When the Process Moves On: Why Filtration Must Evolve With a Gas Field

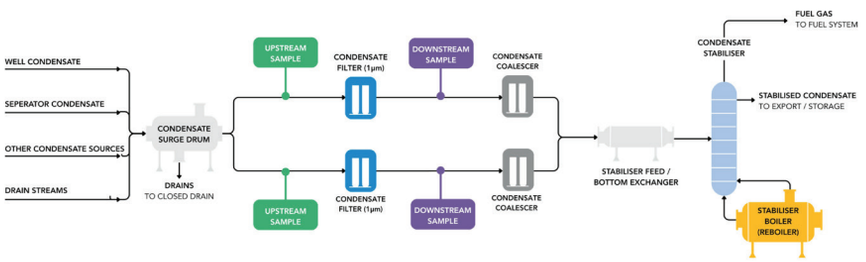
Hydrocarbon condensate recovered alongside natural gas is a valuable product. Keeping it clean protects product quality and the heat exchangers, reboilers, stabilisers and other equipment needed to turn it into a stable, saleable stream.



Syakir Samsudin,
Process Engineer.

Filtration may appear straightforward: choose a micron rating, install the cartridges and replace them when required. But gas fields do not stand still. As production matures, fluid inlet quality and the solids burden can change significantly. A system that performed satisfactorily at start-up may no longer provide enough capacity ten years later.

A recent investigation by UK process filter manufacturer Amazon Filters shows why technical insight, and periodic review of actual process conditions, is essential to maintaining condensate-treatment performance.



CPP Condensate Filtration Process Line.

A changing duty

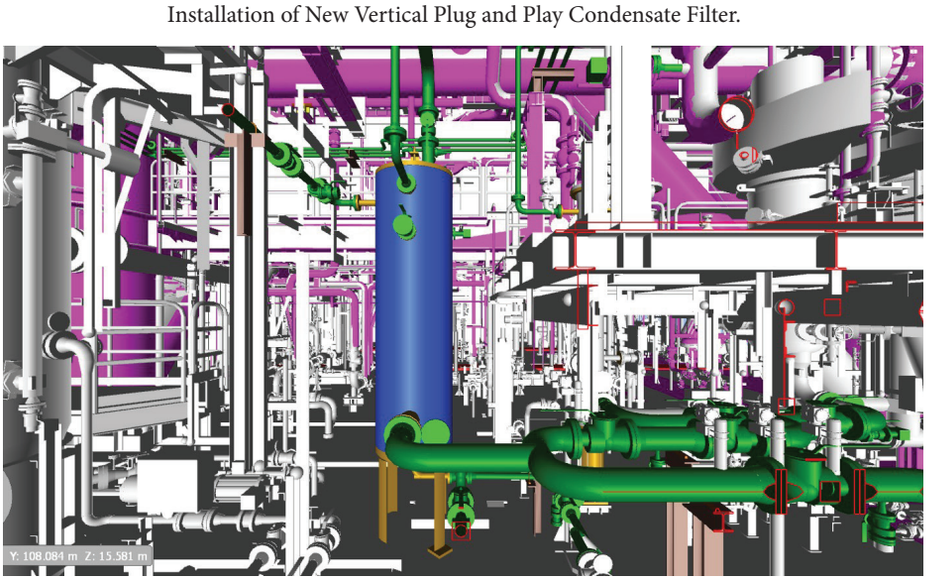
An offshore facility operated two condensate filter trains upstream of liquid-liquid coalescers. Each train used a single 60-inch cartridge rated at 1 micron. In the field's earlier years, when particulate loading was comparatively light, this arrangement had provided satisfactory service.

Ten years on however, sand and other particulate were appearing in downstream equipment, including the heat exchanger, reboiler and condensate stabiliser. The coalescers also showed significant physical damage.

"The micron rating initially appeared to be the obvious focus," explains process engineer Syakir Samsudin. "But the real question was whether the installed system still had sufficient solids-handling capacity for the duty now being presented to it."

The low differential pressure measured across the filters suggested bypassing rather than effective capture. Operational evidence also showed that particulate much larger than the nominal rating was reaching the downstream process.

Installation of New Vertical Plug and Play Condensate Filter.



Follow the evidence

Amazon Filters collected samples upstream and downstream of both filter trains. The assessment combined total suspended solids and particle-size distribution analysis with calculations of solids loading, comparison of upstream and downstream contamination, review of differential-pressure behaviour and an assessment of installed filtration capacity.

The condensate downstream of the surge drum contained an average total suspended solid of 79 mg/L. Samples taken after the two filters were measured at 17 mg/L and 27 mg/L respectively. The existing filter is rated at 99.98% efficiency but the results is only showing average 70% efficiency. This results indicated that the existing system is either bypassing or releasing solids after the filter.

Particle-size analysis provided the wider engineering context. Although particles below 25 microns were most numerous, those between 25 and 50 microns contributed the greatest mass. The calculated solids loading was 26.52 kg per day, far beyond what the original single-cartridge arrangement could robustly accommodate.

Capacity, not simply rating

The diagnosis changed the solution. The principal issue was dirt-holding capacity rather than the efficiency rating itself. Amazon Filters therefore recommended retaining a 1-micron SupaPleat HFC specification to protect downstream equipment while substantially increasing the available filtration area.

A nine-round, 60-inch system was initially proposed in a horizontal configuration. Space on the central processing platform could not accommodate that format, so Syakir and colleagues worked with the operator to develop a vertical pressure-vessel layout designed to plug into the existing pipework.

This illustrates why optimisation cannot be reduced to selecting a finer cartridge. Micron rating describes only one aspect of performance. Filtration area and solids-handling capacity must also match the current mass loading, particle-size distribution, operating conditions and protection required by downstream equipment.

It also shows why inlet-fluid quality should be reviewed through the producing life of a field. Changes in solids burden may be gradual and initially masked by familiar maintenance routines. By the time contamination is visible downstream, filters and coalescers may already be bypassing, shedding solids or suffering damage.



Damaged Downstream Liquid Liquid Coalescers.

A useful preventative-maintenance programme should therefore establish a performance baseline and periodically repeat upstream and downstream sampling, particle-size and suspended-solids analysis, solids-loading calculations and differential-pressure review. Trends can then be compared with the original design basis before reliability deteriorates.

"What worked initially may not be what the process needs today," says Syakir. "The starting point is to understand how the fluid has changed, what contamination the system must now handle and how effectively the current filters are protecting the complete separation process."

For operators of established oil and gas assets, that is the value of technical insight. It replaces assumptions with evidence, distinguishes an efficiency question from a capacity problem, prevents repeated downstream damage and supports a filtration strategy that can evolve with the field. The best question is not simply 'which cartridge fits?' but 'what duty must the filtration system perform now?'

Previous Amazon Filters' articles in Oil & Gas Innovation also highlight how operators can move beyond reactive, like-for-like filter replacement by proactively investigating what is actually occurring and ensuring filtration performance is viewed in the context of the whole separation process.

For more information on Amazon Filters' activities in the oil and gas industries, visit www.amazonfilters.com/oil-and-gas-filtration.

