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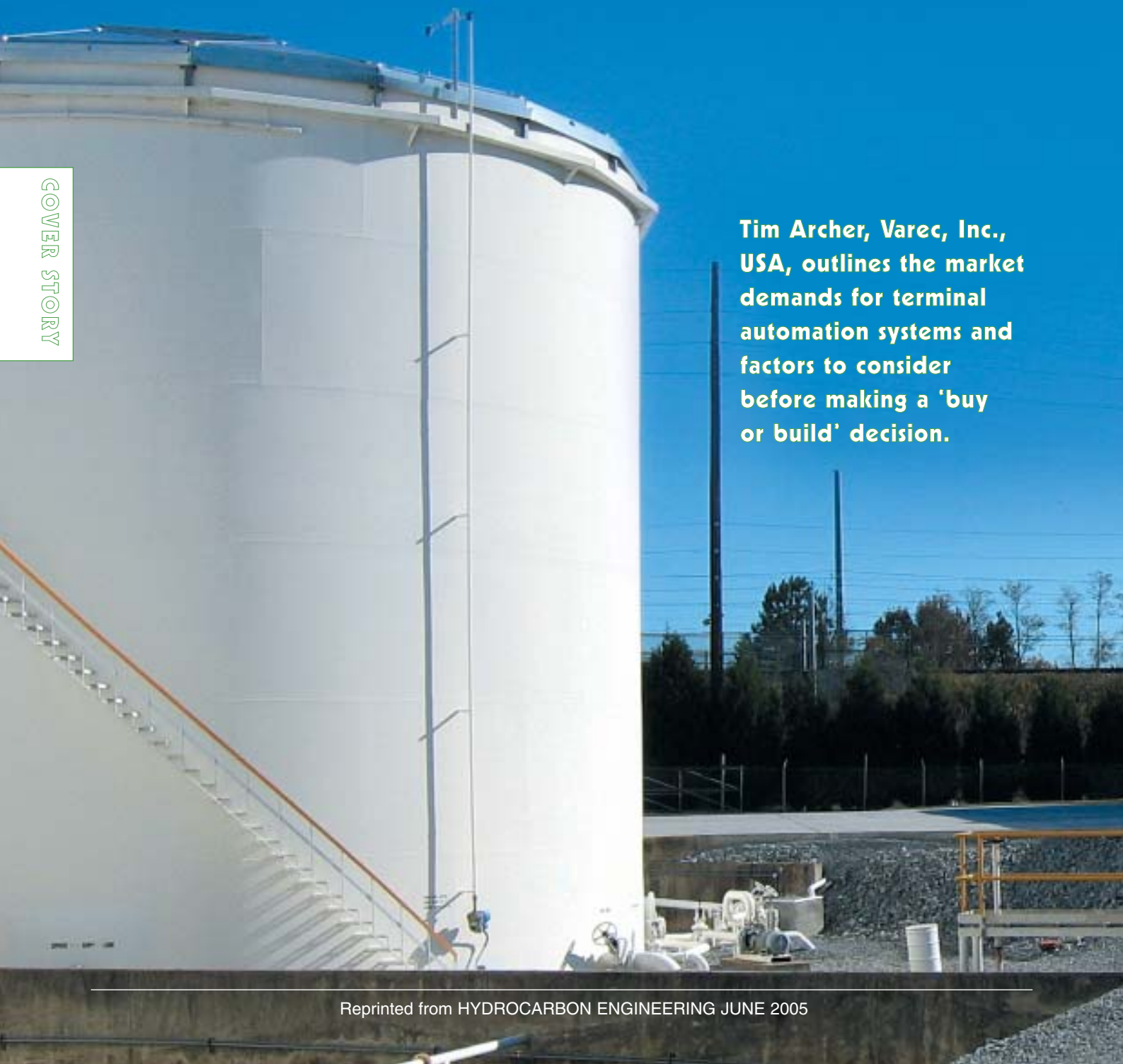
Terminal automation options



COVER STORY

Tim Archer, Varec, Inc., USA, outlines the market demands for terminal automation systems and factors to consider before making a 'buy or build' decision.

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The 'buy versus build' software solutions debate has raged for about as long as commercial off the shelf (COTS) software has been available. If you are an IT manager seeking to replace legacy terminal automation systems, there are three options:

- 'Buy' a COTS solution.
- 'Build' a custom solution.
- 'Build' an engineered solution.

As an IT manager, it is also necessary to ask a number of questions to come to the right decision: What are my internal customer's requirements? Do any vendors offer a COTS solution that meets my specific needs? Is there a strategic advantage to having a custom solution? Do I have the internal expertise to develop and maintain a custom solution? Can I customise a COTS solution to meet any functional gaps? What is my project deadline? What is my budget?

Automation options

A COTS terminal automation system is off the shelf software configured to meet specific requirements. A custom solution is one that is implemented using software development languages and databases. This development can either be performed internally, or can be contracted to a software development company. An engineered solution is one that is based on products such as Supervisory Control and Data Acquisition (SCADA) and database software.

COTS solutions

If choosing the COTS strategy, it will probably not be possible to get every desirable feature, but it is likely that many features that have not been considered will be gained. COTS vendors are able to spread their research and development costs across many customers and markets. In addition, there is the added benefit of receiving new features at a lower cost when upgrading to future versions, which helps the company stay at the forefront of technology.

One of the disadvantages of COTS is that it is impossible to protect the company's innovations when working with a commercial vendor. If the commercial vendor implements specific innovations within its core product, these features will then become available to their other customers as well. If an agreement to limit the availability of the features is worked out, the result is a custom version of the COTS software, which will lead to higher maintenance costs in the future. Innovations in custom interfaces are more easily protected. Therefore, unless you have identified significant innovations that cannot be purchased commercially, the best strategy is to buy a COTS product and invest in integration development that improves overall processes.

Custom solutions

There are many advantages to implementing a custom solution. If the project is successful, it will result in a system that meets all specific needs. COTS products will often have many features that are of no interest to users. When a feature is not used, it usually still shows up during regular operations, which can lead to confusion. Custom solutions implement just the features that are needed and no more.

If the custom solution is developed with internal resources, there will be the added advantage of being in control of your own destiny when new features are needed or when a problem occurs. What is a priority for a company may not be a priority for the vendor, so it is not always possible to get the necessary features. On the other hand, if the vendor agrees that the feature improves the product, it may be acquired at no cost. Terminal automation should be considered a critical business system. When a problem occurs, it can be assured of being given priority attention because the engineers and developers that built the system work for the company. This risk can be mitigated by selecting a terminal automation system supplier that is responsive to the company's business needs.

Engineered solutions

If a COTS solution cannot be found that meets the company's needs, an engineered solution might be a better choice. It is rare for a company to have the budget and internal resources to develop and maintain a custom solution. In addition, it is difficult to find contract developers that have sufficient terminal automation experience. On the other hand, systems integration companies with terminal automation are easier to locate. Finding a company with experience of using standard SCADA software, Programmable Logic Controller (PLC) and database might be more challenging.

Even though you might purchase an engineered solu-

tion, the important distinction to remember is that an engineered solution is 'built'. Although the tools used to develop an engineered solution include COTS components such as SCADA and database software, they do not contain terminal automation specific data structures and business logic. As the data structures and business logic must be programmed, an engineered system is much more analogous to a custom solution than a COTS solution.

An engineered solution has most of the functional benefits of a custom solution. However, there are not the technical benefits because the individual components must still be integrated and contain redundant data. The primary advantage of an engineered solution is that the exact desired functionality is achieved and no additional features.

As Figures 1 - 4 show, the market is demanding comprehensive software suites that offer the advantages of a custom solution without the integration problems of today.

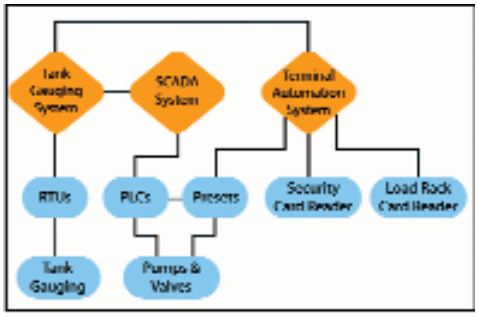

Figure 1. Current COTS solution.

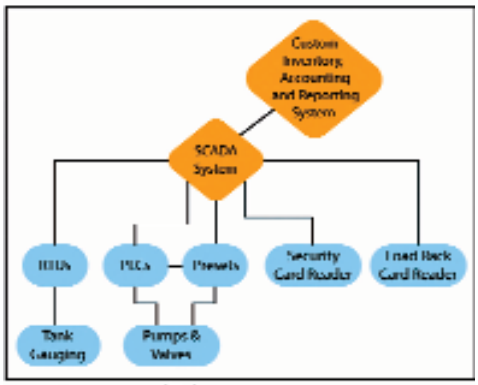

Figure 2. Engineered solution.

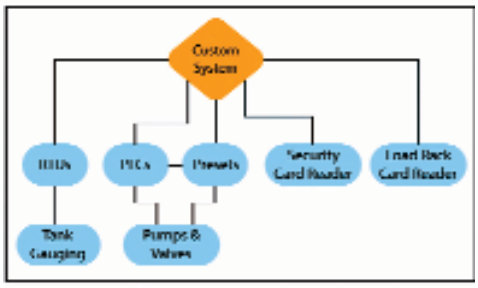

Figure 3. Custom solution.

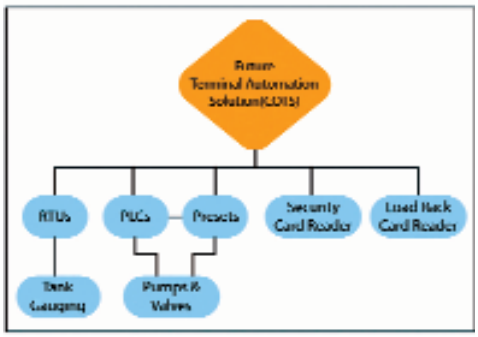

Figure 4. Market demanded COTS solution.

Buying versus building

No matter which automation strategy is chosen, at each stage of the project there is an opportunity to 'buy' rather than 'build'. For example, one option is to choose to do the system design using internal subject matter experts, whether the ultimate decision is to buy a COTS solution or build a custom solution. Another choice would be to build a custom solution, but contract out the actual development to a software development company that builds a system to the company's specifications and under its management. Alternatively, all the quality assurance testing could be undertaken using internal personnel, or this might be left entirely to the vendor. These types of decisions depend on how key questions are answered. No matter which strategy is chosen it is essential to involve key stakeholders (especially end users) in the process as early as possible.

Systems integration

A comprehensive terminal automation system consists of different components, such as load rack automation, tank gauging, pump and valve control, and back office accounting and reporting. A typical problem with COTS solutions is that each vendor focuses on its own area of specialism, and only provides partial solutions for other areas. This forced many terminals to purchase separate systems for load rack automation, tank gauging and SCADA. Until a single vendor is able to offer a comprehensive COTS solution, the only way to resolve the data redundancy and systems integration problem is to develop a custom solution. By using a shared database, a custom solution can minimise system integration and data redundancy. Despite this advantage, there need to be other compelling reasons to choose the custom development. Such custom development projects have significantly higher complexity and risk, which often lead to increased cost and time.

Technical expertise

No one knows the operations of a company better than the employees themselves. Companies that choose to build a custom solution often choose to do so in order to capture unique business knowledge in a system that meets its specific needs. One of the problems with this strategy is that it can also lead to the development of a system that captures and replicates any deficient processes. Partnering with a leading COTS vendor comes with the added benefit of having an outside view of business processes from people with a broad range of experience. Also, to implement a custom or engineered solution, it is necessary to have not only the functional expertise to specify the product, but also the technical expertise to manage the design, implementation and quality assurance of a large scale engineering or development project.

One of the advantages of COTS over custom and engineered solutions is that a COTS system often captures best business practices from across the industry. In the design phase of the project, the system vendor can be a valuable resource for solving business problems. Although there are limitations, most systems support standard methods of extending the system to meet unique requirements with limited impact on future compatibility. Therefore, unless extensive customisations that affect the core system architecture are needed, the best bet is to choose COTS and drive specific requirements into the system using the standard extensibility features.

Budget and timeline

A COTS solution will always cost less and have a faster deployment time than custom and engineered solutions. All custom or engineered solutions will include some COTS components. For example, tank gauging systems must be purchased regardless of which terminal automation strategy is chosen. Therefore, the difference in cost is basically the software cost. As previously stated, commercial vendors are able to spread the development cost of their software and systems across different customers, and sometimes even different market segments.

As the system is already developed, most COTS vendors should be able to begin working on the project quickly. Custom and engineered solutions will take significantly longer. In addition, the potential for technical problems, quality problems and priority changes all significantly increase the risk of delays when implementing custom and engineered solutions.

Making the final decision

When business needs have been identified, the next step should be to determine where a COTS solution can meet those needs. Where there are functional gaps, it should be investigated whether the terminal automation supplier is able and willing to customise the solution to fill these gaps.

There will always be some functional gaps in COTS software. The question is whether the benefit of these unique needs is worth the cost and risk of implementing a custom or engineered solution. If there is not the internal expertise to manage a large scale engineering and development project, the benefits are probably not worth the risk.

If the COTS option is eliminated, the deciding factor between selecting a custom or engineered solution is the availability of development, engineering and financial resources. There are basically three choices:

- If there is an internal software development group that can be allocated to the project, then develop the software internally and integrate it with COTS hardware.
- If there is an internal engineering group that has automation expertise, but not software development expertise, then build an engineered solution with internal resources.
- If there is no internal expertise, then contract with a systems integrator to build an engineered solution.

Contracting with a software development company to build a custom solution is not recommended because it is almost impossible to find a company with expertise in terminal automation, and the final product will be likely to have an unacceptable cost of ownership.

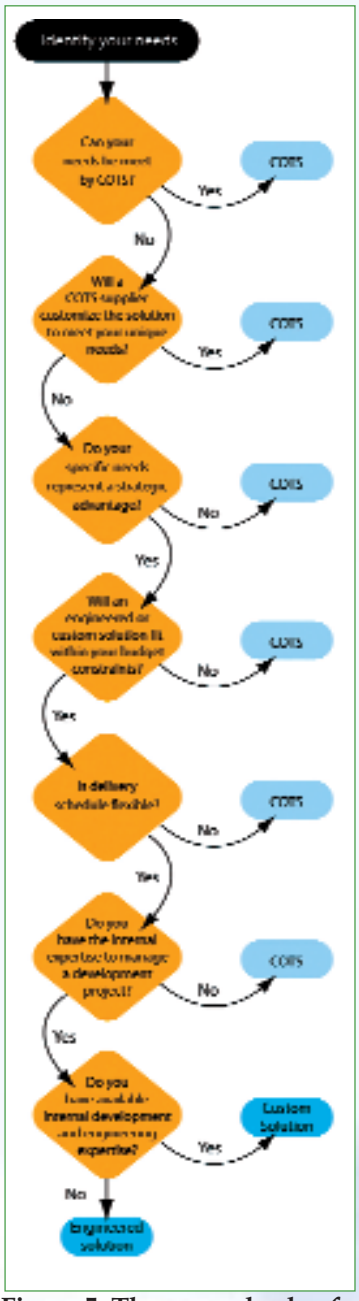

Figure 5. The general rule of thumb is to 'buy when you can and build only when you have to'.

Conclusion

The general rule of thumb is 'buy when you can and build only when you have to.' Custom and engineered solutions were implemented out of necessity in the past, because there were no viable COTS solutions. Today, better development tools, such as Microsoft .NET and J2EE, are enabling more rapid development of highly capable software applications at a lower cost than ever before. These tools are allowing terminal automation system suppliers to offer more comprehensive solutions. As Microsoft Office has standardised spreadsheets, word processor, presentation and small database applications into one software suite, terminal automation suppliers are beginning to offer complete solutions for all aspects of terminal operations, such as SCADA; tank gauging and inventory management; load rack automation; accounting; quality control; and environmental compliance. These software suites are also certified as an integrated component of SAP's Oil and Gas software solution: the market leader of enterprise computing systems for the oil and gas industry.

When terminal automation suppliers provide comprehensive solutions, the problems of data redundancy and integration are eliminated or minimised. The result is that it is no longer necessary to build a better solution in order to gain a competitive edge. By partnering with a supplier who invests significantly in research and development, a company can stay ahead of its competitors.

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