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Introduction

UTS developed the Project Tracking and Design Review System (PTS) with one objective: helping organizations deal with the scale and complexity of medium to large Projects from conception, through design, all the way to implementation.

Today most mid-sized to large organizations have advanced ERP, Project Management, Document Management and Design Modeling Systems. These work well for isolated and highly focused requirements. Many organizations are often forced to use these systems because large amounts of time and capital have been invested in them or because there are pockets of excellence that they can count on and manage. Large scale attempts to integrate such systems often become futile customization exercises and more often than not Projects continue to be delayed.

PTS provides a cost-effective way to thread together best-in-class technologies, creating a consolidated system that provides a macro-view of a Project. PTS offers both web-based and client-server interfaces for various entities:

- Engineers
- Suppliers and Manufacturers
- Site Inspectors
- Site Managers
- Database Administrators
- Senior Executives
- Management

Each interface is customized for the job. Information flows freely into a centralized database. Data is analyzed and compared with individual activities in the overall Project Plan to help track a Project’s progress. Activities that are running behind are flagged and reported for management review. Suppliers, Manufacturers, Inspectors and Site Managers form an integral part of the system and can communicate directly with the system via web-based interfaces.

PTS derives its strength and simplicity from its core design, which gives any organization the flexibility it needs to select specific systems and tools, including:

- Design Tools
- Project Schedulers
- Databases
- Inventory Management
- ERP systems

Representation A depicts an architectural layout of PTS and its core interfaces.
Core Modules in PTS

PTS contains ten core modules. This technical note provides a brief description of each module—including sample interfaces—to give the evaluator a flavor for how the modules work. The modules are:

A. Work-flow Based Design Review Module  
B. Engineering Calculations Module  
C. Manufacturer or Vendor Module  
D. Site Inspector Module  
E. Site Managers Module  
F. Time Tracker & Cost Information Module  
G. Corporate Client Module  
H. Meetings Management Module  
I. Document Management Module  
J. Core Administration Module
A. Design Review (DR) Module

The DR Module is a work-flow based approach to reviewing and approving design-related documents: Engineering Drawings, Calculations, Data Sheets and Quality Plans. A list of Drawings (a Master List) is input to the system with specific drawing numbers, corresponding data sheets and quality plans. These can be appropriately grouped to flow from one member of a review panel to another until the review process is complete. (The Master List details can be conveniently imported from a spreadsheet).

Each reviewer can add their comments and upload relevant reference documents. Comments and documents flow through multiple iterations and can be conveniently accessed by other reviewers. The system automatically tracks the documents’ status. Once the review is complete (all reviewers have approved the set of documents) the group is assumed to be complete and ready to send to the manufacturer or vendor.

A versioning system tracks each master document as it undergoes external changes and is fed back into the system. A document group can contain one or more master documents just as a review panel can consist of one or more reviewers. Different review panels can be created and assigned to different document groups. The DR module handles each in a systematic and non-interfering way.

Appendix A shows some typical screens from the Design Review System Module.
B. Engineering Calculations Module

The DR Module is accompanied by TK Solver, a powerful Engineering Calculations Module which aids in solving the most challenging engineering design problems. Design equations can be entered directly into TK Solver and solved instantly. Outputs and different sets of inputs for each design can be saved as part of every calculation model, allowing reviewers to instantly perform “what-if” calculations during the Design Review Process. TK Solver can accept up to 32,000 design equations and up to 32,000 variables in a single calculation. This module includes an Optimizer for performing non-linear optimization, Engineering Plots, Support for Tables, Advanced Units Conversion and List Solving. Some screens from the Calculation Module are shown below:
Figures 1 & 2: Sample Calculations for Induction Motor Breakdown Torque.

Figure 3: A different calculation for a Civil Package showing support for tables and engineering plots in TK Solver.
C. Manufacturer or Vendor Module

Manufacturing activities are invariably done at remote locations. Each vendor has the responsibility of manufacturing and dispatching multiple parts (sometimes thousands of parts depending on the size of the Package) from the manufacturing site to the Project plant site.

PTS provides a simple and self-sufficient module for each vendor, allowing them to enter the status of every manufactured component and its shipment status and other relevant details such as LR/GR number. Manufacturers can also switch between multiple Projects and multiple Packages. The only things they receive are a web address, a username, and a password for accessing their web site.

D. Site Inspector Module

Large Projects (such as Power Plants) require on-site inspectors at the manufacturing site to ensure that outgoing shipments meet the original requirement specifications. If a manufactured item is found to meet the original specifications and quality constraints it receives approval for final shipment to the site. This is often referred to as a Manufacturing Dispatch Clearance Certificate or MDCC.

PTS provides a web-based interface for each site inspector to enter the inspection status for each manufactured part that is about to be shipped. Each part is then compared to the corresponding activity in the Project Plan. If the inspection and/or shipment gets delayed PTS automatically raises a warning that corresponds to the activity in the Project Plan.
E. Site Managers Module

Site Managers who oversee the receipt of shipments use the Site Managers Module to enter the status of each manufactured or bought-out-item received. They can also enter real-time information on the progress of various erection activities such as Chimney Piling, Boiler Structure Erection, and Cabling. The progress of erection activities and shipments is entered in specific (and customizable) units pertaining to each item. For example, steel shipments may be measured in metric tons while pile caps would be in quantity units.

Site Managers enter progress data via a web-based module. All data received from each site is analyzed and compared with the Project Plan activities to ensure that all delayed activities get reported quickly. The Site Managers module includes customizable interactive graphical interfaces for specific activities such as Chimney Piling, ESP Foundation Piling, Boiler Erection and other activities. A typical Site Managers Module Interface is shown below:

Figure 4: Site Managers Module interface for providing updates on item deliveries and erection progress at the plant site.

Appendix B contains other interactive graphical interfaces found in the Site Managers Module.
F. Time Tracker & Cost (TTC) Information Module

Every Project activity utilizes an intangible resource—time—which adds to the cost of any Project. Human resource costs are sometimes calculated in an ad-hoc manner or get averaged across Projects. Consequently, the time spent by Engineers, Reviewers, Site Inspectors, Site Managers and other Project entities is missed. The TTC module provides a time sheet with a login and password for every Project participant. Individuals’ time is tracked on a daily basis to provide a complete cost estimate in terms of resource hours. TTC can readily monitor a more precise running cost for each Project if the cost rate information is provided. The following image shows a typical Time Tracker interface:

Figure 5: Dialog showing how PTS users can make task-based time sheet entries into the system.
G. Corporate Client Module

PTS comes with an elaborate Dashboard that provides point-and-click access on the status of every Package and every ongoing Project. Information on planned and previous Projects can also be accessed and reported.

The Client Module provides a privilege-based view of all activities in the Project Plan. For each Package in each Project, the status (percentage completed) of each activity and a consolidated completion status—rolled up to the Package and Project levels—can be readily accessed. The Client Module also provides a number of default reports. These include:

- Project Group Progress report
- Package Pre-Award report
- Running Project Cost Report
- Time Tracker Report
- Package Listing Report
- Billing Breakup Units Report (BBU or manufactured and bought out item groups and individual items in each group)
- Activity Alert Report (for viewing the status of various Project activities and identifying the ones that are running late for more timely action)
- Sensitive Activity Report

Project participants interact primarily with the client module on a day-to-day basis to update status and time-related information.

Appendix C shows some typical PTS Client Module screens.
H. Meetings Management (MM) Module

The MM module sets up Project-related meetings and includes facilities to issue meeting notices to a chosen attendee list (subject, agenda, time, date, duration and venue). Attendees also receive notices when meetings are cancelled by the originator. The following images show a typical meeting setup screen and a user-specific view of meetings that they convened or need to attend.
Figures 6 & 7: Module for setting up and managing Project related meetings.
I. Document Management Module
Every activity in a Project Plan involves documentation, which may be shared across teams or among team members. PTS provides upload, filtering and search facilities for viewing information pertaining to Project activities. These may include documents that are internally generated and then uploaded for sharing with other Project or team members.

Documents can be readily viewed. Supported formats include Microsoft Office, PDF, TXT and RTF and DWG files. Support for specific file extensions can be added as needed.

J. Core Administration Module
The Administrative Module is the core module that provides the facilities to:

- Manage Projects (Create and edit project information)
- Link Projects to their respective Packages or systems (Add, edit and delete Packages from a Project)
- Link individual Packages to their respective Project Plans
- Associate users with various Projects and Project groups
- Provide each user with specific roles and privileges to access various Project details through the client module
- Create, edit and maintain a list of all manufactured and supplied items for each Package in each Project. These items are then tracked during the following Project phases:
  - Item manufacturing and inspection
  - Item dispatch
  - Item receipt at plant site
  - Item erection
- Link design review groups to their respective Project Plan activities
- Link pre-award activities to their respective Project Plan activities, including:
  - Notice inviting tenders
  - Opening of bid documents provided by bidders for each Package
  - Receipt of the letter of acceptance from bidders
- Create and manage specific lists of “Sensitive Activities” for each Package. Sensitive activities are tracked for delays through the life of a Project

Appendix D shows some typical screens from the Administrative module.
Appendix A: Screen Images from the PTS Design Review System

Figure 8: Master List of documents for a sample AC Package.

Figure 9: Document group ready for assignment to a Review Panel.
Figure 10: Creation of Review Panels or Review Groups.

Figure 11: Assignment of Review Panel to specific document group for an AC Sub-System.
Figure 12: Graphical report showing review progress for a particular Package.

Figure 13: Review Screen showing that a document group is ready for review.
Figure 14: View of a sample master document. Also shown is a facility for adding comments and uploading other reference documents, which can be viewed by subsequent reviewers.
Appendix B: Screen Images from the PTS Site Managers Module

Figure 15: Sample interface for Site Managers to provide updates on Chimney Piling Progress.
Figure 16: Example of another interface for providing updates on piling activities.
Appendix C: Screen Images from the PTS Client Module

Figure 17: Interface for updating action taken for critical & sensitive activities.
Figure 18: Resource Cost Rate Table for Project Running Cost calculations based on entries in the Time Tracker Module.

Figure 19: Real Time Project and Package Activity Progress Indicator.
Figure 20: Consolidated client view for viewing the status of all post-award activities.

Figure 21: Interface for schematic-based access to information on various Packages in a Power Plant. The schematic can be customized to portray actual Power Plant layout plans.
Appendix D: Screen Images from the PTS Administrative Module

Figure 22: Project & Project Plan Linkages.

Figure 23: Specific Packages & their Project Plan Linkages.
Figure 24: Division of Package Activities into Groups or Phases.

Figure 25: PTS Client User Roles and Authorizations.
Figure 26: Package Items and Item Groups.

Figure 27: Package Pre-Award action linkages with corresponding Project Plan Activities.
Figure 28: Items whose inspection status needs to be tracked.

Figure 29: Items whose dispatch status to the Plant Site needs to be tracked.
Figure 30: Items whose Site Receipt status at the Plant Site needs to be updated and tracked.