

# MCHTM Inc. Applies Its Rapid and Optimized Module Structure Design System to Eliminate 280 Tons of Steel, Saving USD 2 Million

SACS-based RSDS Reduces Design Times of FPSO and FLNG Topside Modules From Weeks to Days

## OVER BUDGET AND OVER TIME

Houston-based MCHTM Inc. provides structural engineering consulting services to the offshore industry, as well as support for procurement, construction, and installation activities. It specializes in topside facility systems of floating and fixed-based offshore platform types. Across the energy industry, topside facility construction is often delayed by engineering disciplines—including structural—insisting on final designs from the other disciplines before proceeding without design “holds.” Original execution schedules are typically underestimated and costs—including for structural steel—tend to run over budget.

It is critical that the engineering of offshore facilities is executed on schedule because delays affect the on-time completion of the downstream project activities, such as construction. MCHTM saw an opportunity to improve the efficiency of structural engineering by applying the automation capabilities built in to the SACS program. The organization set out to reduce structural design cycle times from weeks to days, optimize structural weight, and ensure member design utilizations are as high as possible without exceeding the design requirement. The result is its SACS-based rapid structural design system (RSDS).

## LACK OF “FINALIZED” DATA CREATES PROJECT DELAYS

Large offshore topside projects—such as floating production storage and offloading (FPSO) and floating liquefied natural gas (FLNG)—are often plagued by delays in the design phase, structural engineering included. The construction phase of all the other parts of a project may be halted by structural support needing to be put in place and approved-for-construction drawings not available to fabricate it. On the other hand,

the design of the structural support cannot be completed without risk of change until the designs of all other parts of the projects are finalized.

In the past, MCHTM would hold out for “finalized” data and design inputs, the same approach as—and still is—followed by most engineering organizations. This practice led to delayed start times and risks of a late finish for the entire project. In addition, with no automation in place for an optimized analysis of multiple configurations during the design phase, structural engineers typically settled for a single analysis of a base design that was derived from a similar project to save time. This waiting practice tended to put engineering teams behind schedule and potentially blind to potential hiccups such as a structural configuration that could not easily be optimized later.

## A LONG-TERM AUTOMATED STRUCTURAL DESIGN MODELLING SOLUTION

MCHTM has been a Bentley user for over two decades and has used SACS to streamline similar projects, in part to the software’s interoperability with external programs. “We have settled on SACS since we find it to be an affordable and essential time-saving tool to produce cost-effective and safe offshore structure designs,” said Michael Harwood, president at MCHTM. In creating their semi-automated structural modeling and weight optimization system, they have exploited the simple data input and output interfaces that SACS offers to import and export key information to and from its own and third-party applications.

In a matter of days, the RSDS system can help develop a structural concept into a bid or FEED-level design, considering all available critical data multiple times. These considerations include environmental

## PROJECT SUMMARY ORGANIZATION

MCHTM Inc.

## SOLUTION

Structural Engineering

## LOCATION

Houston, Texas, United States

## PROJECT OBJECTIVES

- ◆ To shorten structural design schedule from weeks to days.
- ◆ To improve analysis and establish automated structural design.

## PROJECT PLAYBOOK

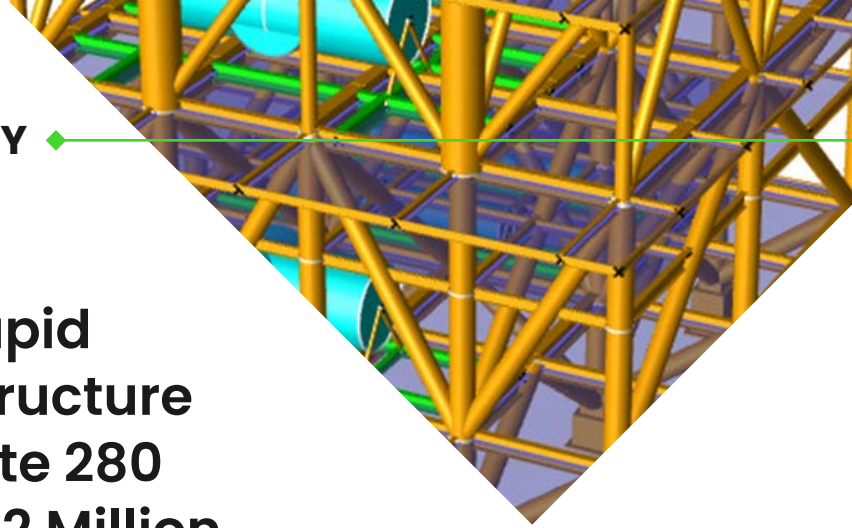
SACS™

## FAST FACTS

- ◆ MCHTM used SACS’s interoperability with other applications to power a rapid design solution with automated modeling capabilities and analysis.
- ◆ With the analysis process automated, the impact of available information can be assessed and implemented as frequently as it is changed throughout the bid and design process.
- ◆ Within days, SACS created a comprehensive analysis folder system that can effectively analyze weight-saving opportunities that would have normally taken weeks.

## ROI

- ◆ SACS-based RSDS eliminated over 280 tons of steel, translating into approximately USD 2 million of savings.



“We have settled on SACS since we find it to be an affordable and essential time-saving tool to produce cost-effective and safe offshore structure designs. We aim to leverage SACS so that one engineer can produce as much work as five or six people would in a large design firm. The functionality that SACS allows us to compete successfully in the tough engineering design market and be more profitable.”

– Michael Harwood, President, MCHTM Inc.

load effects due to wind and waves—and vessel motions—along with impact of potential fire and blast events while at the same time complying with offshore design codes. Without SACS and its automation features, analyzing and addressing weight-saving opportunities would have taken weeks and months—or possibly longer. “One might say that the RSDS may not even be possible without SACS,” said Harwood.

With the analysis process automated, the impact of available information can be assessed and implemented as frequently as it is changed throughout the bid and FEED design process. This is possible even at the detail design phase in cases where a major design change is imposed on a project. SACS powers the RSDS process to provide the analysis of multiple scenarios quickly and efficiently, allowing MCHTM to find the optimized solution in a fraction of the time it would originally take.

#### **SACS POWERS CURRENT AND FUTURE SAVINGS**

MCHTM can quickly develop optimized structural designs of FPSO and FLNG topside modules for the bid and design phases of projects by leveraging

SACS automation capabilities. “We aim to leverage SACS so that one engineer can produce as much work as five or six people would in a large design firm,” said Harwood. “The functionality that SACS provides us allows us to compete successfully in the tough engineering design market and be more profitable.” When executed during a recent project, SACS helped MCHTM show their client that they could eliminate over 280 tons of steel from one of their base module designs at the time, translating into over USD 2 million in savings.

SACS powers faster, safer, and more cost-effective structural engineering designs. SACS analyses are as accurate as possible, drastically reducing the risk of failure and making it easy to identify issues downstream. For initially under-designed structures, the automated structural design modelling allows quick remediation to produce an optimal design. By the same token, weight savings will be realized in initially over-designed structures. Having this visibility during the bid and front end engineering design phase has the potential to dramatically cut costs during construction.