systems.
As a result, this configuration realizes:
-Unified operation/ hardware/ software/ engineering/ maintenance
-Every CRT can monitor/ control all controllers
-No need for any extra interface with other controllers

Open and Flexible system

The TOSMAP-DS utilizes the latest standard and de-facto standard technology as much as possible to make use of advanced technology and enable an open and flexible system:
- Windows-NTTM for HMI and IES
- Ethernet (100M and lOM) for C-NET and I-NET
- Compact PCI bus for ACS CPU backplane
- DeviceNetTM for local I/O bus

An OPS provides the same method and feeling of operation as usual Windows application, to make operators use DCS easily. This feature enables customer to use the stored data in DCS on his PC because all the data in OPS is saved under Windows-NT. The Toshiba's developed Graphical User Interface for TOSMAP-DS, which supports scaleable window to realize an effective multi-window system under Windows-NT. Also, fully independent OPS's configuration makes continuous operation/monitoring and maintenance work by IES is possible even while a server station is failed. Standard interface connection with third party's system is possible using Device-Net interface of standard I/O bus, and remote supervising and maintenance support with Internet server is available.

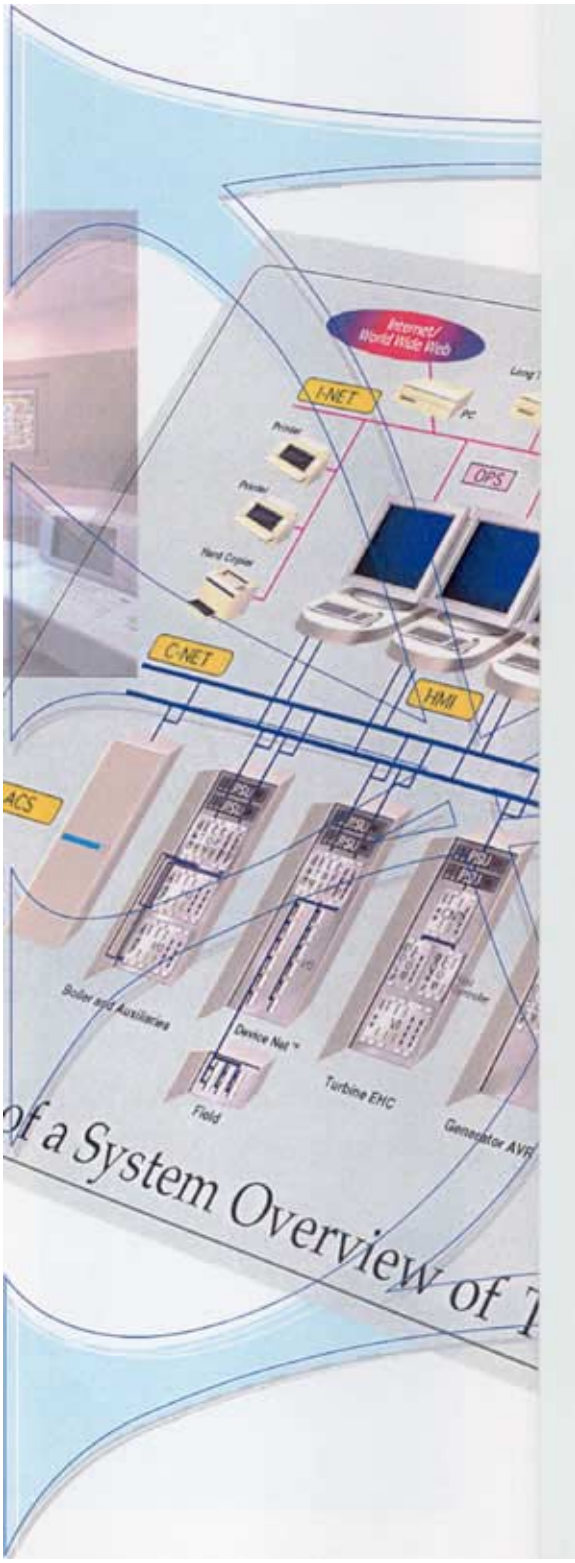
Easy and unified engineering environment

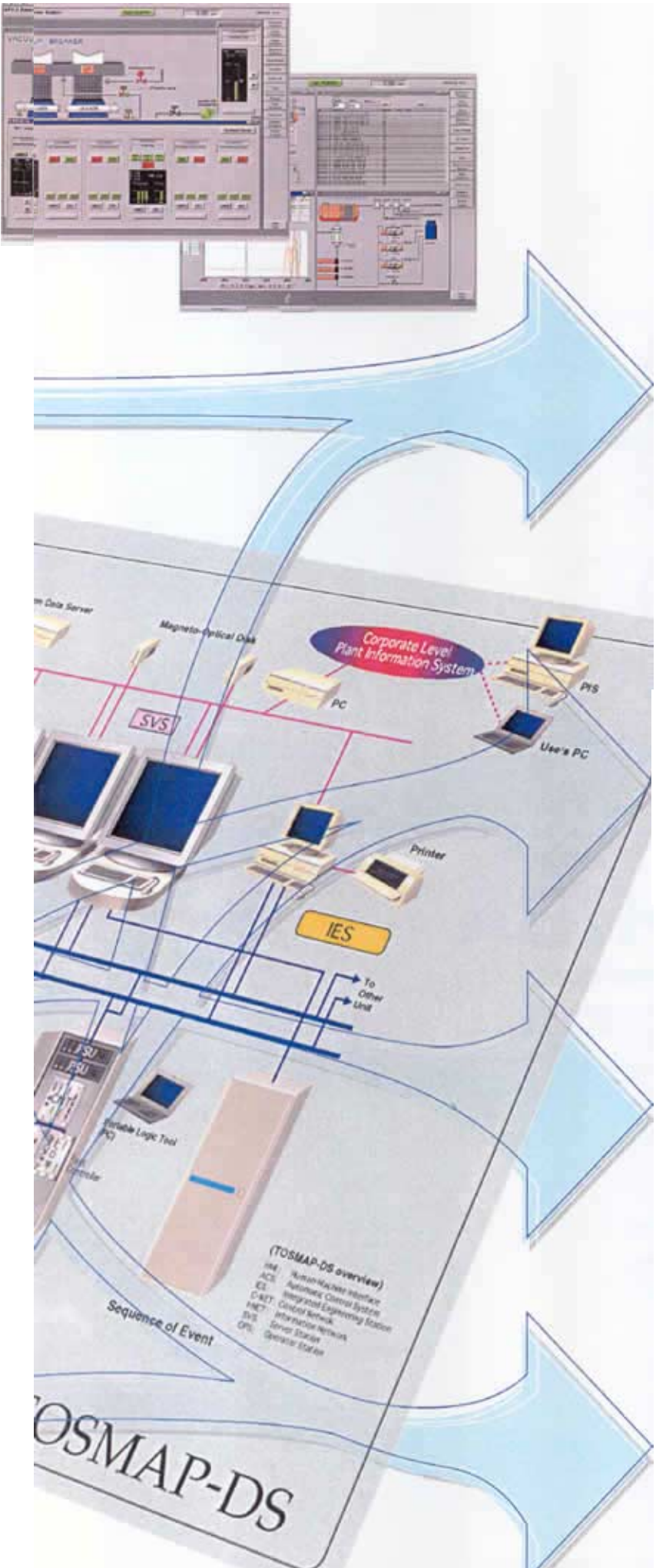
Toshiba provides an Integrated Engineering Station (IES) that is used for engineering system configuration, and maintenance of the HMI, ACS and C-Net All the engineering work, TAG database creation, logic configuration, graphic dip/lay design and log format design are unified on the IES station. Automatic TAG linkage among the HMI data, ACS logic control data, other database and logs dram ally reduces engineering work for communication between all display information and logic inputs/outputs. The FES uses the Windows-NT environment
providing a familiar graphical user interface using functions such as "point and click", “drag and drop”, "pull down menu" and "copy and paste".

Windows application is used to each engineering/maintenance tools, as HMI OS:
TAG DB tool: MS-Access
Log & Report tool: MS-Excel

Best approach for power plant control system

Toshiba, as a manufacturer of total plant equipment including control systems, which covers total engineering from a component basis (semi-conductor) to power plants, can provide a wide range of technical support based on a lot of experiences of power plants through basic engineering to equipment installation world wide areas. Toshiba's experiences are both conventional plants and combined cycle plants, and recently Toshiba has participated total plant construction work including DCS, with the latest technology basis, for example, Yokohama C/C power plant in Japan brings a great success.
Based on such experiences, Toshiba proposes the best solution of DCS.





User's Benefits

Economic Benefits

- Reliable and optimally economic operation of power plant realize equipment lifetime be longer
- Reduction of spare parts because of uniformed system hardware
- Plant startup time reduction - Fully automatic startup and shutdown function can be introduced
- Minimize number of operators
- No special interface link is required for turbine and generator control systems

Quick and Easy Engineering

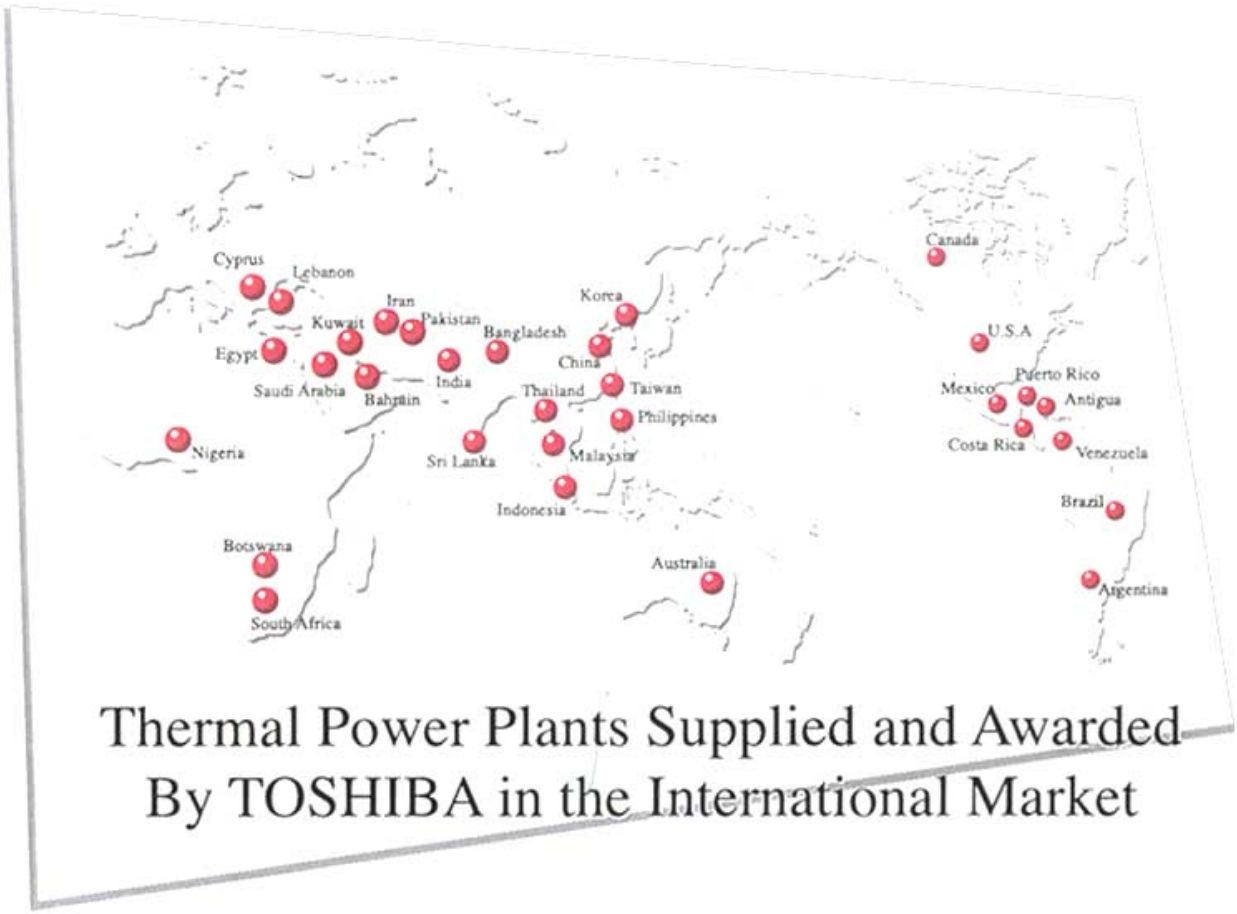
-Tag-linked system can reduce the engineer's effort and engineering period
-Easy configuration with the same method as usual Window's application of IES and object oriented engineering
- Toshiba's experienced engineers provides optimal solution
- Much experience of power plant control systems shorten the each plant's engineering period

Plant Operation

- Easy operation with the same method as usual Window's application, both for OPS and IES - also training becomes easy
- Appropriate monitoring with Multi-window, scaleable Windows Reduction of operational mistakes
- Open interface with other PC with Window's application - Data storage in Window's application is possible
- Fully independent human-machine interface stations, not client/server configuration

Easy Maintenance and Support service

• Commonly used spare parts
• Easy maintenance with tag-linked programming
• High maintainability with de-facto standard hardware
• Remote maintenance support with Internet server
• Total support from each core component to the system
• 24 hours of maintenance support on website and e-mails



Thermal Power Plants Supplied and Awarded By TOSHIBA in the International Market

TOSHIBA

TOSHIBA CORPORATION

POWER SYSTEMS AND SERVICES COMPANY
36-5, TSURUMICHUO 4-CHOME, TSURUMI-KU, YOKOHAMA
230-0051 JAPAN
FAX: 81-45-500-1592 PHONE: 81-45-500-1553

Overseas Office:
Mexico City, Caracas,
Rio de Janeiro, Buenos Aires,
London, Wien, Berlin,
Hong Kong, Bangkok, Manila.
Jakarta, Sydney, Wellington,
Johannesburg, Beijing
Toshiba International Corporation:
San Francisco, Houston,
Toshiba International Corporation:
Pty. Ltd.: Sydney
Toshiba International Company
Limited: London

• For further information, please visit our website at http://www.toshiba.co.jp/index.htm and contact your nearest Toshiba Liaison Representational operation-Producer -Goods.
• The data given in this brochure are subject to change without notice.