Do you want software with that equipment?

JIP tackles standardization for drilling software

RIGS ARE NO longer just rigs. They're complex machines. And this is no longer a brute force industry. Yet when equipment malfunctions, many drillers' tendencies still run toward getting out their hammers and knocking the machine back to shape.

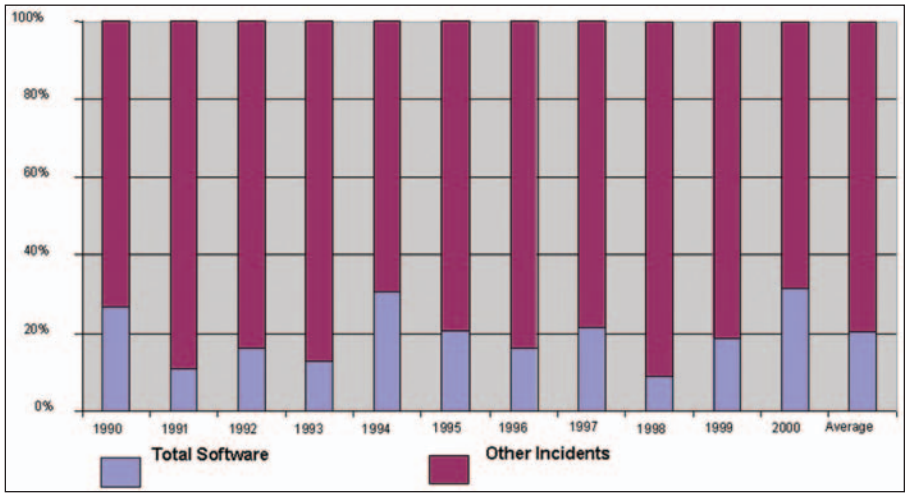
We've got to change that mechanical mentality, said **Don Shafer**, chief technology officer at **Athens Group**, a consulting firm specializing in rig technology and software.

Schedule delays, cost overruns, operational problems and potential safety issues have been plaguing the installation, commissioning and start-up of large drilling control systems. Often, individual systems work as advertised. But when the entire computer network is brought online, overall response times can slow dramatically. This is a common result when there's a lack of standardization of the software interface between the computer-controlled equipment (such as top drives, pipe-handling equipment, drawworks and iron roughnecks) and the integrated control systems (such as Cyberbase, V-ICIS and DCMS).

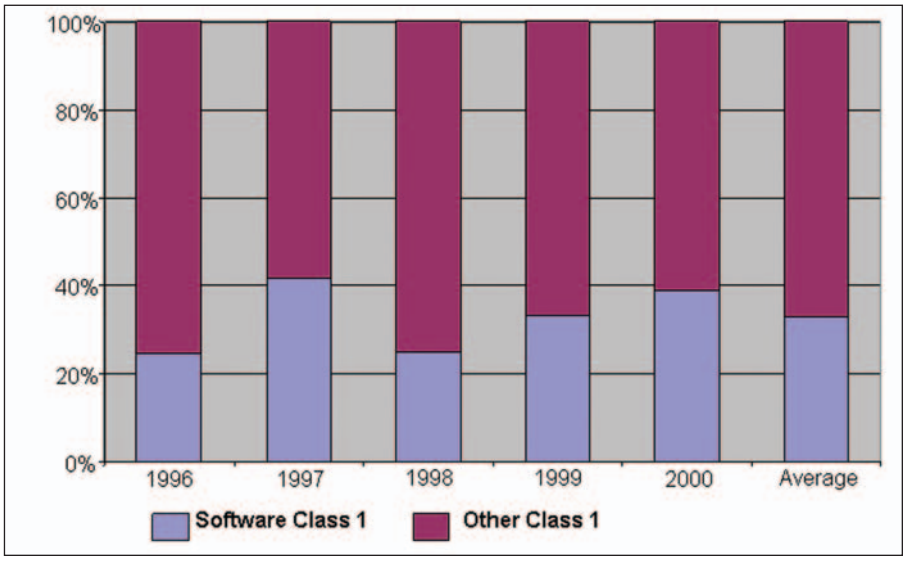
"I've experienced rigs where it's been 3 months, and all the equipment is up and running, but they can't get the software working right," Mr Shafer said.

Achieving standardization in drilling software is the goal of the Drilling Engineering Association's Project 159 (DEA-159), "Implementing Plug and Play for Computer Controlled Equipment" project.

Software is what glues all the different machines together on a rig, yet in drilling projects, they remain only an afterthought. For example, standards for grading drillpipe and classifying types of connections assure that drillpipe – regardless of manufacturer – can be effectively and safely integrated at the rig site and be fit for the intended purpose. Yet there is no equivalent standard for drilling equipment. Networked control systems must resolve vendor differences, all discrepancies and up to 8,000 data interface points. In addition, there are many issues that remain undiscovered or unresolved even at installation time.



Software incidents, as reported to the International Marine Contractors Association, averaged 20% of total incidents over an 11-year period. This mean 1 in 5 are caused by software problems.



This graph shows the percentage of "Loss of Position Class 1" DP problems that were caused by software. This is the most serious class of DP incident that could result in "serious loss of position with serious actual or potential consequences. On average, 33% – or 1 in 3 – of the most serious DP incidents were attributable to software problems.

And the growing complexity of control systems is only making the problem worse.

According to the project, the drilling industry can learn a great deal from the semiconductor and automotive industries, which faced similar challenges 10 to 15 years ago. In response to these problems, the semiconductor industry developed a set of standards known as SECS/GEM (Semiconductor Industry Equipment Communications Standard/ Generic Equipment Model) to allow fabrication equipment from multiple vendors to integrate seamlessly on the factory floor. These were derived from similar standards from the automotive industry.

Following the "plug and play" concept seen on PCs, the standards will allow standards-compliant equipment to integrate easily on the rig floor, regardless of vendor.

BEGIN WITH FEED

To begin with, FEED (front-end engineering design) must be utilized. Early in the project life cycle, everyone involved

must consider what software is needed and how it can be integrated into the hardware.

"Getting software engineering into the front end is important because that's where the decisions, especially big ones like budgeting, are made," Mr Shafer said. Then there must be standards for the software.

"I think the industry is still very immature as far as software is concerned," he said. "For example, **British Petroleum** has an inch-and-a-half thick set of standards just for the paint on a semisubmersible oil drilling platform. But they don't have any standards for rig software. And the software is what kills you in getting to first oil."

BP and other operators are now taking notice. Four – BP, **BHP**, **Exxon** and **Shell** – have expressed strong interest and are reviewing sponsorship packages, and Mr Shafer said he will be making presentations in the coming months to line up more.

"I think we're starting to see the operator leadership that's really necessary to get this going," he said. "And I really do think the operators have to lead this because, in reality, they're the ones that are paying the bills for everybody else."

"If you're going to invest a couple of billions of dollars into a semiconductor fab, there are standards you have to follow. If you're building a flight control system of an Airbus, there are standards you have to follow. And we're just trying to say, there needs to be standards for the drilling industry as well," he said.

Mr Shafer noted that although change has been slow in an industry used to focusing on big iron, he thinks the industry is finally learning from past experience.

"I see things slowly changing. Most operators have realized that they've been bitten by (the lack of standardization), and they don't want to be bitten again," he said.

In fact, he added, more than just operators, the whole industry is catching on to the problem.

"People are finally learning that software is the bottleneck," he said. "It's what's preventing us from smoothly bringing up the billion-dollar investments."

The JIP is divided into 3 phases, with each phase resulting in a deliverable that the DEA and sponsors can review. At a total cost of $100,000, Phase I is scheduled to last 6 months. It aims to consult with operators, contractors and equipment providers to assess the technical feasibility of applying the SECS/GEM standard to the drilling industry.

In this phase, Athens Group will develop a feasibility model of a SECS/GEM-equivalent system for drilling, demonstrating potential solutions for pain points of computer-based equipment integration. Specifically, the feasibility model would include models for a top drive, a pipe handler, a drawworks and an iron roughneck, along with a Cyberbase or V-ICIS. The model would demonstrate solution to installation issues such as automatic recovery, miswiring resolution, capability changes, automatic alarm mapping and reporting.

Consultation with key equipment developers would determine the most meaningful set of equipment commands to be modeled in the feasibility model. Consultation with drilling equipment providers would be included to make the number of data points and commands limited yet realistic to make an assessment of suitability.

There will also be a demonstration of the feasibility model at an Athens Group-sponsored workshop.

If feasibility is demonstrated, Phase II would aim to have major equipment suppliers develop software interfaces compliant to the standards developed in Phase I to demonstrate interoperability at the software level.

A "coalition of the willing" of equipment developers will independently construct software-only interfaces compliant to those developed for the model for key pieces of drilling equipment for 2 theoretical rigs. The integration of the models would again be demonstrated at a workshop. This phase is expected to take a year and is estimated to cost roughly $200,000 to $300,000.

If interoperability is demonstrated, then Phase III would create a committee to develop a set of standards based on those demonstrated in Phase II for the drilling industry. The standards would be rolled out for companies to install and use on any rig. This final phase is expected to take another year, and the cost would be nominal.

In comparison with the semiconductor industry, which took about 8 years to achieve standardization, Mr Shafer predicts the project will take only 2½ or 3 years for the oil and gas industry.

"We've got a really good head start using the semiconductor industry model," he said. "We're able to learn from their false starts and, in some cases, a lot of their over-engineering. There are some things that we just don't need to do because we learned over the years that those specs are never used."

Having worked before on the standardization efforts in the semiconductor industry, Mr Shafer said, he was particularly excited by this project.

"When you see an area where you've solved these problems before, you just know this can really make a difference in an area that's ignored but deserves an enormous amount of attention," he said.

And the benefits could be massive, Mr Shafer said. In addition to reducing risks associated with improper integration and miscommunication, there are also financial benefits. In startup, a rig could be down 10 shifts a week due to incomplete and incorrect software. Based on a conservative dayrate estimate of $150,000 and therefore a 12-hour shift estimate of about $77,000, this translates into a cost of $770,000 a week. According to the JIP, rigs have missed their commissioning date by up to 120 days due to software problems. Given this assumption, the potential monetary impact per rig project would be in the millions and the time savings in months.

There's also the benefit of risk reduction. Potential safety issues arising from improper integration – such as misreading of important alarms – would be minimized. Also minimized would be miscommunication between buyer and seller regarding equipment functionality. The standards would also make tests such as FAT (Factory Acceptance Test) and FMEA (Failure Mode Effect Analysis) more meaningful and consistent because equipment can be tested to an established standard.

"From a software point of view, this really will revolutionize the industry," Mr Shafer said. "When you're dealing with millions of bbl of oil a day, that's an enormous amount of money. Do you really want the rig to be down because of the software? Because you couldn't get the 1's and the 0's right?"

For more information on the project, contact Athens Group at 512-345-0600 or 713-960-5094. Or log onto www.dea.main.com/projects/status/159.html.