NEW APPROACHES AND INNOVATIONS TO IMPROVE EFFECTIVE USE OF VACUUM ASSETS IN CLEANROOM AND SUBFAB

Edwards Vacuum

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Why Apply AI And Smart Manufacturing To Vacuum Assets?



Smart Manufacturing is key to Operational Excellence

Many critical steps in semi manufacturing need high vacuum or very controlled ambient conditions

- ✓ Key process parameter and always on
- Vacuum eco-system consists of a large number of pumps and associated equipment.
- Interconnected Affecting each other and the process



Different Failure Modes Require Different Predictive Approaches





The Benefits Of Predicting Failure – Total Cost of Ownership (TCoO)









Building a Predictive Model Isn't Enough





• Acquires data from a huge number of

systems

- Able to manage increasing volumes of data
- Predictive Model Agnostic
- Cloud-based to improve scalability



Augmenting Artificial Intelligence With Real Intelligence

- Some things that are trivially easy for humans are very difficult for AI
- Al will find recurring patterns, without understanding context





Muffin or Chiwawa

We don't just manufacture vacuum pumps, we understand them



Creating the mode<u>l</u>



Chemical Vapor Deposition Process

Very controlled deposition in the process chamber

Much less controlled deposition downstream of the chamber and in the vacuum pumps

Methods successfully deployed on other processes unable to predict unscheduled pump downs on the TEOS process





Finding The Needle In The TEOS Process Haystack – The Solution





Model Hit Rate Went 20% -> 100%



Running(the model

Metal Etch Dry Pump - Competing Operational and Fault Mechanisms

Etch Process

- Process gasses will tend to **etch material** from internal pump mechanisms
- Etching can **increase** internal clearances and affect relevant parameters



Blue: Advisory Yellow: Warning



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Conclusions

Applying Smart Manufacturing is key to Operational Excellence and the reduction of risk and uncertainty





Questions?





Scan to read more about how Predictive maintenance saves you more from downtime lost

https://hubs.ly/Q02Vgs9M0





Scan to know more about Edwards advanced service plans

https://hubs.ly/Q02Shz4l0

Or request a consultation <u>here</u> now!





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