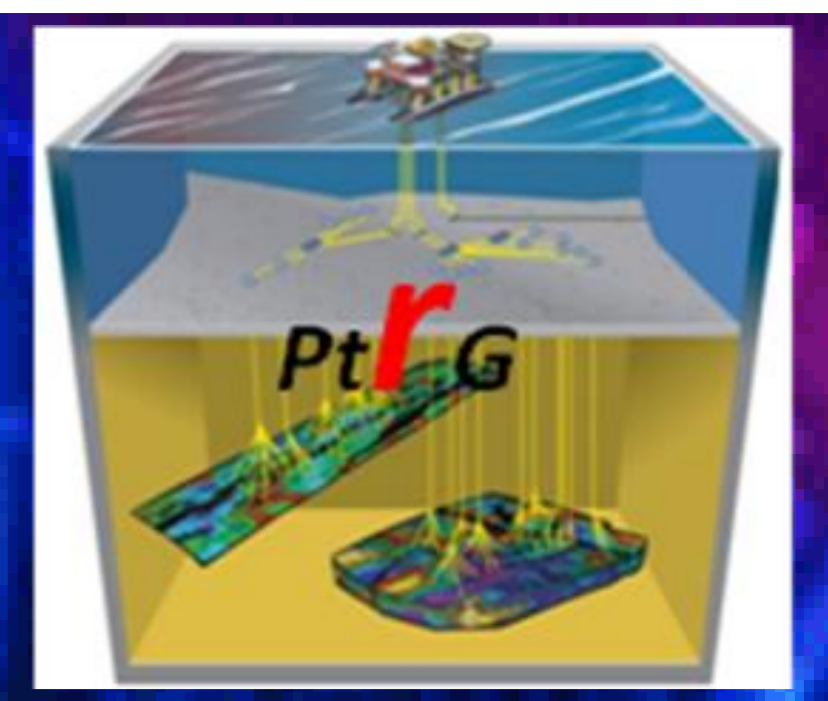




# University of Salford School of computing, Science and Engineering Msc Petroleum & Gas Engineering



## ENHANCING RECOVERY USING WELL TEST ANALYSIS AND INTERPRETATION

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### Abstract

This work is conducted for the purpose of selecting the suitable artificial lift technique for Burgan field. The field production and pressure historical data is collected as a preparation for the pre-design work. Electrical Submersible Pump (ESP) is the most suitable for the field.

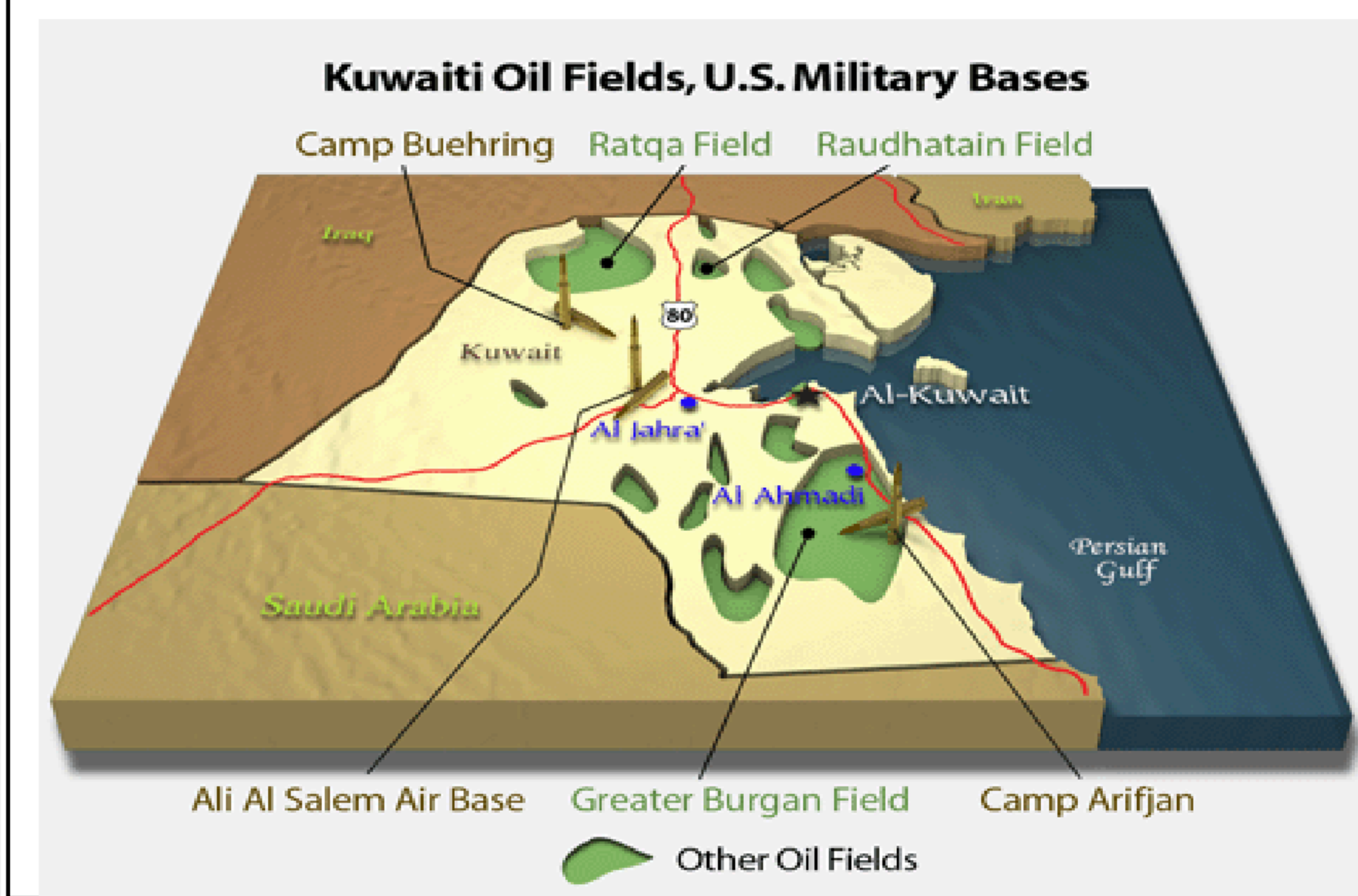
In order to design models were constructed for the Magwa well (MG-0197) utilizing the PIPESIM software to determine the most suitable correlation for the vertical and deviated flow calculations and it is found that Govier, Aziz & Fogarasi is the best correlation for the investigated well. Due to the nature of the produced fluid from Magwa Field (Bottom hole Temperature is 1400F, the Average GOR is 500 SCF/STB, 35-40 Deg API and produced gas sour is 22% CO<sub>2</sub>, 0.04%.

### Introduction

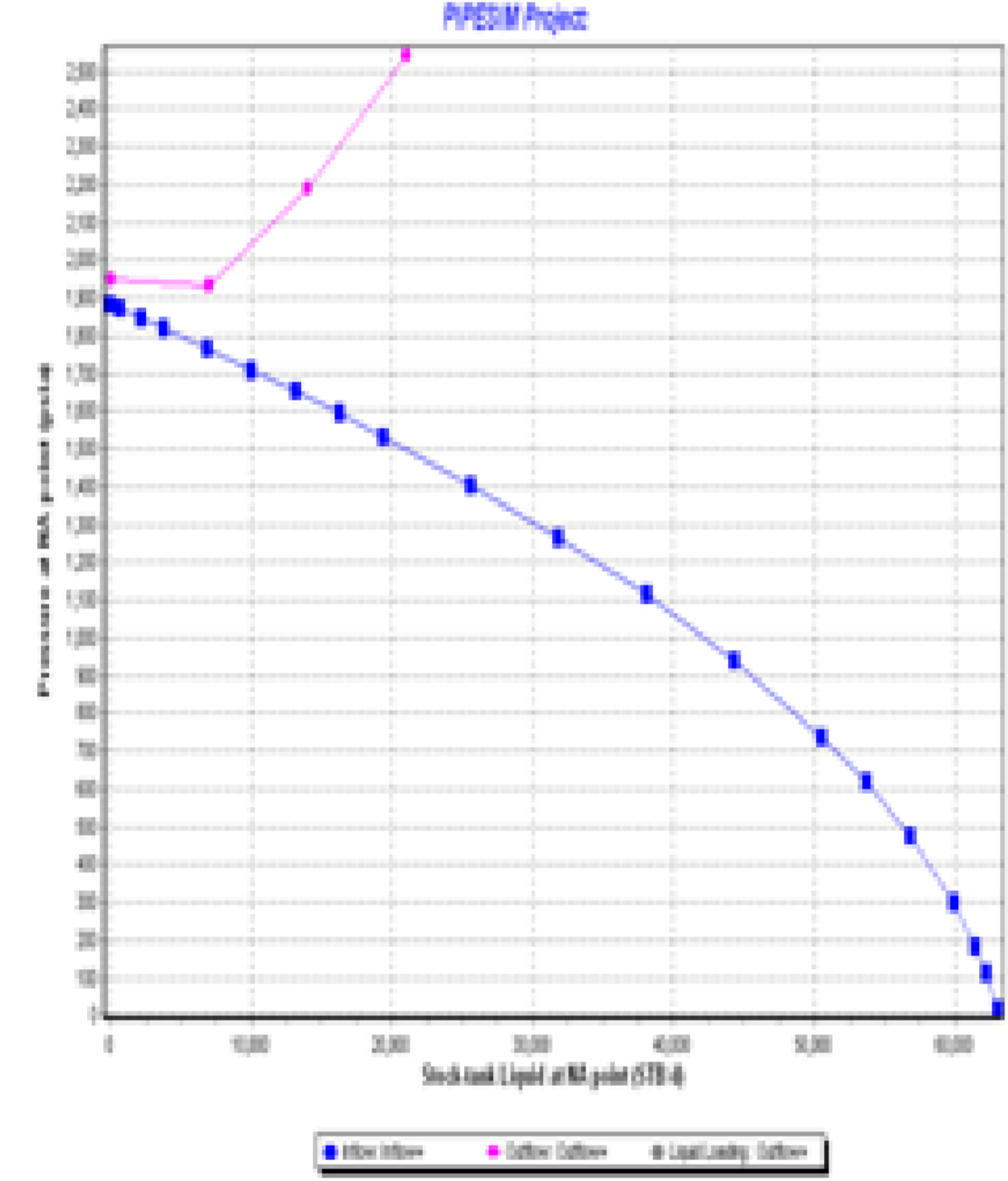
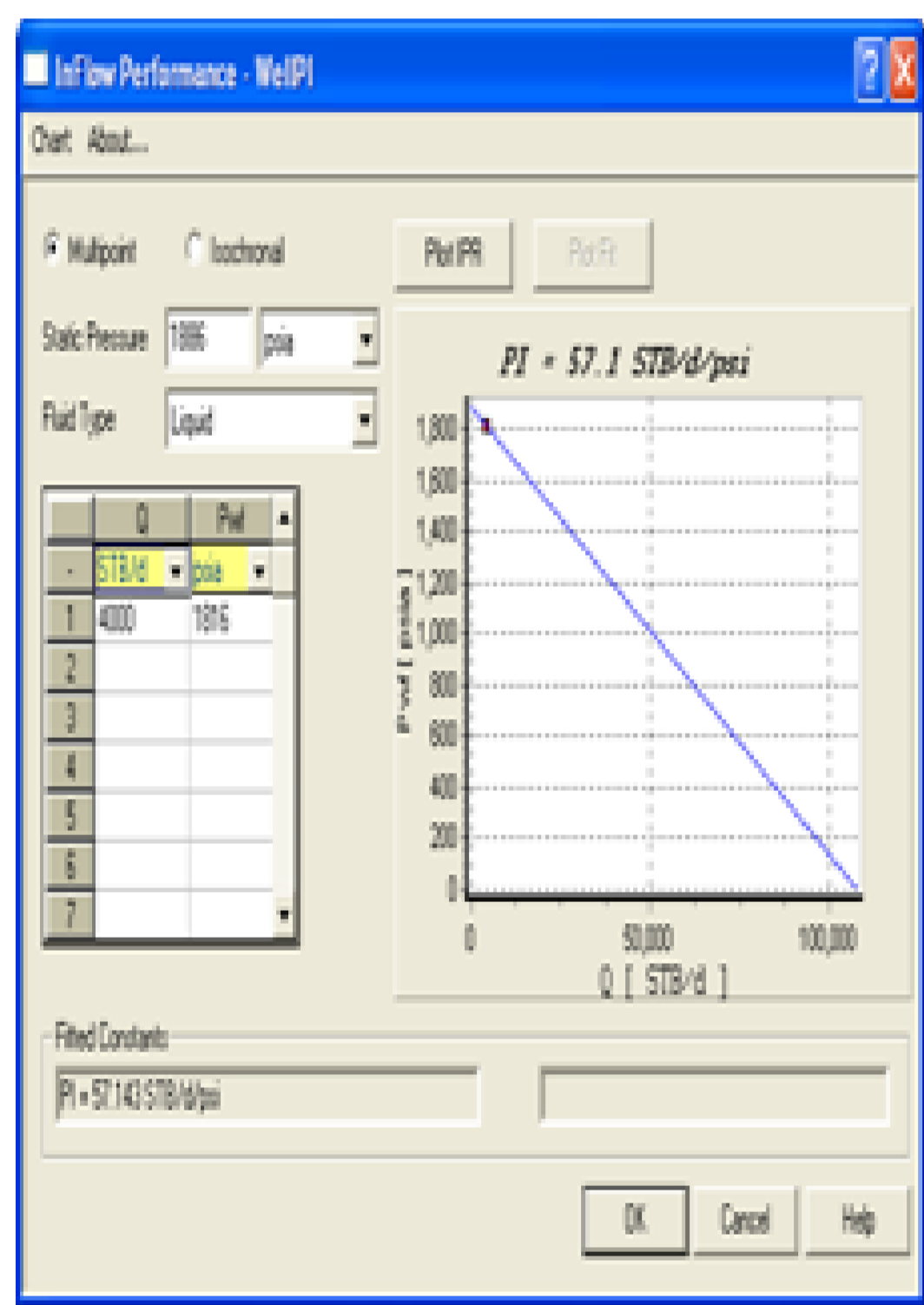
The real challenge facing the oil industry in Kuwait is to keep production up and maximise reserves. The application of artificial lift systems is to improve the productivity, whilst ensuring the most effective use of the existing reserves.

A map for the Kuwait oil fields and describes the different areas of production: Ahmadi, Burgan, Magwa, Umm Gudair, Al Wahfra, Sabriyah, Raudhatain, and Minagish is shown below.

The Burgan is considered to be the most important oil production in Kuwait which contributes more than 70% of total production.



ITEM NO.	ITEM DESCRIPTION	UNIT	VALUE	REMARKS
1	Wellbore	ft	10000	
2	Casing	ft	10000	
3	Annulus	ft	10000	
4	Wellhead	ft	10000	
5	Flowline	ft	10000	



### Problem Statement

From initial field development to 2003, field production was predominant. In beginning 2004, new horizontal and horizontal sidetrack vertical wells targeted the low permeability, with 3,031 BOPD and 5% water.

In 2007 production was 2,220 BOPD and water cut as 10.4%, in 2008 the production was 1600 BOPD and water cut was 22.8%, in 2009 the production was 900 BOPD and water cut was 37.1%. In year 2010 the liquid rate was 4001 and water cut was 80%. Well Test Analysis and interpretation was done to find the reason and was observed that there is no natural energy inside the reservoir and some additional energy is to be provided for more production.

Obviously the field needs some sort of artificial lift in order to restore more production rate to the normal levels and to maximize the ultimate recovery. Choices were confined to ESP's as the more suitable techniques to apply in the field.

### Recommendations & Conclusions

1. ESP is most suitable to accelerate the production of Burgan Field because it does not require gas and the power can be generated from alternate source of energy.
2. ESP is designed for production up to 10,000STB/day.

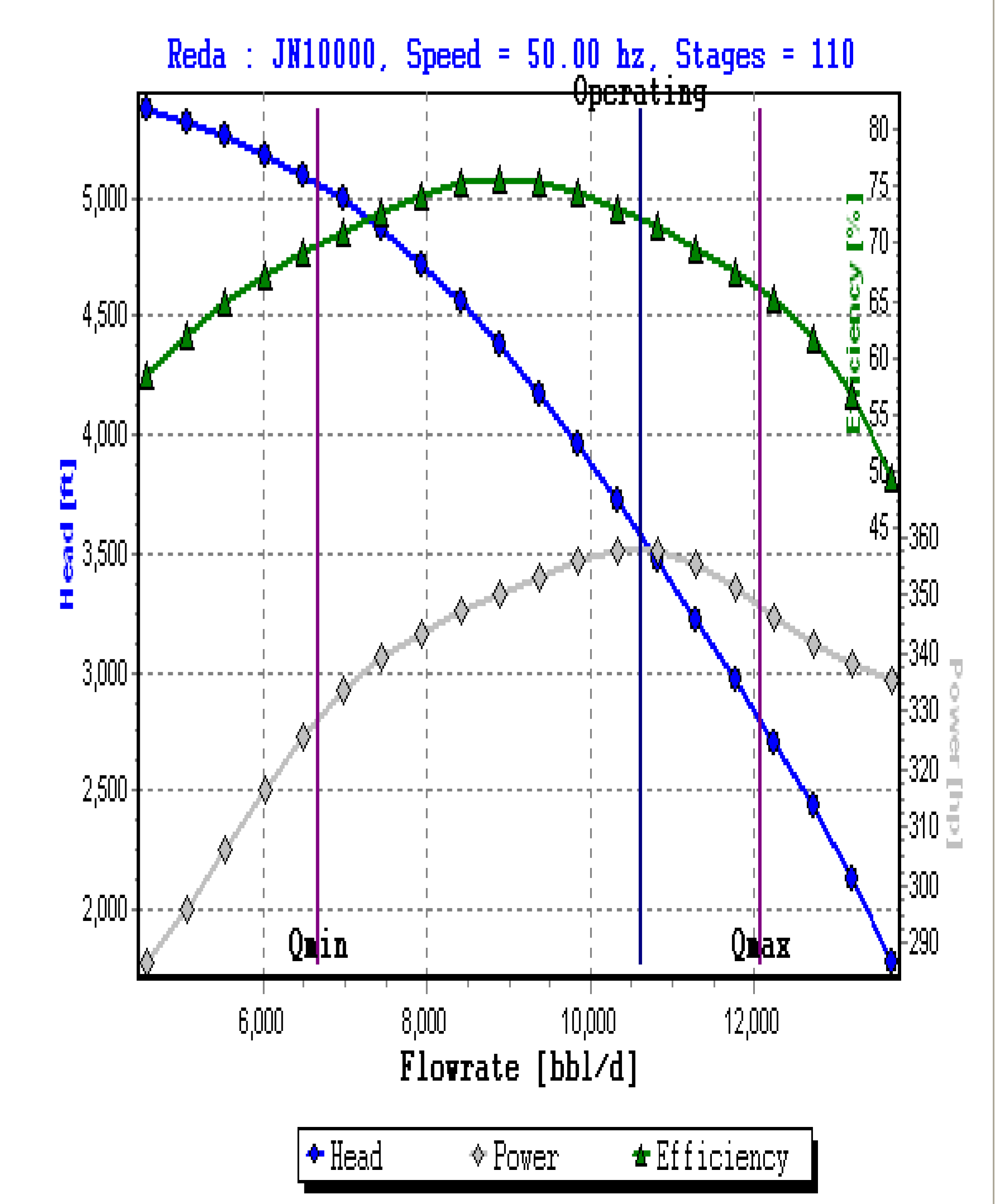
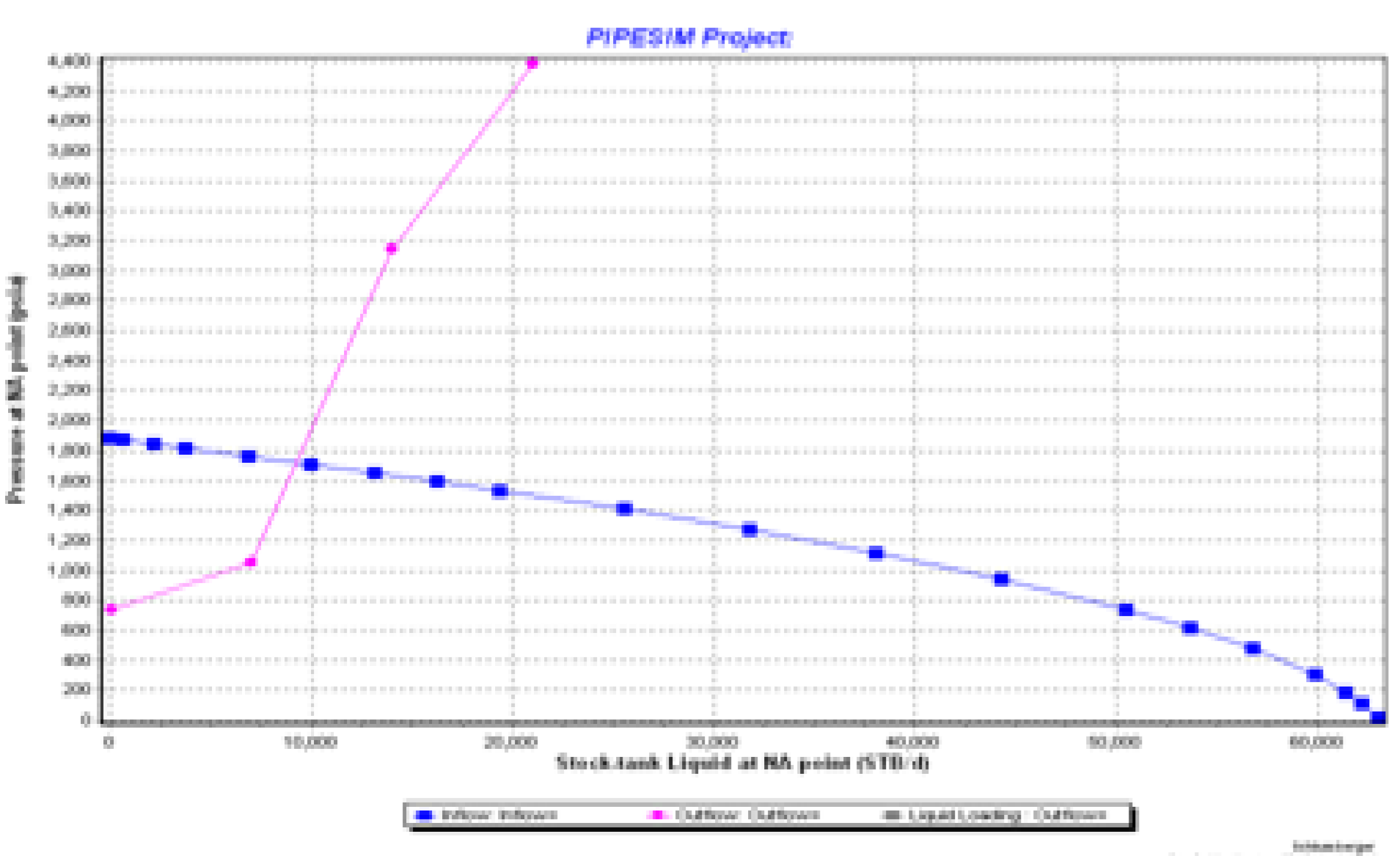
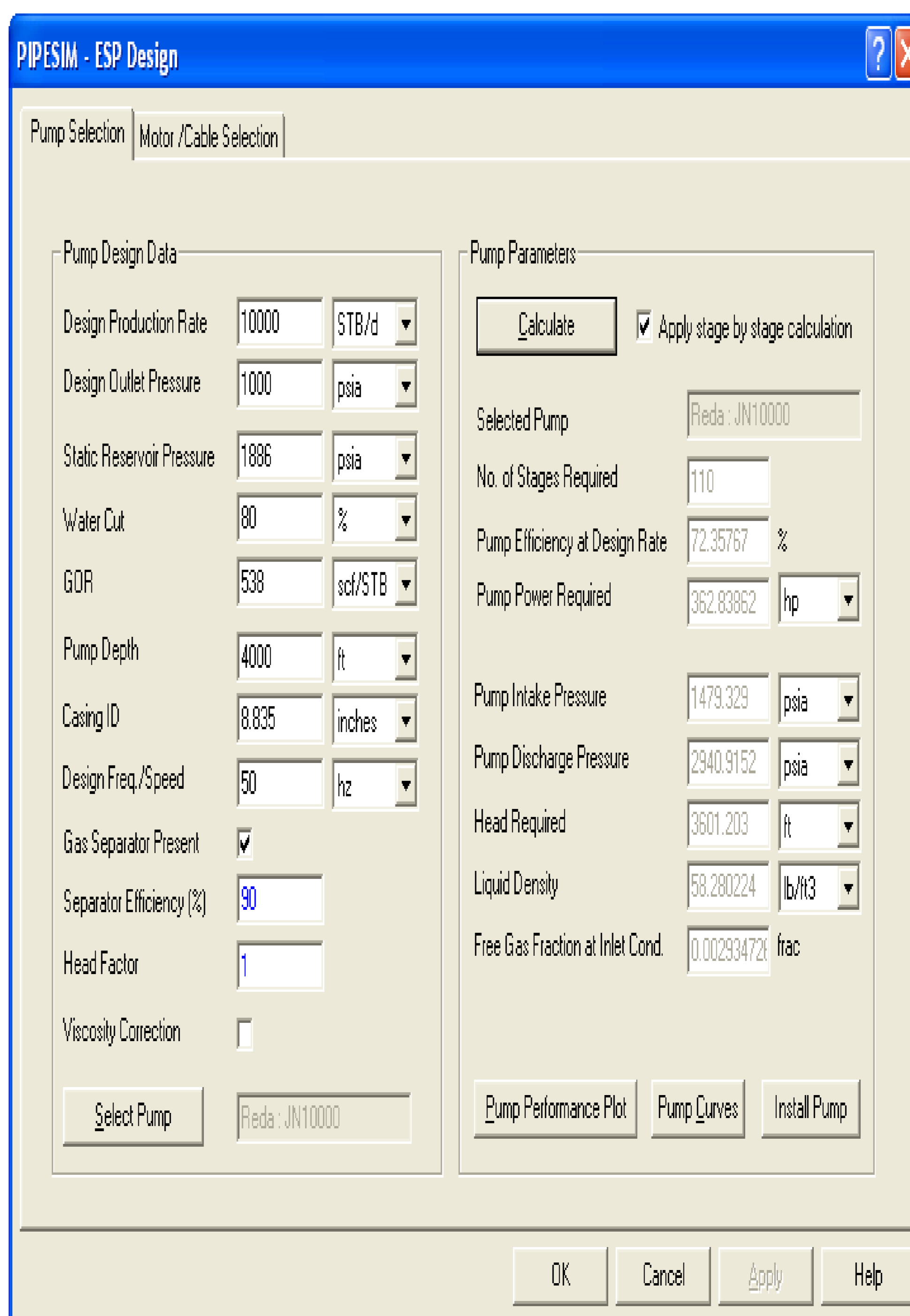
### Methodology

Production history data is collected along with the PVT data which is input to the software. Enter all the required parameters like GOR, Water cut, Specific gravity of Gas, specific Gravity of Oil, viscosity, Static Reservoir pressure, bubble point pressure, well head pressure (WHP), well head temperature (WHT).

Design a black oil model and select appropriate flow correlation. Input all the tubing and casing data for flow correlation matching. Do nodal analysis and design the ESP for suitable well at different speeds and select the best suitable for the particular well.

### Results

Since there is scarcity of gas in Kuwait and gas is generated by burning oil and buying gas from other countries, to fulfil the domestic requirements, gas lift is not the right option but ESP is a better choice. Therefore, ESP is to be permanently installed in MG-XYZ well to maintain or to enhance production of oil.



### Design Results