

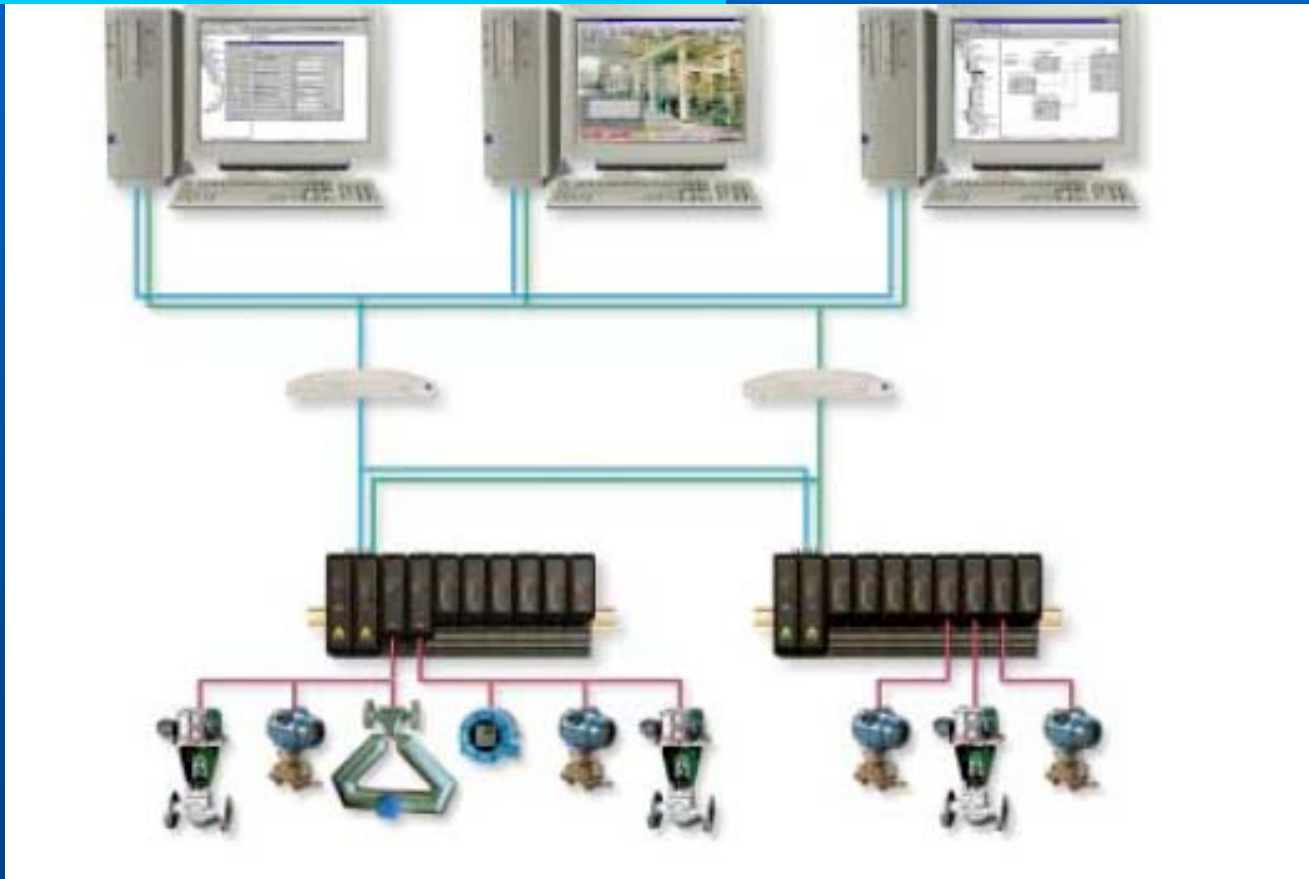
Typical DCS Conversion

Testengeer, Inc.
Gary W. Hales, P.E.

Introduction

- This presentation gives an overview of a typical distributed control system (DCS) conversion.

Introduction, Cont.



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Overview

- A DCS upgrade should
- eliminate the overloading of present controllers
- eliminate bottlenecking of your communications highway
- allow for future growth
- ensure system reliability and performance.

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Equipment Selection

- When selecting equipment for a new DCS system,
- make sure that all of the control strategies in the old DCS system are functionally equivalent.

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Equipment Selection, Cont.

- The new equipment should be capable of replicating the graphics so that they look exactly like the old graphics from the previous system.



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Equipment Selection, Cont.



- The new equipment should be capable of converting:
- all custom programs
- reports
- trends

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Equipment Selection, Cont.



- Equipment selection should include a site survey.

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Equipment Selection, Cont.

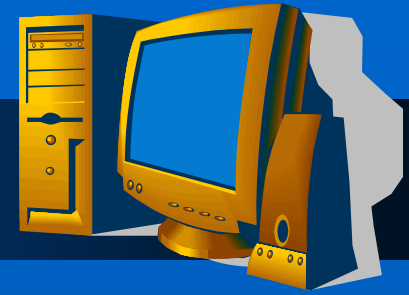


- Equipment selection should include a thorough review of the existing equipments grounding.

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Equipment Selection, Cont.



- The DCS system is made up of many types of hardware devices. To operate this hardware requires licensed software from the vendor.
- Make sure that all of the appropriate software licenses are obtained prior to designing the system.

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Equipment Selection, Cont.

- Every effort should be made to logically group the I/O for associated parts of the plant together in the same controller and termination panels.
- Install redundancy where needed for I/O, controllers and power supplies.

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Equipment Selection, Cont.

- The communications system architecture should be designed such that a single point of failure will not cause the loss of both data highways.
- Disconnection of cables or operations with an unterminated cable should not cause system failure due to reflection effects .

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Equipment Selection, Cont.

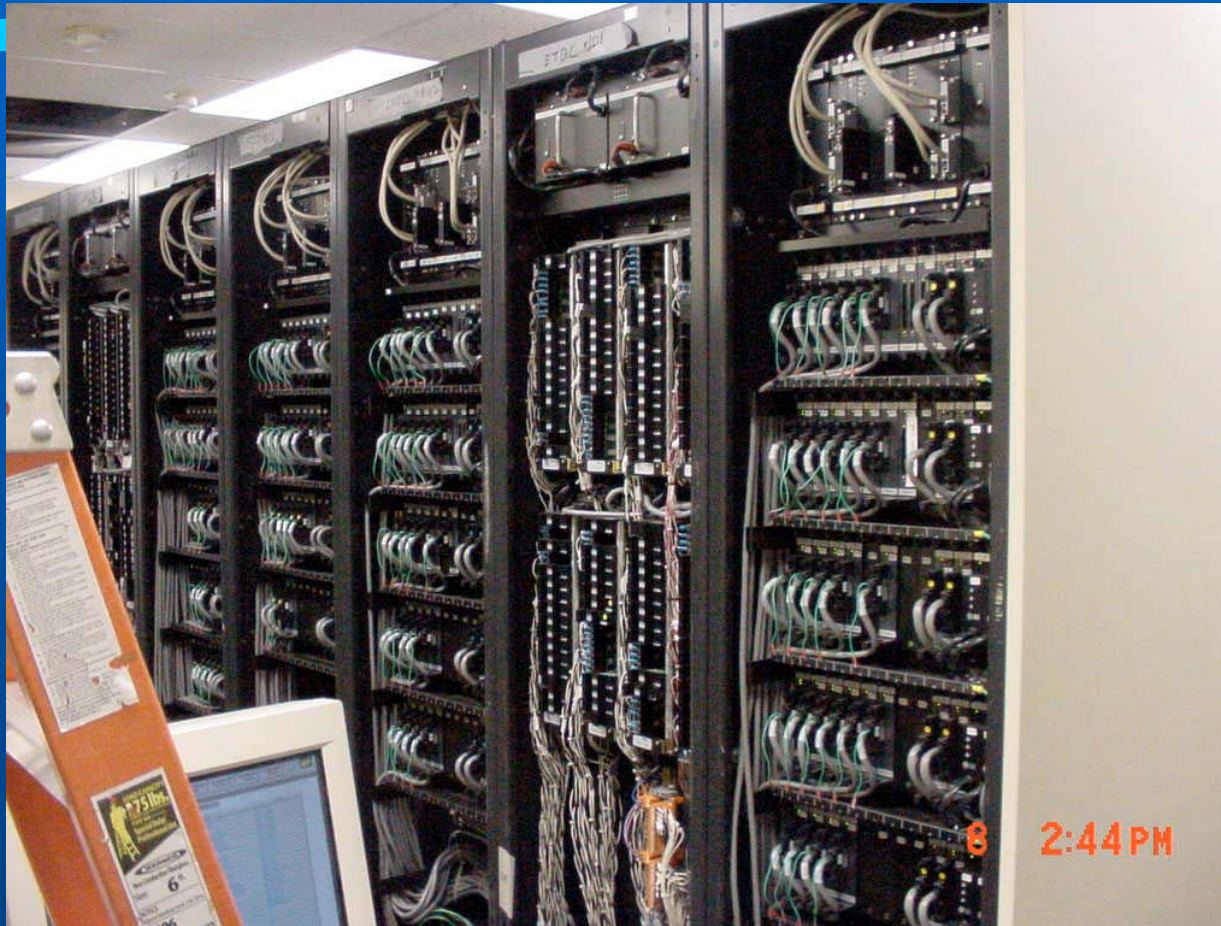


- Reduction of cabinet foot print .

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Equipment Selection, Cont.



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Equipment Selection, Cont.



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Equipment Selection, Cont.

- Re-gain floor space .

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Equipment Selection, Cont.



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Keys to A Successful Project



- Establish the proper Project Team.

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Keys to A Successful Project



- Involve the project team throughout the process so that plant impacts and project durations will be considered.
- Start projects early enough to allow proper designing and planning.

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Keys to A Successful Project, Cont.



- Make sure that several levels of review will be used prior to contract approvals.

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Keys to A Successful Project, Cont.

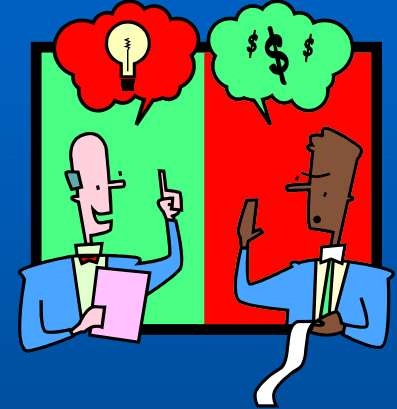


- Perform a proper up-front review of the project costs and deliverables.

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Keys to A Successful Project, Cont.



- Establish a standard format so that the cognizant individuals address costs equally.

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Keys to A Successful Project, Cont.



- Make sure that Management follows the applicable site project structure and processes to alleviate confusion and failure.
- Management should monitor the implementation of the project.

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Keys to A Successful Project, Cont.



- Allow adequate time for pre-project tasks.

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Keys to A Successful Project, Cont.



- Establish project goals and expectations up-front before the kickoff meeting.

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Keys to A Successful Project, Cont.



- Properly evaluate the projects staffing needs and allocate their time accordingly.
- If the project requires full time support, don't compromise the project with part time staffing.

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Keys to A Successful Project, Cont.



- Supply proper clerical support based on project needs.
- Providing no clerical support will hinder the performance of the project team and the project manager.

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Keys to A Successful Project, Cont.



- Make sure that the project team has adequate system or equipment knowledge prior to selection.

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Keys to A Successful Project, Cont.



- Make sure that the remaining equipment Book Value is evaluated and included in the decision making process.

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Keys to A Successful Project, Cont.

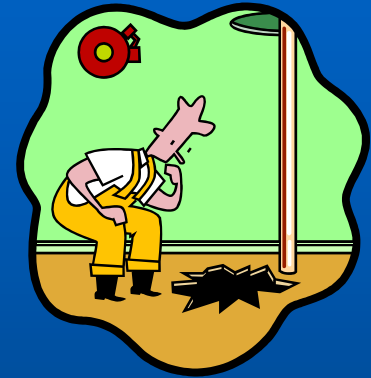


- Make sure that all specifications are addressed and understood by all members of the team prior to project execution.

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Keys to A Successful Project, Cont.

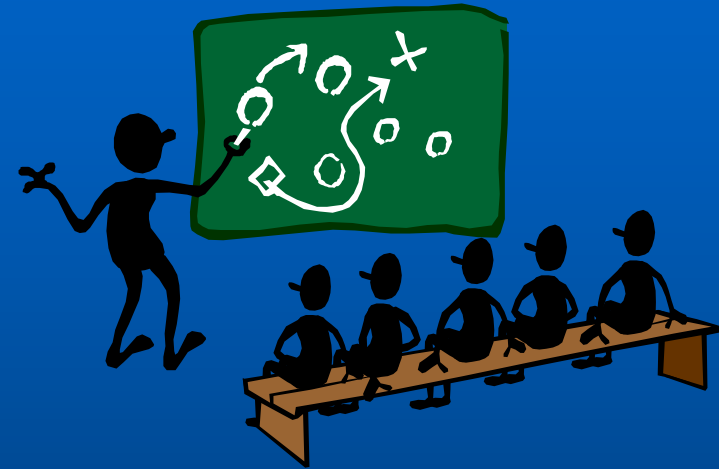


- Perform a risk analysis of the project prior to execution, during execution and prior to implementation.

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Keys to A Successful Project, Cont.

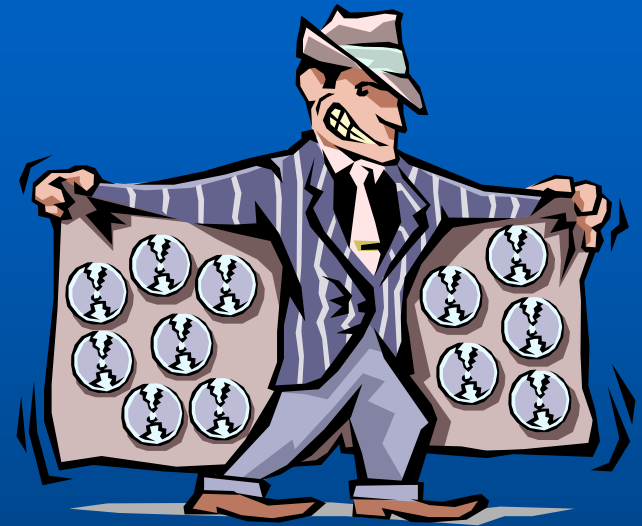


- Make sure that Engineering strategies are developed prior to implementing the project.

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Keys to A Successful Project, Cont.



- Make sure that the client is familiar with the product being purchased.

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What The Owner Can Do



- Prepare the area for equipment installation.

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What The Owner Can Do, Cont.

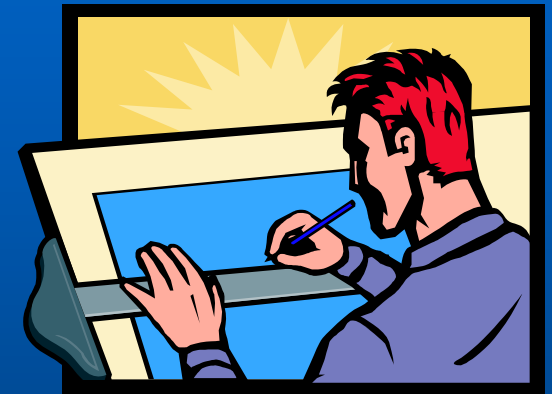


- Reverse engineer the old DCS system.

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What The Owner Can Do, Cont.



- Perform all drafting related to site equipment and systems.

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What The Owner Can Do, Cont.



- Supply project management and the site project team.

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What The Owner Can Do, Cont.

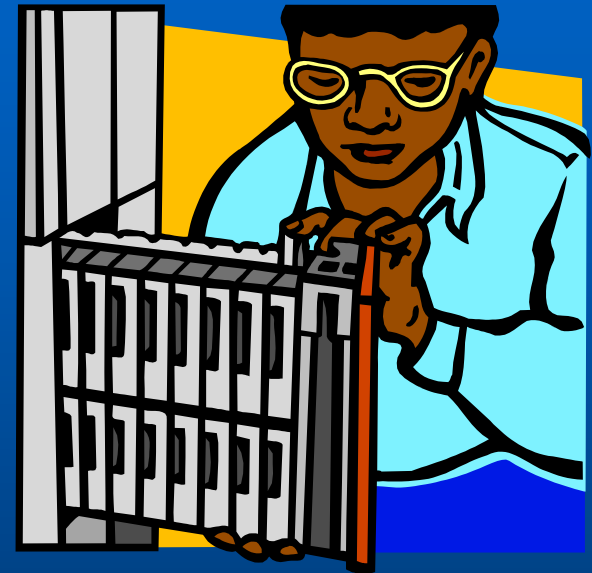


- Provide engineering support to the vendor during the design phase of the project.

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What The Owner Can Do, Cont.



- Properly install and test the DCS at the site.

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What The Vendor Is Required To Do

- Be familiar with client's system.

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What The Vendor Is Required To Do, Cont.

- Assure that the Vendor's project team and management is:
- communicating
- handling issues through the proper chain of command
- providing a detailed schedule
- supplying periodic updates.

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What The Vendor Is Required To Do, Cont.

- Supply sufficient details about their system.

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What The Vendor Is Required To Do, Cont.

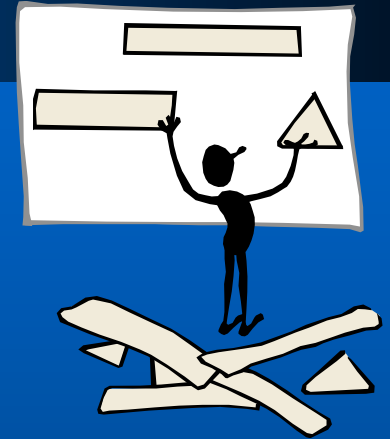


- Assure that the system licenses are identified upfront prior to system designing.

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What The Vendor Is Required To Do, Cont.



- Assure that any changes to the project are approved by the client's management.

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What The Vendor Is Required To Do, Cont.



- Assure that an adequate QC program is in place.

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What The Vendor Is Required To Do, Cont.



- Properly spec and design the DCS equipment to meet the client's needs.

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What The Vendor Is Required To Do, Cont.



- Properly test the DCS system so that it operates properly in the client's plant.

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Problems to Avoid

- The following is a brief discussion of a few problems to avoid prior to and during project execution.

Problems to Avoid, Cont.

Design & Implementation:

- Start projects early enough to allow proper designing and planning.
- Allow adequate time for pre-project tasks
- Make sure that the remaining equip BOOK VALUE is evaluated and included in decision making.

Problems to Avoid, Cont.

System Testing:

- Remember to test PLC interfaces.
- Make sure that passive and active devices are configured properly.
- Make sure that a proper Pre-FAT is conducted.

Problems to Avoid, Cont.



Project Installation:

- **Begin logging critical environmental data prior to system installation.**

Problems to Avoid, Cont.

Project Startup:

- Check for impedance issues between vendor system and client's equipment.
- Prior to startup, reset counters to baseline.

Costs

- The following is a brief discussion of project costs.
- This is only a rule-of-thumb approximation and is not to be used for actual costs since the variables for each project are unique.

Costs, Cont.

- The scope of a typical DCS Upgrade Project could be as follows:

Costs, Cont.

- Install new cabinets with a reduced footprint to allow for expansion.
- Relocate I/O's to their appropriate stations.
- Install new marshalling cables to reduce installation time.

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Costs, Cont.

- Modify existing cabinets to allow for the new upgrade.
- Install new switches for optics links between control rooms and remote locations.
- Seamlessly transfer of all existing system user configuration into the new system.

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Costs, Cont.

- Line items to consider when estimating Cost of Project.

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Costs, Cont.

- Project Management (5% of cost)
- Controls Engineering (3% of cost)
- Operations Support (2% of cost)
- Clerical Support (1% of cost)
- Site Engineering (7% of cost)
- Site CAD (2% of cost)

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Costs, Cont.

- **Project Expenses, i.e. travel/hotels/meals. (2% of cost)**
- **Site I/E Support (0.7% of cost)**
- **Vendor DCS Equipment, hardware/software/license, (40% of cost)**
- **Vendor Support (10% of cost)**
- **Contingency (5% of cost)**
- **Spare Parts (0.5% of cost)**

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Costs, Cont.

- **Client Training, i.e. Ops/Eng/Maint. (4% of cost)**
- **Foundation Support (0.8% of cost)**
- **Vendor System Commissioning (3% of cost)**
- **FAT/SAT (3% of cost)**
- **System Installation (4% of cost)**
- **System Startup (2% of cost)**

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Costs, Cont.

- Overtime (3% of cost)
- Project Closure (2% of cost)

Costs, Cont.

- Approximate cost to design, test and install a DCS project system is as follows:

Costs, Cont.

(Data link software points)

- \$300.00 to \$500.00/pt.

(Direct points to DCS)

- \$500.00 to \$700.00/pt.

Costs, Cont.

- Average cost to design, test and install a DCS system is approximately \$500 per point.
- This includes both the client's and vendor's cost.

Summary

- The questions you need to ask yourself are,

Summary

- What are my needs?

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Summary

- Have I properly addressed the cost of a DCS change out?

Summary

- Did I account for the current value of my existing DCS system?

Summary

- Do I have adequate resources to perform a DCS change out?

Summary



- Is the vendor's system going to meet my future needs?

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Summary

- Did I address all plant impacts?

Summary



- And last but most important of all,

did I allow adequate time to
implement the project?

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