

Finding more

A blueprint for effective oil production capacity planning

THE world has changed since the end of the 1990's. The demand for oil is increasing dramatically. As demand soars, ensuring the supply of the world's number one energy source has become more challenging.

Natural disasters, wars, political tensions and tighter health, safety and environment requirements have made the quest for oil and gas increasingly difficult.

Simultaneously, however, OPEC has increased production quotas from 23 million barrels a day in 2003 to approximately 30 million. For oil producing companies in the Middle East, this implies a radical change from the 1990s paradigm of operating well below maximum capacity.

The high OPEC quota means there is no ceiling on allowable production for companies within OPEC countries. Any additional production achievable can be absorbed by the market. However the industry finds itself acutely shorthanded for two

main reasons.

Firstly, investment in new facilities, equipment, manpower and exploration was driven down during the period of low to moderate oil prices from 1986 to 2003. This led to a systematic aging of facilities and workforce.

Processes have been rationalised with cost optimisation in mind. Spare capacity has not been built up, resulting in producing companies unable to keep up with soaring demand.

The industry is responding to this challenge with remarkable increases in capital spending. However, given the nature of these major projects and a shortage in available capacity on the service provider/contractor side, this efforts will only translate into additional production on a medium to long term basis – three to five years at best.

Secondly – and this especially affects OPEC companies – the workforce has often been conditioned to operate in an



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environment where the market would not have been able to absorb higher output without driving prices down even further and where the OPEC-quota put a cap on production levels.

This conservatism in the planning process leads to an underestimation of the true system capacity, resulting in lower production targets and eventually lower production compared to what could have been achieved.

From our project experience we have seen that by optimising the planning process alone and without any additional investment in new assets or upgrade of existing facilities, production can be increased by 3% to 12% within two to four months.

Common symptoms of overly conservative planning processes must be addressed in order to obtain a comprehensive overview of the true effective production capacity.

Underestimation of system capacity: The perceived capacity of a facility in the oil producing value chain is often below the actual operating capacity which can be achieved while respecting HSE requirements.

Overestimation of system interventions: Frequently, generous safety margins are applied when maintenance work is scheduled. This provides up and downstream functions with an unrealistic view about the future available system capacity and will thus amplify throughout the value chain.

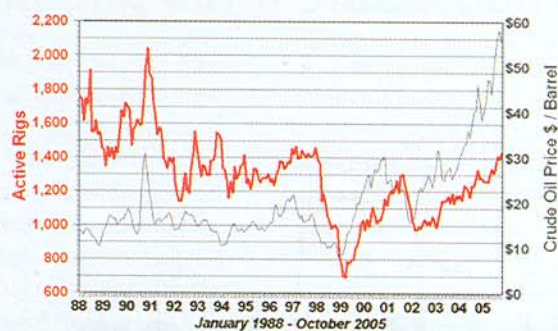
In a recent client engagement, we came across an example where the planning engineer responsible for a separator estimated an overhaul to take five days while putting an additional three days safety margin into the production plan.

Another planning engineer responsible for a downstream compressor train took advantage of this eight day outage in order to undertake maintenance work on the compressors for eight days while putting another two days safety margin for this item.

In reality, the separator overhaul was finished after four days but production had to be throttled for another five days until the compressors were back on line to capture the gas.

The point is that if the second engineer had known that the expected outage of the separator would only be five days, he could have scheduled the work on the compressors

Oil Price vs. Workover Rigs
1988 to 2005



Investment in equipment has been drastically reduced in the 1990s and is still far below the 1980s level

for a more suitable point in time.

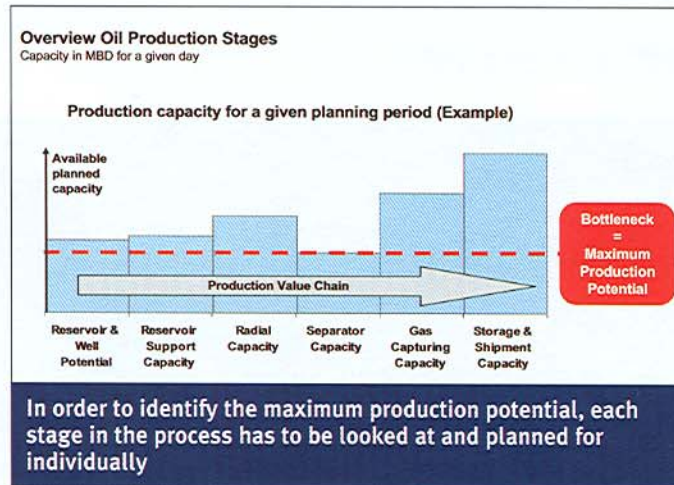
Double counting of planned production losses: It is common industry practice to take a top down approach in the planning process - starting with what is seen as the maximum production capacity and deducting losses due to system interventions such as well monitoring and planned repair maintenance work in order to derive the average daily production target for the upcoming planning period.

In general, the production process is broken down into discrete steps - reservoir/wells, pipelines/radials, separators, gas capturing and treatment facilities and so on, whose availability and production capacities are planned by different departments.

Sometimes, individual departments report planned losses due to system interventions, without taking into account that these losses have already been included at a different stage in the production planning process. This can, and does, lead to double counting of losses, compiled into low production plans, resulting in low actual production.

MESA is applying a three staged process addressing the above points to develop and implement production planning systems which deliver a comprehensive overview of the effective production capacity and yield increased production.

In the first stage, the relevant critical path for production planning is established. The key question here is which facilities and pieces of equipment can



be potential bottlenecks for production and have to be taken into account for the planning process. Usually this step is fairly straightforward and quickly accomplished.

Once the value chain is established the next step is to derive the true system capacities – clarification of how much production capacity the individual components in the system can yield while respecting HSE requirements.

This should be an easy task to accomplish but in reality often turns out to be the most vividly discussed in the whole planning process. The main cause for discussion is frequently that the low, deliberately chosen operating mode of the past is mistaken to be equal to the maximum production capacity the facility in question can support.

In some cases the maximum sustainable system capacity has to be reaffirmed by actual high rate testing and restating the maximum achievable operating capacity.

The setting up of a planning model and the supporting information feed process

represents the last stage. While the actual programming and implementation of the planning model itself can be done by a small expert task force, the creation of information feed processes involves a larger number of people, since each stage from the well/reservoir on to the export facilities has to be covered.

We recommend our clients to establish a central planning coordination function which is responsible for collecting the planning input from the different parties involved in the process along the value chain and challenge their input if required.

As an output, the planning process and model and process will yield an overview of the available production potential across the value chain.

The system clearly shows where excess capacity is available and which link in the production chain represents the bottleneck in determining the maximum production potential. This allows the setting of production targets accordingly in order to maximise production within the existing system capacity.