

# PACMAN

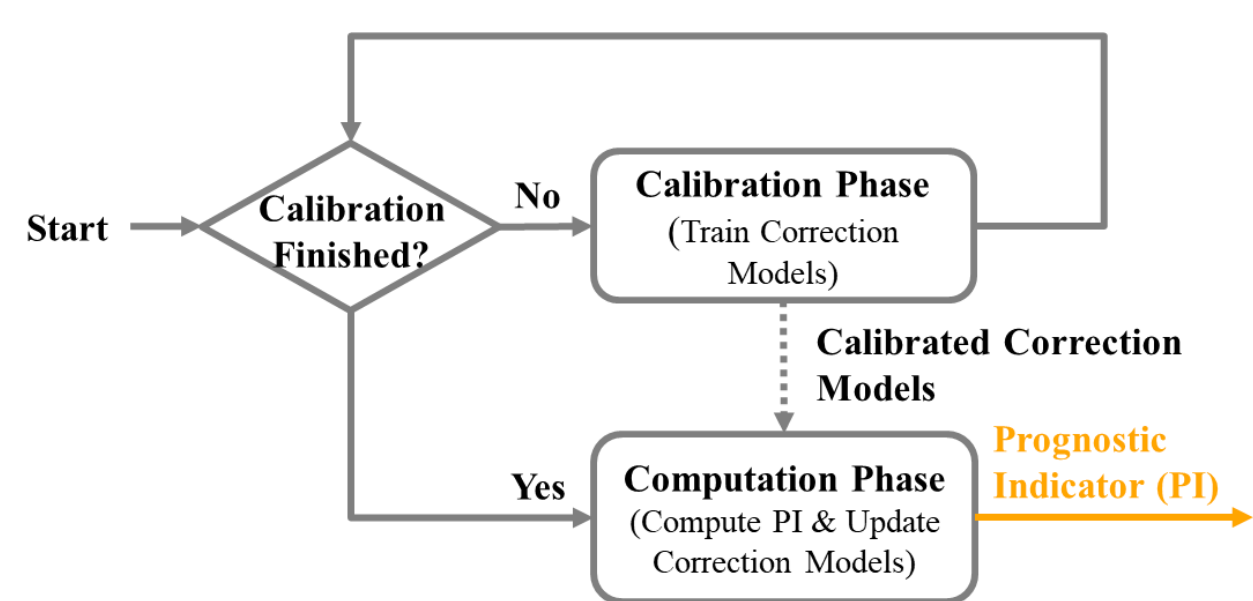
## Prognostics And Computer Aided Maintenance

### Prognostics for Auxiliary Power Unit

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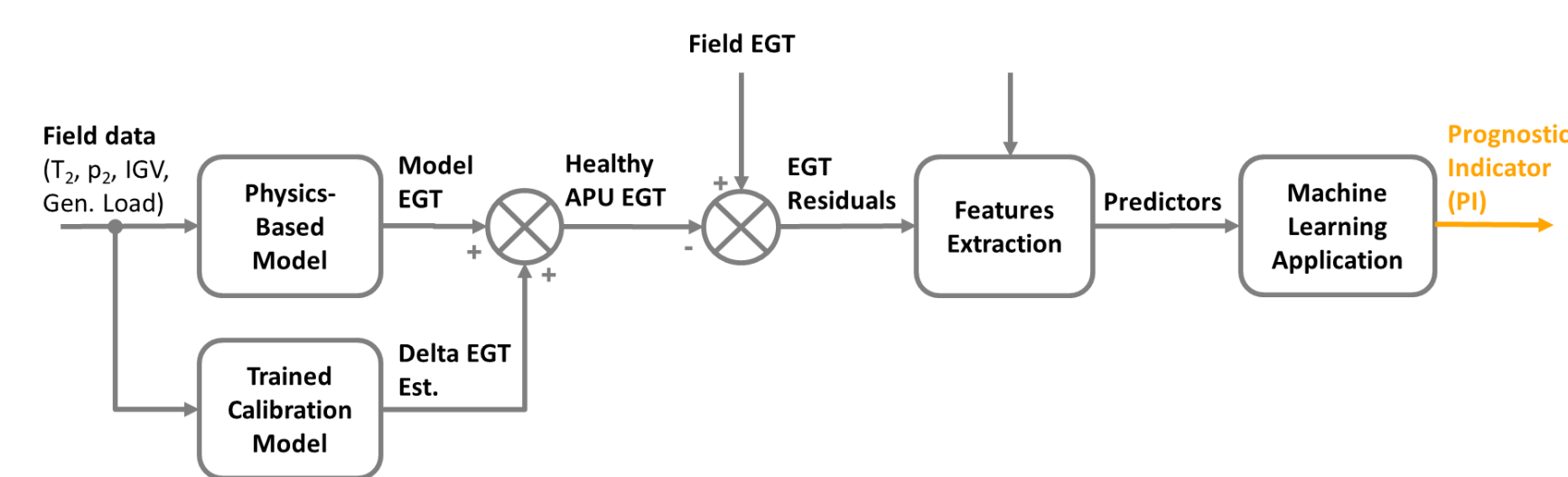
#### Key Idea

Utilize an APU physics-based performance model in combination with APU and domain knowledge from APU repair and overhaul.



#### Computation Phase

Use the calibrated correction models to compute healthy APU outputs → EGT Residuals track the APU degradation → Machine learning deployed to provide the Prognostic Indicator in accordance with defined requirements

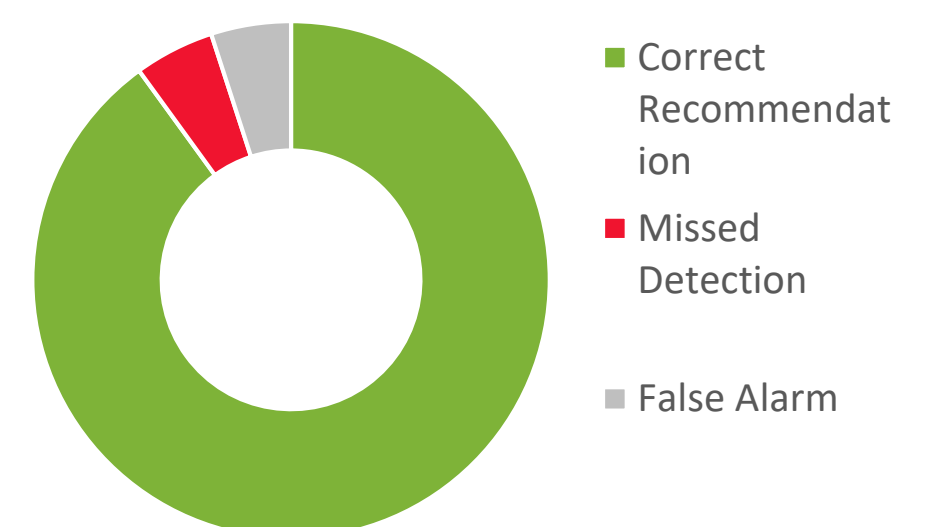


#### Performance Evaluation

The set of more than 100 run-to-failure APU life cycles capturing various operators with various operating conditions available for development

Performance with criteria set to:

- Prediction Horizon = 0 OH
- Failure Anticipation Interval = 200 OH

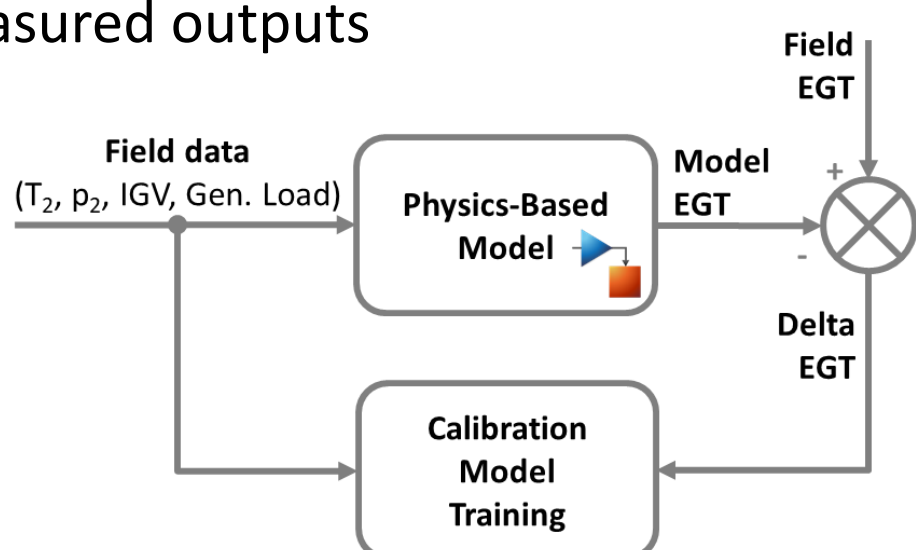


Results of performance evaluation:

- Correct recommendation in the 90% of the tested cases.
- False alarm in 5% of the cases
- Missed detection in 5% of the test cases.

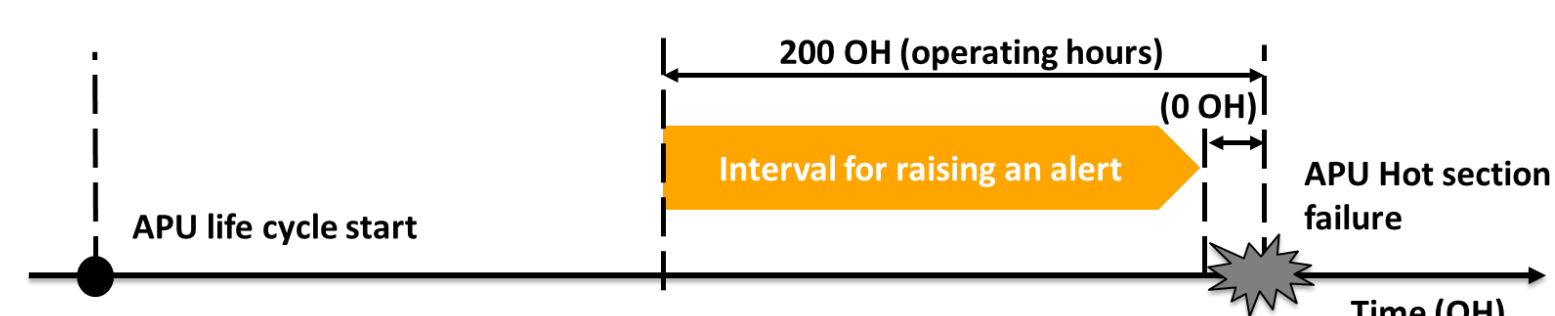
#### Calibration Phase

Train the Calibration Models for eliminating the influences of operation conditions from the measured outputs



#### Requirements for APU prognostics

Accustom the PHM system to a specific maintenance strategy.



##### False alarms region

If an alert is raised sooner than 200 OH before failure, it is considered as false alarm.

##### Correct alert region

(Failure Anticipation Interval)  
If an alert is raised between 200 and 0 OH before failure, it is a correct recommendation.

##### Missed detection region

(Prediction Horizon)  
If an alert is not raised before failure occurs, it is a missed detection case.



This project has received funding from the Clean Sky 2 Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 686782.

