© IPA, 2006 - 25th Annual Convention Proceedings, 1996



**Poster # 12**

**IPA96 - 2.3 - 155**

PROCEEDINGS, INDONESIAN PETROLEUM ASSOCIATION
Twenty-Fifth Silver Anniversary Convention, October 1996

# NEURAL NETWORK ALGORITHM ON ELECTRICAL SUBMERGIBLE PUMP (ESP) DESIGN

**Sudjati Rachmat***
**Anas Pudji Santoso***

## ABSTRACT

*A Neural Network* (NNs) is a computational structure by the study of biological neural processing. There are many different types of NNs, from relatively simple to very complex as describe in theories on biological neural processing. Neural network models are designed to emulate human information processing capabilities such as knowledge processing, speech, prediction and control. Therefore, there is no exaggeration if neural network applications are used today to solve the problem of design, optimization and selection of the Electrical Submergible Pumps (ESP).

Before the NNs model can be used to provide the desired output, the model must be trained to recognize the relationship between the input parameters. Firstly, the vertical flow model is used for computing the pump discharge pressure requirement and pressure lost in the pump to calculate intake pressure of pump. Secondly, the fluid intake volume (oil, water and free gas) could be fixed by inputing the surface production and intake pressure or the program can utilize a subroutine to calculate draw-down, flowing bottomhole-line pressure, etc. using the straightline P.I. method. This calculation could be refined when producing condition are below the bubble point of the oil by using a subroutine incorporating the *Vogel Technique* (IPR method).

This result of the research would be used for pump selection for several reasons. First is economics; a large unit would have to be purchased to produce a disproportionately low volume of liquid. Second, the pressure generation capacity of stage would be optimized to protect the gas lock problem. The final result can also be used to simulate an existing pumping system. It is very useful to evaluate a well by allowing the program to calculate the pumping bottomhole pressure versus rate. Equally important, this technique can determine the overall efficiency of the system and points out any changing well conditions, resizing or replacing the pump.

* Institute Technology Bandung