

The Many Applications of Proximity Probes – Installing Probes When It Seems Impossible

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Piedmont Chapter Meeting
Lake Junaluska N.C.
Friday, September 20th, 2013

Who is this guy?

- Started vibration analysis in 1986
- 25 years Commercial Nuclear experience
- 8 years Fossil Plants
- Chairman of the Central Florida Chapter
- A kid who (barely) graduated from Tuscola High in 1978.
- My hobby is old Chevys, I am a gear head (See next slide)
- If you have a similar video consider professional help.



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- Did he say, “Florida Chapter”?
 - Yes, we started a chapter back in 2009 and we have an all day meetings once a quarter.
 - There is a effort underway to start a South Florida Chapter.

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March 11, 2009



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Why this Topic?

- Because casing mounted data is not enough to understand many problems with sleeve bearing machines.
- The machinery you have most likely does not have prox probes.
- Your sleeve bearing problem may, or may not be, vibration.
- Not everyone has experience using prox probes.

Why add Prox Probes?

- Prox probes offer a unique view of the machinery dynamics with no equal and can be installed quickly, temporarily and at a low cost.
- More machines need prox probe systems than have them, and it is increasingly difficult to justify the capital funds to install a complete prox probe system.
- Many machine problems can be more easily and quickly understood if you have prox probe data.
- Caution - You must accept some compromises like: Glitch from probe target area condition issues, longevity of the installation (they may fall off), non-compliance with accepted conventions or standards (one channel instead of a pair of channels) and less than optimum analytical value.

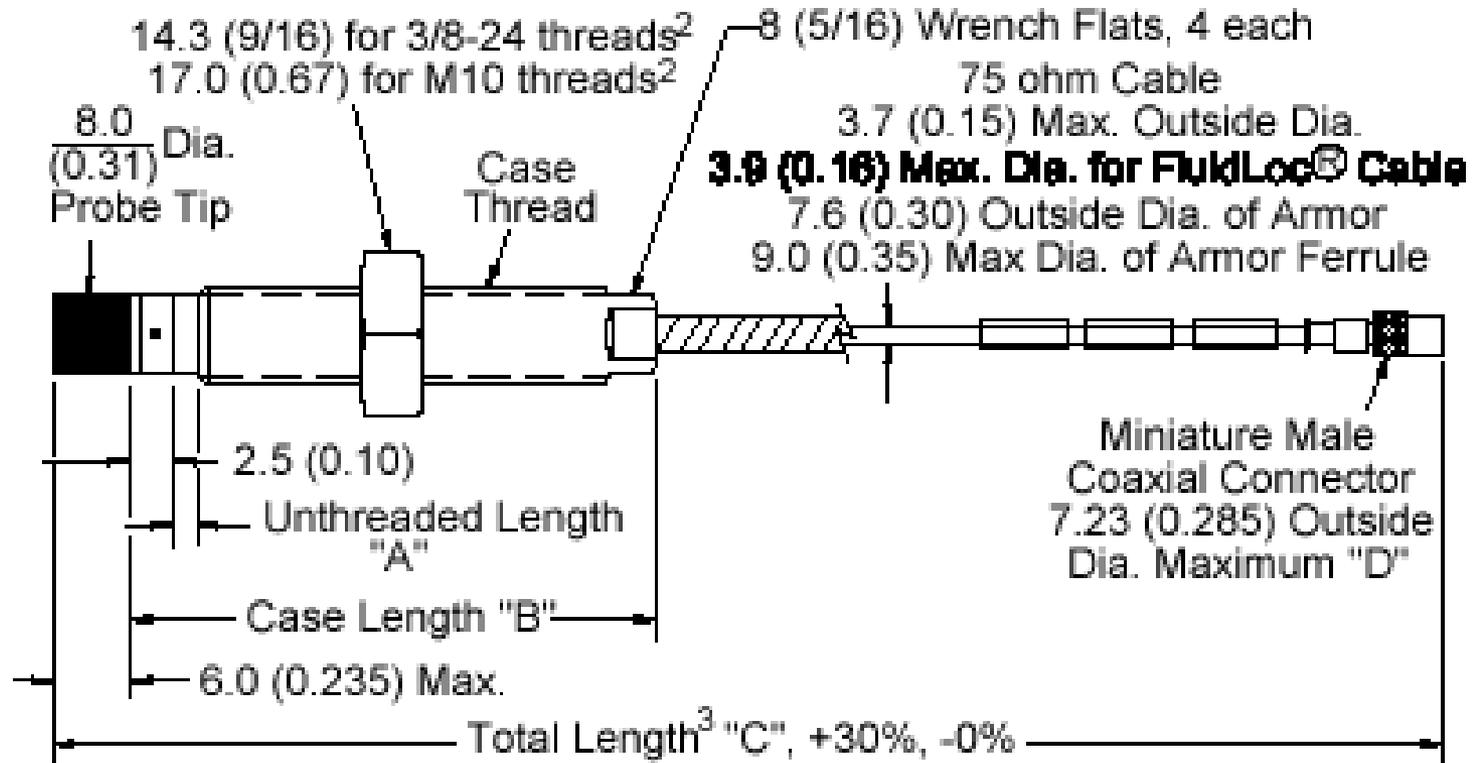
The Prox Probe (Eddy Current Probe)

- Don Bently invented the use of eddy current probes on rotating machinery in his garage back in 1956.
- An excerpt for his online obituary: Don (Bently) possessed a titanic intellect and an astute business mind. His small business, Bently Scientific Company, began operating out of his garage in Berkeley, California, in 1956, and from these humble beginnings he would create a new global industry as well as an entirely new field of engineering.

THE PROBE SYSTEM

- Channel Parts Needed
 - PROBE
 - CABLE
 - DRIVER
- - 24 VDC Power Supply

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Proximeter Probe Operation

- A Proximeter Probe is an electronic micrometer.
- The channel includes the Probe, an Extension Cable and a Proximeter (Driver).
- The typical probe is calibration at 200 mv/mil for 4140 steel (see chart).
- It operates at 400khz (sample rate).
- Measures the shaft movement inside the bearing.
- Measures the shaft position inside the bearing
- Care must be take to keep these parts matched (impedance).

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- Prox Probes come in several sizes.
- The typical size is 8 mm having a liner range of 50 mils.
- 25 mm probes have a useful range of ½ inch
- They are great for fast transient events or very slow changes
- Imagine what you can measure.

Types of data we get

- Motion of shafts
- Position of shafts
- Speed of shafts
- Phase of vibration, 1X, 2X and NX
- Positions and movement of structures

Common Applications

- Large Turbo Machinery
 - The most expensive equipment - but not much more.
- High Speed Machinery
- Sleeve Bearing Machinery

Most Frequently used Standard

- API-670 - Machinery Protection Systems (1976)
- Started as API 617 back in 1970

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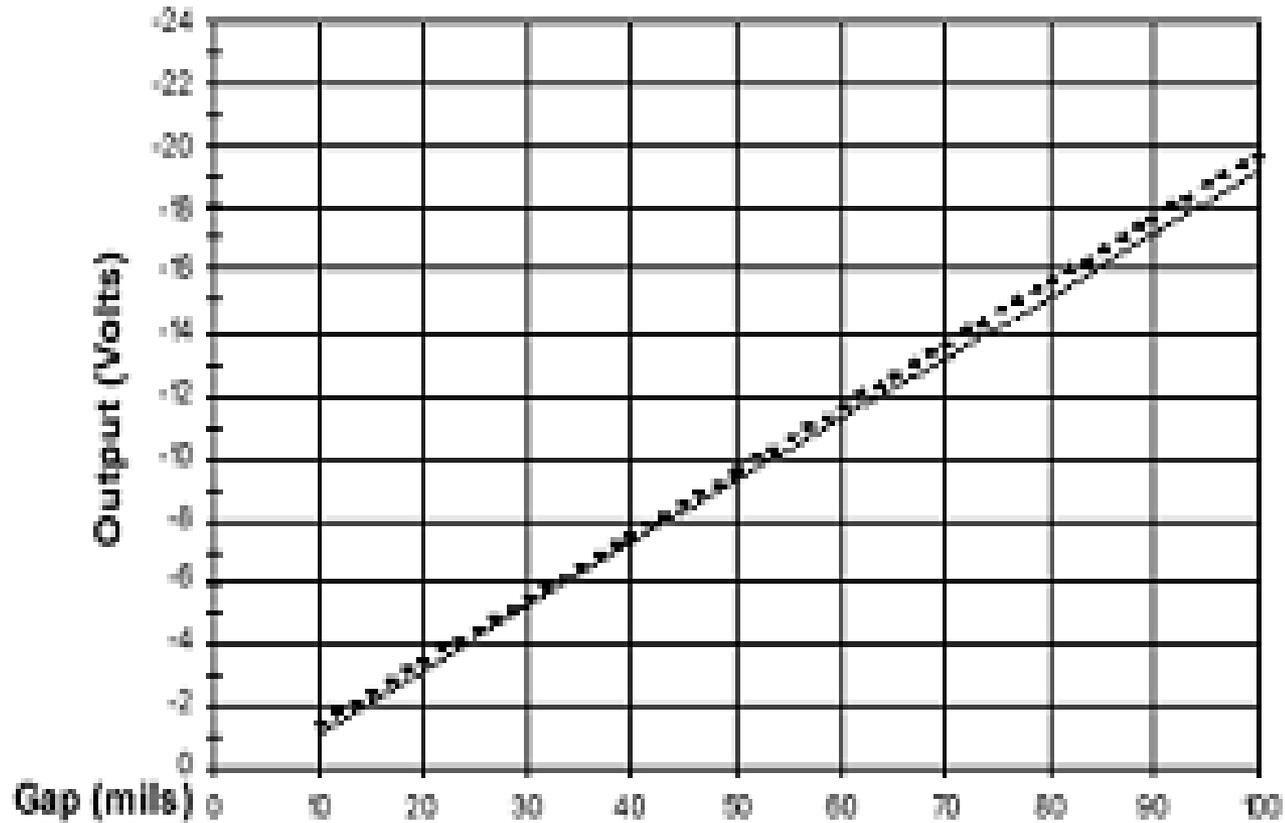
Machinery Protection Systems

API STANDARD 670
FOURTH EDITION, DECEMBER 2000



**Helping You
Get The Job
Done Right.™**

Typical Calibration curve

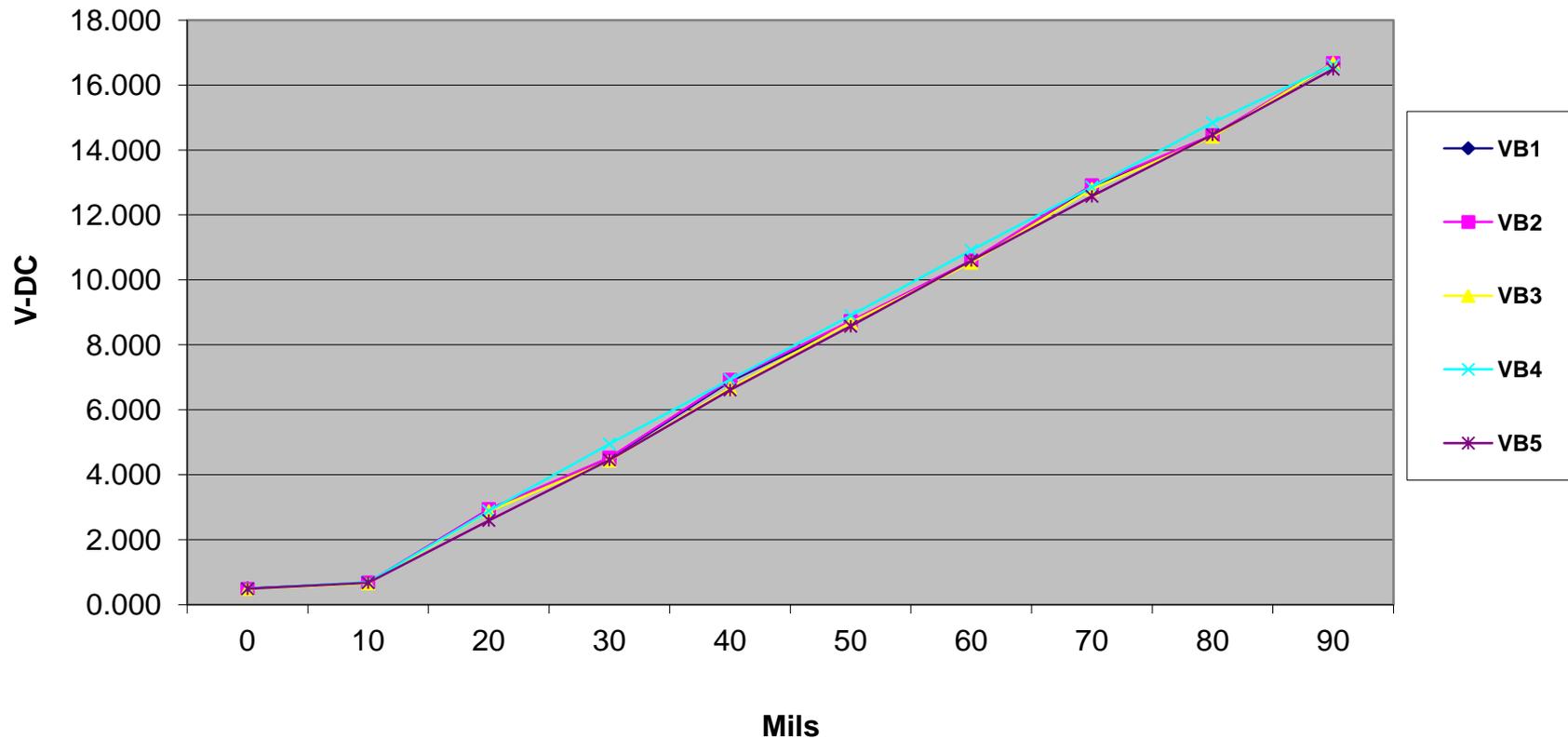


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3300 SYSTEM LINERITY CHECK - 4/15/08										
mils	0	10	20	30	40	50	60	70	80	90
VB1	0.497	0.673	2.931	4.488	6.873	8.676	10.580	12.845	14.411	16.658
VB2	0.479	0.679	2.938	4.524	6.922	8.731	10.597	12.912	14.457	16.678
VB3	0.476	0.652	2.875	4.431	6.666	8.688	10.530	12.797	14.408	16.672
VB4	0.488	0.690	2.881	4.946	6.932	8.902	10.909	12.858	14.838	16.613
VB5	0.486	0.673	2.592	4.454	6.609	8.571	10.595	12.574	14.468	16.487

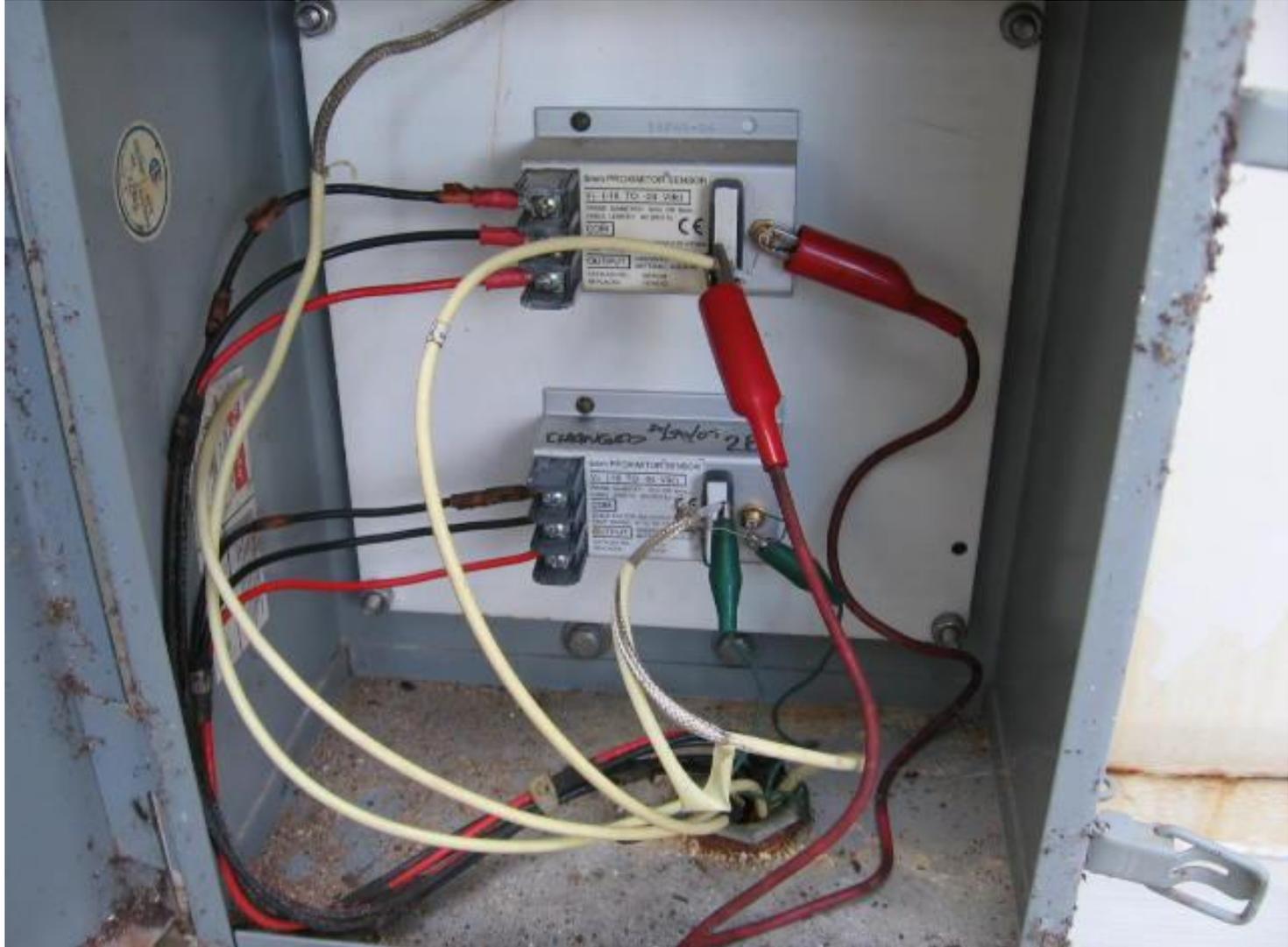
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3300 Probe Test 4/15/08



- Typical errors/traps
 - Non Matching parts cause scaling errors
 - Probes not installed deep enough thus they are measuring the wall of the hole and not the shaft. Resulting in no data.
 - Failure to maintain the installed system (See Next Slide)

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Limitations of temporary systems

- Glitch
- Keys and Key slots
- Electrical Interference
- Shaft Shoulders

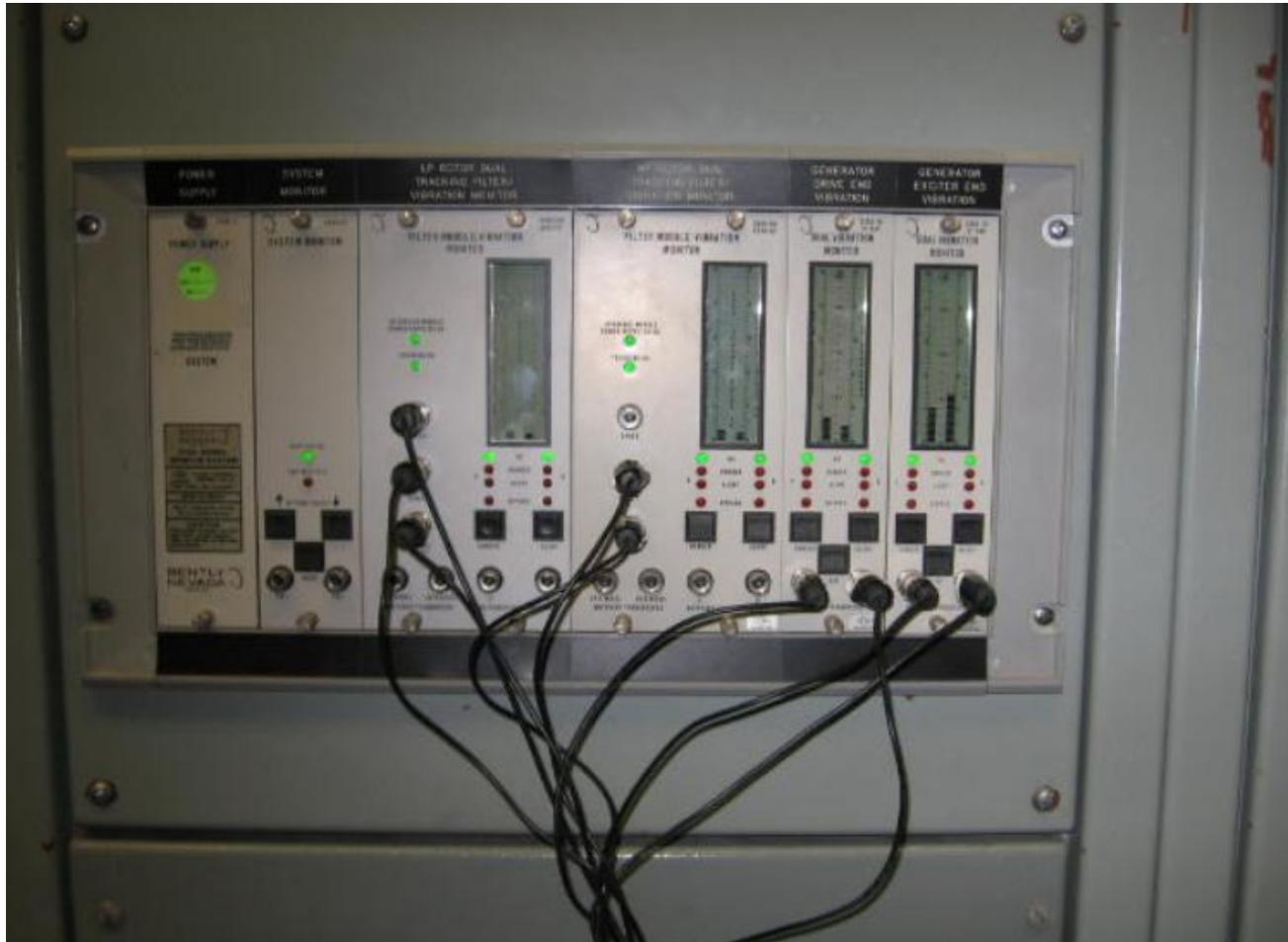
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- An Example of a Normal Application

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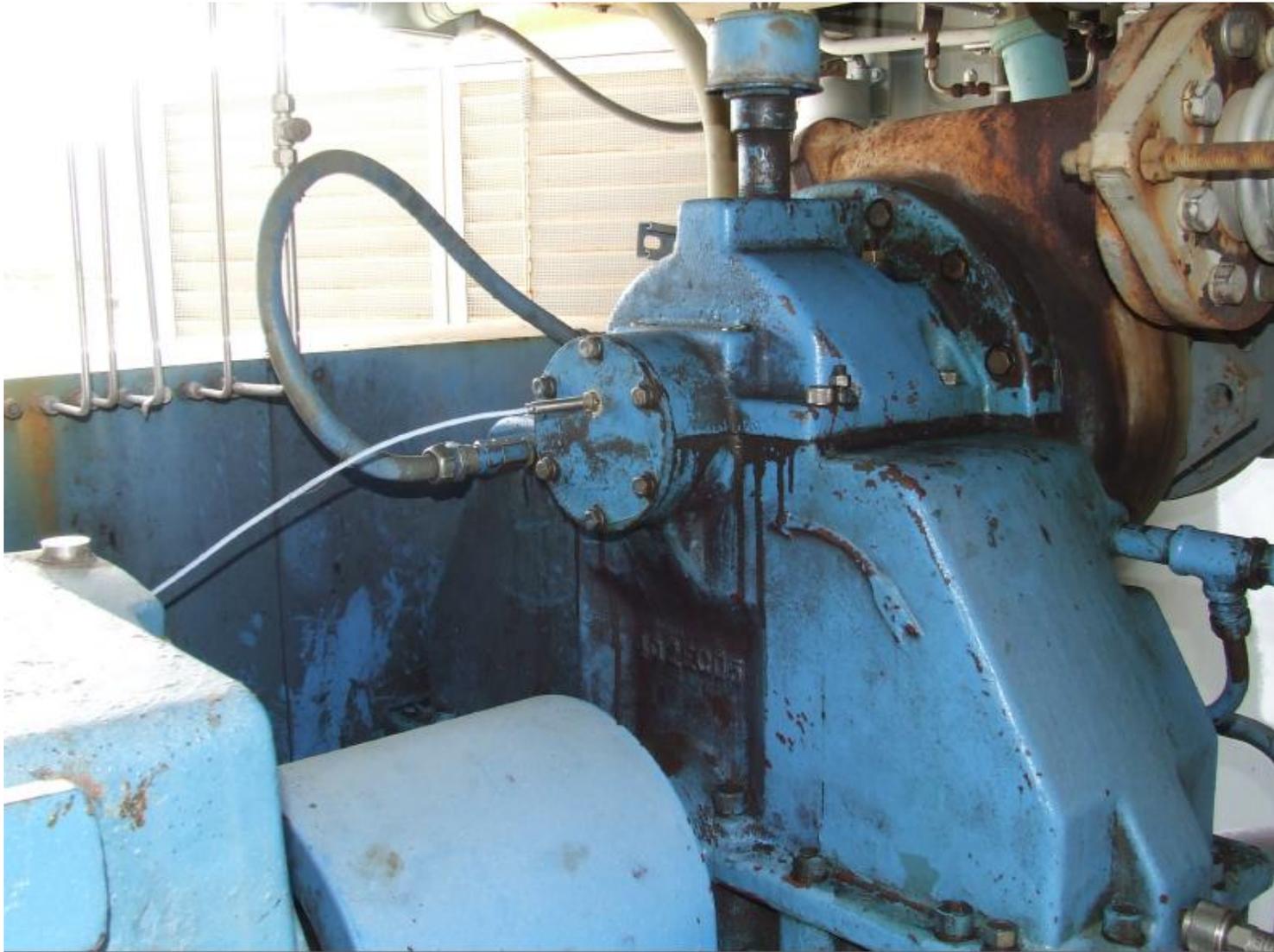
Uncommon Applications

- “Replacing” some existing probes that have a problem
- Thermal Growth Measurements
- Balance Stands
- Anything else

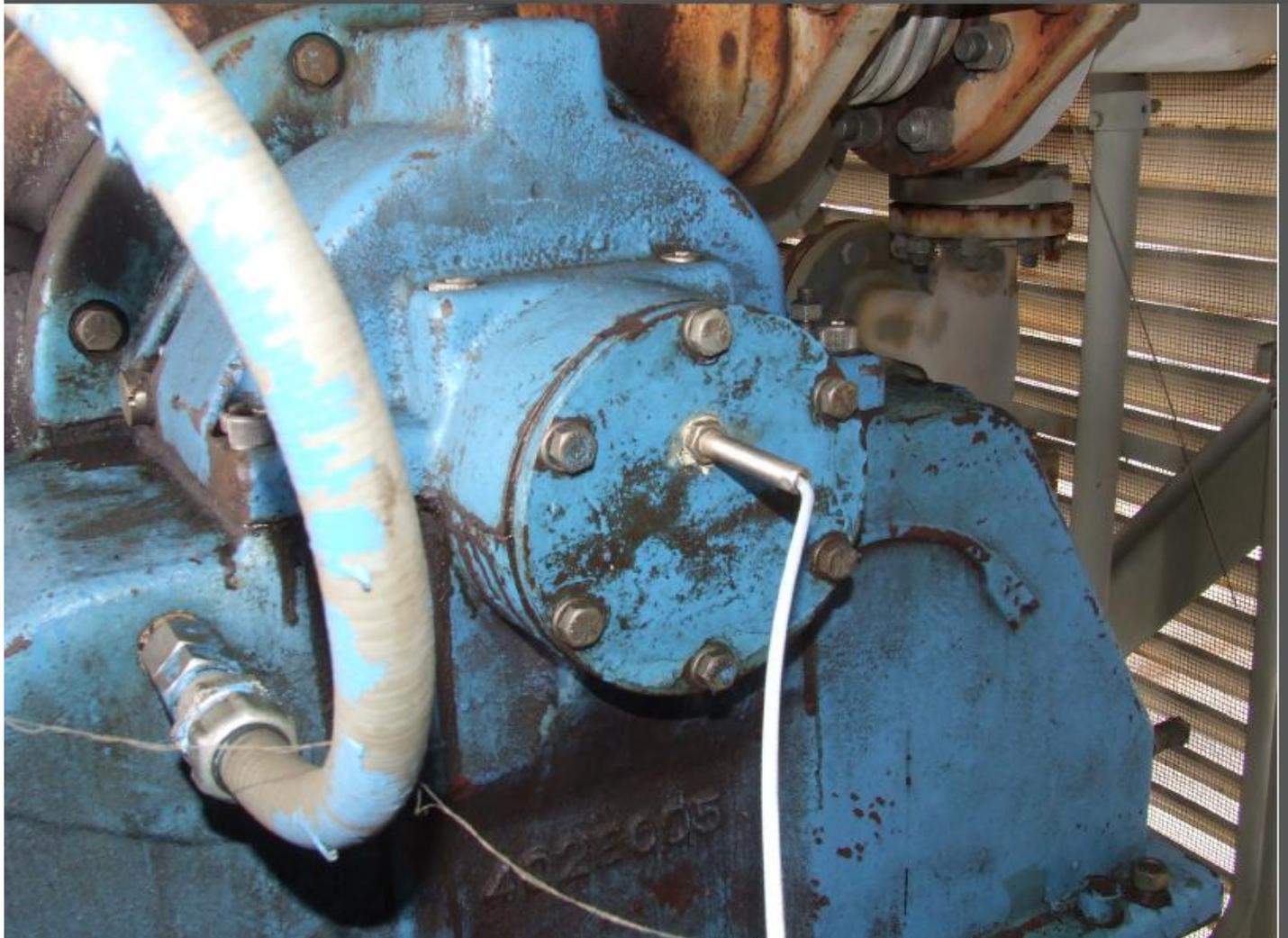
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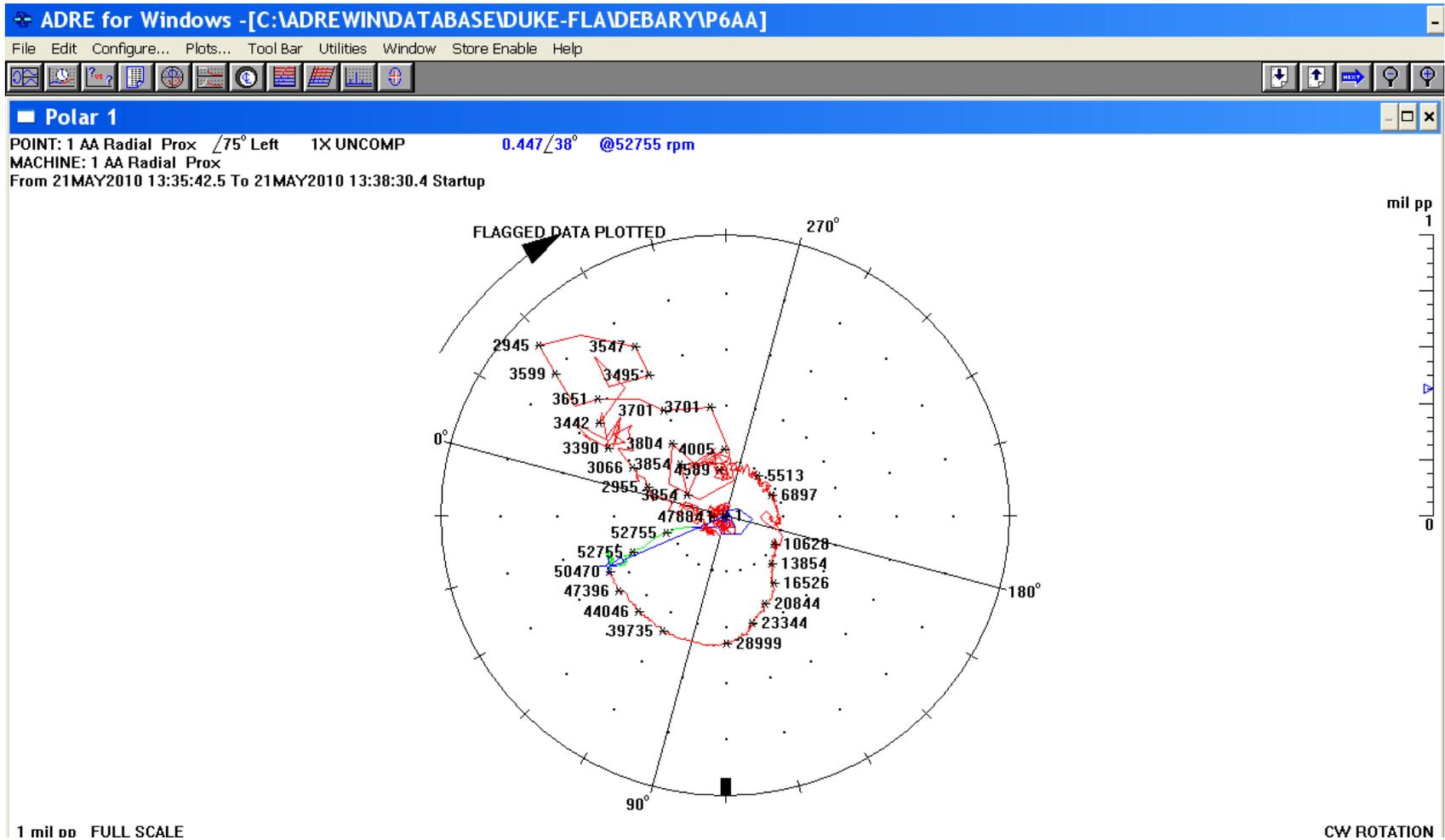
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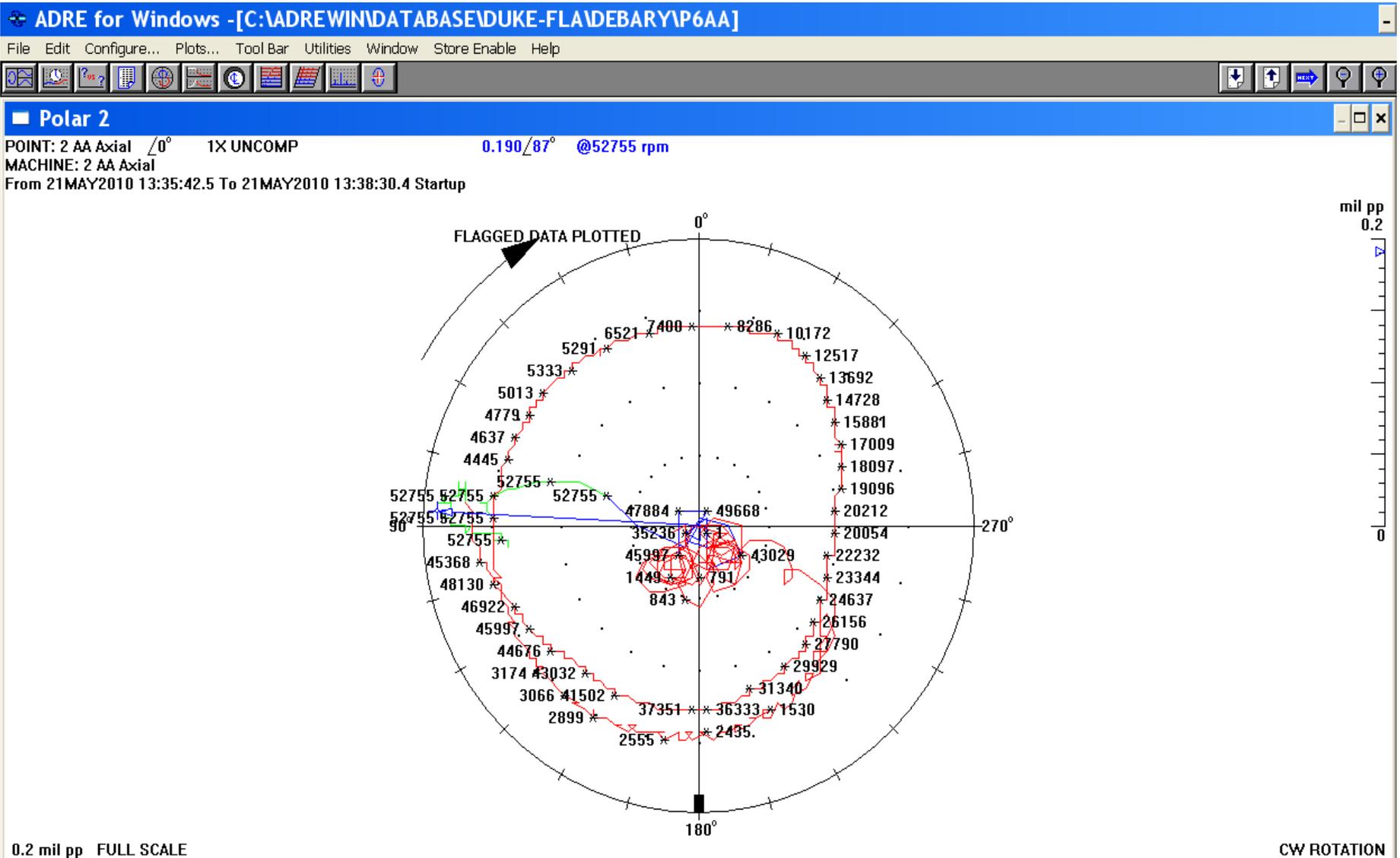


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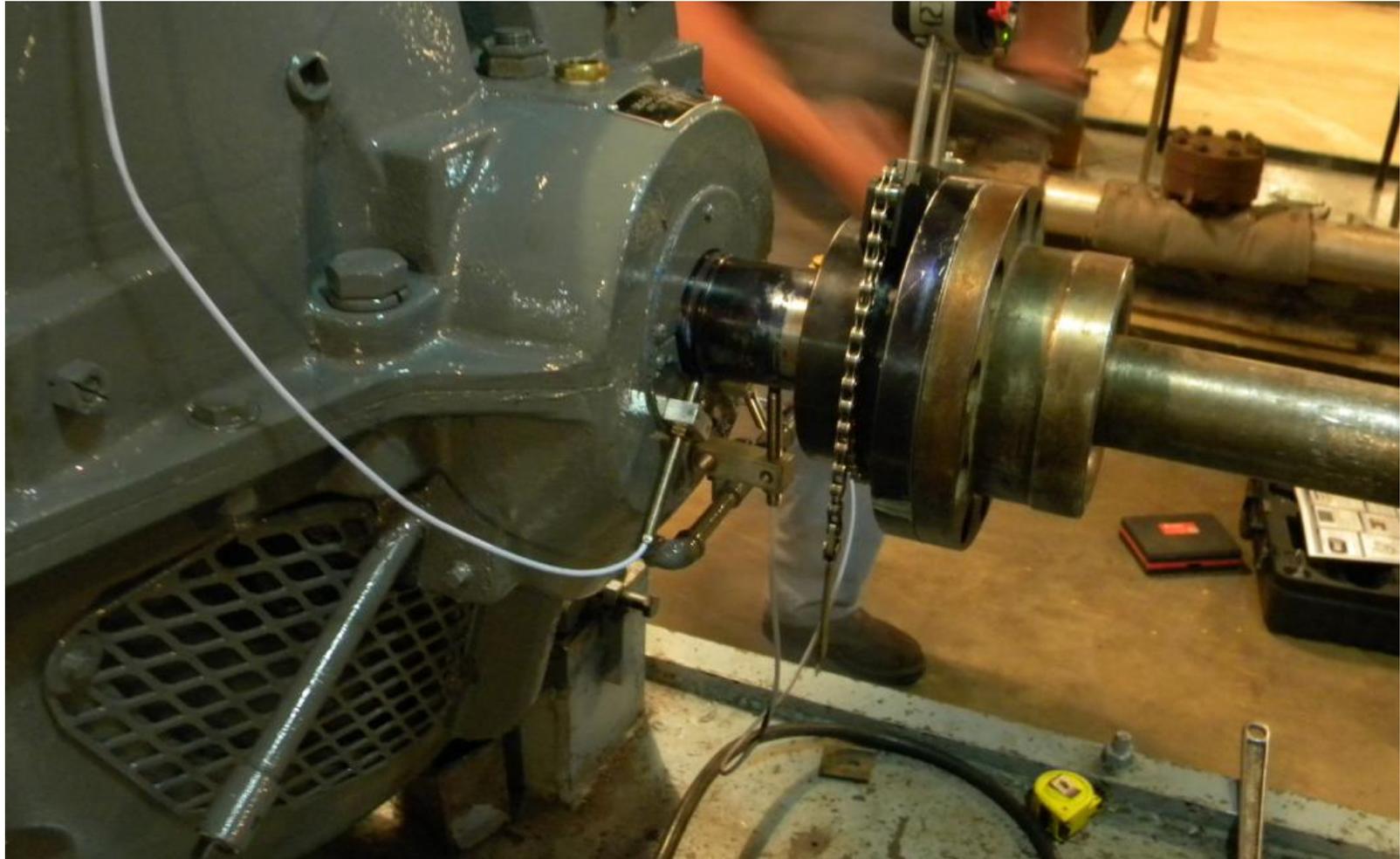


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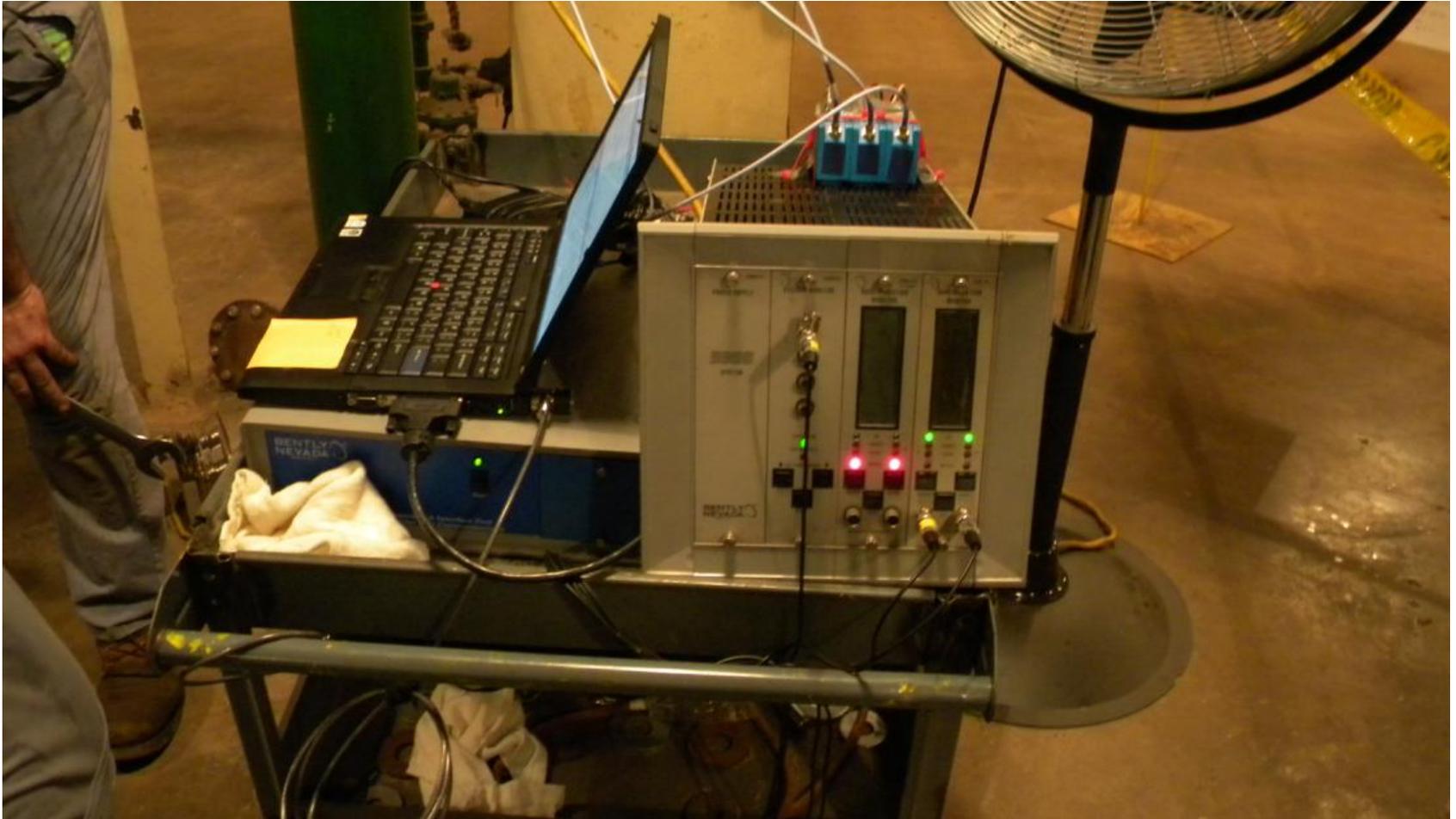
Axial Prox Probe Data



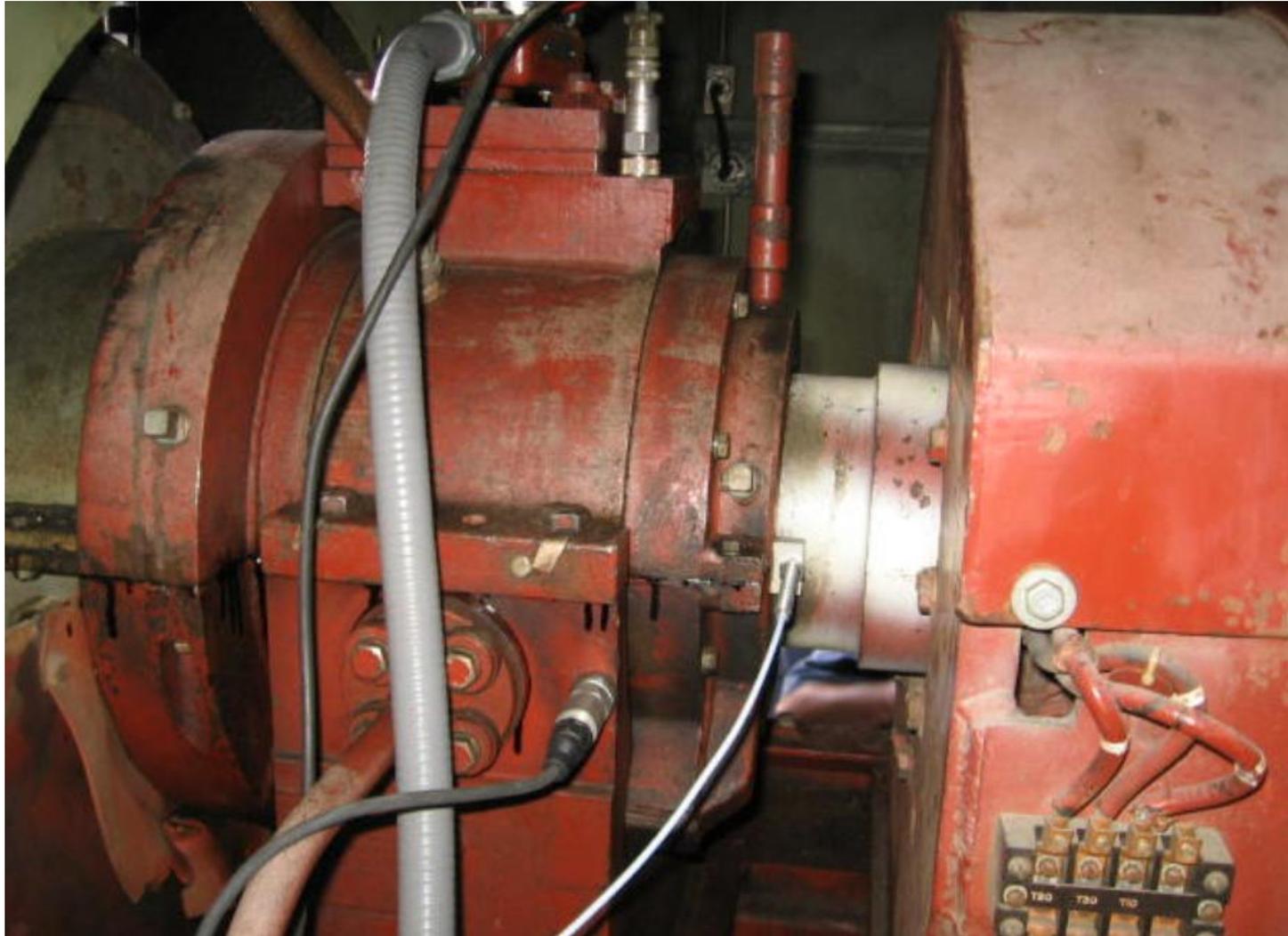
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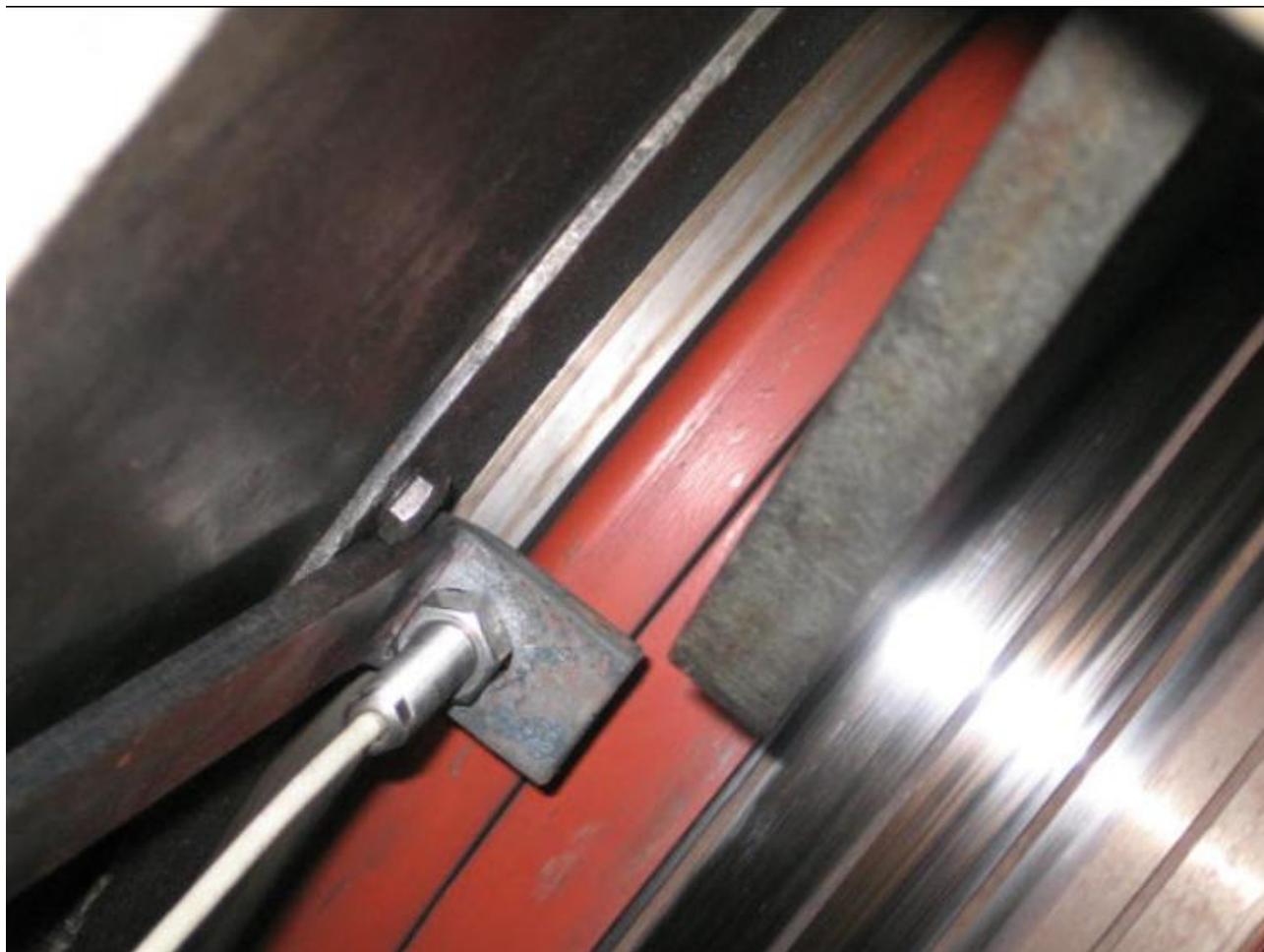
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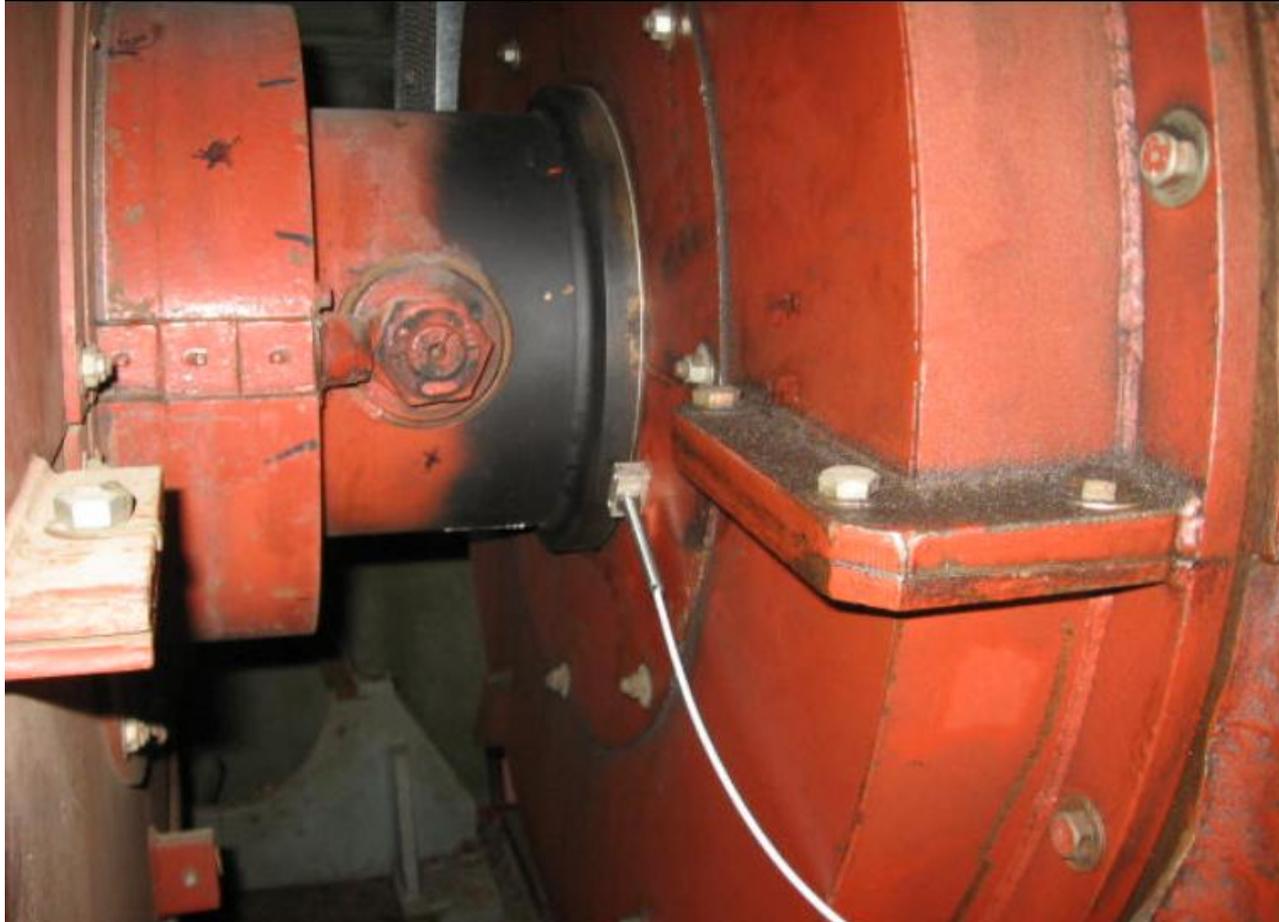
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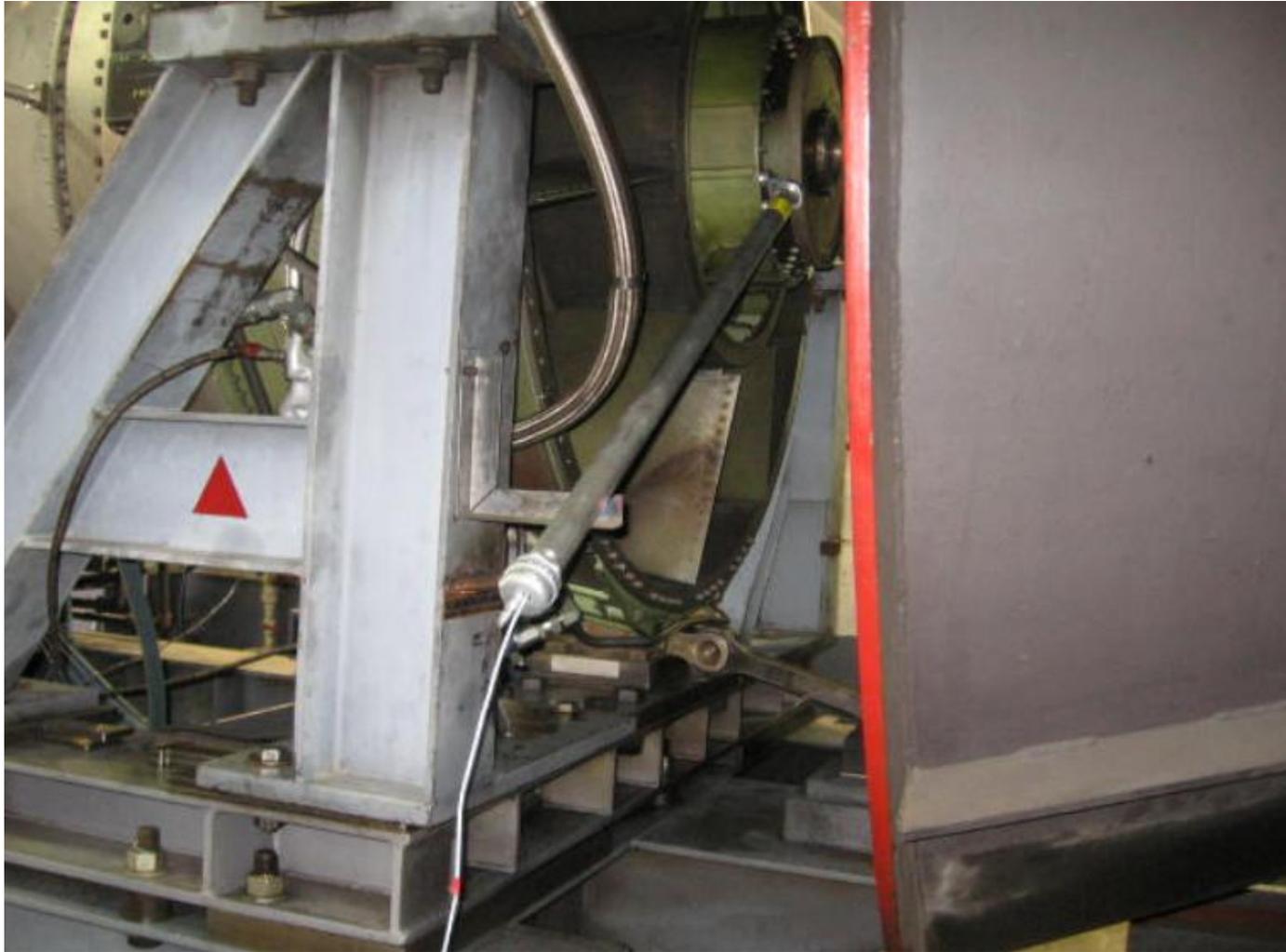
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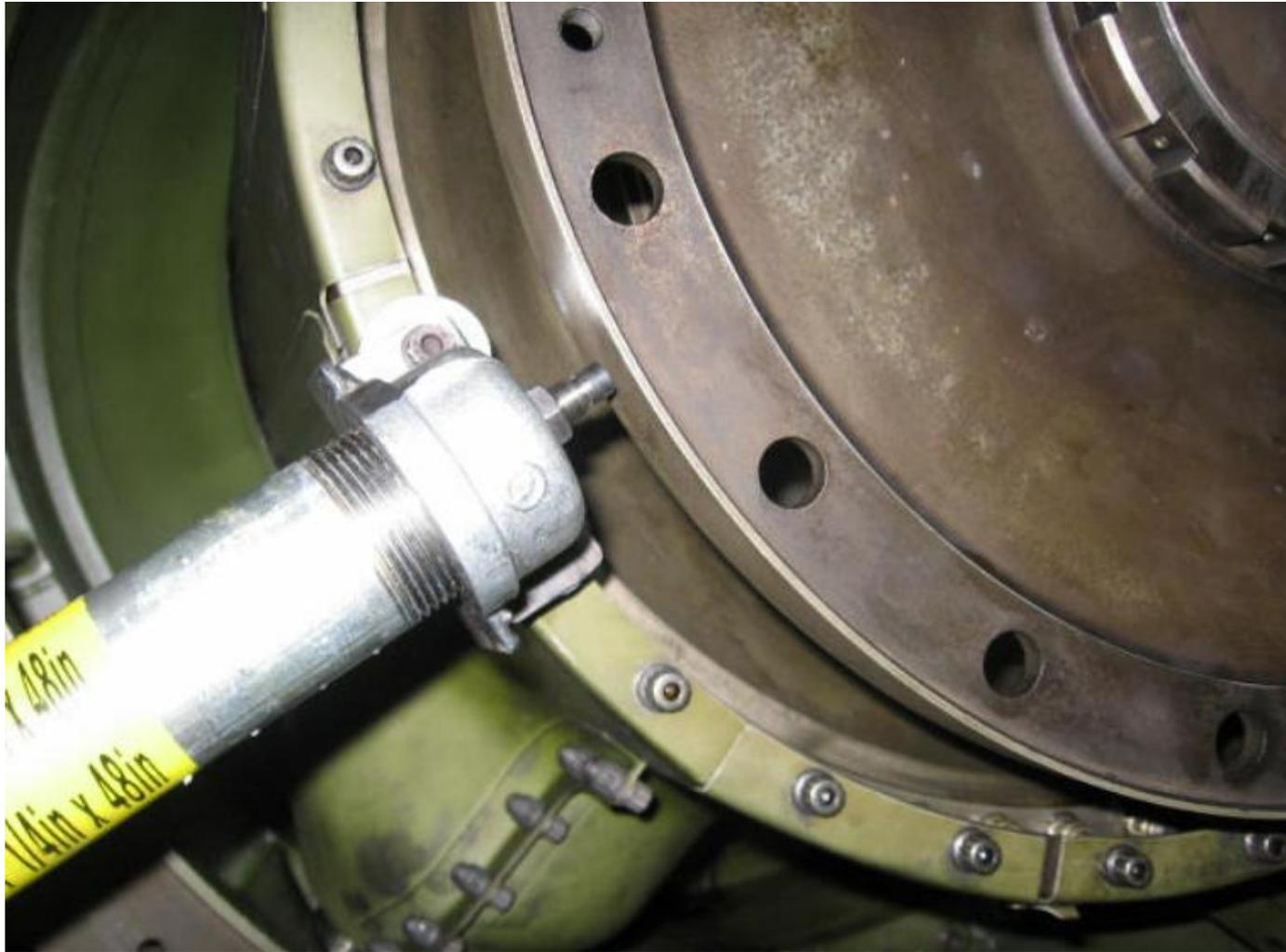
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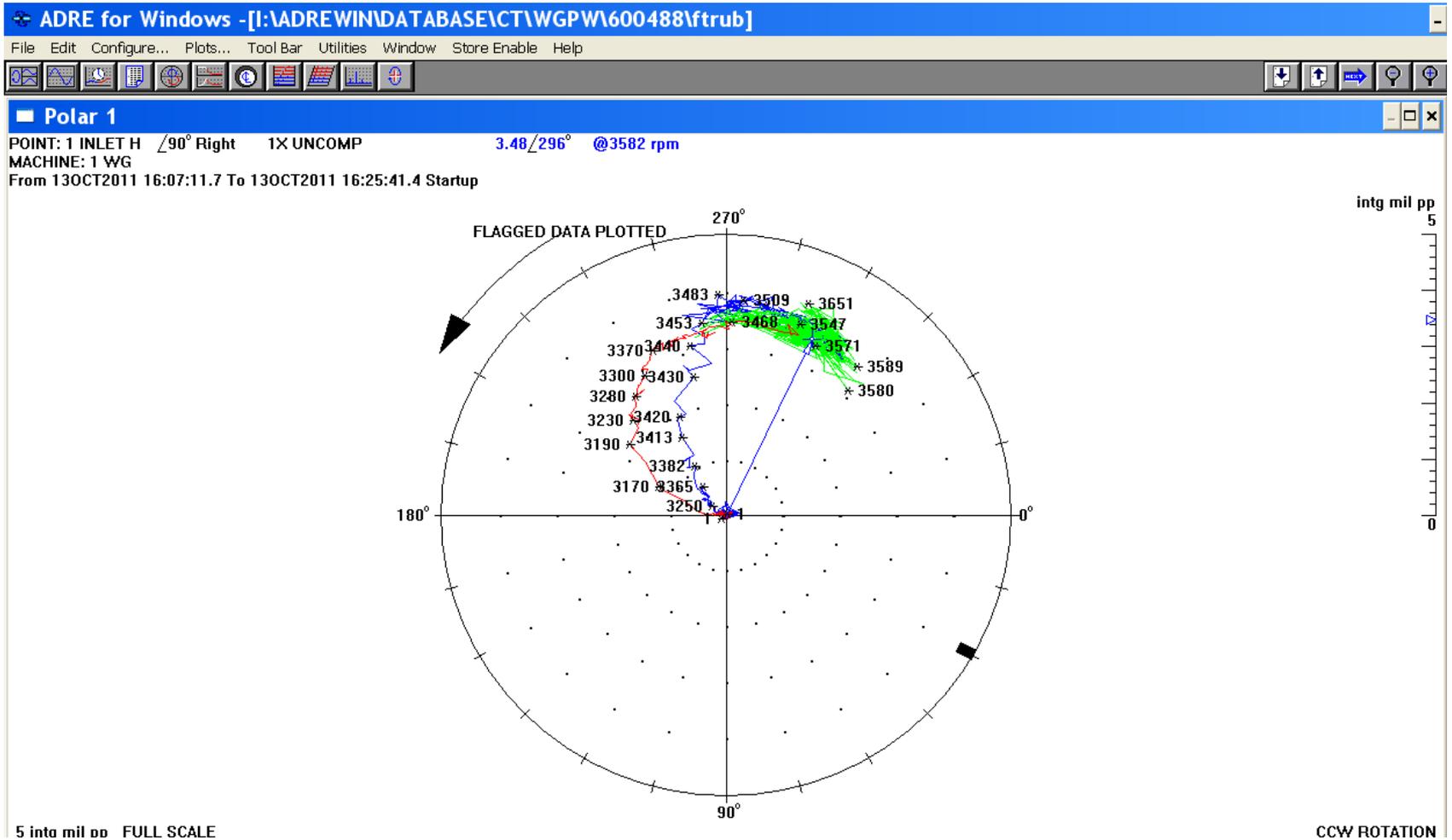
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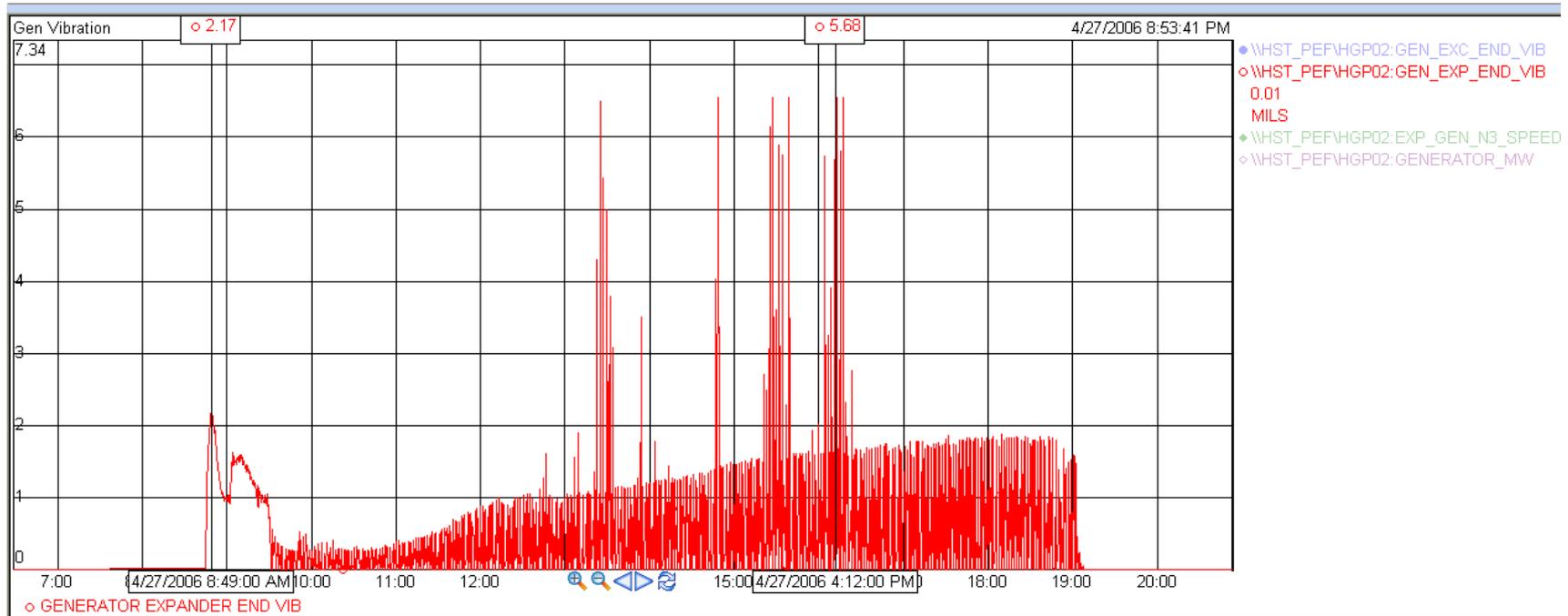
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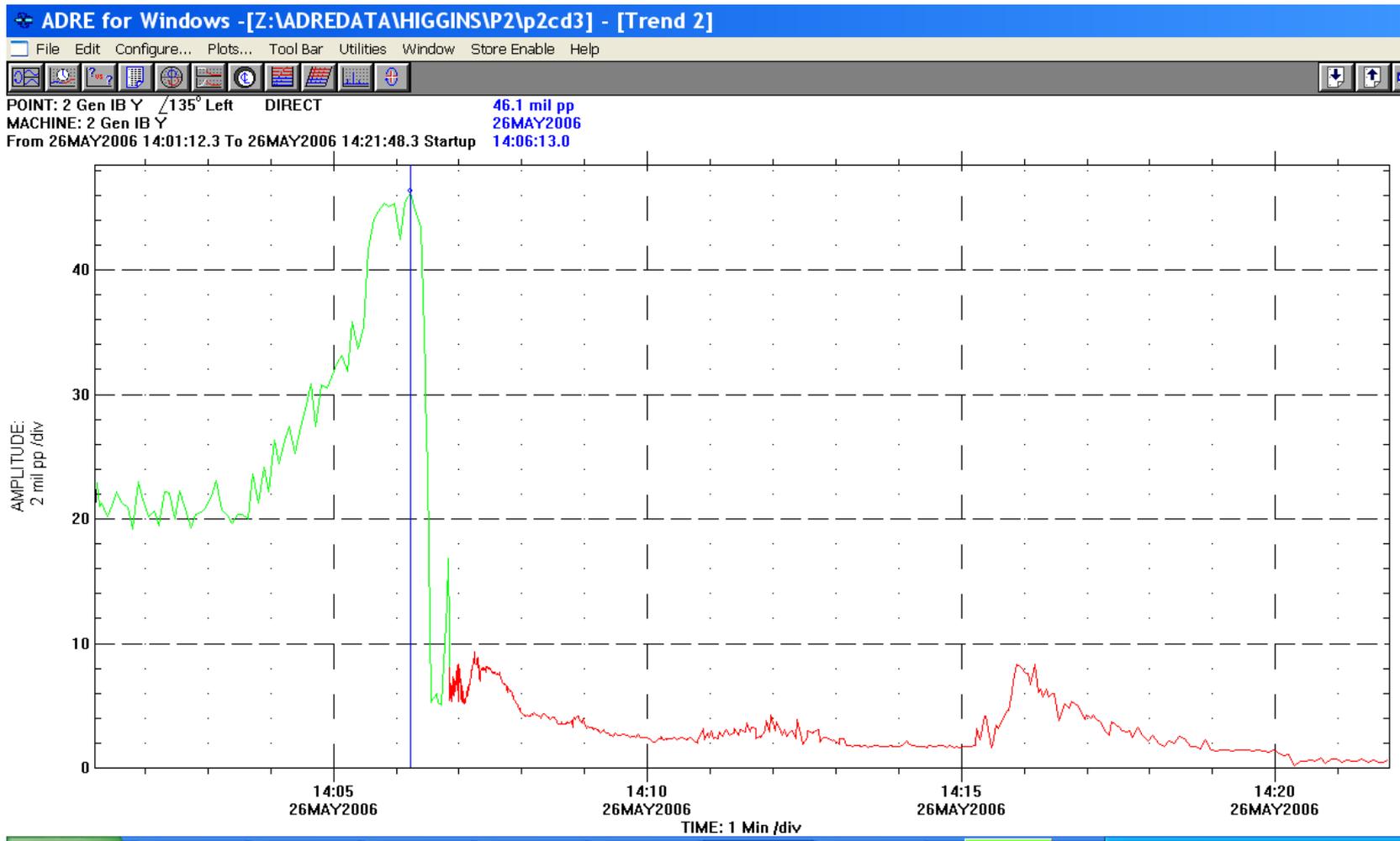
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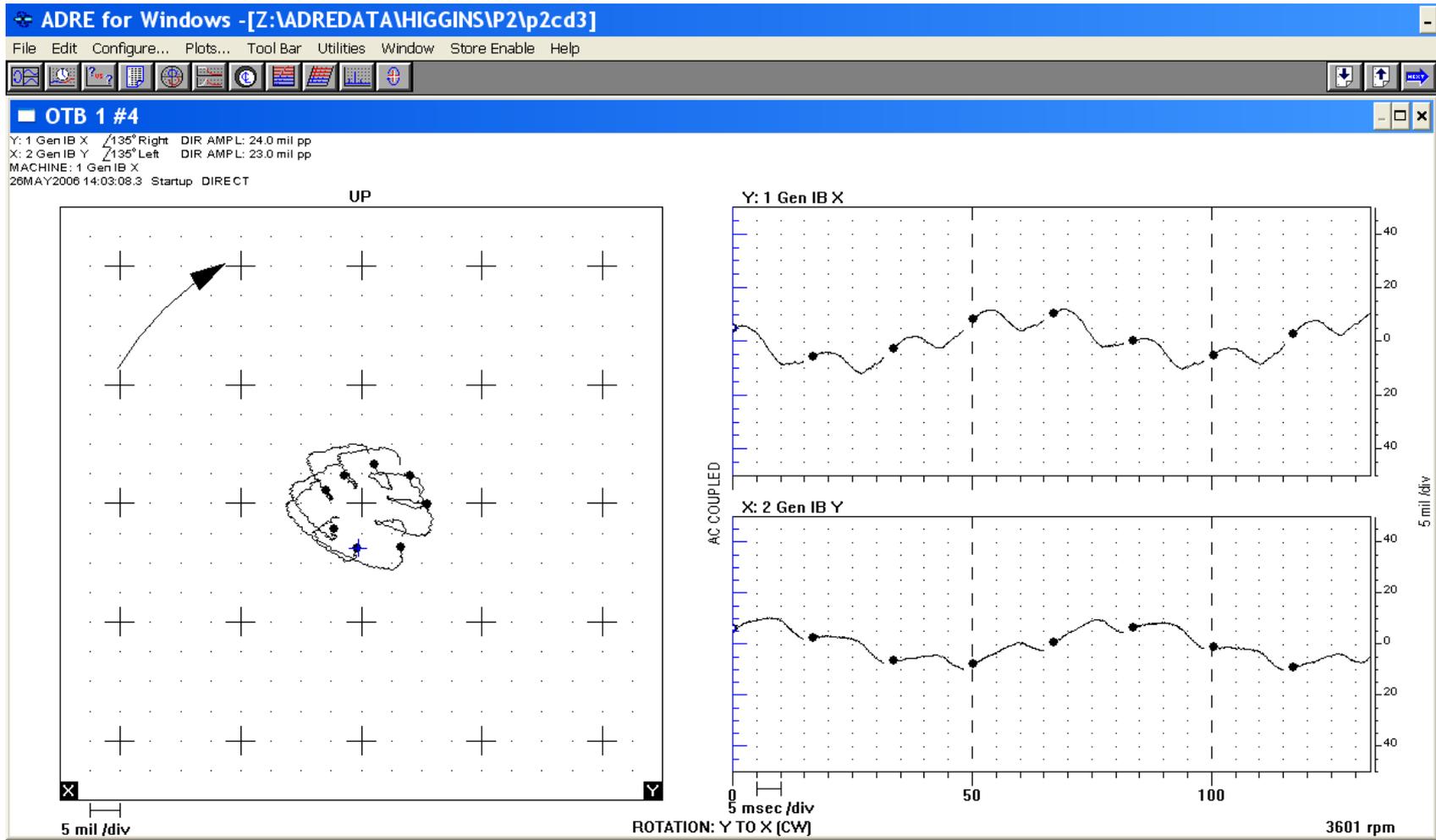
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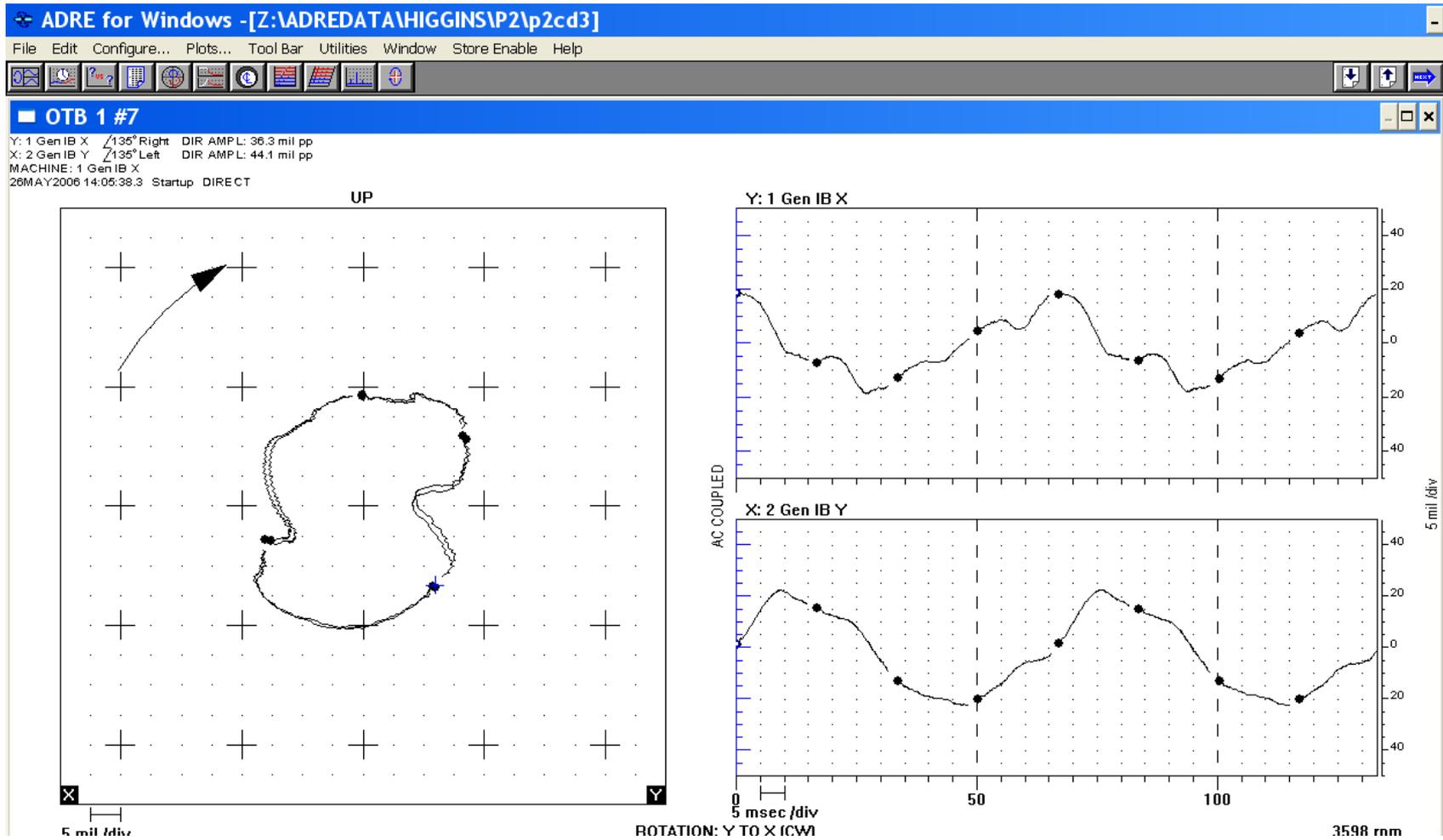
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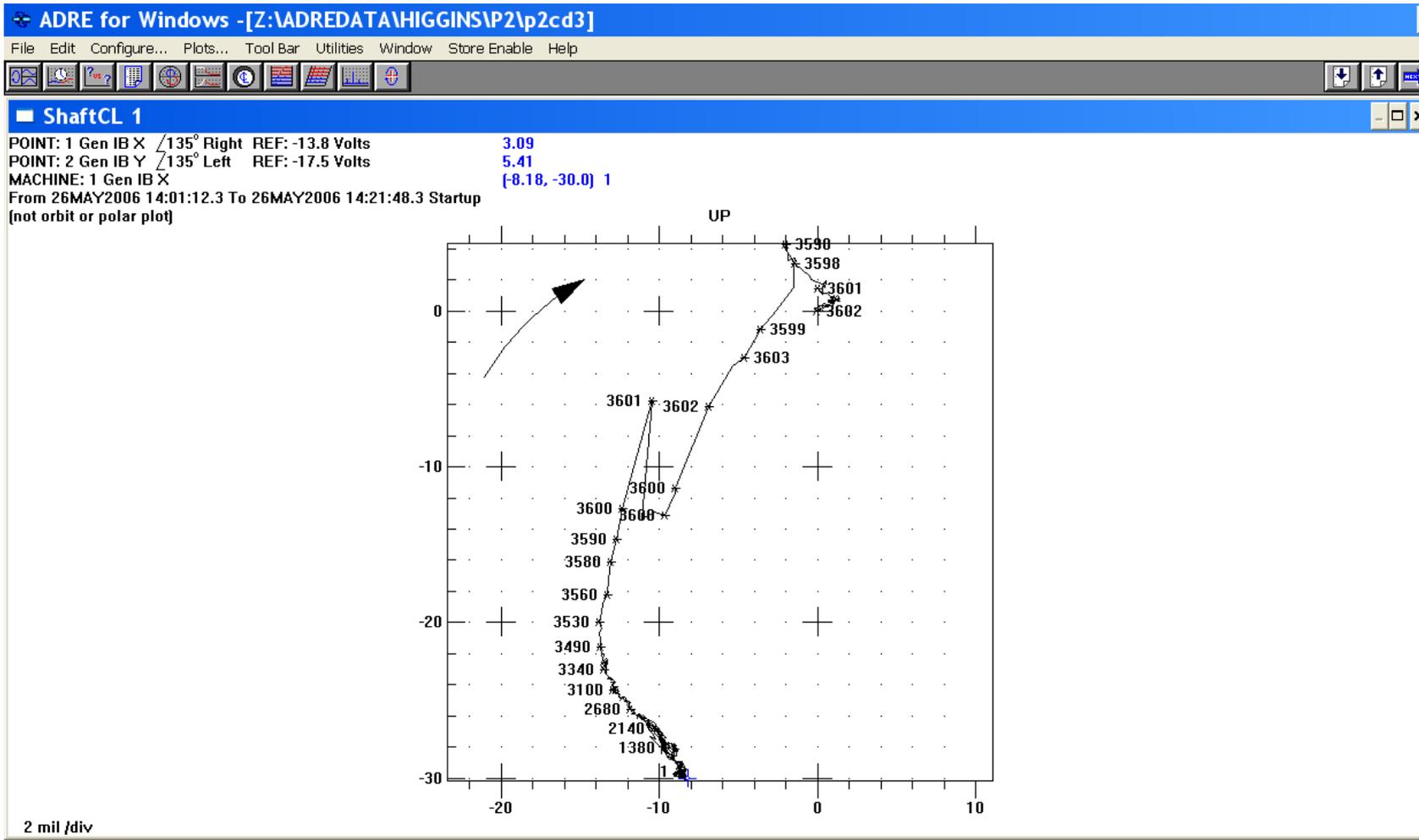
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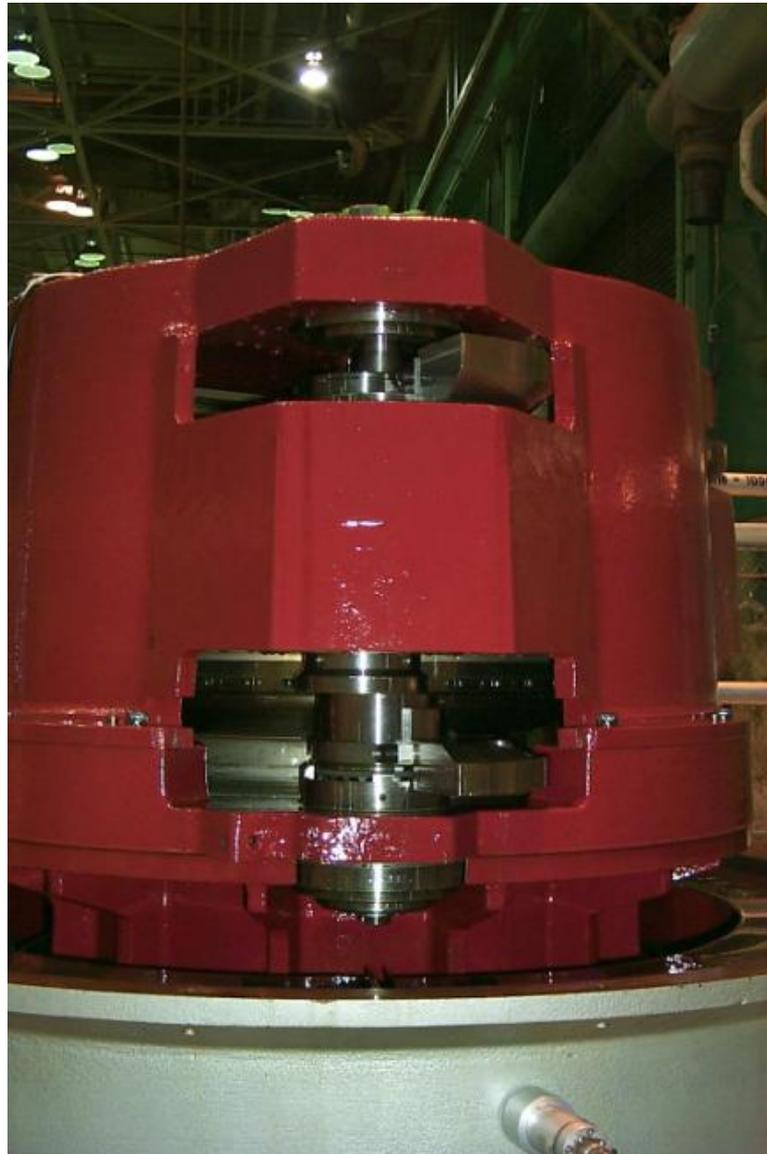
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- QUESTIONS?