

## Advanced Well Performance

10 days  
Overview

WPERF2-EN-P

### LEVEL

Skilled

### PURPOSE

This course provides the practical, comprehensive understanding and skills needed to master well performance and make significant contributions to field productivity studies and well performance monitoring.

### LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:  
select the adequate reservoir, fluid, near-wellbore zone, well completion and facilities characteristics related to well performance design,  
select the remediation/stimulation and artificial lift methods,  
model, forecast, assess, troubleshoot and optimize well performance.

### WAYS AND MEANS

Use of the software program PROSPER™ (training license provided for the duration of the course).  
Short lectures alternating with hands-on sessions.  
Course ends with a 2-day integrated case study.

### LEARNING ASSESSMENT

Presentation and discussion of the results of design (integrated case study).

### PREREQUISITES

Knowledge in reservoir, completion or production engineering.

## Agenda

### WEEK 1

#### INTRODUCTION TO PRODUCTION SYSTEM

0.5 d

Introduction to well performance nodal analysis: inflow/outflow.  
Overview of PROSPER™ software workflow:  
PROSPER™: building initial well system file.

#### PVT DATA/PVT MODELING

0.5 d

Oil & Gas PVT properties: bubble point,  $B_o$ ,  $R_s$ , GOR, solids...  
PROSPER™: building PVT model.

#### RESERVOIR PROPERTIES & RESERVOIR-WELLBORE INTERFACE

0.5 d

Reservoir rock & fluids: porosity, permeability, saturation, relative permeability, scales.  
Reservoir behavior type.  
Pay zone drilling, completion (open hole, cased hole), perforating.  
Wellbore treatment: sand control, stimulations (acidizing, hydraulic fracturing).

## INFLOW PERFORMANCE/IPR MODELING

1.5 d

Flow in the reservoir: Productivity Index (PI), empirical Inflow Performance Relationship (IPR).  
Back pressure equation for gas wells.  
Global skin: formation damage, perforation, partial penetration, deviation:  
PROSPER™: IPR modeling exercise.  
Horizontal drains:  
PROSPER™: horizontal drain modeling.

## WELLBORE FLOW, OUTFLOW PERFORMANCE/VLP MODELING

1 d

Flow in the wellbore: pressure gradient and Vertical Lift Performance (VLP) curves.  
GLR, tubing head pressure, tubing ID impacts.  
Monophasic vs. polyphasic flow: minimum flow rate/well loading:  
PROSPER™: tubing correlations, VLP modeling.  
Choke performance.

## WELL PERFORMANCE

1 d

Well deliverability nodal analysis: inflow x outflow:  
PROSPER™: IPR + VLP natural flow well performance modeling.  
Sensitivity study: prediction and analysis vs. reservoir pressure, PI, GLR , BSW , tubing ID.

## WEEK 2

### ARTIFICIAL LIFT

2.5 d

Gas lift: fundamentals, unloading procedure, surveillance and troubleshooting:  
PROSPER™: gas lift design, prediction, analysis and diagnosis.  
Electrical Submersible Pump (ESP): components, design, problems:  
PROSPER™: ESP design, prediction, analysis and diagnosis.  
Rod pumping and jet pumps fundamentals.  
Comparison of the artificial lift methods.

### PROSPER™ CASE STUDY

2 d

Application of PROSPER™ to a comprehensive case study, from PVT modeling and matching, IPR + VLP building and matching, to natural flow performance, gas lift and ESP design/performance prediction.

### KNOWLEDGE ASSESSMENT

0.5 d