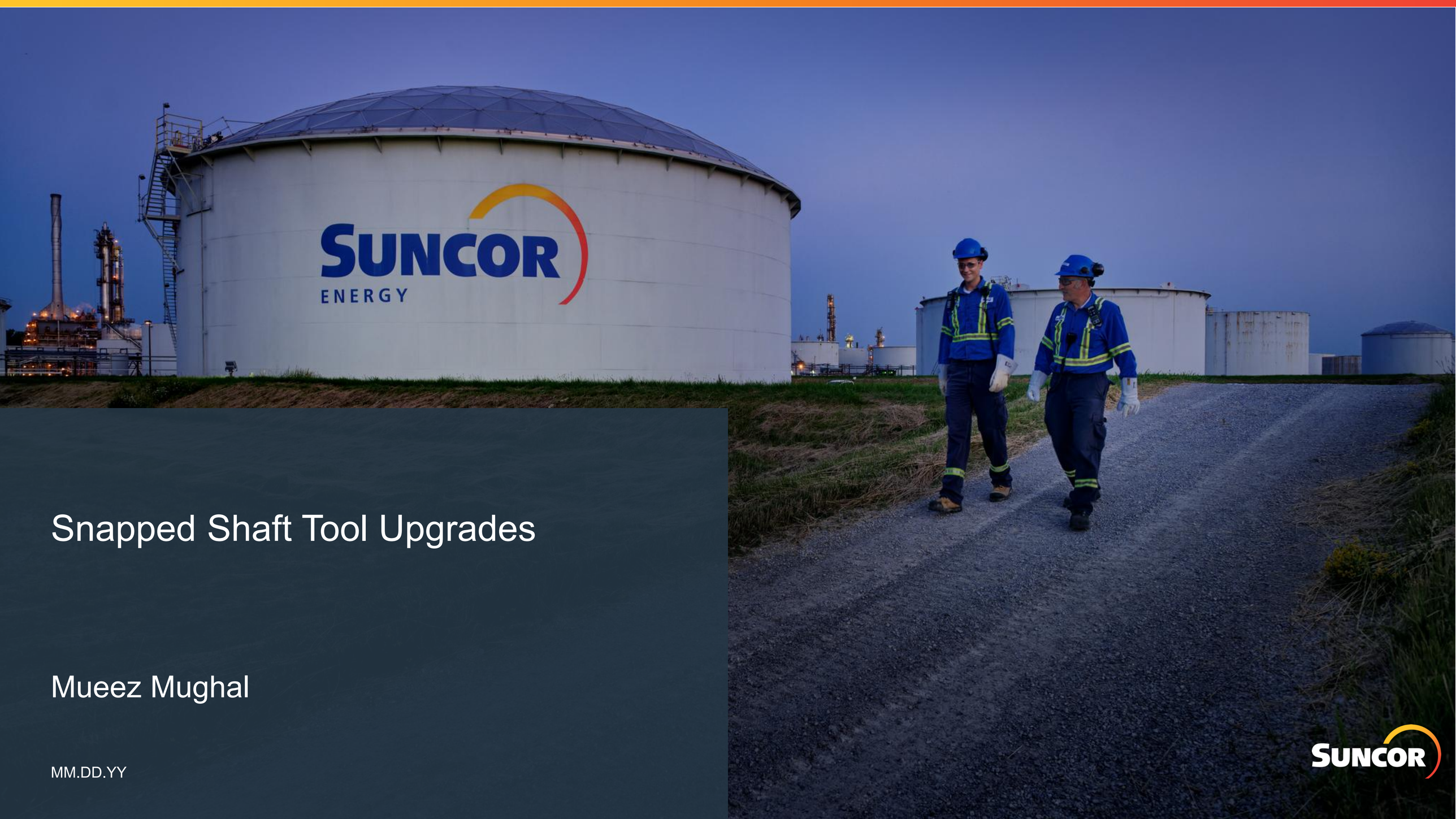


Snapped Shaft Tool Upgrades

Mueez Mughal

MM.DD.YY

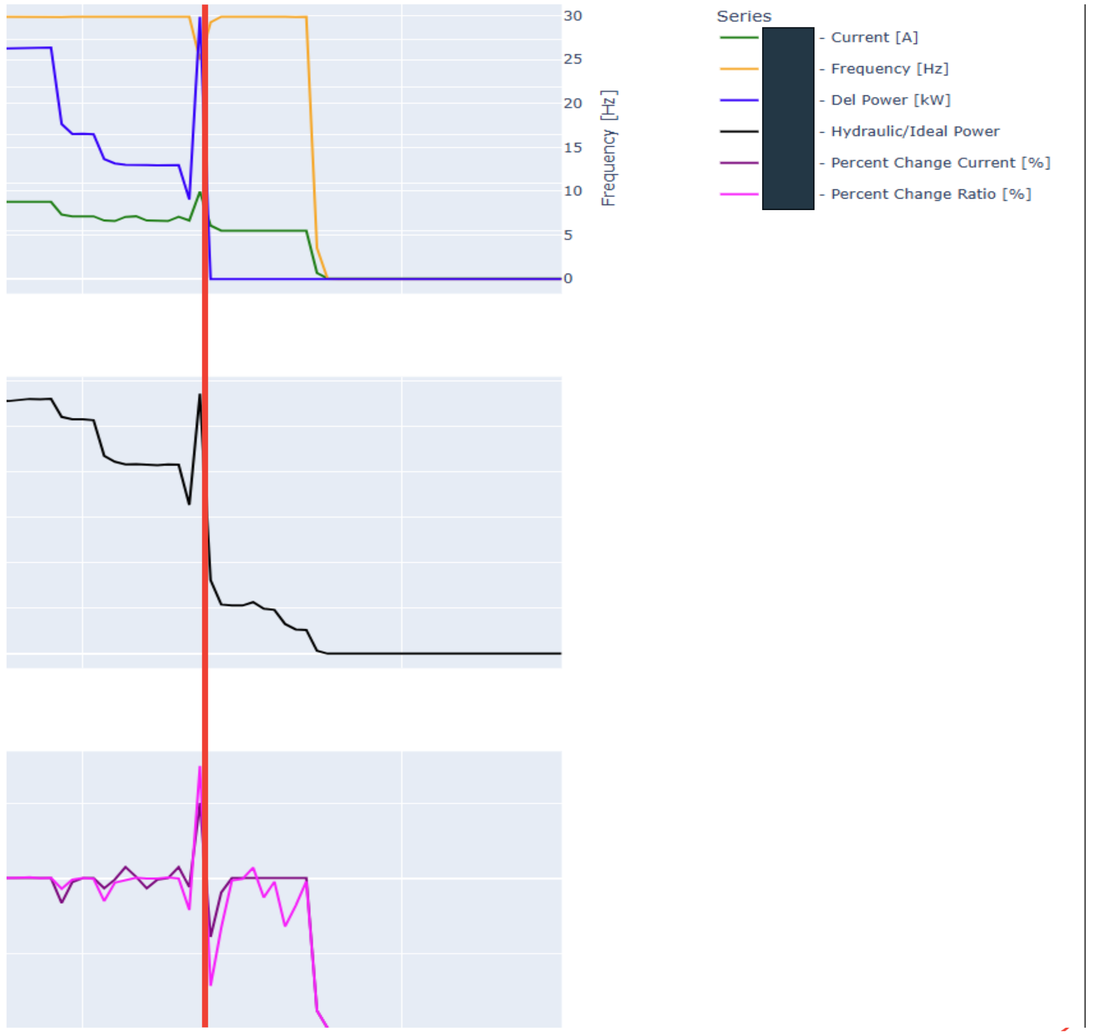
Snapped Shaft Through a Power Lens

Looking at the ESPs ideal performance with fluid mechanics equations

- VFDs measure power output
  - Find the ratio of actual power / ideal power
    - This ratio should be relatively stable
- Finding the % change between current and previous value
- Happens very quickly (2-5 minutes)

```
if (
    curr_pct_current <= -150 and
    curr_pct_ratio <= -550 and
    #next_pct_current < -200 and
    #next_pct_ratio < -200 and
    next_val_current != 0 and
    any(df.iloc[i - j]['Percent Change Current [%]'] >= 0 for j in range(1, 5))
):
```

- Large spike then dip is indicative of a snapped shaft



End Goals

1. Identify snapped shafts for legacy VFDs

2. Improve redundancy of existing snapped shaft tool

3. Identify proactive workover opportunities

All of this will be possible with the Field's help!

Thank you