

Oil & Gas: The Half-Full Perspective



J.R. Quiles
Heavy Industry/
Oil & Gas Program
Manager
FANUC America
Hoffman Estates, IL

In any situation, you can look at the glass being half empty or half full. How you perceive the situation at the time and your course of action as a result of it determines future outcome.

putting a hold on funded projects involving capital equipment purchases in 2015. Machine tool purchases which tend to come with significant price tags are being put on hold. Companies that still have billion-dollar backlogs are delaying

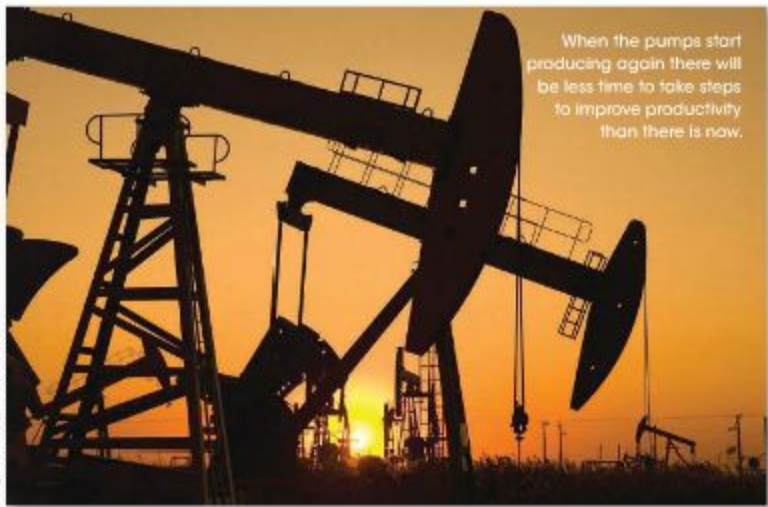
purchases of production equipment. Looking at these hard facts on paper, it may initially appear that the glass looks half empty, but in reality, the glass is half full as it is the perfect time during the slowdown to analyze manufacturing processes to maximize productivity in preparation for the oil & gas market recovery.

When business is booming, there isn't time to analyze manufacturing processes and make adjustments. In order to fulfill demand, machines are in continuous operation and taking them out

of production for testing purposes is not an option. However, during a slowdown is the ideal time to review and test processes that require manpower, time and other resources that are not available when business is booming. So, right now consider testing, evaluating and adding productivity solutions such as adaptive control to reduce cycle time in the roughing process, automating rethreading or thread repair as well as data management and load/unload automation. This is also a good time to consider retrofits of existing machine tools instead of purchasing brand-new machines.

Reduce Roughing Cycle Time

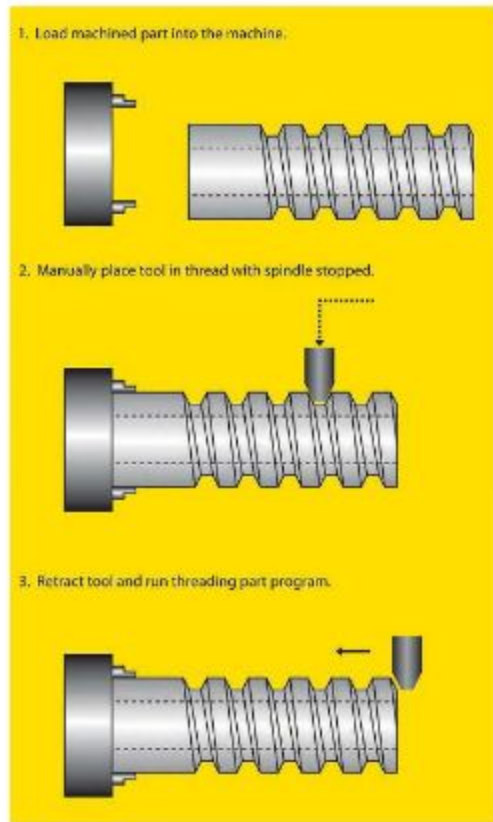
Reducing cycle time in the roughing process is one operation to review and test. Adaptive control solutions allow improvement in both machine cycle time and tool life. In fact,



When the pumps start producing again there will be less time to take steps to improve productivity than there is now.

Recently, some of the large players in the oil & gas industry have announced significant layoffs. Thousands of people are now out of work. People who are closer to the well head as opposed to those who are mid-stream in the processes are the first to feel the effects. Additionally, recent company acquisitions mean redundancy of products and manufacturing capabilities which also leads to layoffs. Eventually, this should find its way down to the shop floor. This has been generally attributed to the price of oil, which had fallen below \$46 per barrel in early 2015. Some industry experts are predicting that the prices will bottom out at \$40 while others predict it will be lower. Some predictions are that the downturn is short-lived while others predict it will last through 2015.

What this means for manufacturing is companies are



While rethreading was once a highly skilled manual process, arbitrary speed threading has now automated the procedure.

productivity is increased as cycle times are reduced by up to 40% as every part is automatically optimized in real-time, including the first. Adaptive control compensates for material and process variations including material hardness, tool wear, depth of cut and width of cut. Additionally, feed rate control is 100 times finer, which increases the responsiveness and accuracy of the adaptive control. Tool life is also extended as adaptive control keeps roughing tools fully loaded, putting the heat into the chips rather than the part. As a result, there are fewer minor stoppages, which further increases productivity and reduces labor costs.

Look for an adaptive control solution that is integrated into

the CNC and provides the ability to increase feeds faster than programmed when conditions permit—thus increasing output. Material removal is improved and cycle time is minimized by automatically optimizing the cutting feed rate based on the actual spindle load.

Automate Rethreading or Thread Repair

Threading in the oil & gas industry is common, and all CNCs have some sort of threading cycles. They are not, however, all equal in functionality or have the ability to significantly increase productivity. The most innovative versions are available not just for threading but also rethreading or thread repair. Arbitrary speed threading automates the rethreading process that used to be a highly skilled manual process. The increased productivity gained from this option is ideal for the oil & gas industry where threading large diameter or long length workpieces and pipe rethreading or repair is common.

Arbitrary speed threading allows the operator to adjust the spindle speed during a threading cycle to eliminate vibration and chatter. Generally, the spindle speed override is inhibited during threading. This is to prevent damaging the part, as a change in thread lead would occur. The arbitrary speed threading function ensures that the cutting tool remains coordinated with the spindle speed at all times during threading to produce the programmed lead.

Arbitrary speed threading is also an invaluable feature for thread repair as it also provides the functionality to pick up and repair an existing thread—making it fast to set up, easy to use and quick to reproduce original threads. The process of repairing threads can be simplified further for operators by using conversational programming. Without any knowledge of G-code, the operator uses straightforward graphical screens to answer simple questions to generate a suitable thread repair program. Review your machine specifications with your MTB or distributor to determine your machine capabilities.

CNC Data Management

Manufacturers today are looking for ways to gather and manage data from their CNCs. Whether the need is for upload/download of programs, automatic backup or full-blown OEE, there are many data management systems to consider. Look for systems that meet your shop requirements and are easily integrated into your specific CNCs.

Traditionally many end users have not actively backed up critical data on their CNC machines. Those who have generally used a manual method where someone went around from machine to machine backing them up by archaic RS232 communication to a PC on the shop floor. Others output the

information to a memory card. These methods are difficult, time consuming and failure prone. Program management has been the reverse, where someone needed to walk the program down to the CNC or an operator had to actively pull the program from the network while at the machine.

With available accessibility from any PC on the network, the CNC data is presented in a folder/file structure that makes it easy to view with Windows Explorer. FASBacCNC makes viewing and backing up the data easy and intuitive with a Windows-like interface. Transferring text files is fast and convenient across the Ethernet network and provides less opportunity for human errors. The complete file backups can be used for various purposes such as maintenance archiving, difference comparison or disaster recovery. Data management is a snapshot using text-based data. Writing of part programs to the CNC is possible and allows for remote part programming without being at the machine.

Integrate Industrial Robotics

A slowdown in capital equipment purchases is an ideal time to analyze and assess manufacturing processes that can be robotically automated, along with updating existing automation equipment with new robotic automation, for when funding becomes available. Industrial robot orders in North America reached an all-time high in 2014 (+28% vs. 2013), according to the Robotic Industries Association, with the fastest-growing applications being arc welding (+58%), spot welding (+57%), assembly (+16%) and material handling (+11%). This reflects a number of robot utilization opportunities seen in today's oil & gas manufacturing operations, where robots are being used extensively.

Today, industrial robots are being used to arc-weld drill-heads together, and to load and unload drillheads, valves, pumps, piping materials, and a variety of cast/forged components to machine tools. Robotic bin picking for machine tool load/unload has become a highly reliable process through advances in robotic 3D vision systems that are used to locate, pick and load cast or forged parts into a machine tool. In addition to the value robots add through quality and faster load speeds, servo doors can be incorporated on the machine to allow high-speed synchronization with a CNC to allow faster part load/unload. Other applications for the oil & gas industry being heavily utilized are robotic assembly, deburring, hardfacing, threading, finished part inspection, and painting applications that require Class 1 Div. 1 explosion-proof capabilities.

Ease of use for these products will continue to advance due to the requirements of a reduced-skill labor force. For example, many workers that are experienced welders may find



In slow times there may not be the cash flow needed to invest in capital equipment like robotics, but there is the time to plan to do so when business picks up.

The current level of automation difficult to use, especially for a low-volume and high-model mix of parts. Robot manufacturers are simplifying path teaching and weld procedure development. This will ensure that oil & gas components can be set up and welded quickly, with excellent quality regardless of whether the product is a small batch or single item run. Expect oil & gas component suppliers to significantly increase the use of robots as oil & gas manufacturers—as with many other industries—look to use robotic automation as a way to be more competitive, flexible and provide products quickly during peak times. Your local robotics system integrator can provide recommendations on areas in which robots can get you up to speed quickly when capital equipment funding is freed up.

Summary

Spend your time wisely now by preparing for the upturn in oil & gas. Investigate technology that can help you be more productive and work smarter from the shop floor to the top floor.

Other things to consider during this downtime in addition to what is featured in this article are software features including tooling review to reduce cycle time, wireless technology for data transfer, power consumption and energy savings, preventive maintenance, and failure detection features. Implementing one or more of these features will better prepare your company for the upturn in the industry. So keep your focus on the half-full part of a glass as that is what will pay off in the future. ➔