

An Earth-Moving Decision

CB&I chooses AutoCAD Civil 3D to help balance cut and fill in Chile

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Harprit Dogra, Engineer, CB&I

Think CB&I and you think big. The engineering, procurement and construction (EPC) contractor is one of the leading companies of its kind in the world with over 13,000 staff in 60 locations.

But it’s the sheer scale of its projects that really impresses. CB&I specialises in turnkey solutions for customers that produce, process, store and distribute the earth’s natural resources – for example, those in the oil and gas, petrochemical and chemical, power, water and wastewater and metals and mining industries. Projects include hydrocarbon processing plants, LNG terminals and peak shaving plants, offshore structures, bulk liquid terminals, water storage and treatment facilities, and other steel structures and their associated systems.

These are usually enormous installations – covering vast tracts of land. Imagine the extent of the early civils work needed on any of these projects in order to get the ground ready and prepare for underground infrastructure such as drainage and other Underground lines.

In CB&I’s London office, engineer Harprit Dogra has been using AutoCAD Civil 3D to help him calculate the cut and fill for a large new LNG facility in Chile. He reports that it is changing the way this major task is carried out – and for the better. “I can now do many things that just weren’t possible before and work with much greater accuracy,” he says.

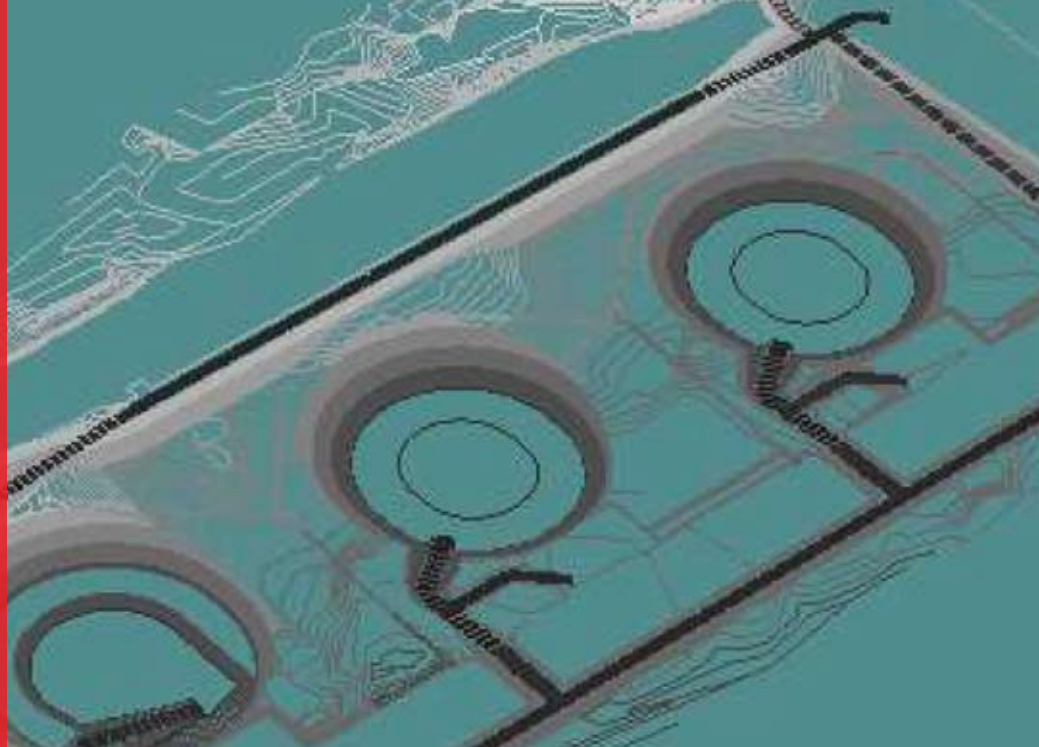
Costly phase

Earthworks are often a very expensive part of an engineering and construction project – and coming as they do at the beginning of the construction phase are vital to get right to set the rest of this stage on the right track. Often, there is also a legal and environmental obligation to minimise the amount of spoil removed from the site and perhaps to develop a tipping site to accommodate the surplus.

As Dogra explains, it is always a fine balance – and no more so on his recent work on the Chilean project. “The preliminary civils work on this project has been extensive, especially where we will cut into the earth for pits, ponds, roads and huge pipelines. There are cuttings for tanks 80m dia set 10m deep, site is approx 2.5km long and 1km wide,” he says.

The London office uses a range of software, including a specialist package for the pipework and another competitive civils solution for other infrastructure work. “However, I wanted to try AutoCAD Civil 3D as I had heard it could bring a new precision to site preparation works and volume calculations that otherwise would just not be possible,” says Dogra.

“Previously we would have worked out cut and fill by longhand. It was a very basic way of doing things but it was just how it had always been done. However, these days we need to be more mindful of the



environmental impact of shifting large volumes of earth and disposing of it. It's becoming increasingly more important to have some realistic figures so that we get it right on site and work to budget."

What makes AutoCAD Civil 3D so useful for this work is the way it deals with changes. An infrastructure design forms a dynamic 3D model. Linked to this is a database of all dimensions and other statistics integral to the design.

If the design is manipulated to change, for example, the shape of a hole in the ground, every other piece of information updates accordingly. As a result, it becomes very easy to experiment - taking some ground away here, adding a slope there - so that a better balance can be achieved.

This is certainly working for the site in Chile. "The grading/cut and fill here is a major exercise but using the software we have been able to streamline the task like never before. For example, getting just the right gradient for the design. Now we have so much valuable information at our fingertips," says Dogra.

"We are only allowed to take so much spoil off site so I am able to work out where we can re-use the extra. However, we still may need to buy a tipping site but, if so, we'll be able to work out exactly what size of site we will need. This is a great benefit to us and to our client"

So, will he continue to use AutoCAD Civil 3D and explore its other options? "There's obviously far more to the solution than volume calculations - it's a wide-ranging software and we've been working closely with Autodesk on our use of it.

"But, it's certainly worth investing in for this aspect of it alone."

Cut and fill may just be one small part of such a major project but when such extensive volumes of earth are involved, accuracy and careful balance can be key to maintaining profit margins and of course remaining environmentally sound. Less spoil removed, less material brought onto the sites, fewer journeys, smaller tipping sites - there could be benefits all round in the future.

For more information

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