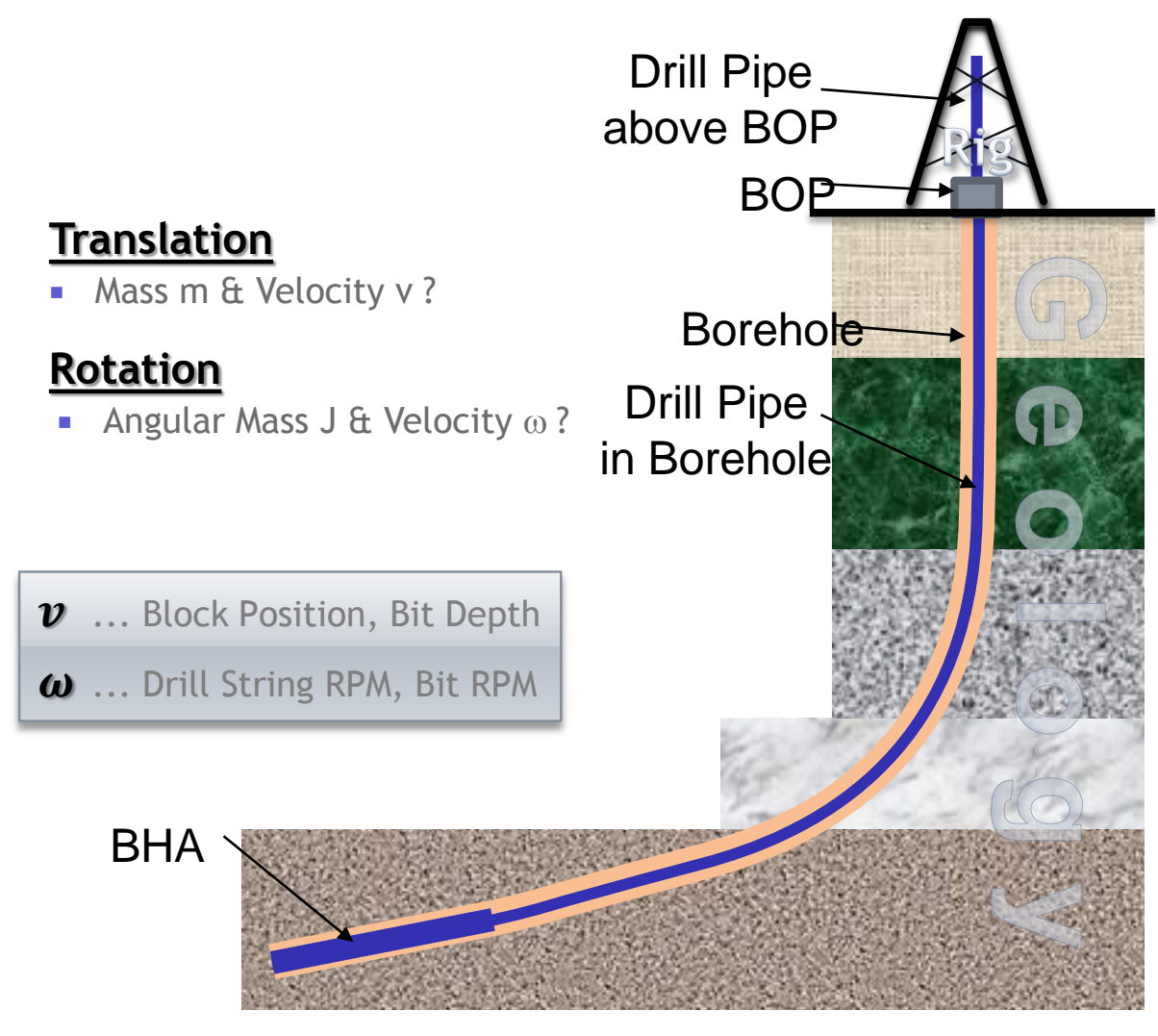


Model-Based Hookload Monitoring and Prediction for Drilling Rigs using Neural Networks and a Forward-Selection Algorithm

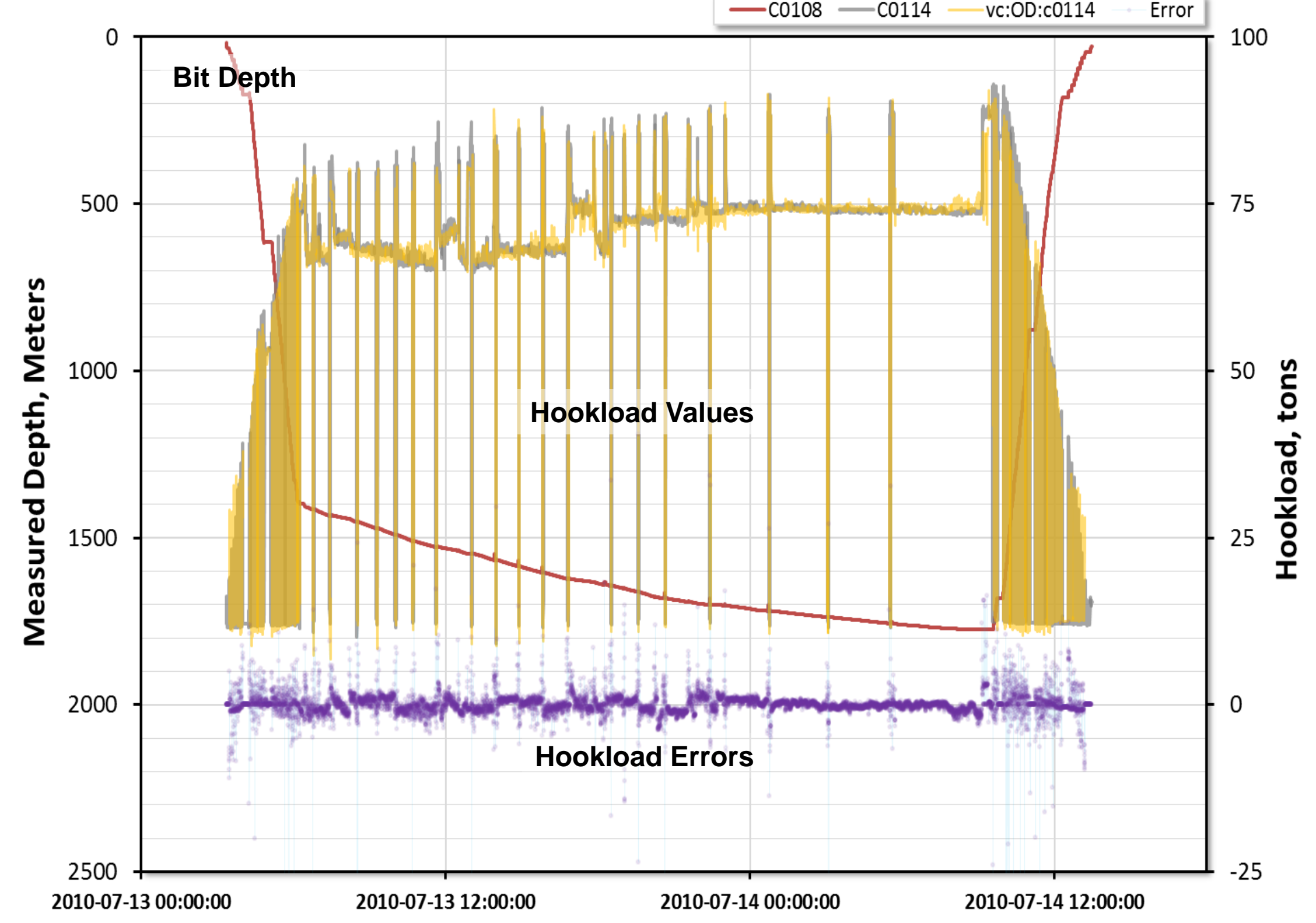
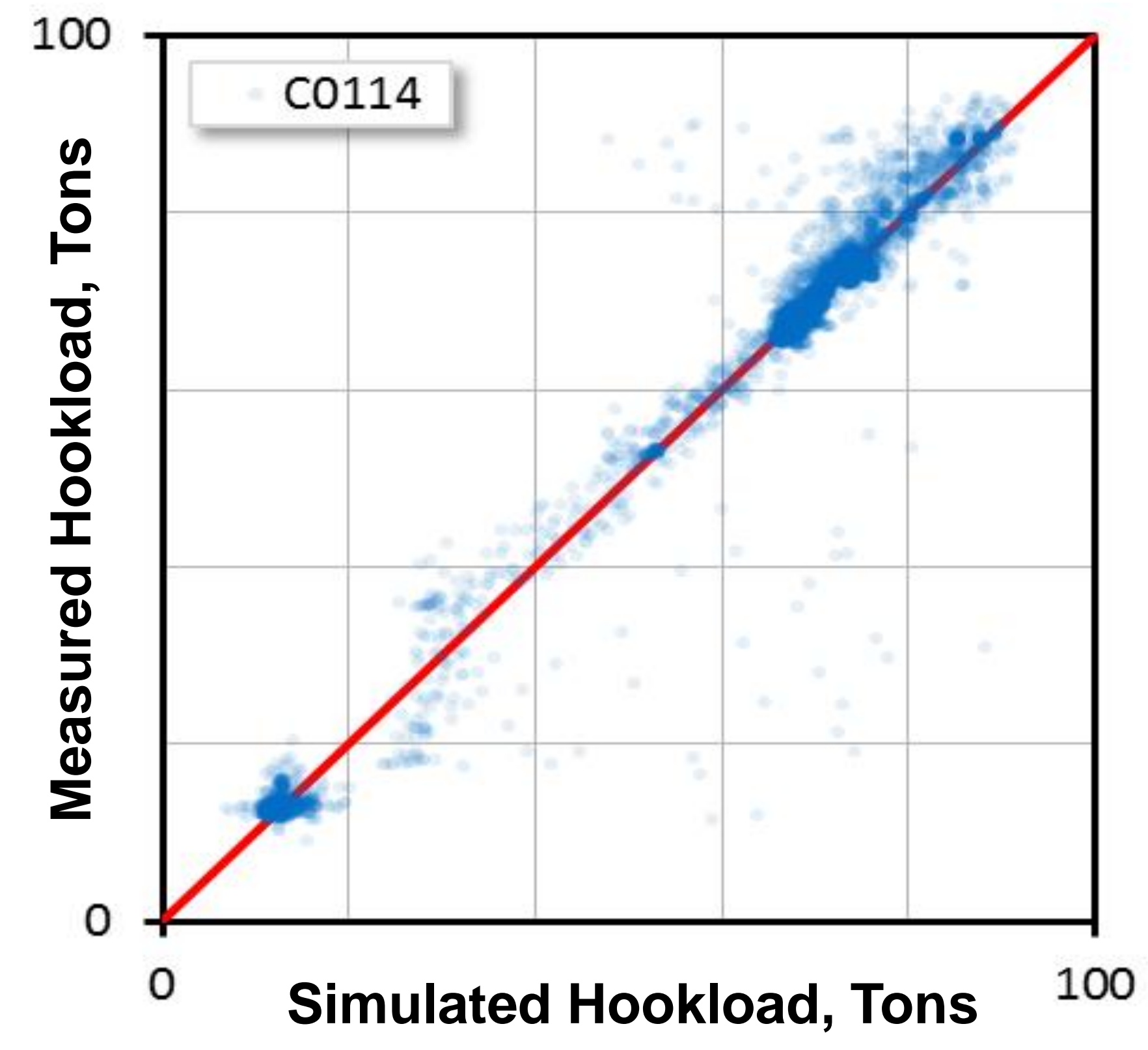
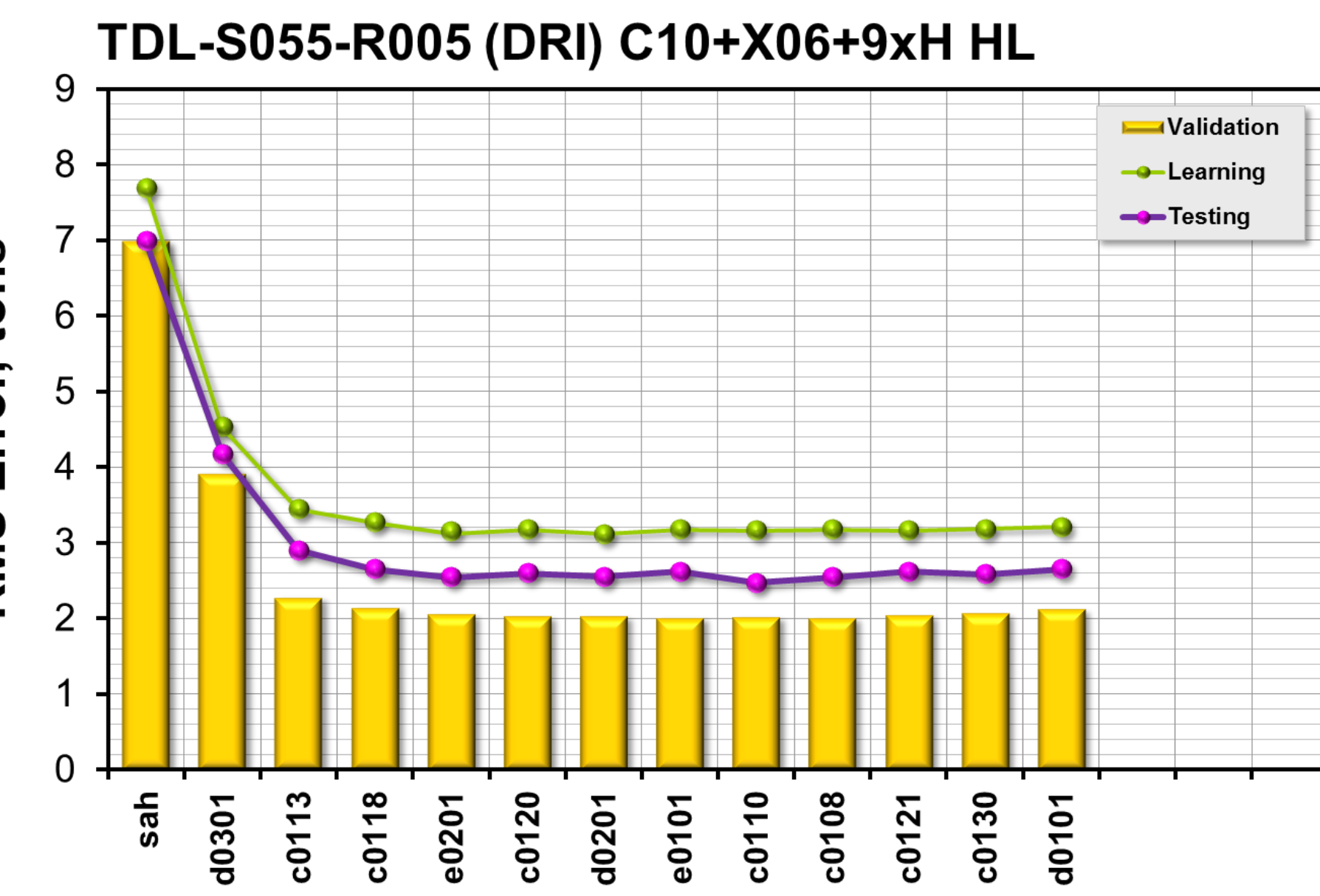
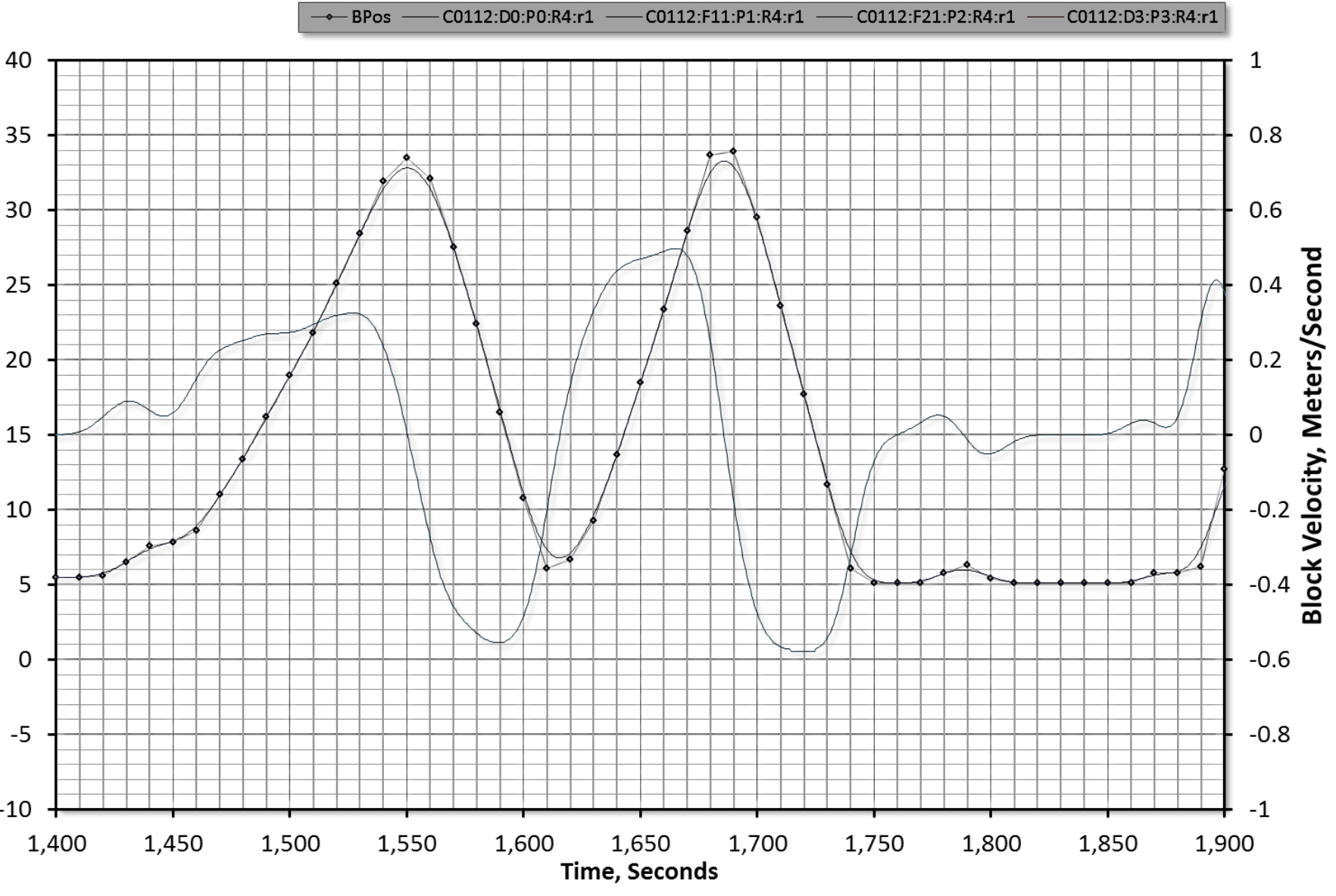
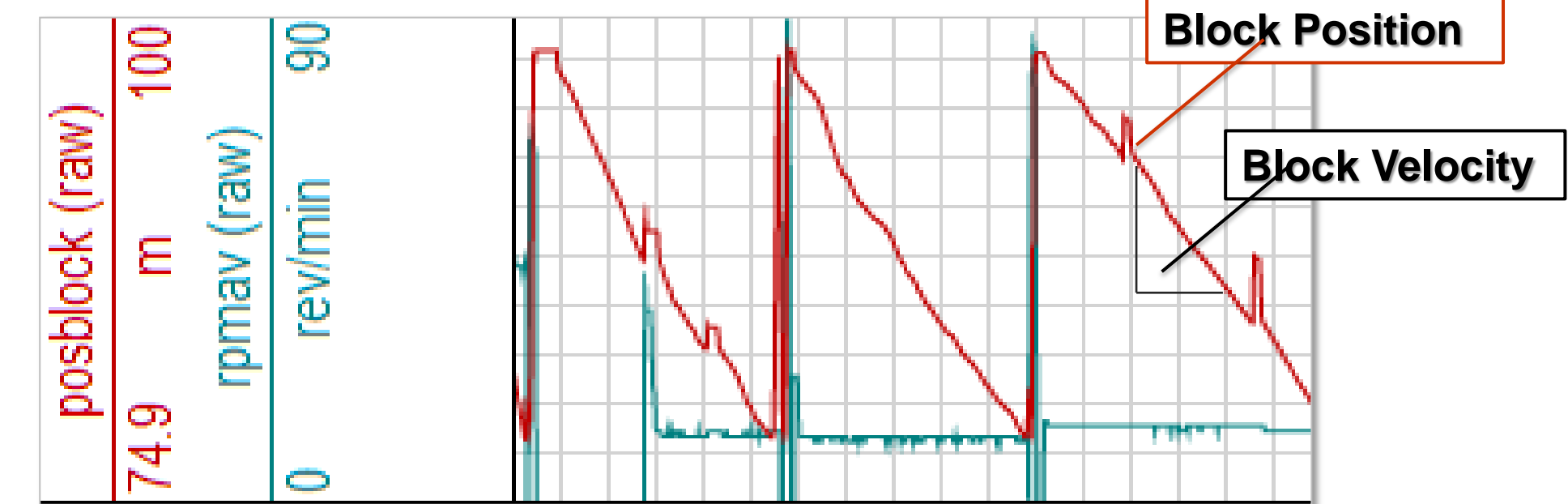
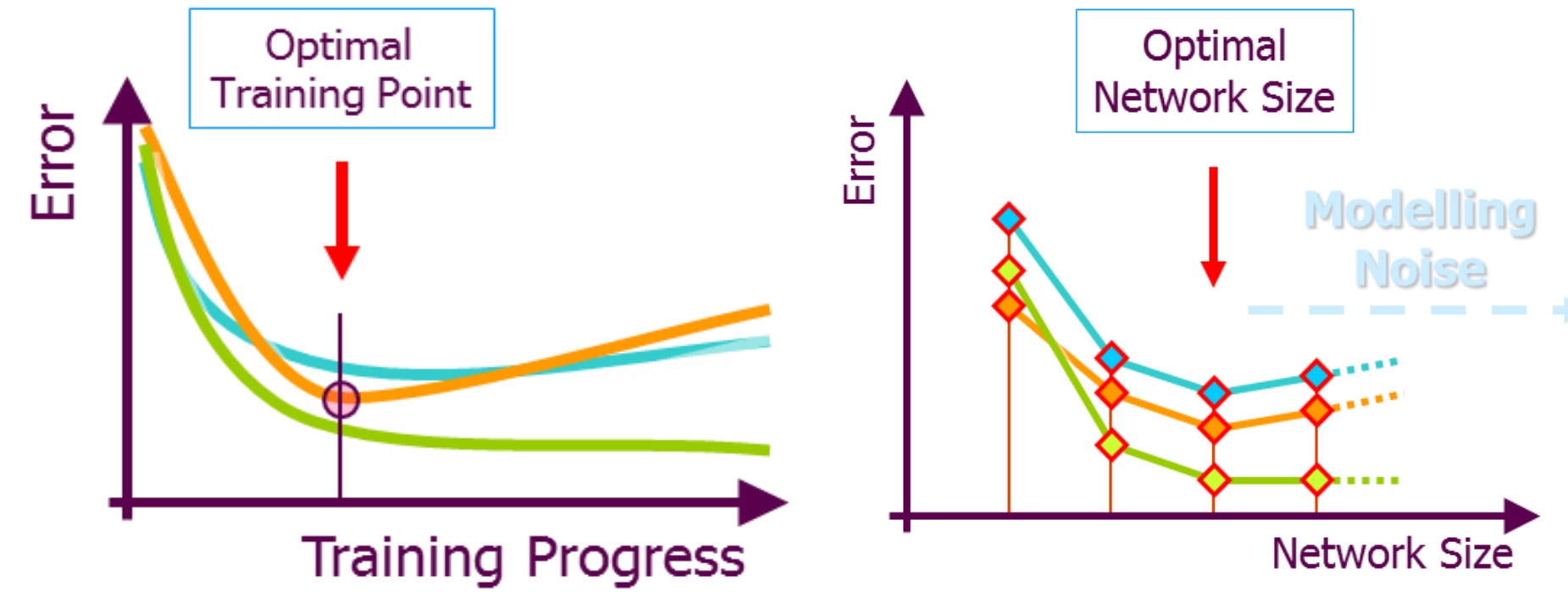
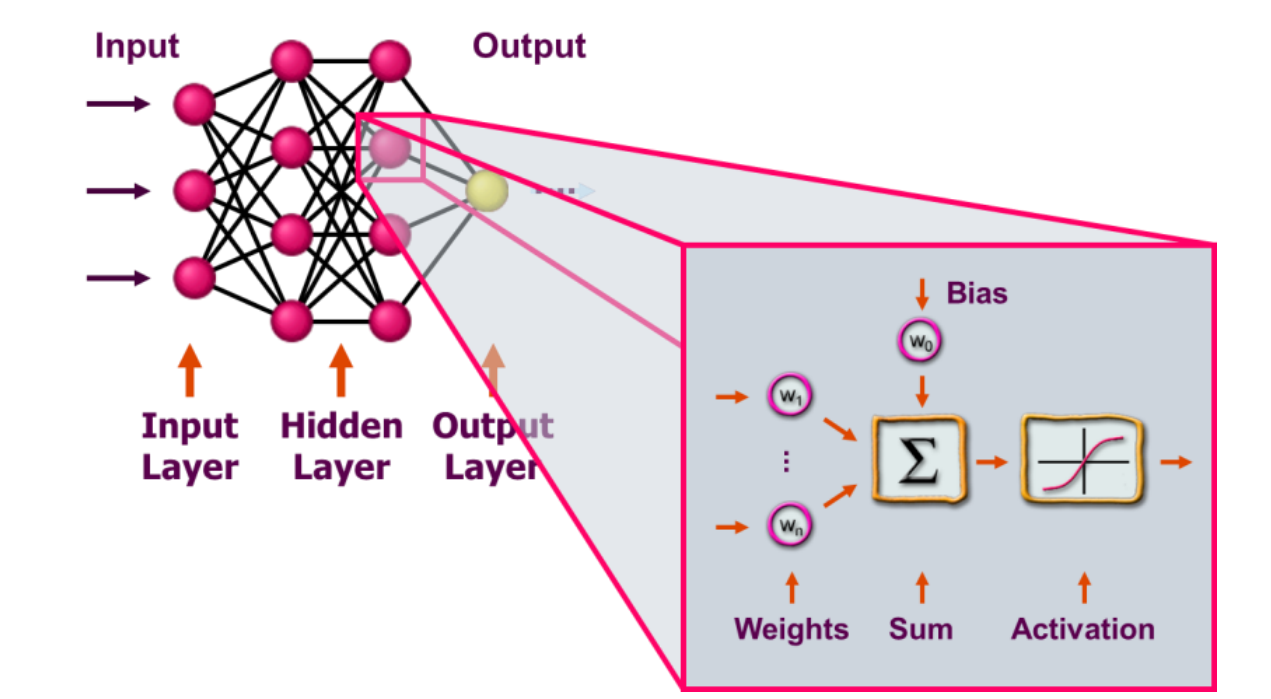
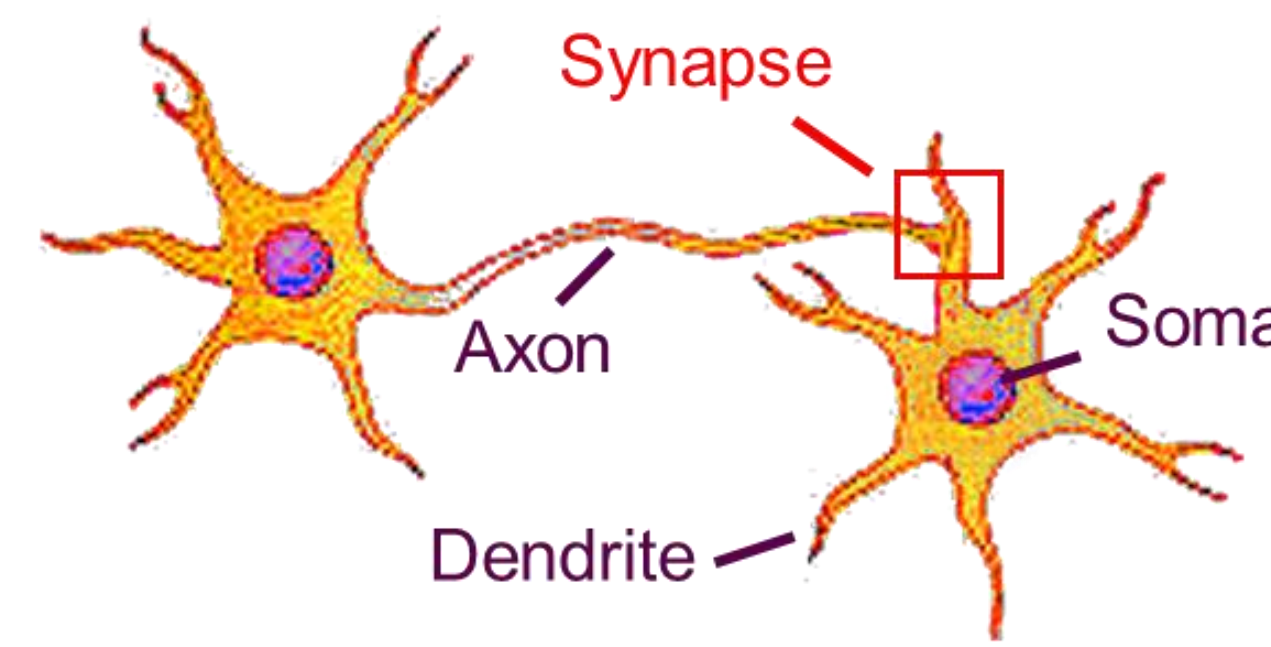


Drill Pipe Weight per Meter, Drill Pipe Length (above BOP), Drill String Length (Borehole), BHA Length, Drill Pipe Length, BHA Weight per Meter, BHA Length

$$m = c_p(d_h + d_s - \Delta d_a) + c_a \Delta d_a$$

$$m = c_p(d_h + d_s) + c_x$$

$c_p, c_x \dots$ constants



1 - Data Acquisition Phase
Using mud-logging systems sensor data are collected. Examples: Hookload, Block Position, Bit Depth, Flow In, Flow Out, Pump Pressure, Hole Depth.

2 - Features Generation Phase
Physical features are calculated from the sensor data. Examples: Block Speed, Acceleration, String Mass, Bit Speed, Bit Acceleration, etc..

3 - Training/Features Selection Phase
Completely connected neural networks were combined with forward selection method. 3 features out of 23 were identified as important for hookload modeling.

4 - Prediction Results
The results show accurate prediction of the hookload data with average errors of ≈ 2 tons.

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