**CTCI**
Discover Reliable

Technical Skills

Research of Liquid Amine Absorption Tower Design
Amine absorption and regeneration is a process widely applied to treat fuel gas and LPG for reducing its acid contents to the specified level in refinery and natural gas industry. Based on relevant literatures, engineering standards, and experience of historical projects, CTCI had accomplished thorough research on process parameters and system design of amine system. Moreover, CTCI is able to use ProMax, the standard tool in amine system, to do process simulation. With this research, CTCI has equipped itself with the capability of basic design for this process.
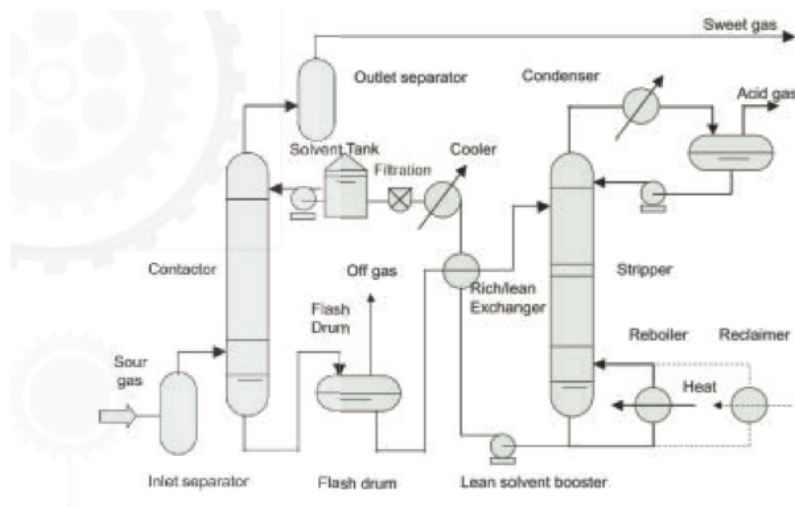

◄Amine Absorption Process Flow Diagram

Database of Modularized Equipment Piping Design
Piping design engineers accumulate experience by engaging in different types of piping configuration design projects and accomplishing design works for a variety of plants. Database of modularized equipment piping design was established to help piping design engineers efficiently comprehend process of plants, assure that the piping arrangement can meet the requirement for operation and maintenance of piping and equipment, enhance personal design ability, and improve design quality. Piping design leaders and senior checkers can use the database to provide reference design in 3D PDF format for designers and junior checkers. It can be applied not only for design phase but also for piping material estimation in projects quote.

Steel Connection Design for H-Beam to Tube Column
Steel tube columns, also commonly called steel HSS (Hollow Structural Section) columns, perform excellent features subject to axial loading and biaxial bending as they have uniform geometry along the cross-sectional axis, and thus uniform strength characteristics. Besides, their smooth surface and architectural esthetics makes them good choices for columns in exposed structures. Hence, it gradually becomes popular in engineering to use tube columns accompanied with H-beams for building design. However, there have been more restrictions in constructing connections of H-beams to tube columns than those to H-columns. In addition, the analysis and design for this connection types is also intricate. In this context, CTCI adopted external-diaphragm gussets for steel beam-column connections, and strengthened the connection with stiffeners at the locations of stress concentration. A finite element analysis method was further performed to analyze the stress distribution precisely in the connection to assure the design quality. Accordingly, with the development of foregoing technique, CTCI enhanced the application of steel tube columns.
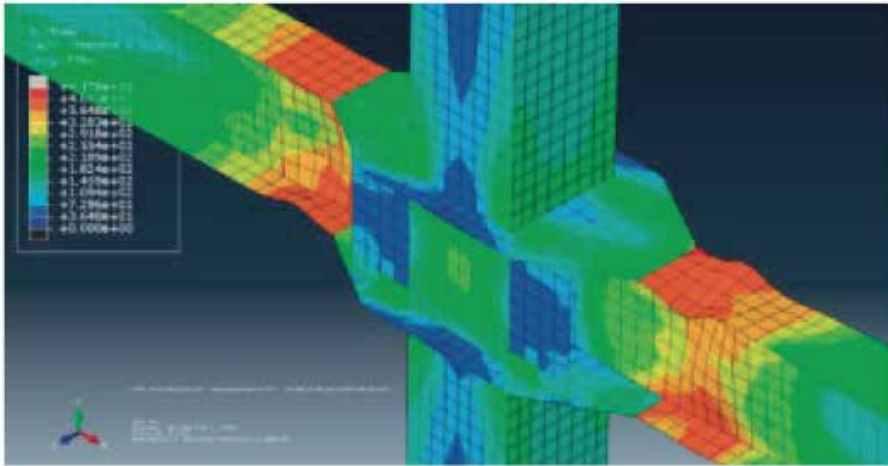
◄ Stress Contour of Connection

Optimal Design for Harmonic Filter of Bulk Supply Substation of MRT Power System
Since mass non-linear loading equipment is used in Mass Rapid Transportation (MRT) power supply system, it is easy to produce harmonic pollution which influences the quality of power supply. In this context, CTCI developed a design system to find out the optimal planning of parameters, installed capacity and orders for harmonic filter in order to suppress harmonic pollution effectively and improve power quality for MRT. Furthermore, it makes the estimation for the scheme of power supply system and equipment capacity more accurate so as to improve the autonomy technology and save the equipment investment for MRT power supply system.

Pressure Vessel and Storage Tank Design Software
Design Program of Tall and Slender Pressure Vessel Laterally Supported by Steel Structure When the suitable shell thickness or geometric dimension of skirt of a self-supporting vertical pressure vessel could not be designed due to its lateral force, we will consider using steel structure as the lateral support(s) for the pressure vessel. However, most commercial pressure vessel design software is incapable of dealing with steel structure supporting design, and the general structural analysis software does not consider the requirement for pressure vessel design. Therefore, CTCI developed the pressure vessel steel structure support calculation module, which can quickly obtain suitable shell thicknesses and support skirt's geometric dimension according to lateral supports location and its stiffness.

Dome Roof Support Tank Design
For the large storage tank with internal floating roof, the existence of support column will cause the emission of the content and affect the operation of internal floating roof. To avoid these issues before they occur, dome roof structure is an alternative solution widely used in practical design. However, most commercial storage tank design software does not have dome roof support design function. Commercial steel structure software, therefore, are generally used for this design. In practice, however, this approach requires skillful users and if necessary, a lot of efforts are needed to repeatedly modify the structure model in order to meet the CODE requirements.

In view of this, CTCI applied SAP2000 OAPI (Open Application Programming Interface) module combined with tank design standards and rules of thumb to develop dome roof support structure design program, which not only issue proper dome roof structure layout more quickly but also provide material take-off and weight calculation for the benefit of cost estimation.
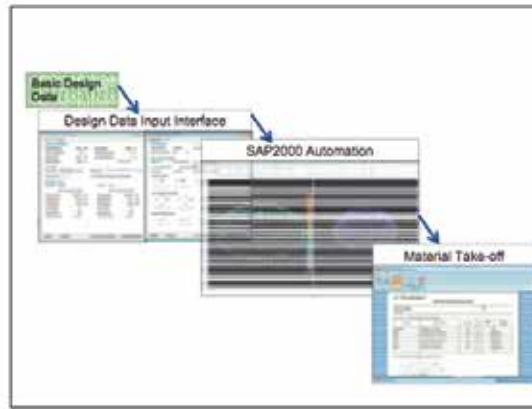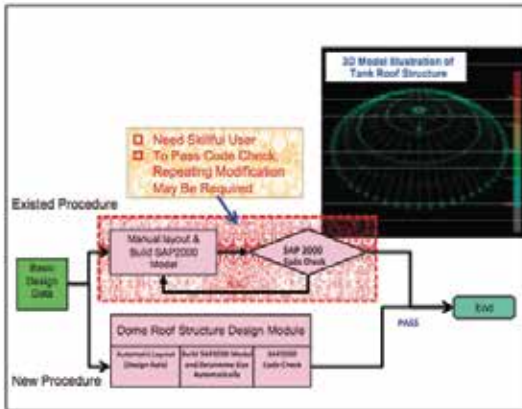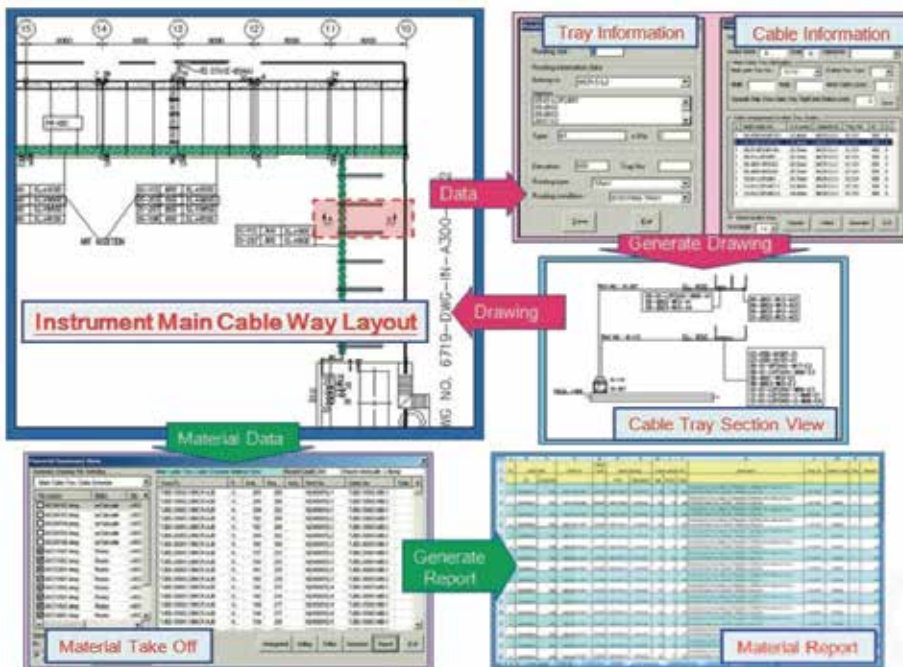
▲ Workflow comparison before and after improvement

▲ Design - Modeling / Analysis - Material Take Off

Automatic Cable Tray Cross Section View Generation and Cable/Tray Material Take Off for Instrument Main Cable Way Layout

The automatic cable tray cross section view generation and cable/tray material take-off for instrument main cable way layout is programed by integrating the CAD system and database system. Through drawing design operation, the program can store design information, such as cable type and quantity, cable tray specification, design regulation and rule requirements, into database automatically. Meantime, 2D CAD system will automatically track the cable path drawn by users, calculate its quantity of cables and trays material for these cable route, and then generate cable tray cross section view. By using the automatic calculation and drawing generation, it saves cost for manual works. In addition, computerization enhances design quality and accuracy.

The automatic cable tray cross section view generation and cable/tray material take off for Instrument main cable way layout