

# INTEGRATED FLUIDS ENGINEERING

Reducing drilling time and total well construction costs, while increasing production and meeting your QHSE objectives.

Thousands of wells have proven it.

**Mi SWACO**

*Customer-focused, solutions-driven*

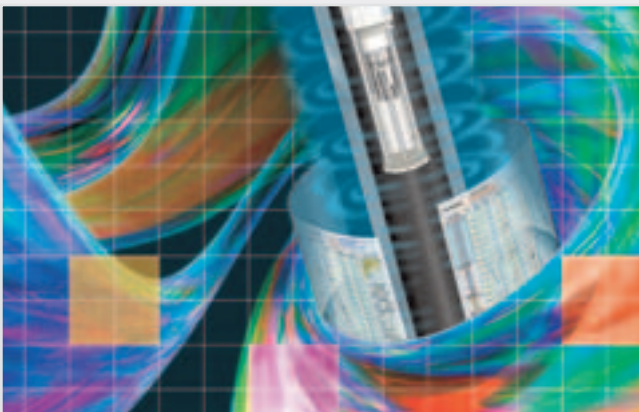
By integrating key M-I SWACO products and services, IFE provides real value, positively affecting factors that determine the success of your project

Our integrated service offering, INTEGRATED FLUIDS ENGINEERING\* (IFE\*), is comprised of products and services within our DRILLING SOLUTIONS\*, WELLBORE PRODUCTIVITY\* and ENVIRONMENTAL SOLUTIONS\* groupings. The difference is that when we provide these solutions as part of IFE, there is a high degree of coordination, key performance indicators, specially trained personnel and results-tracking among the services and possibly even reward-for-performance targets built into the contract.



## DRILLING SOLUTIONS

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>Wellsite and project engineering</li> <li>Simulation software</li> <li>Drilling-fluid systems and additives</li> <li>ALPINE SPECIALTY CHEMICALS*</li> <li>FEDERAL* Wholesale</li> <li>HDD MINING &amp; WATERWELL*</li> <li>Technical support</li> <li>Mud mixing</li> </ul> | <ul style="list-style-type: none"> <li>Rig-equipment engineering</li> <li>Drilling waste management                             <ul style="list-style-type: none"> <li>• Solids control</li> <li>• Screens</li> <li>• Cuttings collection</li> <li>• Pneumatic transfer</li> <li>• Cuttings re-injection</li> <li>• Dewatering</li> <li>• Desorption technologies</li> <li>• Site remediation</li> </ul> </li> <li>Pressure control</li> </ul> |
|--|--|



## WELLBORE PRODUCTIVITY

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>Engineering/simulation software</li> <li>Reservoir drill-in fluids</li> <li>Breakers</li> <li>Spacers and displacement chemicals</li> <li>Specialized tools</li> </ul> | <ul style="list-style-type: none"> <li>Completion fluids</li> <li>Filtration</li> <li>Pit management</li> <li>Vessel cleaning</li> <li>Fluids recycling</li> </ul> |
|---|--|



## ENVIRONMENTAL SOLUTIONS

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>Mud mixing</li> <li>Rig-equipment engineering</li> <li>Drilling waste management                             <ul style="list-style-type: none"> <li>• Solids control</li> <li>• Screens</li> <li>• Cuttings collection</li> <li>• Pneumatic transfer</li> <li>• Cuttings re-injection</li> <li>• Dewatering</li> <li>• Desorption technologies</li> <li>• Site remediation</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Pressure control</li> <li>Pit management</li> <li>Vessel cleaning</li> <li>Fluids recycling</li> </ul> |
|--|---|

# INTEGRATED FLUIDS ENGINEERING — from conception to production and beyond



## APPLICATIONS

Any well, whether complex or relatively simple, where there is room for improvement in drilling time, production rates, environmental issues and overall project costs.

## PROBLEMS

Traditional bundled services often present problems of gaps, overlaps and even conflicts among the service companies. This can result in lost time and money as well as increased risks to health, safety and the environment.

## SOLUTIONS

The M-I SWACO\* IFE approach ensures that all fluids-related services and equipment work closely together to shorten drilling time, increase production, meet environmental regulations and lower overall costs.

## ECONOMICS

With the entire well's aspects planned far in advance, and a true integration of personnel, services and equipment, IFE will reduce overall drilling and completion costs.

## ENVIRONMENTAL

During well planning, certified M-I SWACO IFE personnel coordinate all the factors that influence the environmental performance of the well, including fluids, solids control, waste processing, wellbore cleanup, completion and post-well operations.



## What is IFE?

The INTEGRATED FLUIDS ENGINEERING (IFE) approach is a totally different method of drilling and completing a well. It is a results-driven, comprehensive fluids solution that optimizes the design, delivery and management of wellsite fluids and fluids-related services. The IFE program leverages all M-I SWACO products, equipment and technology engineered by highly trained personnel.

## Addressing challenges from every perspective

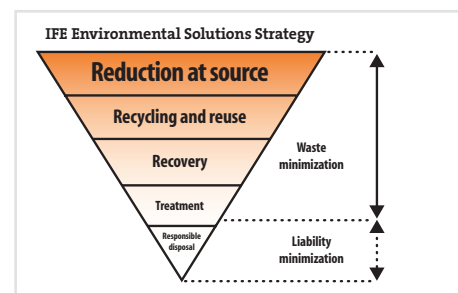
- High day rates demand that operators reach TD quickly and that producing formations yield the most oil and gas possible.
- The use of expensive, sophisticated equipment requires logistics and operations to be carried out seamlessly, with no gaps or overlaps.
- Increasingly stringent regulations are putting a bigger burden on operators to improve health and safety conditions, and either reduce the amount of drilling waste or bear the costs of dealing with it.

The bottom line is — get the most productivity from every person, service, instrument, tool and product used in drilling and completing your wells. We are so confident in our ability to deliver on these promises, that we are willing to share the risk with our clients.

## Optimized Drilling Waste Management techniques provide sound environmental solutions

In planning your well, M-I SWACO specialists look at the whole picture,

including the generation and management of drilling waste (ENVIRONMENTAL SOLUTIONS). We will always strive to manage wastes at the highest possible (widest) level of the pyramid, and then move down the priorities as circumstances dictate.



## Making the most of valuable information

One of the tools we use in our improvement process is our proprietary software. As various situations and needs have arisen, M-I SWACO has authored fit-for-purpose computer programs to support the IFE mission. This powerful, industry-accepted software suite is another reason that only M-I SWACO can provide true INTEGRATED FLUIDS ENGINEERING solutions.

Our IFE-related software includes:

- ONE-PLAN\*/ONE-TRAX\*
- PRESSPRO\* RT
- OPTIBRIDGE\*
- LOST CIRCULATION ADVISOR\*
- VIRTUAL HYDRAULICS\*
- VIRTUAL RDF
- VIRTUAL COMPLETION FLUIDS\*
- WASTE-MANAGEMENT ADVISOR\*

# INTEGRATED FLUIDS ENGINEERING proofs from around the world:

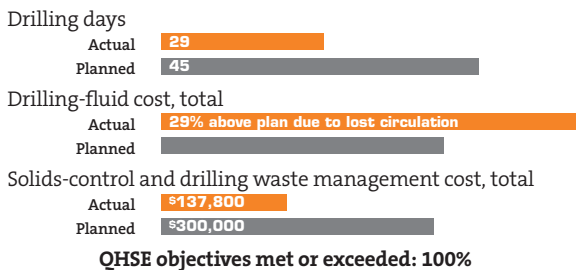


## Deepwater Gulf of Mexico

### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
NOVADRIL\* drilling-fluid system  
Environmental-compliance engineering  
Solids-control equipment  
Drilling waste management

### Performance summary for deepwater project:

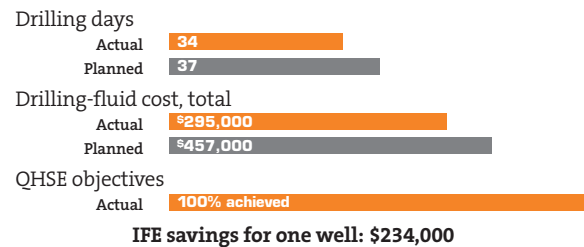


## Offshore West Africa

### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
PARADRIL\* drilling-fluid system  
Solids-control equipment  
Drilling waste management  
Completion fluids

### Performance summary:



## Offshore Thailand

### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
VERSACLEAN\* drilling-fluid system  
Solids-control equipment  
Drilling waste management  
Completion fluids

### Performance summary for 86-well deepwater project:

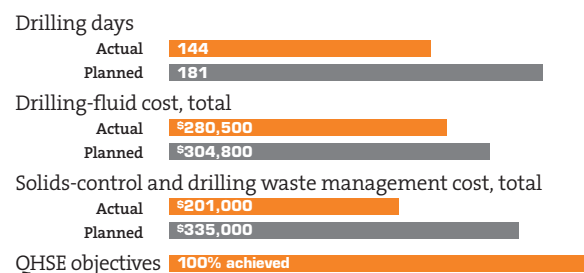


## Central Europe, Romania

### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
Drilling fluids  
Solids-control equipment  
Drilling waste management

### Performance summary for seven-well land project:



Over one year, IFE saved operators more than \$200 million, while drilling more than 12 million feet (3,657,607 m) of hole.

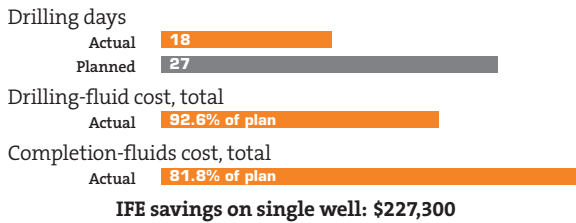


### Alaska North Slope

#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
 FLOPRO\* NT RDF  
 Clear brine completion fluid  
 Solids-control equipment  
 Drilling waste management, including CRI

#### Performance summary:

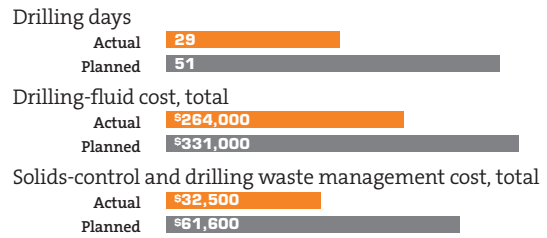


### Colorado Rockies

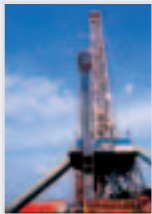
#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
 Water-base fluids  
 Solids-control equipment  
 Pressure-control equipment

#### Performance summary for three-well remote location project:



**Average of 7.3 days saved per well.  
 Total savings of \$205,000+ over three wells.**

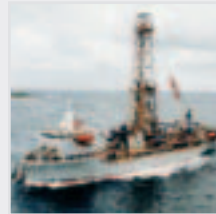
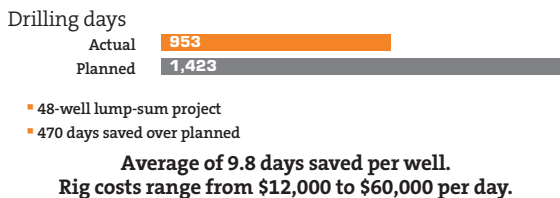


### Mexico

#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
 VERSADRIL\* drilling fluid  
 Solids-control equipment  
 Drilling waste management

#### Performance summary:

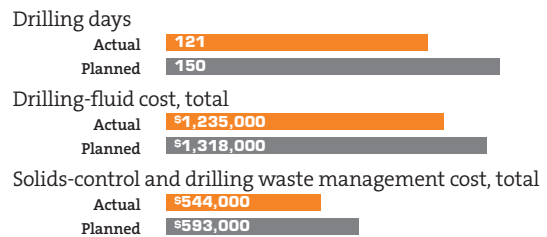


### Deepwater Offshore Brazil

#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
 PARADRIL drilling-fluid system  
 Solids-control equipment  
 Drilling waste management

#### Performance summary for eight-well deepwater project:



**Average of 3.6 days saved per well  
 with daily operating cost of \$230,000.**



### Offshore Eastern Canada North Atlantic

#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
PARADRIL drilling-fluid system  
Solids-control equipment  
Completion fluids

#### Performance summary:

##### Drilling days

Actual **101**  
Planned **83**

##### Drilling-fluid cost, total

Actual **\$2,825,549**  
Planned **\$3,092,493**

##### Solids-control and drilling waste management cost, total

Actual **\$495,369**  
Planned **\$358,618**

##### Completion-fluids cost, total

Actual **\$100,274**  
Planned **\$121,179**

QHSE objectives **100% achieved**

**IFE savings related to minimizing  
days to target: over \$2,700,000.**



### Western Canada Onshore tar sands

#### Equipment and services provided by M-I SWACO:

INTEGRATED FLUIDS ENGINEERING  
SAGDRIL\* drilling-fluid system  
Solids-control equipment  
Drilling waste management

#### Performance summary:

##### Drilling days

Actual **7.5**  
Planned **12**

##### Drilling-fluid cost, total

Actual **Nearly 20% below AFE estimate**

##### Solids-control and drilling waste management cost, total

Actual **50% reduction in solid waste**

QHSE objectives **100% achieved**

**The system saved \$5,000 per day  
by eliminating a cooler.**



P.O. Box 42842

Houston, Texas 77242-2842

Tel: 281-561-1300

Fax: 281-561-1441

www.miswaco.com

E-mail: questions@miswaco.com

#### Technology Centers:

HOUSTON, TEXAS

Tel: 281-561-1300 · Fax: 281-561-1441

ABERDEEN, SCOTLAND

Tel: 44-1224-334634 · Fax: 44-1224-334650

STAVANGER, NORWAY

Tel: 47-51-577300 · Fax: 47-51-570605

This information is supplied solely for informational purposes and M-I SWACO makes no guarantees or warranties, either expressed or implied, with respect to the accuracy and use of this data. All product warranties and guarantees shall be governed by the Standard Terms of Sale. Nothing in this document is legal advice or is a substitute for competent legal advice.