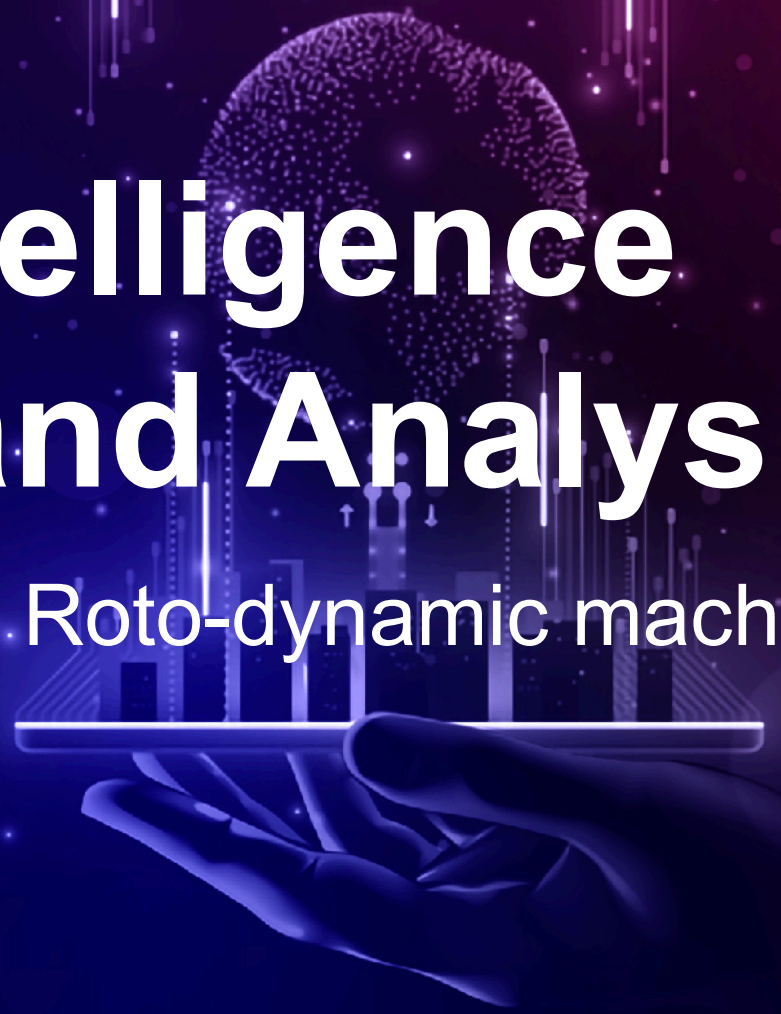
CONFERENCE OMAINTEC 2024 EXHIBITION

THE 21ST INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE IN THE ARAB COUNTRIES

Artificial Intelligence Diagnosis and Analysis

Fault troubleshooting in Roto-dynamic machinery



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An Initiative by

OMAINTEC
المجلس العربي للتشغيل والصيانة
Arab Operations & Maintenance Council

Organized by

EXICON.
International Group
مجموعة أكزيكون الدولية

Artificial Intelligence Diagnosis and Analysis

A cooperation project between the SWCC, Saudi Arabia and OPTIMIZERS , Egypt

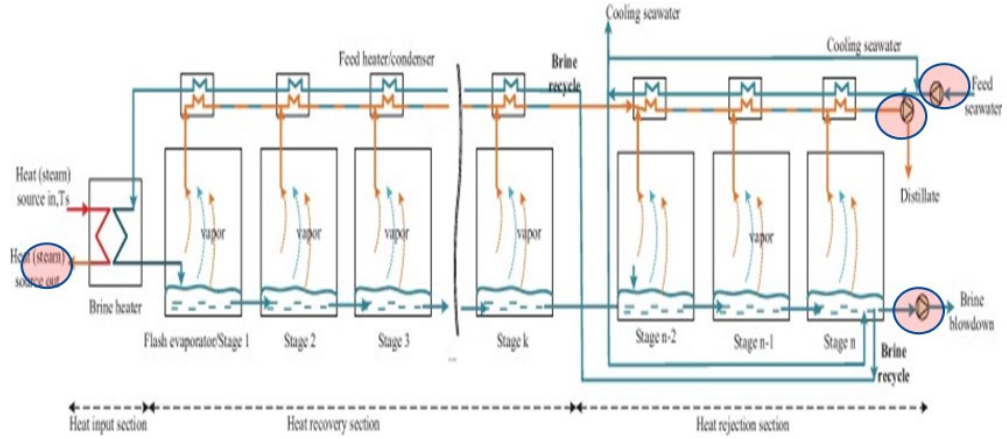
OPTIMIZERS

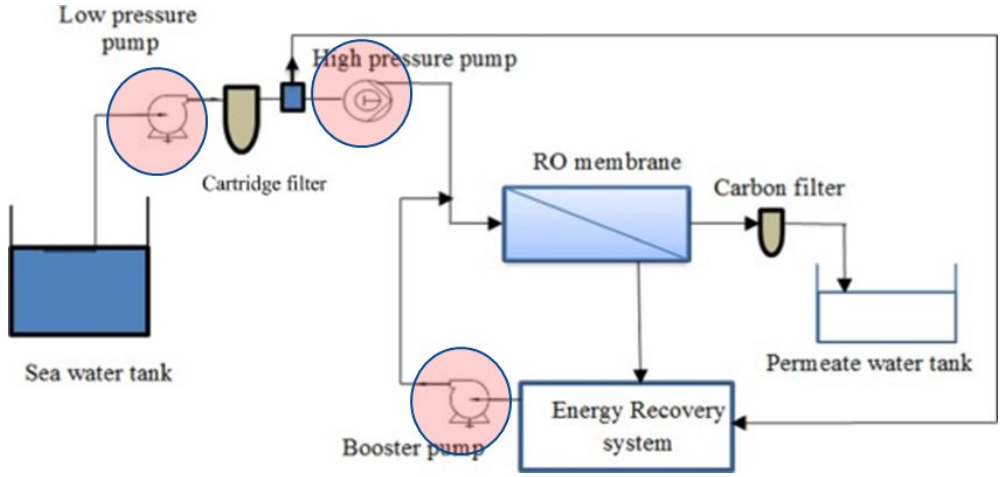
المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation (SWCC)

Introduction

Pumps is the heart of the desalination plants, which energize water to flow through the system.

Pumping power represent 70% of total power consumption in RO.





Idea Generation

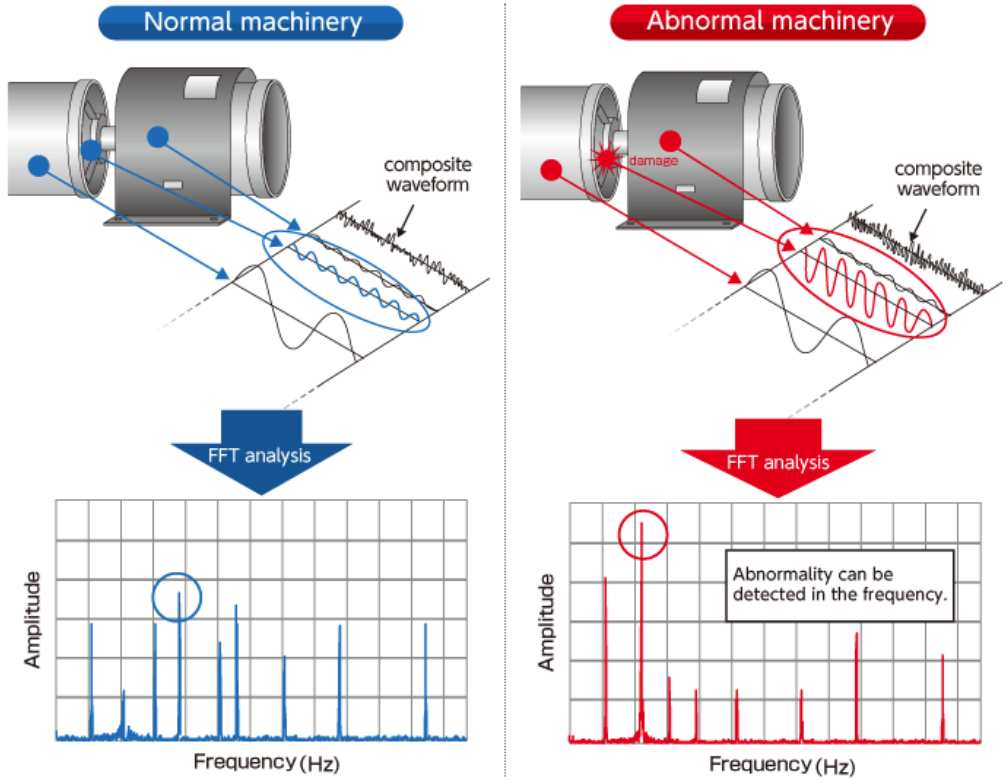
1. During the initiative of increase SWCC production up to 5.5 million cubic water per day, one of the unit was subjected to acid cleaning (major overhaul), after restart the unit one of the major pumps was forced to shut down.

2. Leading to 3 days shutdown (reliability and production loss). Inspection, spare parts check and purchase.

3.Prediction of faults would lead to sustain the production and enhance plants reliability.

Current status

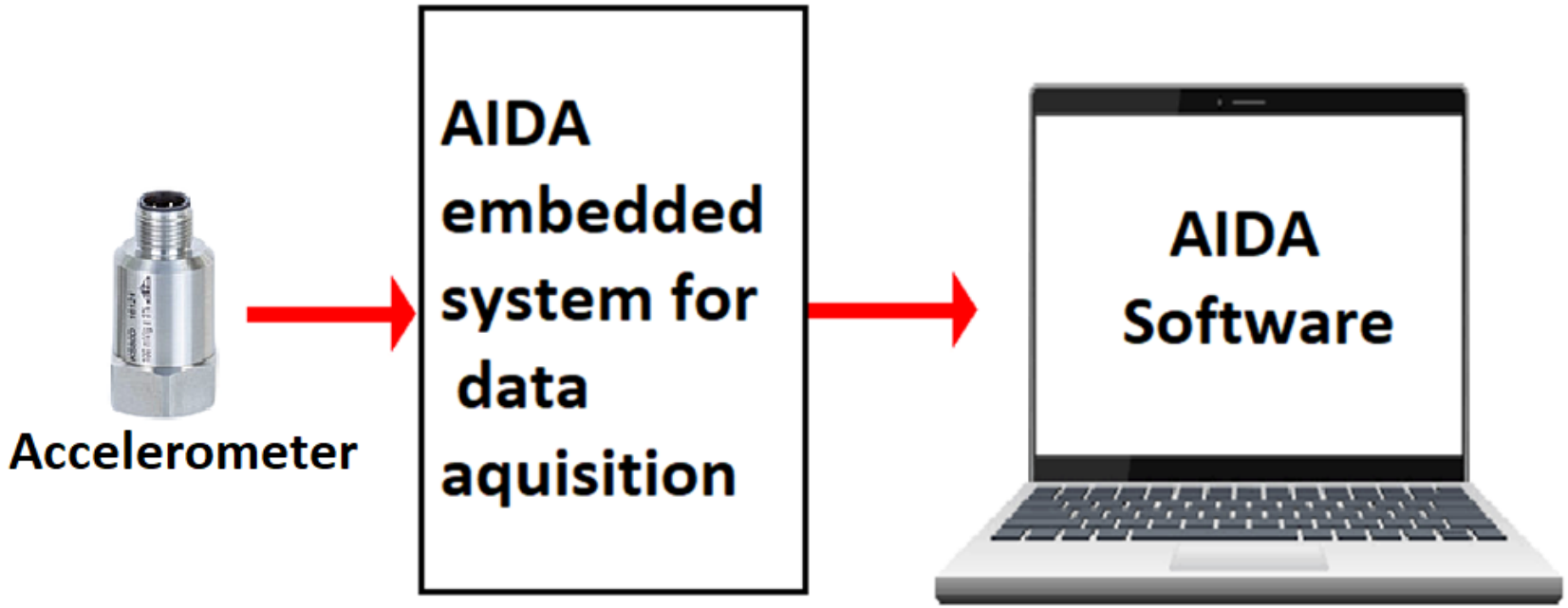
Classical methods in troubleshooting (condition monitoring) the measurements of machines vibration then a human vibration analyst make the analysis using some sorts of spectrum analysis with graphical and analytical methods to make the exact trouble shooting



*generic example

Components

In the AIDA system a new utilization of the Artificial neural network to make sorting and classifications of problem making a real time continuous trouble shooting of machine faults with exact



Advantages

- continuous machine monitoring
- Inventory status continuous updates about spare parts with assets maintaining in safe
- Utilizing the AI to increase plant reliability
- Reduce unplanned shutdown
- Smooth operation
- Increase operators awareness

Concept

In the AIDA system a new utilization of the Artificial neural network to make sorting and classifications of problem making a real time continuous trouble shooting of machine faults with exact

Data inputs
Accelerometers
Temperature
sensors

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Accelerometers
Temperature
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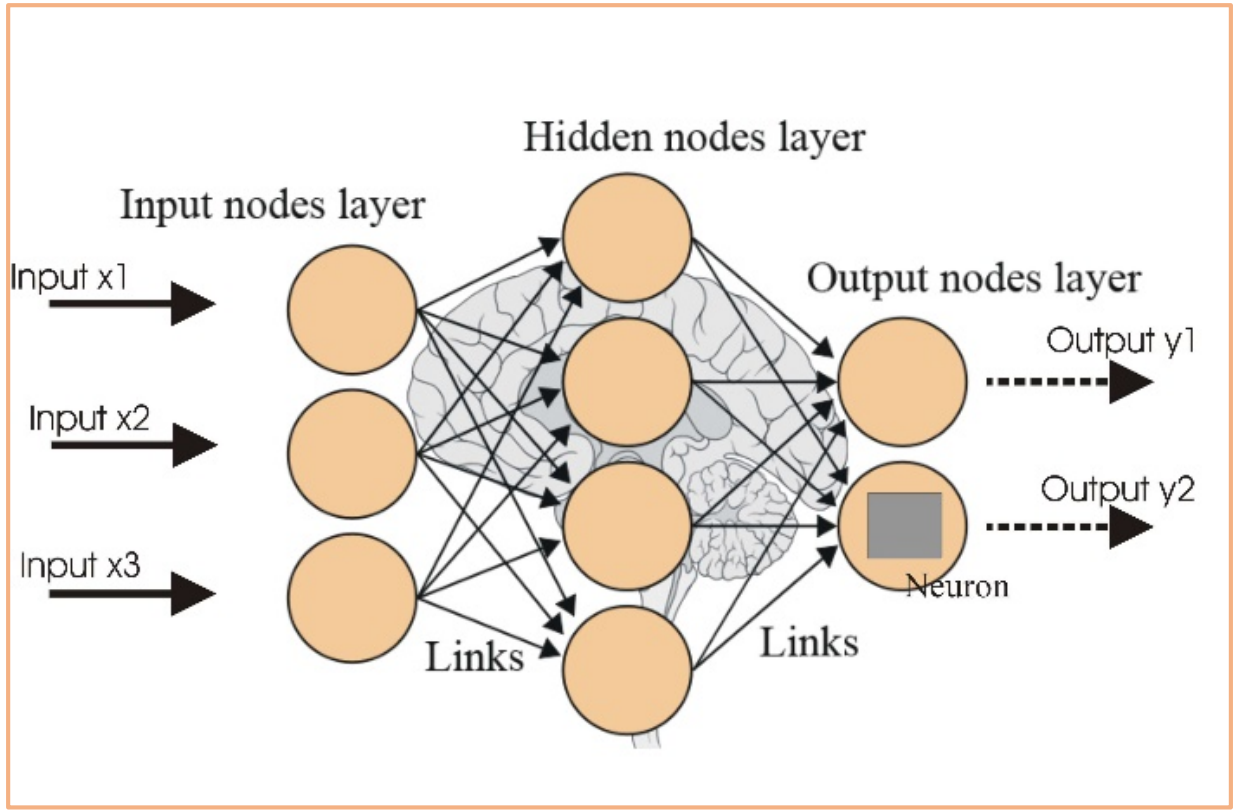


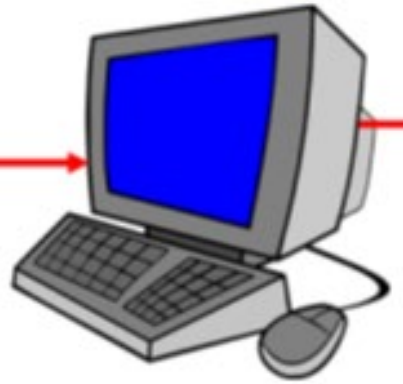
Outcomes

Outcomes

Signal from Vibration Sensor On Pump

AIDA signal conditioner module

- Convert Raw signal to computer readable data with (50K sample /S)
- Logging files on computer
- Accumulated data generate trend of machine
- Instantaneous alarming
- Generate FFT to enable Instantaneous faults detection by Expert
- Time domain spectrum / frequency domain spectrum



outcomes	
condition monitoring	✓
Machine status	✓
Trend analysis	✓
Fault diagnosis (expert)	✓
Working with internet	✓
Working without internet	✓
Artificial intelligence diagnosis	✓
Fault parameterization window	✓
Intelligent fault futuristic detection	✓

OPTIMIZERS

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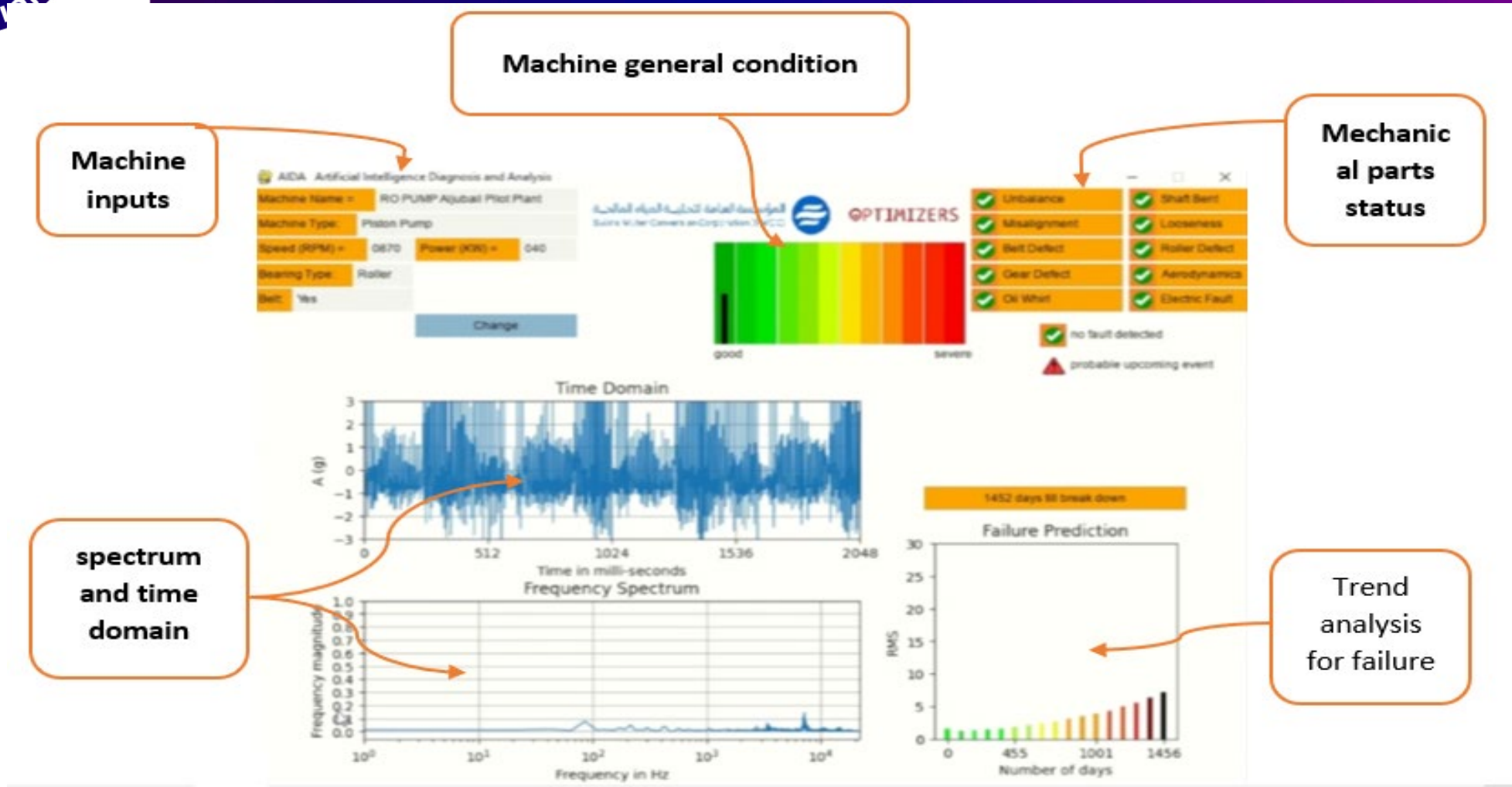
System Interface



Outcomes

Condition monitoring
Getting the exact fault that is imminent to machine

Trend Analysis
The is a prediction AI method to obtain an accurate duration prior of machine failure

Machine health
According to the ISO standard 10816
An indicator represent the machine operating condition

logging
Complete history of all events occurred in machine are being logged

Future work

- Integrate the system with additional sensors to maximize the sensing and benefits
- Root cause analysis for the diagnosed faults

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THANK YOU!

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