Some project possibilities

Project	Description
Multiflow JIP (2016-2019)	3-phase flow industry scale experiments. Next generation of multiphase flow reference data
OWAD JIP *(2017-2019)*	Industry scale oil water dispersion study. Effect of surfactants and forced mixing on flow development
Flow induced vibrations	Accurate prediction of piping vibration and fatigue for multiphase flows
Slug flow	Increase the reliability of the hydrodynamic slug analysis (slug length and frequency) taking into account gas distribution within the slug and surface active components
Hydrate plug index	Effective ranking of plug potential through fluid chemistry knowledge
Cold Flow	Living with hydrates and wax. Using the flowlines as a reactor and problem solver
DAS for wells	Distributed acoustic sensing for wells
Leakage Detection JIP	Assessment of DTS/DAS technology for detection of leaks in above surface and buried pipes in the large scale flow loop
Slug Flow Metering JIP	Assessment of multiphase flow meter in large scale slug flows

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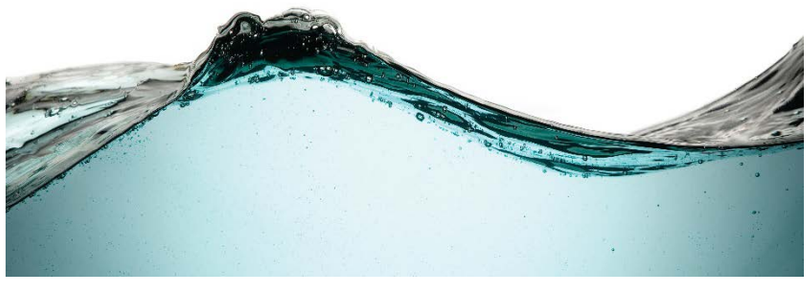

THE NEW MULTIPHASE LABORATORY

TILLER 3.0

SINTEF

Technology for a better society

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The flow loops- technical specifications

		Typical max operating pressure	Minimum pressure	Temperature range (typical)	Line sizes	Horizontal line length	Inclinations	Vertical line length
		bara	bara	°C		m	deg	m
Large Scale Loop	Three-phase flow loop	90	5	10 to 50 (30)	8" (4" and 12")	800	0, 0.5, 1	55
Medium Scale Loop	Three-phase flow loop + solids (sand)	10	atm.	5 to 50 (20)	2.5", 3", 4"	50	-4 to 4	35
Small Scale Loop	Three-phase flow loop + solids (hydrates. etc.)	100	atm.	-10 to 50 (4)	1" and 2"	~50 m	0 to 90	2 (flex. conf.)
Wheel Flow Loop	Three-phase flow loop + solids (hydrates. etc.)	1000	atm.	-10 to 80 (4)	2" and 5"	6.3 m (circular)	NA (vertical mounting)	NA (vertical mounting)

		Flow rate, gas	Flow rate, oil	Flow rate, water	Oil	Water	Gas
		Am3/h	m3/h	m3/h			
Large Scale Loop	Three-phase flow loop	1500	480	175	Refined oil, Crude oil (no precipitates)	Fresh water/brine pH>10	Nitrogen (any inert gas)
Medium Scale Loop	Three-phase flow loop + solids (sand)	160	80	120	Exxol D80 (any non-flammable HC)	Fresh water	Sulphur hexafluorid (any inert gas)
Small Scale Loop	Three-phase flow loop + solids (hydrates. etc.)	3	5	5	Any crude or model oil	Any water chemistry	Any (excl. H_2S)
Wheel Flow Loop	Three-phase flow loop + solids (hydrates. etc.)	36	36	36	Any crude or model oil	Any water chemistry	Any (excl. H_2S)

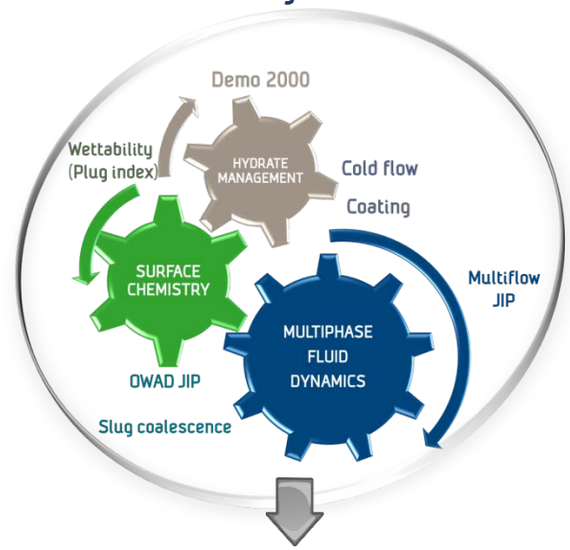
Technology validation

The facilities can be adapted to test and validate a variety of flow components and equipment.

Normal instrumentation is a wide range of flow meters, pressure transducers for pressure gradient measurements, temperature probes and gamma densitometers for holdup measurements. In addition, special instrumentation is installed as needed and special sections exist for optical measurements and visual observation.

Real crudes can be studied also in the SINTEF's Small Scale Real Crude laboratory also allows work on high-pressure high-temperature (HPHT) fluids again reflecting one of the important trends in current production developments

Projects focused on understanding the interaction between fluid dynamics, surface chemistry and hydrate management



NEXT GENERATION OF 1D MODELS

Short time between R&D and knowledge implementation

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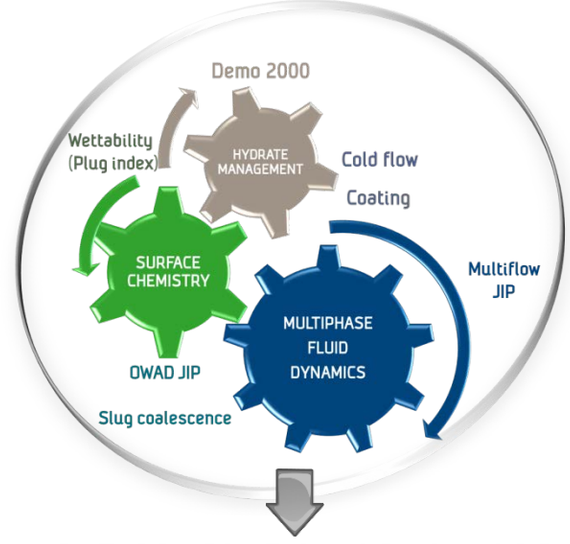

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