

# Grind Trak case studies

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# How does it help?

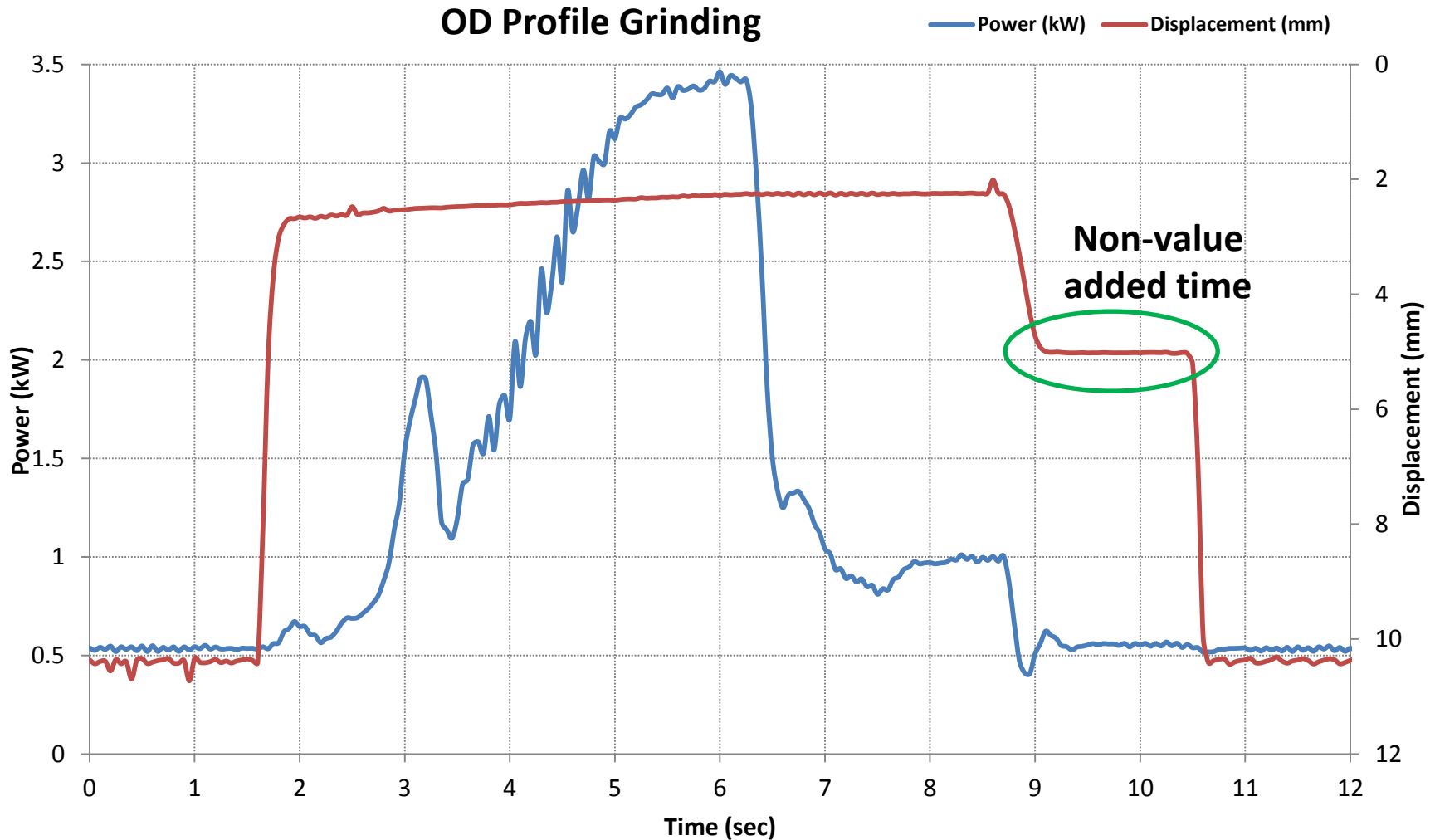
- Better asset utilization
  - Capacity Increase & Reduced cost per part
    - By optimizing grinding cycle
    - Reduction of non-grinding time
    - Increasing wheel life
- Solving process related issues
  - Identify and resolve process problems
    - Burn, wheel loading, glazing, high wheel wear
- Process benchmarking and machine characterization
  - Document the grinding process for future reference
  - Comparison of in-process signals between two grinding systems
    - 2 different cycles
    - Same cycles, but different machine, operator, wheel, etc.
  - Machine characterization
    - Axis behaviour
    - Deformation shapes, etc.

Examples of use of Grind-Trak

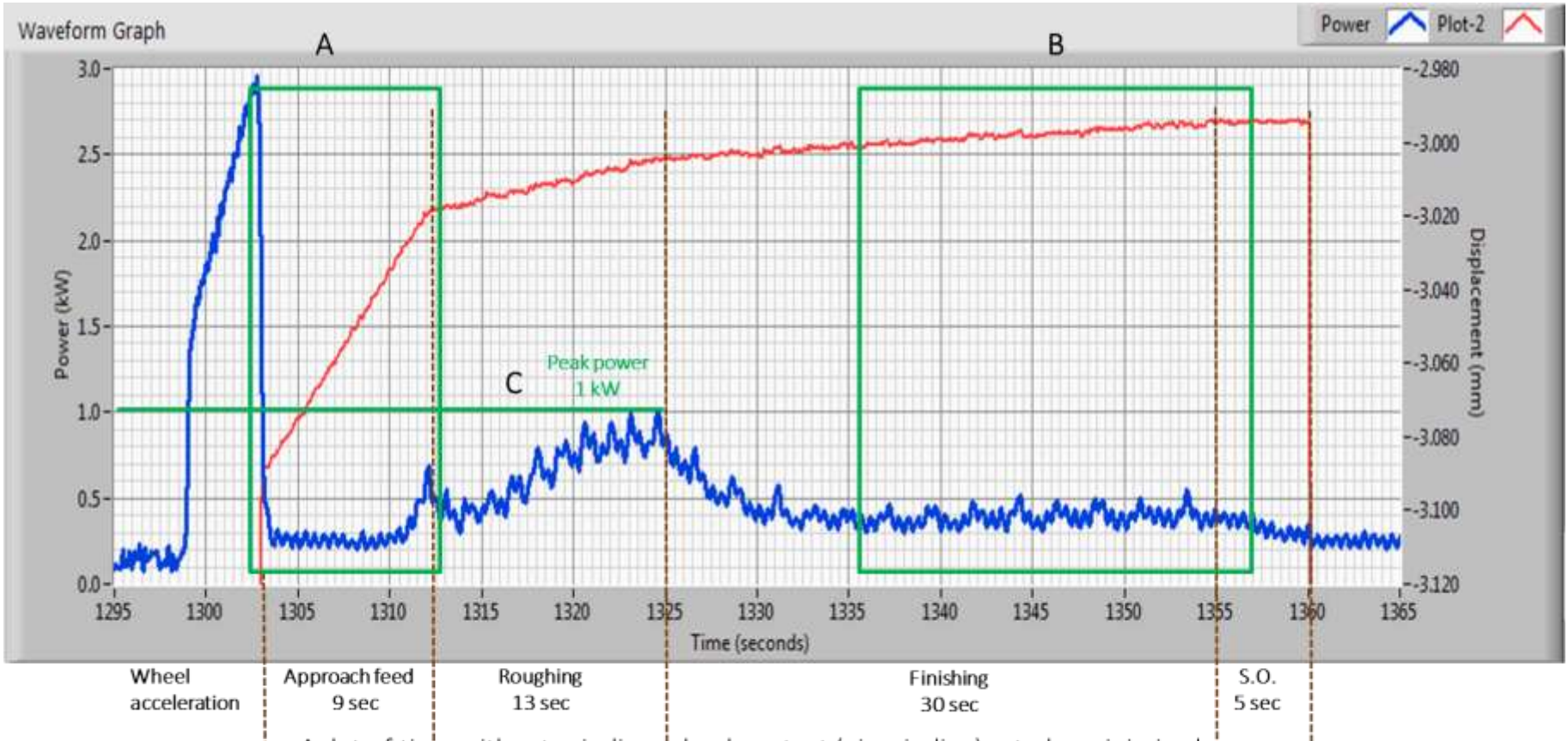
# **CASE STUDIES**

# BETTER ASSET UTILIZATION

# 1. Reduction of non-value added time



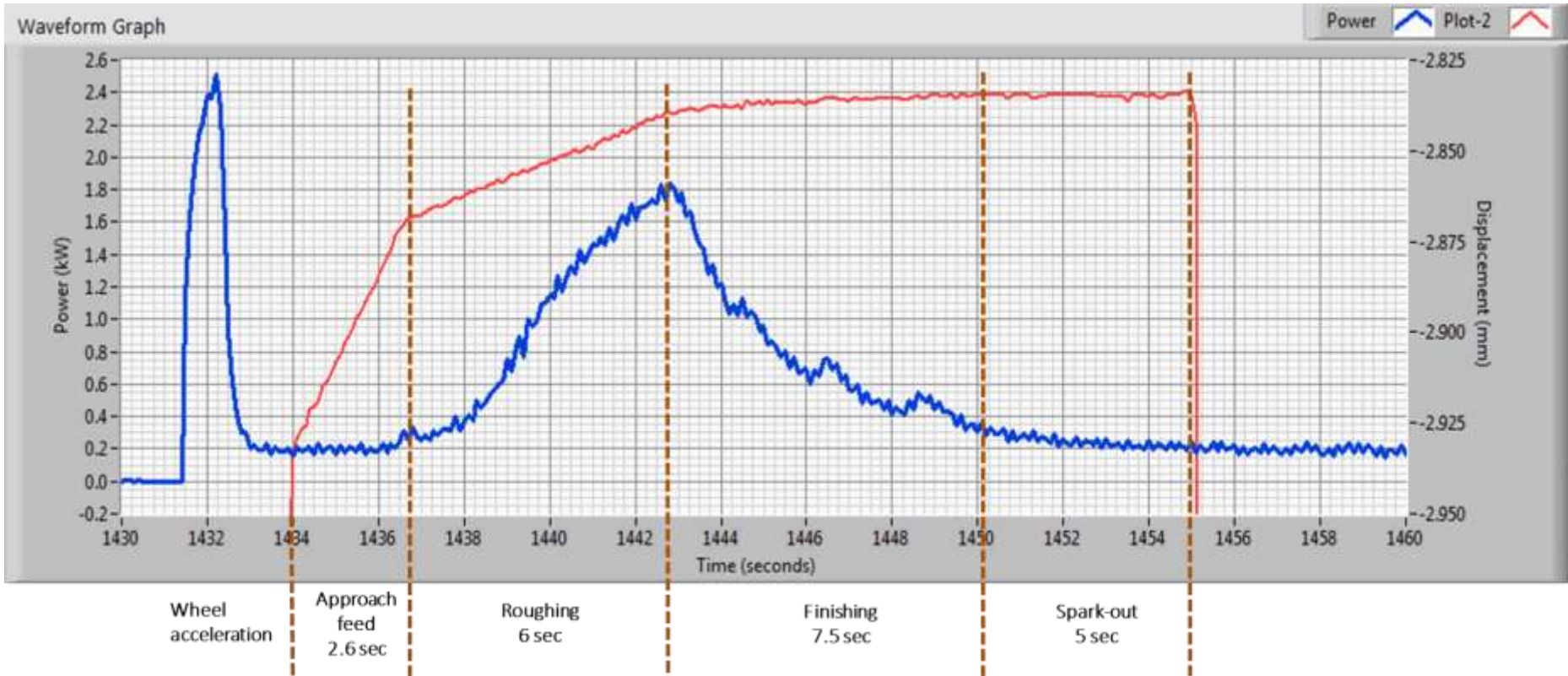
# 2.a Reduction of grinding cycle time



- A: lot of time without grinding wheel contact (air grinding) – to be minimized
- B: Lot of time with no significant stock removal – to be optimized
- C: Peak power is very less (1 kW); motor power 7.5 kW – to be optimized

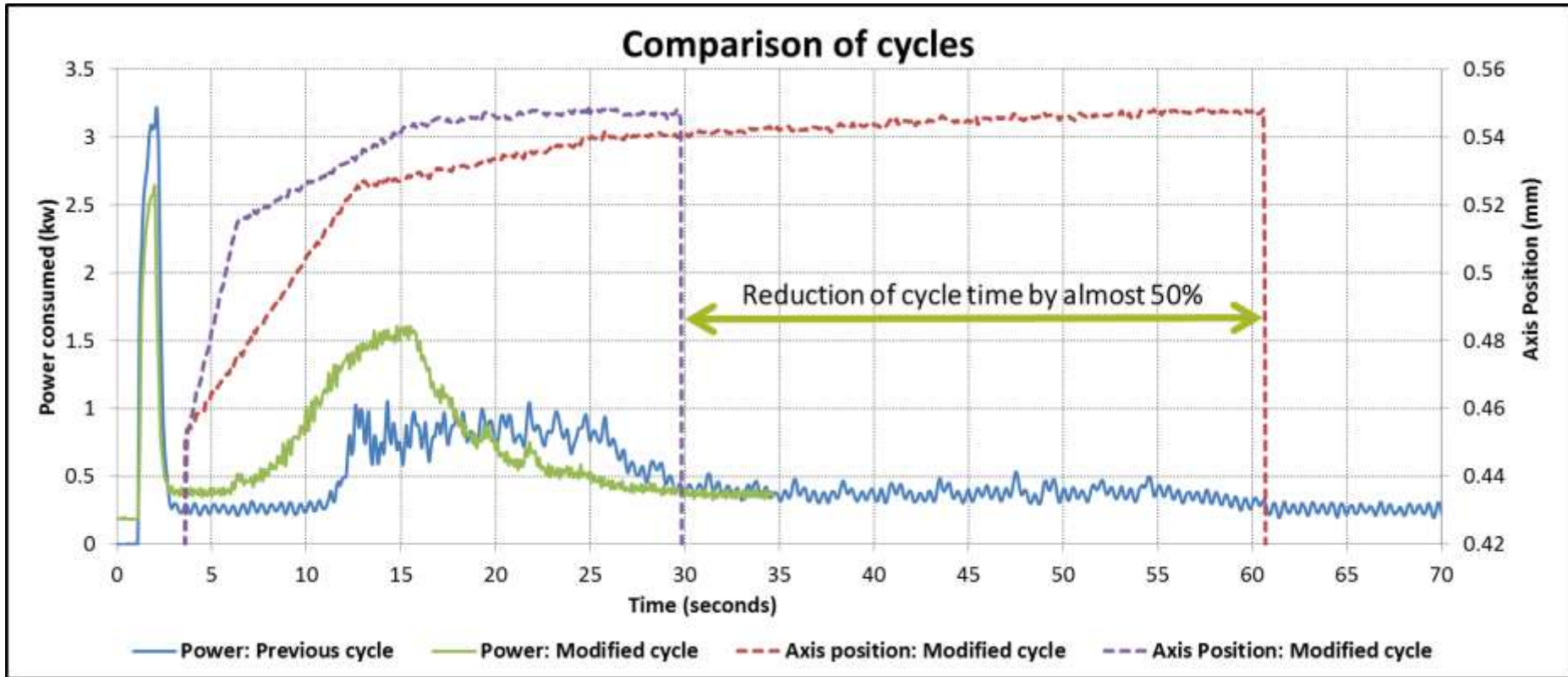
Initial Cycle

# 2.b Reduction of grinding cycle time



Modified Cycle

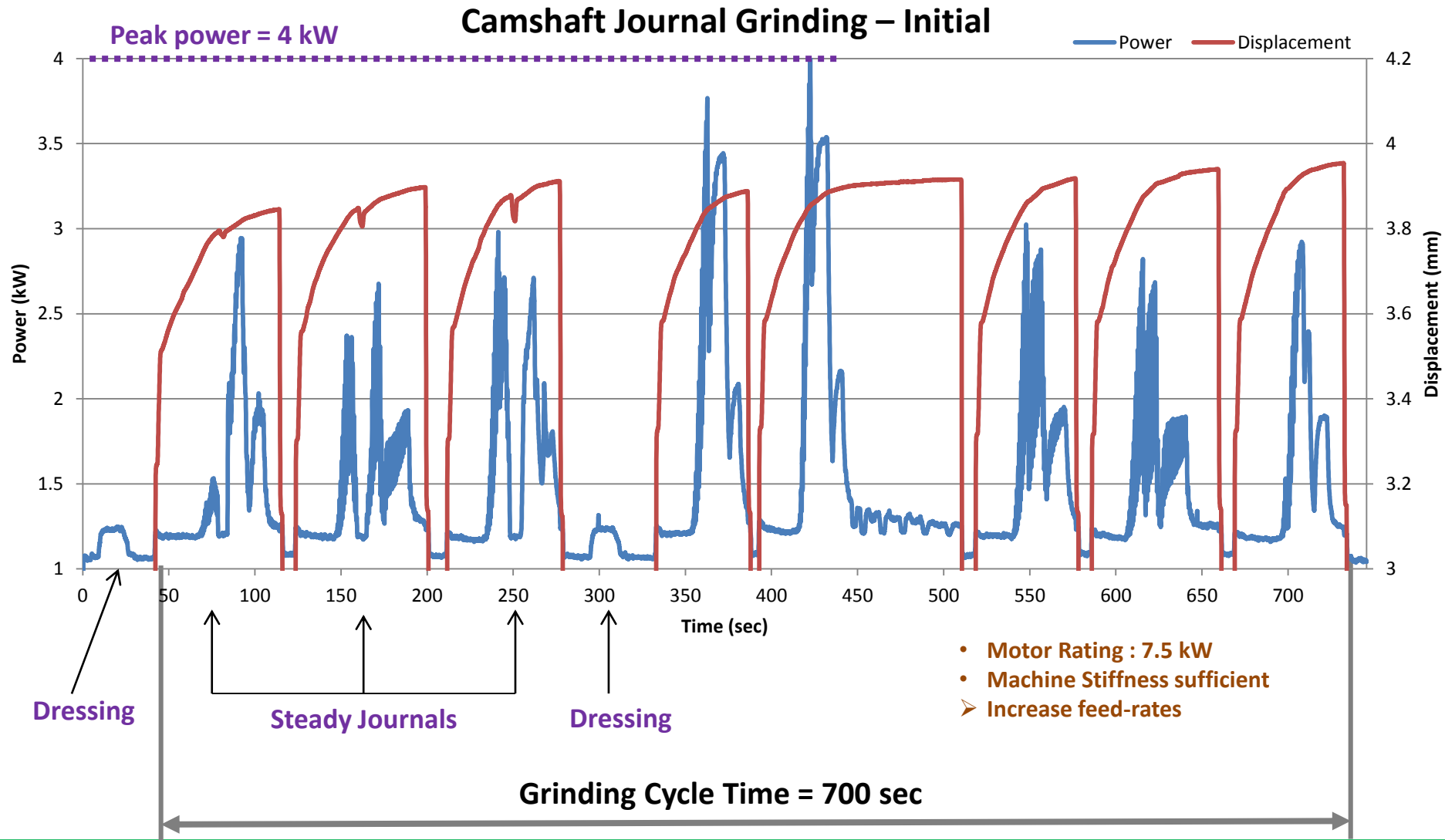
# 2.c Reduction of grinding cycle time



Overlapped Signals

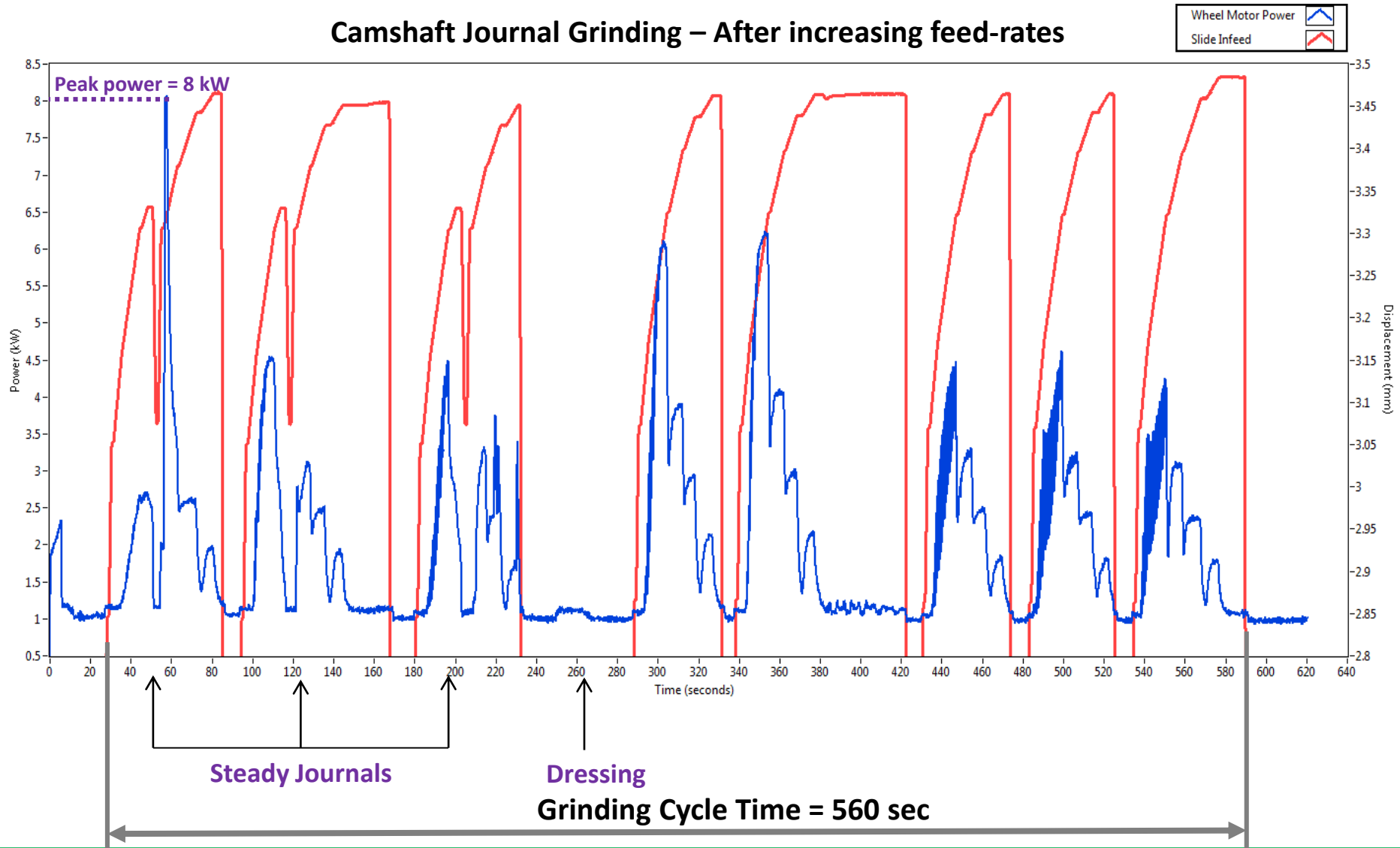


# 3.a Reduction of grinding time



# 3.b Reduction of grinding time

## Camshaft Journal Grinding – After increasing feed-rates



# **SOLVING PROCESS RELATED ISSUES**

# 1. Wheel Glazing

- High Power in the finishing operation indicates glazing.

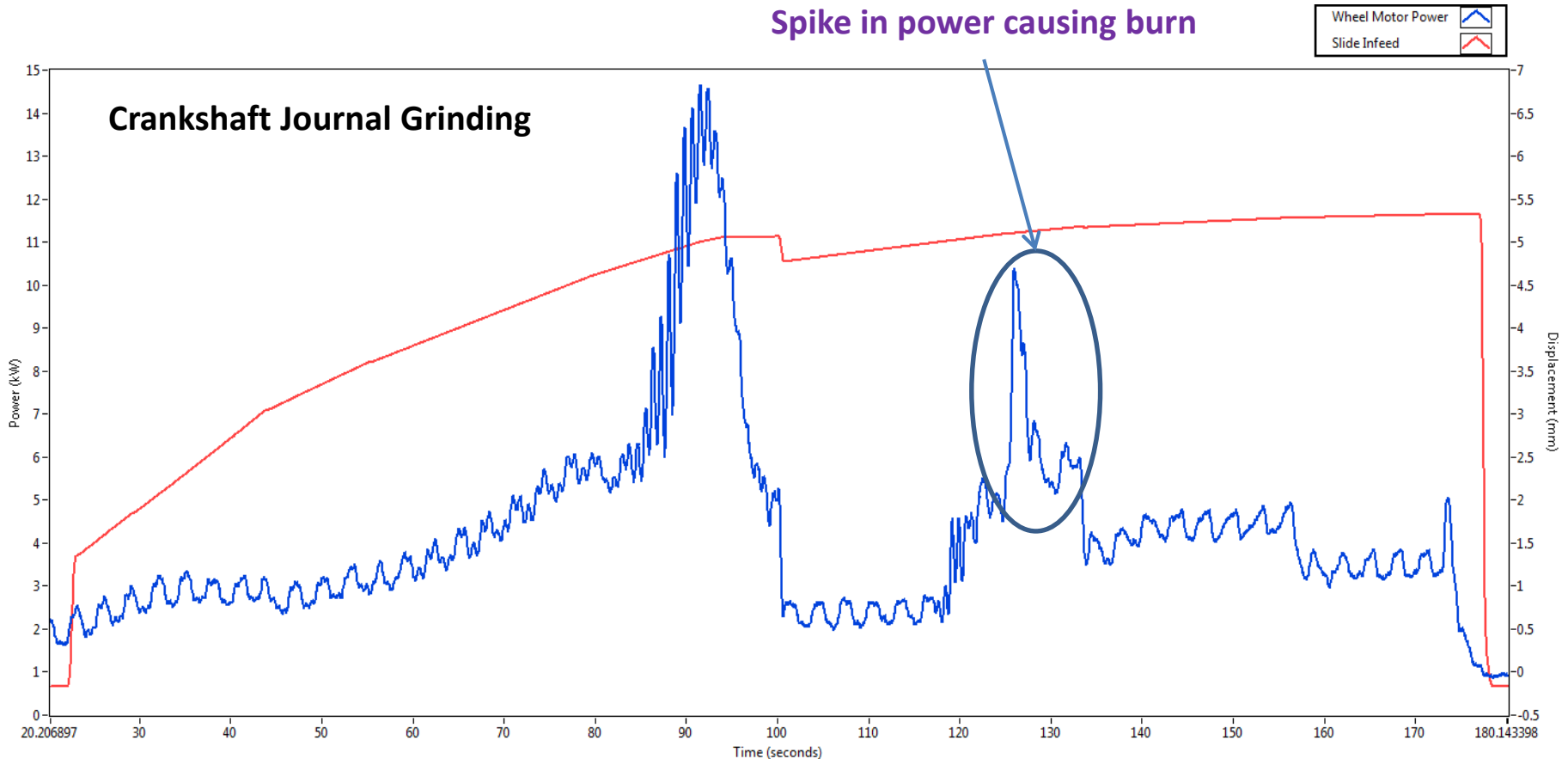


OD profile grinding – work-material with high hardness (62 HRC)

- **Grind-Trak** shows portions of the grinding cycle where the glazing takes place.
- Remedial action may be taken to rectify the problem by attacking that portion of the grinding cycle.

# 2. Burn

- Sudden spikes in power indicate potential for burning

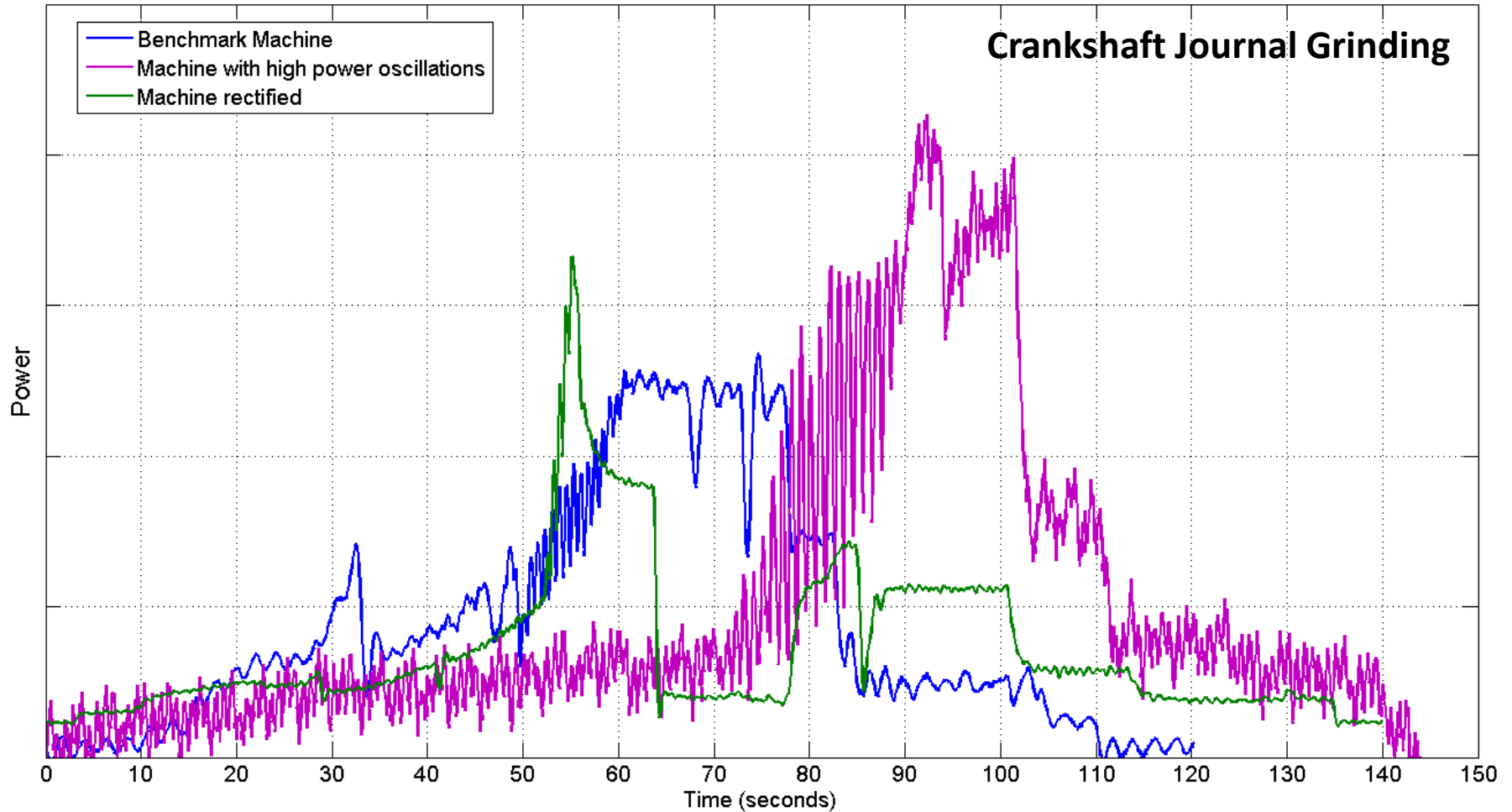


- Remedial action may be taken to rectify the problem by attacking that portion of the grinding cycle

# **PROCESS DOCUMENTATION AND BENCHMARKING**

# Benchmarking

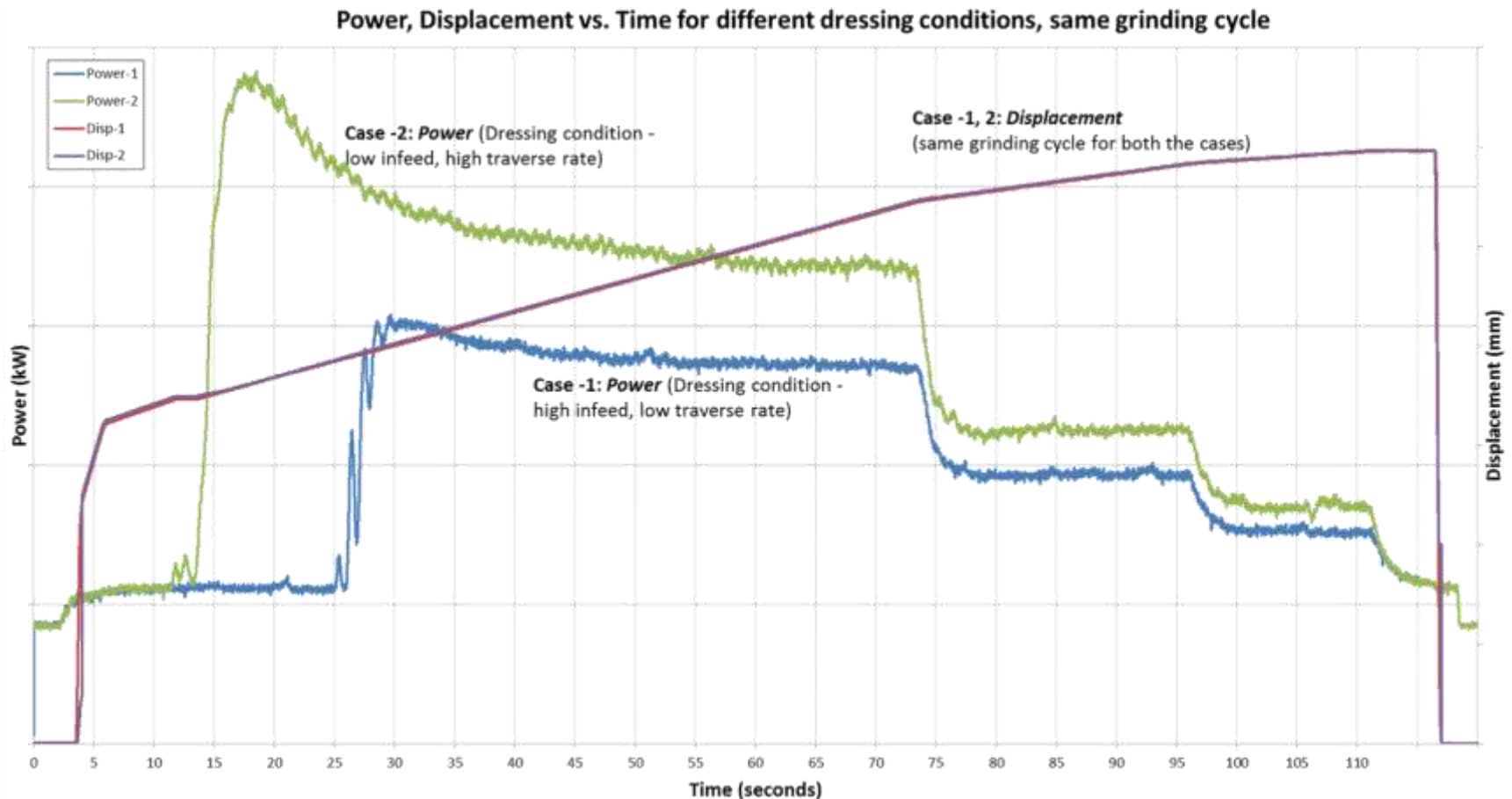
High Power Fluctuations (Initial and After rectification)



- Compare grinding cycle, system stiffness, cycle time and process behaviour.

# Process Auditing – Effect of dressing

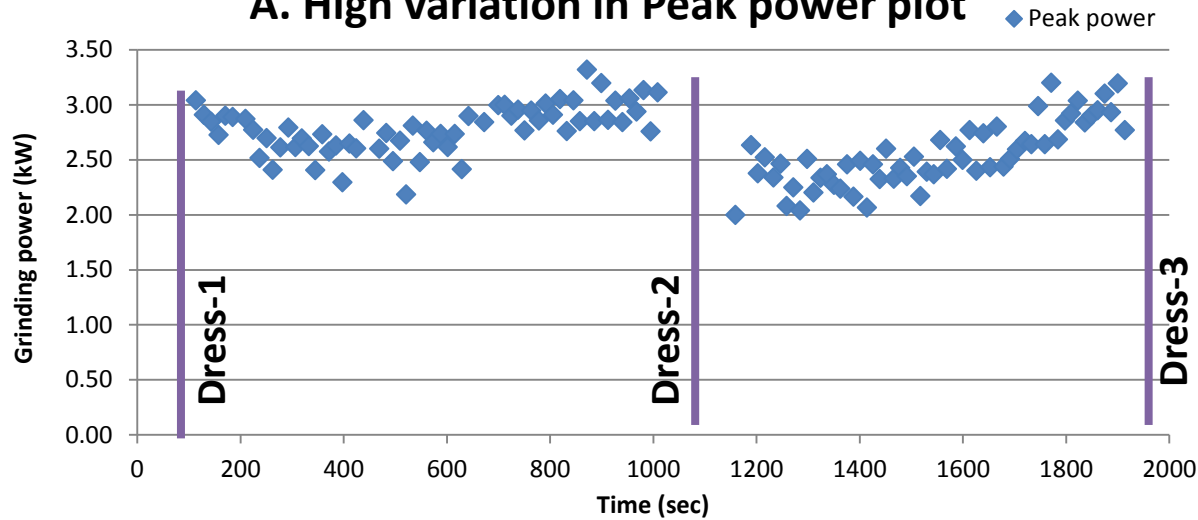
- Dressing conditions affect the grinding process results.
- Wheel dressed to dull conditions (closed wheel face) gradually becomes more efficient in grinding thanks to “Conditioning” during grinding.
- Grind-Trak makes shows the difference for different dressing conditions.



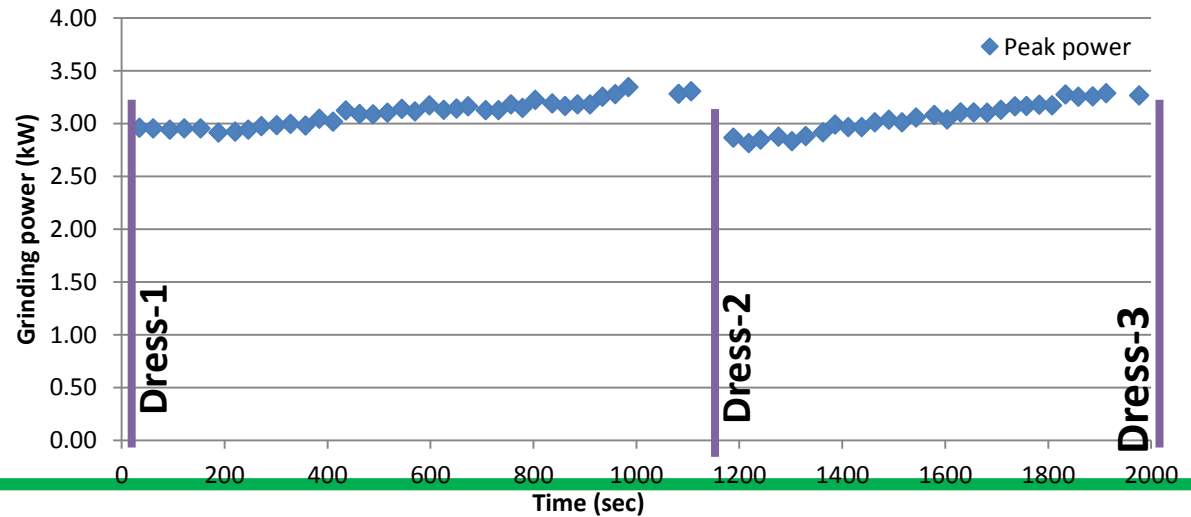


# Dressing cycle - Benchmarking

## A. High variation in Peak power plot



## B. Consistency in- Peak power plot



# Machine Characterization

## Axis behaviour

- Spikes generated when there is a change in feed-rate.
- These spikes were giving rise to step on the component.
- After Servo Motor tuning, the spikes were eliminated.
- No more step on the component

