

Making software work for you

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Introduction

As a software house we get a rather unique and interesting view of the Consultant Engineering industry. More and more there appears to be a gradually widening gap between those companies that are using software to move forwards and those that are standing still.

This article looks at an example of how some progressive companies are using the latest tools to become more efficient and successful, and the key steps required in any process of improvement

Flexibility is the key

Recently, one of the significant growth areas has been in the use of free format calculation software. Coming from a slightly different angle to traditional software tools, 'Calc pad' style software is much more aligned with the analogy of spreadsheets, but without many of the issues associated with spreadsheets(1). This is not a new concept but it is only over the last 5 years or so, where companies have really started to exploit the benefits and opportunities that this model can bring.

Typically 'Calc pad' style software consists of a platform upon which calculations can be created or edited by Engineers and a mechanism whereby they can be distributed. As well as this platform, a number of pre-written calculations provide the prerequisite set of 'standard' designs. This provides a twofold solution, the quick, standard design solution, and the capability to create company specific non-standard or unique solutions.

The ability to create company specific calculations has several benefits - it provides a solution that perfectly fits the problem (better than any third party will create), it allows the capture of knowledge (an important asset in any Consultancy) and it results in a solution with all of the major benefits of software such as quality, speed and consistency.

Of course, all these advantages do come at a cost; time and resource. Since an up front investment is often required, it is important that any process is carefully planned and managed(2).

A recent project by MWH (Montgomery Watson Harza) provides an example of creating a bespoke solution to improve efficiency.

Setting the pace

With an upcoming project to design several hundred Combined Sewage Overflows (CSOs), MWH realised that they faced several potential hurdles.

The designs were going to be done through a range of offices by staff with a wide range of experience in CSO design. Secondly, given the scale of the project, any reduction in design time would have a big impact for both MWH and their clients. Thirdly, the quality of design would have a large implication on the operational efficiency of the finished products - crucial to the clients. MWH needed to produce top quality designs, as efficiently as possible from offices throughout the group.

To resolve these issues, MWH set up a team to refine the CSO design process to maximise efficiency. The first stage in this process was to take the experts in CSO design throughout the company and develop a best practice design guide.

Having completed this stage, MWH identified the 'Calc Pad' software TEDDS as the tool with which they would implement the design guide as a working calculation.

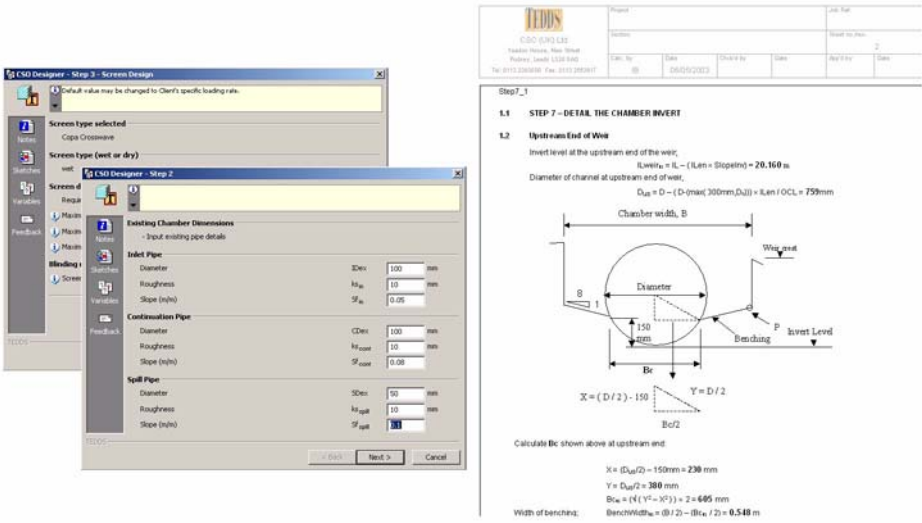


Figure 1: CSO design calculations in TEDDS.

"With such a large workload and varied levels of experience we needed to ensure that staff had the necessary tools to deliver projects. It was identified early on that a traditional 'long hand' approach would not deliver in time.

The challenge was to create an automated calculation process that would follow the MWH CSO design guide through the necessary steps producing the correct calculations and reporting/warning of any problems with the design to the engineer. The calculation would produce a clear, concise and auditable final document." - Andy Arnison, Project Manager

The creation of this solution did two things, it documented and 'locked in' best working practice for CSO design within the company - taking the experience and skills of the top Engineers and disseminating them throughout the company (and to some extent, using software to teach a process) and secondly provided this in an accessible, transparent software format, which saved time and increased quality.

Having gone through this process, the benefits now being realised are significant as Andy reports;

"The benefits of this process have included a reduction in design time, consistent, auditable designs, flexibility to re-run calculations for various scenarios quickly and easily while maintaining a complete, clear and concise design document and finally improved quality assurance for designing, checking and reviewing".

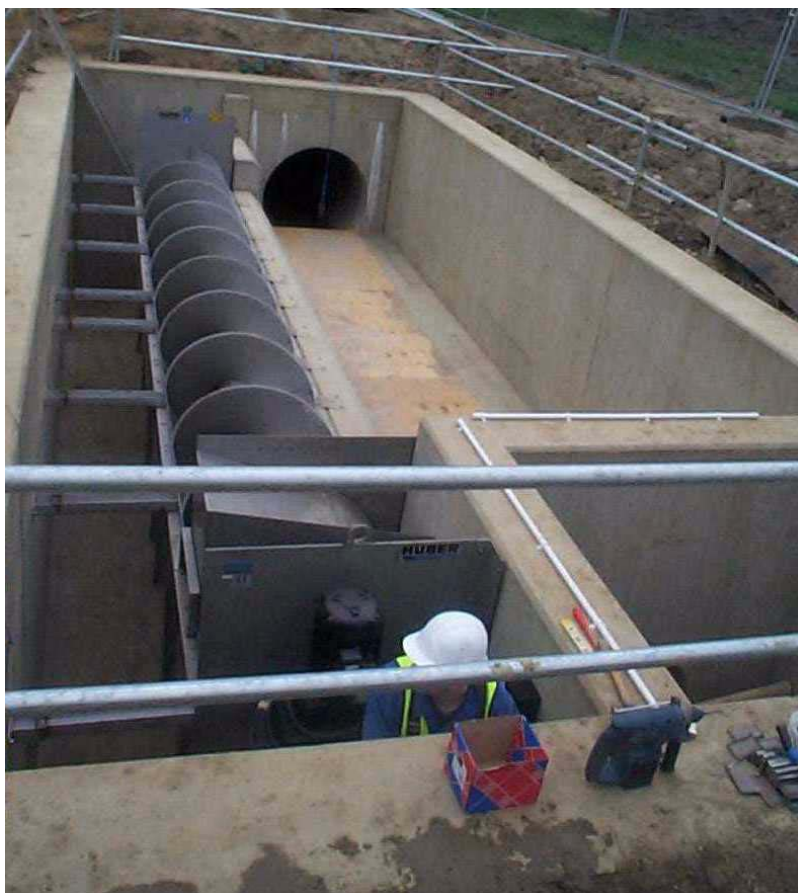


Figure 2: A finished CSO design under construction (courtesy of MWH).

While this may seem far away from reality for many smaller consultancies, this example is as relevant to a small practice as it is to the multi-nationals. The point is not the scale of implementation but the principle of identifying common tasks (or in this case design calculations) and reducing the impact of those tasks to give an overall benefit. There are numerous examples of small companies who have done exactly that, only on a much smaller scale.

How can you make it work?

From theory to practice

The primary aim of using software is to enhance or replace an existing process to the benefit of the user. Fully understanding and applying this principle to using software is the key to ensuring a return on any investment.

In order to do this there are several natural stages to go through, each of which can have several parts, but broadly speaking they can be categorised as follows;

- Determining the enhancements or savings that can be made,
- Identifying the process through which these benefits can be achieved and
- Successfully carrying out this process.

The basic principles which lead to success are the same whether the goal is wide scale software development to standardise and lock in knowledge, or the setting up of a simple spreadsheet. The following principles demonstrate how to maximise the chances of success in implementing any process of improvement.

The five fundamentals of improvement

1. Define your objectives

The fundamental building block of any process of enhancement is to clearly define the objectives. These might range from saving money on a multi-million pound project, to saving 10 minutes on a calculation that is used repeatedly.

Although MWH had several objectives, one of the key factors in deciding to use Calc Pad style software was the transparency of the final design process. The design calculations that were written out were the calculations that had been performed, not merely output from a black box solution. In defining that this was important the choice of tool became far more focussed and hence easier to get right.

Clearly defining the main objectives achieves three important things;

1. It forces thought about what benefits are really the most important to your company and why you are trying to achieve them.
2. It provides a requirement that can be used to help choose the correct software or process.
3. It gives a yardstick by which the success of the implementation can be measured.

Change and improvements do not need to be radical to have effect; in fact the opposite is true. Large scale change is far more difficult and hence more likely to fail than small but gradual improvement.

2. Ensure benefits

The most effective solutions are those which are cost effective at all times. Although there was development work done up front by MWH, the final result was a net gain - this is crucial to any process. Again the principle 'start small' is fundamental, small steps are far easier to justify and far less risky.

Whilst ideally benefits should be clearly defined and measurable(3), this is not always straightforward. Secondary effects, such as a higher quality output resulting in fewer building control queries or being able to quote more competitively, are not easy to quantify but are nevertheless significant achievements and have value.

3. Plan ahead

In the example given, planning ahead meant that by the time the design work had started, the design guide and software was in place. Had MWH waited until the start of the design project before going through the process, it would be unlikely that any benefit would have been seen until towards the later stages, with the total amount of work done having either been the same or more. Timing is everything!

Although planning ahead is difficult, particularly when projects nearly always come in with little lead time, most practices often deal with the same type of design work time and time again.

4. Using the correct tools.

There are many different tools available; knowing what is out there and when to use them is probably the single most important aspect of using software. Whilst everyone will argue that their 'solution' is best, each type of software has its place and its benefits. The correct route to take needs to be an informed decision made by and for your organisation.

5. Careful management.

All of the principles listed here are really about good management; however there are several other points that are often overlooked quite unnecessarily.

Getting buy-in. - Involving personnel at all levels will ensure that as well as buying in to the final solution, it is much more likely to be useful and beneficial to those at the sharp end. While many changes are driven gradually from the bottom up, there are equally many that are forced top down and these are far less likely to succeed unless communicated effectively.

Supporting change - Supporting change can be as simple as providing more information such as what tools are available and how they should be used, through to providing documentation and training where it is required.

Measuring the success. - Finally, having spent time and effort on a change, it is important to know whether the expected benefits are being achieved. In the long term the earlier problems are ironed out the more cost effective this will be for the company.

Conclusion

The use of software is only one part of the equation that makes a successful and progressive company, but it is certainly one that cannot be ignored.

It is not proposed that every company should start a radical overhaul of their processes or, in fact, that developing bespoke calculations is always the answer. Developing calculations is merely one solution

to a particular problem, although knowing what is available and using the right tools is a fundamental part of this process.

However, every company should be aware of and constantly thinking about how they can be more efficient and how they will be working in 1 month, 1 year and 5 years' time.

The competitive edge is now gained not by purely choosing better tools than the competition, but by doing a better job of using those tools.

In an increasingly sophisticated market place, identifying and embracing progress is now a necessity.

(1) Guidelines for the use of computers for engineering calculations. IStructE, Mar 2002

(2) CCTA, Managing Successful Projects with PRINCE 2. The Stationary Office, 1998

(3) Downs C, Managing technical software for profit. Journal of IStructE 4 Feb 2003 Vol 81 No 3