



## Introduction

The team of Odebrecht Industrial Plants is responsible for internal consulting and technical support on engineering solutions for all Odebrecht's contracts.

The main effort is to analyse the different stages of the assembling of huge equipment through designing specific accesses or a group of accessories that allow the required movements, which means the manipulation of heavy loads until the end of the installation process. These accessories and/or accesses are normally not considered during the conception of the equipment design, but are fundamental to their installation.

## About our work

The workflow is based on simple client information regarding the equipment, and the first decision is to define the machines (the cranes) that will make the movement. Subsequently, the equipment itself is analysed in order to check if it supports the lifting loads in the different construction stages. The analysis will define if reinforcement is necessary for the installation process or even for the equipment operation. The accessories are defined based on global and local analyses of the introduction of loads. Scia results define the material and components, with the information flowing to the customer and the internal Odebrecht S.A. team.

The analysis is based on American Standard Code AISC 89, but in some cases, for a refined analysis, Eurocode is used.

## Use of Scia Engineer

Scia Engineer has been used since 2011. The biggest discovered benefit was the shells study. The tools used previously did not allow easy modeling with a refined analysis that considered heavy loads manipulation.

The projects are distributed across different parts of the world, including Brazil, Mexico, Houston, Argentina and Italy. The main challenge in these contracts is the deadline, which demands an agile analysis, a quick dialogue with the support team, and fast and reliable results, since maintenance stops for important equipment are involved.

In citing some main examples of the use of Scia Engineer, we refer to some projects where advancements in the field of analysis and accurate calculation were possible. The Scia Engineer response is very close to the real structure behaviour.

In conclusion, the use of Scia Engineer means, for us, Practicality for Consulting Engineering through a user friendly interface and large gains in modelling.

## Project 1: Chimney

Client: YPF Ensenada Industrial Complex  
Description: Continuous Regeneration Process Reactor.  
Equipment: 200 tonnes.  
Location: Argentina

## Project 2: Chimney

Client: CSN - Companhia Siderúrgica Nacional  
Description: Reheat Furnace Chimney. Ten sections, four vertical points, critical section: 70 tonnes.  
Location: Rio de Janeiro - Brazil

## Project 3: Pernambuco Arena

Description: Load Measuring Device. Hydraulic Equipment for loads acting in the coverage rods.  
Maximum load extent: 60 tonnes.  
Location: Pernambuco - Brazil

## Project 4: Aquapolo Project

Description: Cylindrical Tank, with a 12 m diameter and a 12 m height. Chimney of Balance: 30 tonnes.  
Location: São Paulo - Brazil

# Construtora Norberto Odebrecht S.A.

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## Project information

Owner	Construtora Norberto Odebrecht S.A.
Architect	Odebrecht Plantas Industriais
General Contractor	Construtora Norberto Odebrecht S.A.
Engineering Office	Odebrecht Plantas Industriais
Location	América do Norte, Central e Sul, Brazil
Construction Period	01/2011 to 04/2013

## Short description | Lifting of Heavy Loads and Construction Stages

The key focus for Odebrecht Industrial Plants is to analyse the different stages of huge equipment assembling through designing specific accesses or a group of accessories that allow the required movements, meaning the manipulation of heavy loads until the end of the installation process. These accessories and/or accesses are not normally considered during the conception of the equipment design, but are fundamental to their installation.

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