O&M PAPER – SYNOPSIS

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TITLE

Efficient Solutions to Modern-Day DCS Challenges

INTRODUCTION

A wide range of DDCMIS is maintained across plants in NTPC. With enhanced DDCMIS systems both risks and privileges have increased. Since the advantages are "Already in Use" with existing system, here is a study and development of tools to reduce risks and counter the existing loopholes for better and more efficient DCS system maintenance.

OBJECTIVES

To enhance the reliability and integrity of HMI section of DDCMIS. This would result in higher dependency on HMI systems for Unit operation as well as provide timely Alarms for system maintenance.

THEORY

Present tools for DCS maintenance and System monitoring have been derived from various researches and developed based on system requirements. Although they satisfy our requirements to much higher levels still there are scope for refinement and redesign. Moving into the direction for enhancing the present day techniques of DCS tools, few methods have been developed in house at Stage 4 DCS of VSTPP which are described below:

1. Pop up alarms

Problem: There has been numerous cases of unit tripping in various NTPC projects where the operator states that they could have saved the unit if they would have received a clear alarm message about the critical conditions on time.

Current Scheme: LVS Annunciation alarms are being provided with hooter to aware Operations team about the critical situation. But the limitations are:

1. Reliability of alarms are low due to software limitations, freezing issues etc.
2. Philosophy of alarms are different in different DCS (limitations by Vendors)
3. Critical Situation leads to flooding of various alarms leading to hiding of the main alarm.

Modified Design

As being instructed by C&I (OS) and with permission of HOD (C&I) – VSTPP, a pilot project for pop-up alarms was asked to be designed and implemented at Stage 4 Systems. In Unit 11 and 12, a particular LVS in each unit has been identified and configured where in a critical alarm condition shall pop up over the opened graphics alarming the operation engineers to identify the most critical situations. Critical situations shall be acknowledged by operation engineer to hide the window for a particular time. If the condition persists till that time, window appears again. This has proved helpful to operation engineers (as per feedback taken from various Shift Groups). Suggestions are coming to apply the same in all Stages.

2. Auto LVS Test

Problem: In Invensys HMI, LVS annunciation tool is very prone to failure. This includes freezing of Software, non occurrence of Alarms in some cases and delay in Alarm occurrence.

Modified Design

A provision of self check of Annunciation tool is developed which will generate an Auto alarm in every 4 hours repeatedly (2 times in shift) in all the Bands of all LVS of each unit. The malfunctioning of Annunciation tool in any of the LVS shall be marked by Operation personnel who shall forward the message to C&I team for review and rectification.

3. Smart & Fast Bypassing techniques

Problem: Due to availability of Low schedule in Units, periodic shutdown of one FD FAN is being done as part of APC reduction plan. Since there are few Protections and Interlocks which are needed to be bypassed during shutdown of only one FD FAN, hence involvement of C&I personnel is mandatory. As per latest design, Bypassing technique is quite critical and time consuming.

Modification

To reduce the time needed for bypassing the needed protection and that too directly from HMI graphics, a special BUTTON is being developed (on Engineering PC only) which would not only allow C&I personnel to bypass the P&Is in no time but also indicate the current state of Bypassed Criteria as well as the current Input and Output of the Protection block.

4. Efficient monitoring of PADO and TLA

Problem: PADO and TLA have been provided in both Unit11 and 12 of VSTPP. Since both have salient features in themselves to enhance efficiency of Units but still they are not yet integrated with current DCS.

Modification:

There are 12 LVS each in Unit 11 and 12. Out of these 2 in each Unit are kept for Flame camera and CCTV. This sometimes causes distraction from Plant running parameters to Operation personnel at desk.

With an aim to integrate PADO and TLA system with existing DCS, these 2 spare LVS are being Used for displaying screens for PADO and TLA (TLA is already linked up and provision for PADO linking shall be done soon). This has proved useful to operation department as they can view real time operating and efficiency parameters simultaneously.

5. Smart system alarms

Problem: For efficient and reliable monitoring of necessary Software in DCS and all critical Nodes (DPU, CP, Switches) no proper scheme or alarms were available. As a result, failure of such critical units of DCS went unnoticed causing Process abnormality.

Modification:

Necessary Scripts were being coded and deployed into the system for monitoring such critical features of DCS which could cause system abnormality leading to system failure. Such alarms were defined in LVS annunciation system. These include:

1. OPC Status monitoring
2. Network Switch Status monitoring
3. Processor Status Monitoring
4. Network Cable Status monitoring

6. System Power monitoring

Problem: In current scheme there is no provision to monitor Power supply of Static switches and no alarm is provided in scheme for Panel Power supply monitoring. As The Unit is highly dependent on such critical systems of Panels and Nodes, monitoring of such Power supply (both Primary and Secondary) should be mandatory.

Modification:

Utilising the available alarm contacts of DC-DC Convertor and Static Switches, such alarms were hooked up with DCS for efficient monitoring through Graphics and Annunciation tool. Group alarms for all like Panels were defined.

7. Network security

Problem: With inclusion of concept of Station LAN, there has been observed a lot of advantages but the same system also imposes threats and security risks. Risks such as Virus attacks and System crash increases in Offsite areas. Since the network links offsite areas to Main Unit, risks of intrusion of Viruses increase in Unit DCS.

Modification:

Through proper and efficient methods, all USB storage devices (PENDRIVE, HARD DISK etc.) have been blocked in all Workstations and Servers of Unit and Offsite. Moreover a regular pattern of Antivirus update through Scheduled task is created to keep Antivirus definitions updated in entire DCS. Since in station LAN all systems are interconnected so a Master Client topology is created for updating such definitions and Updating definitions on a master PC updates the entire system. Also there is a provision for Assigning Authentication Levels to different Users through Password which is deployed in entire DCS to restrict actions to particular Access Levels.

8. Network cable laying

Problem: After commissioning of any Unit, risks of Cable cut/damage remains throughout the network. Since the design of Cable trays and cable routes limit addition of new cables to certain limit, task of cable laying, cable dressing and cable identification inside conduit gets critical in any running Unit.

Modification:

Plastic make/Fiber make cable trays with varied dimensions are available in market. These trays can be routed over Panels throughout the network and through aluminium partitions throughout CCR to the Servers and Workstations in Engineer Rooms from NOP rooms. Cables can be laid according to our need and cable identification gets easier in cases of cable cut/damage. These trays have cable carrying capacity from 5 to 50 cables (FO) through them. This particular modification allows DCS engineer to carry out hassle free cable laying and identification.

REFERENCES:

- ➔ Drawings and documents of Stage 4 VSTPP
- ➔ Foxboro Manual - **Foxdoc V8.2**
- ➔ MAXDNA Manual - MAXDOCS