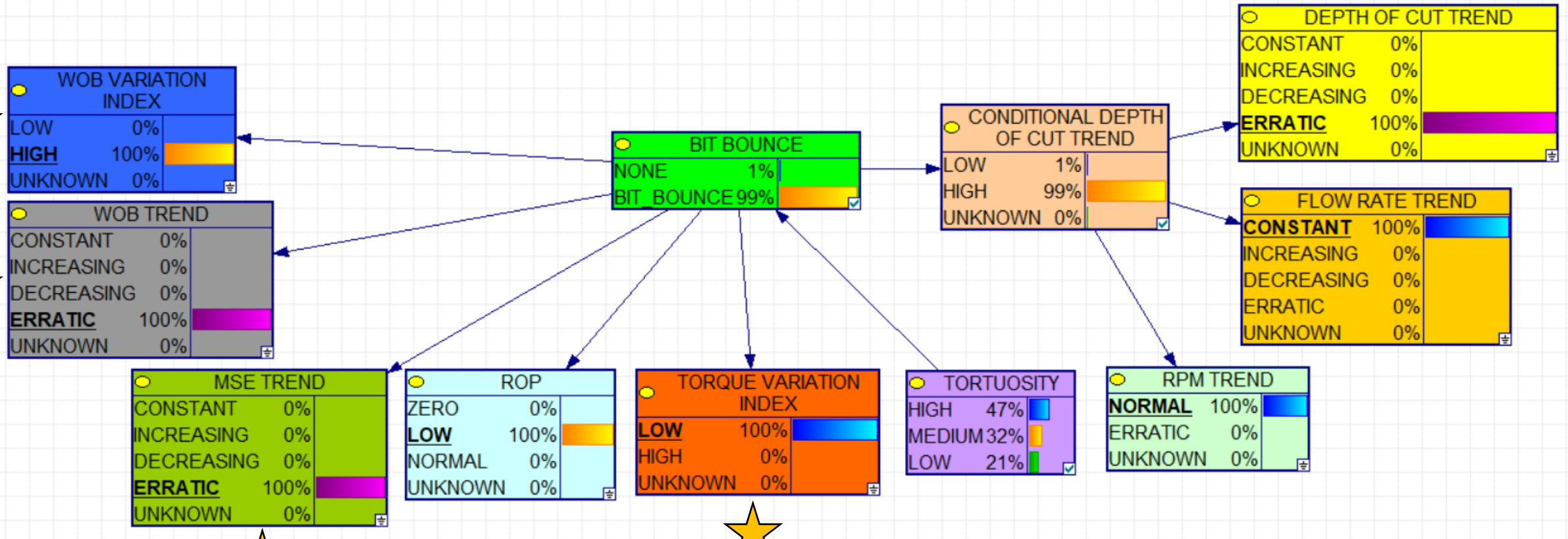


# Bit Bounce Detection Model



# Influential Features

Node	Feature Description	Node State Breakdown	State Conducive to Belief
Conditional Depth of Cut Trend	Depth of cut erratic given constant flowrate and non-erratic RPM, where: $\text{Depth of Cut} = \frac{12 * ROP}{60 * (RPM + Q_{in} * RPG)}$	<b>LOW:</b> DOC not erratic given constant flowrate and non-erratic RPM <b>HIGH:</b> DOC erratic given constant flowrate and non-erratic RPM	High
MSE Trend	Surface MSE trend over short time window where: $MSE_{surface} = \frac{4 * WOB}{\pi * (d)^2} + \frac{480 * RPM * T}{(d)^2 * ROP}$	<b>CONSTANT:</b> Constant MSE <b>INCREASING:</b> Increasing MSE <b>DECREASING:</b> Decreasing MSE <b>ERRATIC:</b> Erratic MSE	Increasing, Erratic
ROP	Real-time .5ft cut foot ROP with respect to configurable expected ROP values	<b>ZERO:</b> Zero ROP <b>LOW:</b> ROP low compared to expected value <b>NORMAL:</b> ROP meets or exceeds expected value	Low
Torque Variation Index	Erraticity of torque: $\text{Torque Variation Index} = \frac{\text{Torque}_{max} - \text{Torque}_{min}}{\text{Torque}_{avg}} \times 100$	<b>LOW:</b> Non-erratic torque <b>HIGH:</b> Erratic torque	Low
WOB Trend	WOB trend over short time window	<b>CONSTANT:</b> Constant WOB <b>INCREASING:</b> Increasing WOB <b>DECREASING:</b> Decreasing WOB <b>ERRATIC:</b> Erratic WOB	Erratic
WOB Variation Index	Erraticity of WOB: $\text{WOB Variation Index} = \frac{WOB_{max} - WOB_{min}}{WOB_{avg}} \times 100$	<b>LOW:</b> Non-erratic WOB <b>HIGH:</b> Erratic WOB	High

# Bit Bounce Detection Example

