Bukti Korenspondensi Online di "*International Journal of Prognostics and Health Management*"

1. Submission – Receipt of manuscript
2. Decision of the first review
3. Responses to reviewers
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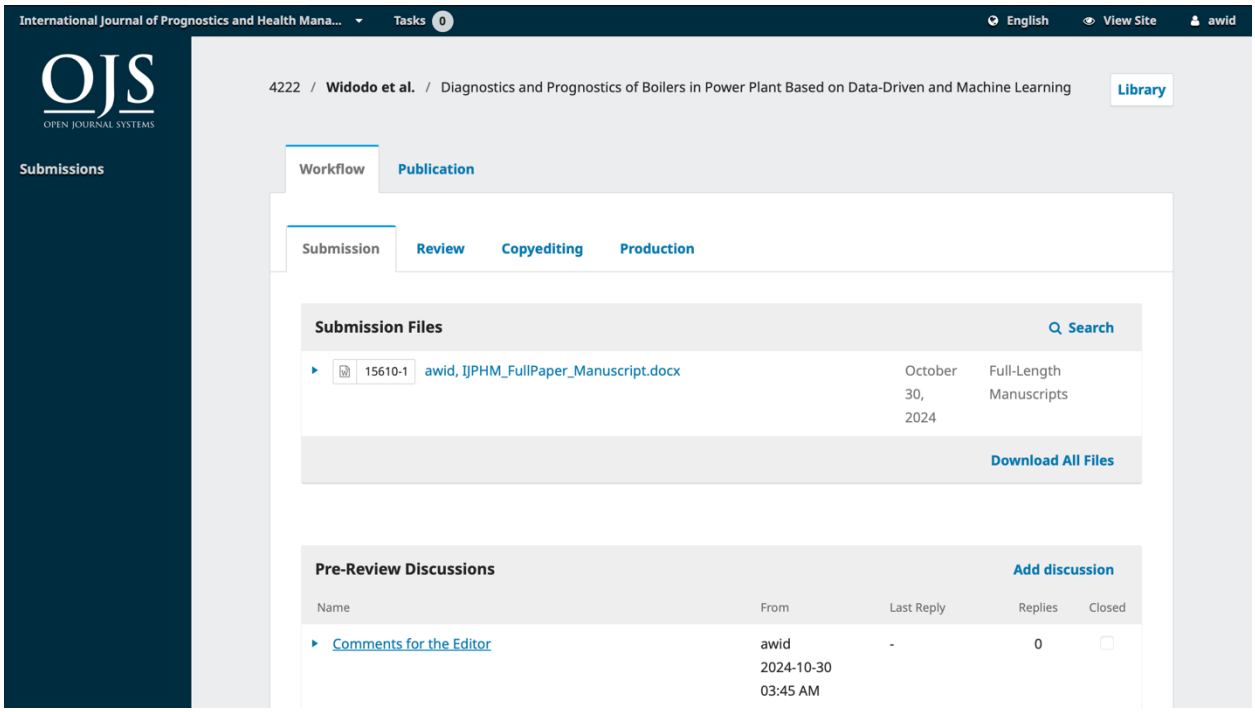
https://papers.phmsociety.org/index.php/ijphm/article/view/4222

https://www.scimagojr.com/journalsearch.php?q=21100283367&tip=sid&clean=0

1. Submission – Receipt of manuscript (30 Oktober 2024)



Outlook

[ijphm] IJPHM Submission Acknowledgement

From IJPHM Editor via PHM Society Paper Submission & Review Portal <no-reply@papers.phmsociety.org>
Date Wed 10/30/2024 11:09 AM
To Achmad Widodo <achmadwidodo@lecturer.undip.ac.id>

Dear Achmad Widodo,

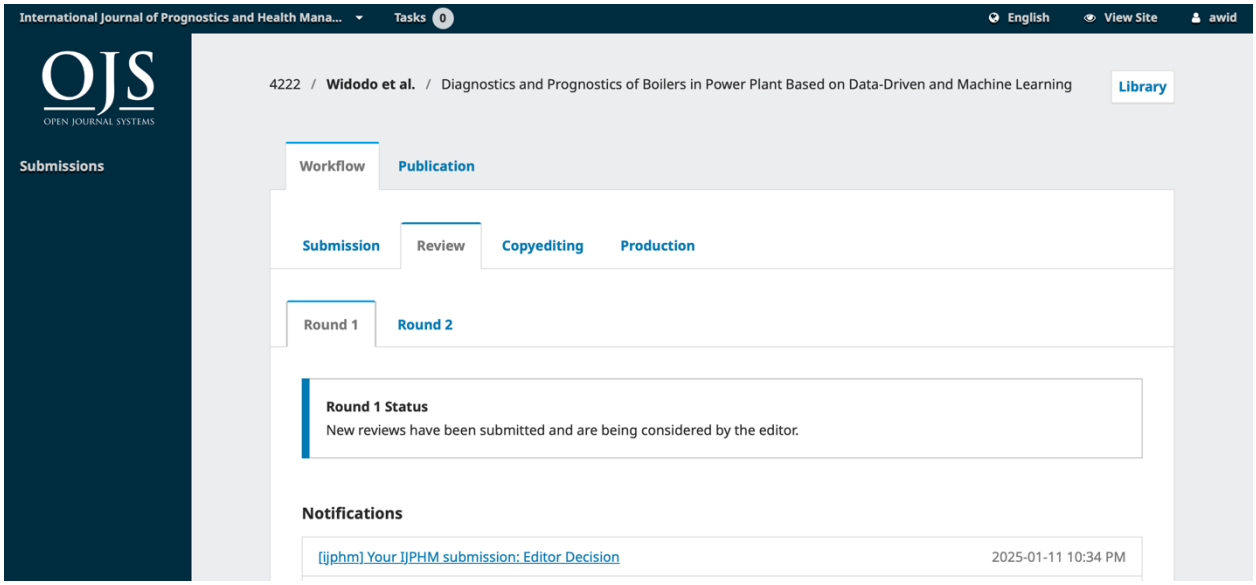
Thank you for submitting the manuscript, "Diagnostics and Prognostics of Boilers in Power Plant Based on Data-Driven and Machine Learning" to International Journal of Prognostics and Health Management. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Submission URL:
https://papers.phmsociety.org/index.php/ijphm/authorDashboard/submission/4222
Username: awid

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

IJPHM Editor

2. Decision of the first review (11 Januari2025)



Outlook

Fw: [ijphm] Your IJPHM submission: Editor Decision

From Achmad Widodo <achmadwidodo@lecturer.undip.ac.id>
Date Mon 1/13/2025 2:34 PM
To Toni Prahasto <toniprahasto@lecturer.undip.ac.id>; toni.prahasto <toni.prahasto@gmail.com>; mochamad.soleh@pln.co.id <mochamad.soleh@pln.co.id>; herry.nugraha@pln.co.id <herry.nugraha@pln.co.id>

From: ijphmeditor via PHM Society Paper Submission & Review Portal <no-reply@papers.phmsociety.org>
Sent: Sunday, January 12, 2025 5:34 AM
To: Achmad Widodo <achmadwidodo@lecturer.undip.ac.id>; Toni Prahasto <toniprahastoo@lecturer.undip.ac.id>; Mochamad Soleh <mochamad.soleh@pln.co.id>; Herry Nugraha <herry.nugraha@pln.co.id>
Subject: [ijphm] Your IJPHM submission: Editor Decision

Dear Achmad Widodo, Toni Prahasto, Mochamad Soleh, Herry Nugraha,

Congratulations! I am pleased to inform you that your submission to International Journal of Prognostics and Health Management, "Diagnostics and Prognostics of Boilers in Power Plant Based on Data-Driven and Machine Learning" has been reviewed. Reviewers have recommended that this submission be ***accepted for publication with minor revisions***. Reviewer comments can be found below.

Next steps:
Please take the following actions and submit the final manuscript **within 4 weeks of today** or earlier.
1. Consider all review comments and incorporate changes in your final manuscript. Please also provide a detailed "Response to Review" document (by uploading to as an additional file). These responses will then be evaluated by the reviewers again to make a final decision on publication.
2. Please, **DO NOT** start a completely new submission when uploading a final version of your article. If you have questions/concerns please reach out to us to figure out how to submit.
3. PHM Society has a strict policy on manuscript formatting before they can be published. Please double check for any formatting issues and avoid delays.
Instructions for full paper submission can be accessed here. Please follow Author Guidelines in preparing your manuscript and use the PHM Conference Paper template. Once resubmitted, your paper will be evaluated for final check and decisions will be communicated ASAP.

Best regards,

Girish Ganachari
Recommendation: Accept Submission

Document the **strengths** and **weaknesses** of this paper based on the following points:
(1) Assessment of the related state-of-the-art
(2) Theoretical Contribution
(3) Novelty of the developed methodology and approach
(4) Benchmarking of the developed methodology against other related work
(5) Repeatability of the approach presented

Strengths:

The paper provides a comprehensive review of existing literature on boiler diagnostics and prognostics, highlighting significant advancements over the past 25 years. It effectively contextualizes its contributions within this broader framework, citing various studies that have utilized both model-based and data-driven approaches for fault detection and RUL prediction. It identifies gaps in previous research, particularly the limited application of machine learning techniques like SVM in real-time boiler diagnostics, thereby establishing a clear niche for its study.
The paper proposes a novel framework for boiler diagnostics that integrates machine learning techniques with real-time data acquisition from operational boilers. This represents a significant theoretical advancement in predictive maintenance strategies for industrial applications.
It contributes to the theoretical understanding of condition-based maintenance by illustrating how machine learning can be effectively applied to predict anomalies and RUL in a complex system like a boiler.
The methodology utilizes a combination of support vector machines (SVM) for anomaly detection and dynamic time warping (DTW) for RUL prediction, which is relatively novel in the context of boiler diagnostics
The application of these methodologies to real-time data from operational boilers distinguishes this work from previous studies that often relied on laboratory or inspection data.
The paper benchmarks its results against existing methodologies, demonstrating that its approach yields comparable or improved accuracy in anomaly detection and RUL prediction compared to traditional methods.
By using real operational data, it provides a practical validation of its methods against those that have been tested under controlled conditions, highlighting its potential applicability in real-world scenarios.
The study emphasizes data acquisition through a SCADA system, which is a widely used method in industrial settings. This suggests that other researchers can replicate the data collection process easily.
The clear description of the algorithms used allows other researchers to implement similar methodologies in their own studies, promoting repeatability.

Weaknesses:

The theoretical implications could be more explicitly stated. While the practical contributions are clear, the broader theoretical impact on fields such as predictive maintenance or machine learning could be better articulated.
Although the methodologies are innovative, further justification for their selection over alternative techniques could strengthen the argument for their novelty. A discussion on why SVM and DTW were chosen specifically would enhance clarity.
The benchmarking section could benefit from quantitative comparisons with more detailed statistical analyses. Presenting specific metrics (e.g., accuracy rates, precision) alongside visualizations would enhance the rigor of this evaluation.
While the approach is theoretically repeatable, details regarding specific implementation challenges or limitations encountered during testing are not thoroughly discussed. Addressing these could provide valuable insights for future researchers attempting to replicate or build upon this work.

Have the Authors provided sufficient results with respect to the benchmarking of their approach and assessed their approach for completeness?

The authors of the study on diagnostics and prognostics of boilers in power plants have provided a comprehensive approach to benchmarking their methods.

The authors validated their proposed method using real operational data from three boilers, which is a significant strength. This real-world application allows for a more accurate assessment of the method's effectiveness compared to studies relying on laboratory or inspection data when systems are not in operation.

The study employs well-known machine learning techniques, specifically Support Vector Machine (SVM) and Random Forest Algorithm (RFA), for anomaly detection and Dynamic Time Warping (DTW) for Remaining Useful Life (RUL) prediction. This choice of algorithms is supported by previous literature, indicating a solid foundation for the methods used.

The results indicate that while some anomalies were successfully detected, there were instances of low accuracy in predictions. This suggests that while the approach has potential, it may require further refinement or additional data to improve its reliability.

Have the Authors discussed the implications of their research in the discussion? Have they presented a balanced survey of the literature and information so their data and results can be put into context?

The authors have indeed discussed the implications of their research in the discussion section of their paper, providing a balanced survey of the literature to contextualize their data and results.

Real-World Application: The authors emphasize that their method for diagnosing and predicting the remaining useful life (RUL) of boilers is applicable in real operational settings, unlike many studies that rely on data from non-operational conditions. This real-time applicability enhances the relevance of their findings for industry stakeholders, particularly in improving maintenance strategies and operational efficiency.

They highlight how their research builds on existing literature by integrating machine learning techniques with actual operational data, thereby contributing to the field of predictive maintenance. This integration addresses gaps identified in previous studies where either laboratory conditions or inspection data were predominantly used.

The authors suggest that their findings could pave the way for future studies aimed at refining diagnostic algorithms and expanding the dataset for better predictive accuracy. This forward-looking perspective indicates a recognition of the ongoing nature of research in this area.

The paper includes a thorough review of related works, citing various studies that have explored both model-based and data-driven approaches to fault diagnostics and prognostics. By discussing these different methodologies, the authors provide a well-rounded perspective on the current state of research in boiler diagnostics.
Contextualization of Results: The authors place their findings within the broader context of existing literature, comparing their approach with other studies that have utilized different techniques or datasets. This contextualization helps readers understand how their results align with or differ from previous work, enhancing the credibility and relevance of their contributions.

They also acknowledge limitations within their study, such as the accuracy of predictions and potential biases in data collection, which reflects a balanced approach to discussing their findings. By recognizing these limitations, they provide a more nuanced view that encourages critical evaluation by readers.
Overall, the authors effectively discuss the implications of their research while situating it within a comprehensive review of existing literature, allowing for a contextual understanding of their results and contributions to the field.

Is the methodology used presented in a clear and concise manner so that someone else can repeat the same experiments? If not, what further information needs to be provided?

The authors provide a structured overview of their approach, detailing the use of machine learning techniques such as Support Vector Machine (SVM) and Random Forest Algorithm (RFA) for anomaly detection, along with Dynamic Time Warping (DTW) for Remaining Useful Life (RUL) prediction. This framework gives a solid foundation for understanding the methodology.
The methodology includes information on data acquisition through a Supervisory Control and Data Acquisition (SCADA) system, which streams real-time data from sensors installed on the boilers. This detail is crucial for replicating the study as it outlines how data was collected during normal operational conditions, differentiating it from many studies that rely on non-operational data.
Information regarding how the models were trained, including training/testing splits, cross-validation methods, and any feature selection processes would be beneficial.
A clear outline of the metrics used to evaluate model performance (e.g., accuracy, precision, recall) would provide a benchmark for future studies.
In conclusion, while the methodology is presented in a generally clear manner, adding these details would significantly improve its clarity and allow other

researchers to replicate the experiments more effectively.

Significance: What is the overall significance of the publication to the PHM Community?

4: Good

Originality and innovation of the publication. Does the submission offer sufficient innovation and original contribution to warrant publication?

4: Good

Clarity, coherence, and organization of writing. Has the content of the submission been presented in a manner that is easy for the reader to follow?

4: Good

Clarity discussion
(1) Are there any typos to fix in the paper?
(2) Are all abbreviations used explained? Does the author use standard scientific abbreviations?
(3) Do all the figures and tables help the reader better understand the manuscript?
(4) Are all figures and tables readable?
Please detail here.

No typos and all abbreviations explained.

Overall evaluation. Please provide a detailed review.

Overall, this study presents a valuable contribution to the field of boiler diagnostics and prognostics using data-driven approaches. The combination of real operational data with advanced machine learning techniques offers promising insights into improving maintenance strategies for power plants. Addressing the identified areas for improvement will enhance the clarity, reproducibility, and impact of this research, making it an even more useful resource for both academic and industrial audiences.

Format
Does the publication match the formatting instructions of the Journal?
Author instructions and templates can be found at:
https://papers.phmsociety.org/index.php/ijphm/about/submissions

Yes

Reviewer Decision

Accept submission as-is

Fawzi Gougam
Recommendation: See Comments

Document the **strengths** and **weaknesses** of this paper based on the following points:
(1) Assessment of the related state-of-the-art
(2) Theoretical Contribution
(3) Novelty of the developed methodology and approach
(4) Benchmarking of the developed methodology against other related work
(5) Repeatability of the approach presented

> The study investigates boiler diagnostics and prognostics within an industrial power plant using real-world data. The proposed methodology employs Support Vector Machines (SVM) and Random Forest Algorithm (RFA) to predict the Remaining Useful Life (RUL) of the boiler system. The study proposes a method combining machine learning techniques (SVM and RFA) for anomaly detection and dynamic time warping (DTW) for Remaining Useful Life (RUL) prediction. Using real data from three power plant boilers, the method successfully detects some anomalies and delivers fair RUL predictions despite data limitations.

Have the Authors provided sufficient results with respect to the benchmarking of their approach and assessed their approach for completeness?

> The manuscript provides sufficient results regarding the benchmarking of the proposed approach and assesses its completeness effectively. However, to enhance the comparison of results, the author should include additional evaluation metrics. These metrics would offer a more comprehensive and quantitative assessment of the method's performance relative to other approaches.

Have the Authors discussed the implications of their research in the discussion? Have they presented a balanced survey of the literature and information so their data and results can be put into context?

> yes it discussed .

Is the methodology used presented in a clear and concise manner so that someone else can repeat the same experiments? If not, what further information needs to be provided?

> The paper is well stuctured

Significance: What is the overall significance of the publication to the PHM Community?

> 4: Good

Originality and innovation of the publication. Does the submission offer sufficient

innovation and original contribution to warrant publication?

4: Good

Clarity, coherence, and organization of writing. Has the content of the submission been presented in a manner that is easy for the reader to follow?

5: Excellent

Clarity discussion
(1) Are there any typos to fix in the paper?
(2) Are all abbreviations used explained? Does the author use standard scientific abbreviations?
(3) Do all the figures and tables help the reader better understand the manuscript?
(4) Are all figures and tables readable?
Please detail here.

There is no remarks concern these points

Overall evaluation. Please provide a detailed review.

The study investigates boiler diagnostics and prognostics within an industrial power plant using real-world data. The proposed methodology employs Support Vector Machines (SVM) and Random Forest Algorithm (RFA) to predict the Remaining Useful Life (RUL) of the boiler system.
1. Features were extracted from 37 sensors; however, the dataset includes irrelevant data (e.g., non-monotonic and random noise). The author should elaborate on the preprocessing steps used to address these issues.
2. While the study highlights sensor data utilization, the literature often identifies subsets of relevant sensors for improved diagnostic accuracy. A comparison with such approaches would strengthen the analysis.
3. Table 5 lacks validation accuracy details, focusing solely on training accuracy. The author should clarify the rationale for this choice and address its impact on model generalizability.
4. The number of principal components (PC) used in dimensionality reduction is not specified. This critical parameter should be included to enhance the reproducibility of the study.
5. Table 9 mentions the maximum number of features as the ‘sqrt’ of the dataset size. Additional details on the criteria for this selection are necessary to provide context.
6. The study alternates between prognostics and diagnostics in certain sections. Clear differentiation and consistent terminology would improve the manuscript's coherence.
7. To provide more robust and quantitative results, additional evaluation metrics can be included in the comparison section for a more comprehensive assessment.

Format
Does the publication match the formatting instructions of the Journal?
Author instructions and templates can be found at:

https://papers.phmsociety.org/index.php/ijphm/about/submissions

Yes

Reviewer Decision

Minor revisions requested - accept the paper once revisions are made

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Responses to Reviewer's Comments on Submitted Manuscript

"Diagnostics and Prognostics of Boilers in Power Plant Based on Data-Driven and Machine Learning"

International Journal of Prognostics and Health Management

The study investigates boiler diagnostics and prognostics within an industrial power plant using real-world data. The proposed methodology employs Support Vector Machines (SVM) and Random Forest Algorithm (RFA) to predict the Remaining Useful Life (RUL) of the boiler system.

1. Features were extracted from 37 sensors; however, the dataset includes irrelevant data (e.g., non-monotonic and random noise). The author should elaborate on the preprocessing steps used to address these issues.

Response:
We have revised the manuscript to include a description of the sensor data preprocessing, as outlined on page 8 (highlighted in yellow, top left).

2. While the study highlights sensor data utilization, the literature often identifies subsets of relevant sensors for improved diagnostic accuracy. A comparison with such approaches would strengthen the analysis.

Response:
We have added three reference articles and literature studies related to the use of sensor data in our research that are in line with the sensor data used in the article. Please, see it on page 3.

3. Table 5 lacks validation accuracy details, focusing solely on training accuracy. The author should clarify the rationale for this choice and address its impact on model generalizability.

Response:
We have revised the manuscript and added the validation accuracy of training. Please refer to Table 5 and Table 7 on page 8 and 9.

4. The number of principal components (PC) used in dimensionality reduction is not specified. This critical parameter should be included to enhance the reproducibility of the study.

Response:
In our study, the determination of the optimal number of principal components (k) for feature reduction in PCA is performed simultaneously with the selection of appropriate hyperparameters during SVM training. This process is conducted using the random search method with 5-fold cross-validation and 100 iterations. The possible values of k are chosen from

the set {5, 10, 15, ..., 25, 50, 100, 150}, as shown in Table 6. Through this approach, the optimal value of k is determined to be 150, as indicated in Table 7. A detailed explanation of this process is provided in the manuscript on page 9 (highlighted in yellow in the top-left corner).

5. Table 9 mentions the maximum number of features as the ‘sqrt’ of the dataset size. Additional details on the criteria for this selection are necessary to provide context.

Response:
In Table 9, the term "sqrt" for max_features indicates that the number of features used for splitting nodes is the square root of the total number of features. We have provided additional details regarding the selection of "sqrt." Please refer to the explanation on page 9 (highlighted in yellow).

6. The study alternates between prognostics and diagnostics in certain sections. Clear differentiation and consistent terminology would improve the manuscript's coherence.

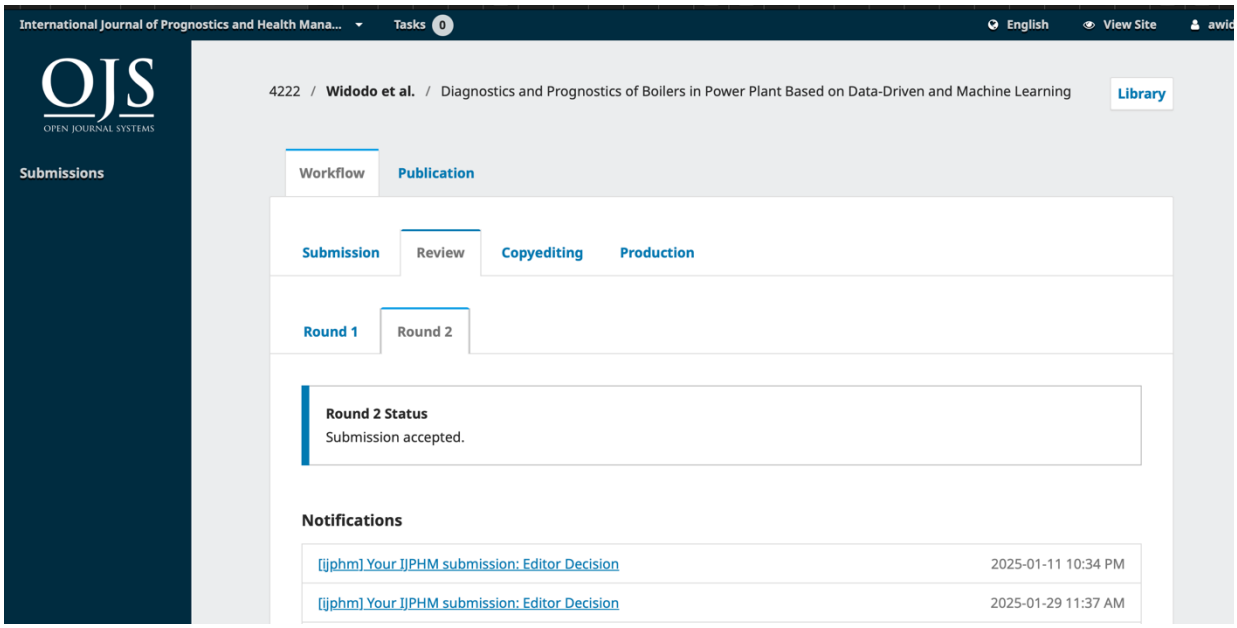
Response:
In Section 4.2 (page 10), we have provided a brief explanation of the differences between boiler diagnostics and prognostics, based on their respective purposes.

7. To provide more robust and quantitative results, additional evaluation metrics can be included in the comparison section for a more comprehensive assessment.

Response:
We have included evaluation metrics using RMSE and MAE to assess the RUL prediction error in the manuscript, just above Figure 11.

Thank you for the comments from Reviewer. We have tried our best to respond to all reviewer comments by revising our manuscript. We hope that all our responses to reviewer comments are acceptable and satisfactory. Once again, thank you very much for taking the time to provide valuable comments on our manuscript and provide recommendations for minor revisions.

3. Decision of the second review (29 Januari 2025)



Outlook

[ijphm] Your IJPHM submission: Editor Decision

From ijphmeditor via PHM Society Paper Submission & Review Portal <no-reply@papers.phmsociety.org>

Date Wed 1/29/2025 6:46 PM

To Achmad Widodo <achmadwidodo@lecturer.undip.ac.id>; Toni Prahasto <toniprahastoo@lecturer.undip.ac.id>; Mochamad Soleh <mochamad.soleh@pln.co.id>; Herry Nugraha <herry.nugraha@pln.co.id>

Dear Achmad Widodo, Toni Prahasto, Mochamad Soleh, Herry Nugraha,

Congratulations! I am pleased to inform you that your submission to International Journal of Prognostics and Health Management, "Diagnostics and Prognostics of Boilers in Power Plant Based on Data-Driven and Machine Learning" has now been accepted for publication.

Before your article could be transferred to our production department, please make sure to update the year in the footer on page 1 as described in the template, so it reads (replace 20XX by the current year):

International Journal of Prognostics and Health Management, ISSN 2153-2648, 20XX

After the manuscript with the updated footer is uploaded, we will begin the creation of the proof.

Thank you for submitting your manuscript to this journal. I look forward to seeing it published in the near future.

Best regards,

Reviewer A:

The authors have addressed reviewer comments, including adding details on preprocessing, validation accuracy, PCA optimization, and evaluation metrics.
The authors have adequately responded to reviewer concerns.
The manuscript has been enhanced with relevant literature.
Figures and tables effectively convey the results.

Recommendation: Accept Submission

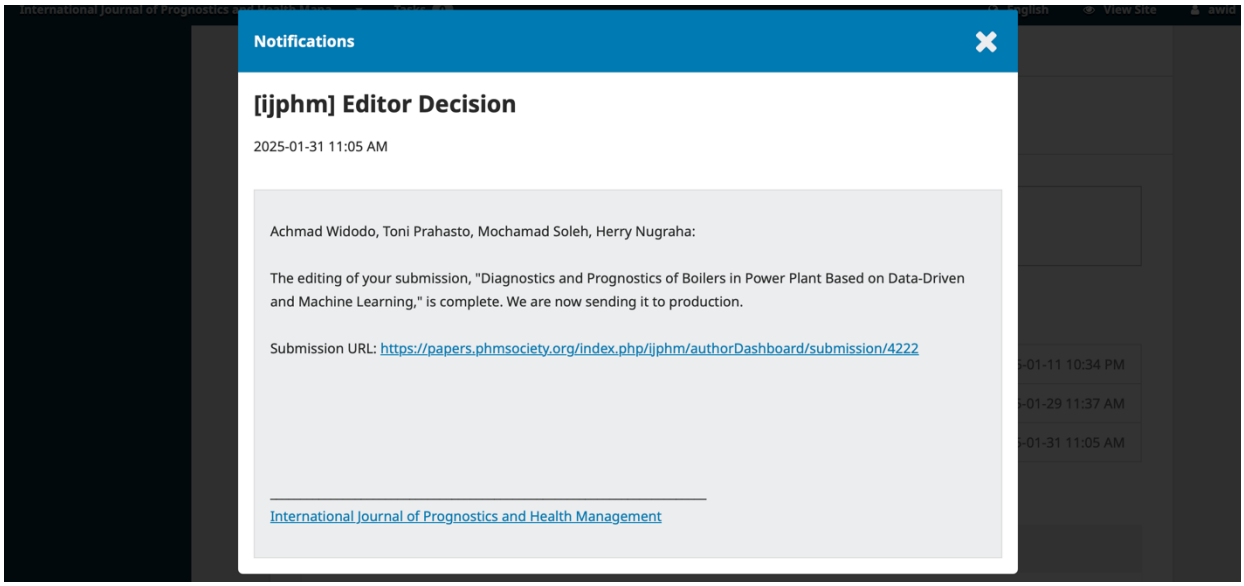
Reviewer B:

I believe the author has effectively taken my comments into account regarding boiler diagnostics and prognostics within an industrial power plant using real-world data. The proposed methodology utilizes Support Vector Machines (SVM) and the Random Forest Algorithm (RFA) to predict the Remaining Useful Life (RUL) of the boiler system.

Recommendation: Accept Submission

International Journal of Prognostics and Health Management

4. Accepted (31 Januari 2025)



Outlook

[ijphm] Editor Decision

From ijphmeditor via PHM Society Paper Submission & Review Portal <no-reply@papers.phmsociety.org>

Date Fri 1/31/2025 6:05 PM

To Achmad Widodo <achmadwidodo@lecturer.undip.ac.id>; Toni Prahasto <toniprahastoo@lecturer.undip.ac.id>; Mochamad Soleh <mochamad.soleh@pln.co.id>; Herry Nugraha <herry.nugraha@pln.co.id>

Achmad Widodo, Toni Prahasto, Mochamad Soleh, Herry Nugraha:

The editing of your submission, "Diagnostics and Prognostics of Boilers in Power Plant Based on Data-Driven and Machine Learning," is complete. We are now sending it to production.

Submission URL:
https://papers.phmsociety.org/index.php/ijphm/authorDashboard/submission/4222

International Journal of Prognostics and Health Management