

## Choke valves -

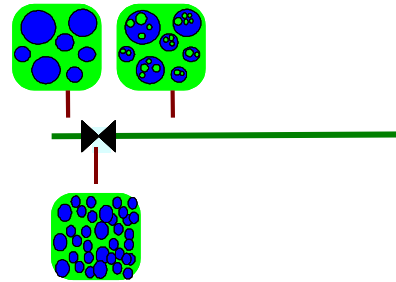
### how they influence on produced water quality

A successful troubleshooting of a produced water problem very often includes examining conditions upstream the separator in order to reveal the root cause of the problem.

Pressure control across a choke valve causes shearing action on the fluids. Low water cut, high gas/liquid ratio, high pressure drop and small choke valve opening tends to further amplify these effects.

In order to collect information from specific wells about oil/water separation properties and water treatment we use the portable Mini Test Separator (MTS). The MTS is operated at retention times equal to the 1<sup>st</sup> stage separator and the separated water is further analyzed for oil concentration and oil droplet sizes.

Choke valve droplet break-up



Results from well testing using the MTS on a North Sea platform is presented below. The test focused on water cut and choke opening and two wells were identified as problem originators for the produced water treatment:

X-14: Reasonable oil concentration but extremely small oil droplets.

X-20: Good oil droplet sizes but very high oil concentration.

Well	Water cut (%)	Choke opening (%)	Upstream choke		Downstream choke	
			Dv50 (um)	OiW (ppm)	Dv50 (um)	OiW (ppm)
X-40	6	40	No water separated		NA	NA
X-48	3,4	34	No water separated		NA	NA
X-09	23	47	10	160	6,9	412
X-52	0,1	12	No water separated		NA	NA
X-14	28	22	6,3	50	1,5	500
X-20	40	11	8,9	43	18	2712
X-33	78	75	-	-	8	326

With the problem wells identified different solutions were evaluated. Possible solutions may be individual chemical treatment, choke valve replacement or change of choke opening.

Through our world wide testing activity we have learned that choke valves often play an important role in separation problems, both for produced water but also when working with stable crude oil emulsions.



## Seminars -

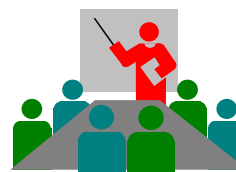
an unique way to increase the understanding of gas/oil/water processes and the skills of operators.

As a request from the oil industry Mator has put together different seminars that are specially designed to meet the day by day challenges for offshore personnel working with gas/oil/water production regarding separation processes and condition based maintenance.

Seminars focusing on separation challenges are tailor-made for the clients production set-up:

### “Understanding the separation process from the reservoir to the export pipeline”

- Transport of fluids from the reservoir to top-side
- Choke valve operation and how they influence separation
- Two- or three-phase separators: inlet section, level- and interface control, residence time and coalscing internals
- Electrostatic coalescers
- Production chemicals; how they work and how to reduce
- Produced water treatment
- Experience and operation of the separation system on the specific platform
- Proposal on how to address part of the process causing problems



Seminars focusing on maintenance technology, especially the preventive maintenance and condition based maintenance, are tailor-made to meet the specific demands to avoid malfunction of equipments:

### “How to achieve a more cost-effective maintenance by condition monitoring”

- We have the focus on the streamline of operations included in condition based maintenance
- Basic understanding of root-causes for malfunctions and brakedowns
- Lubrication charts and handling of lube- and hydraulic oils as well as grease
- Condition Based Maintenance and Condition Monitoring
- Hydraulic and lube oilsystems
- Special subjects related to the specific installation



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