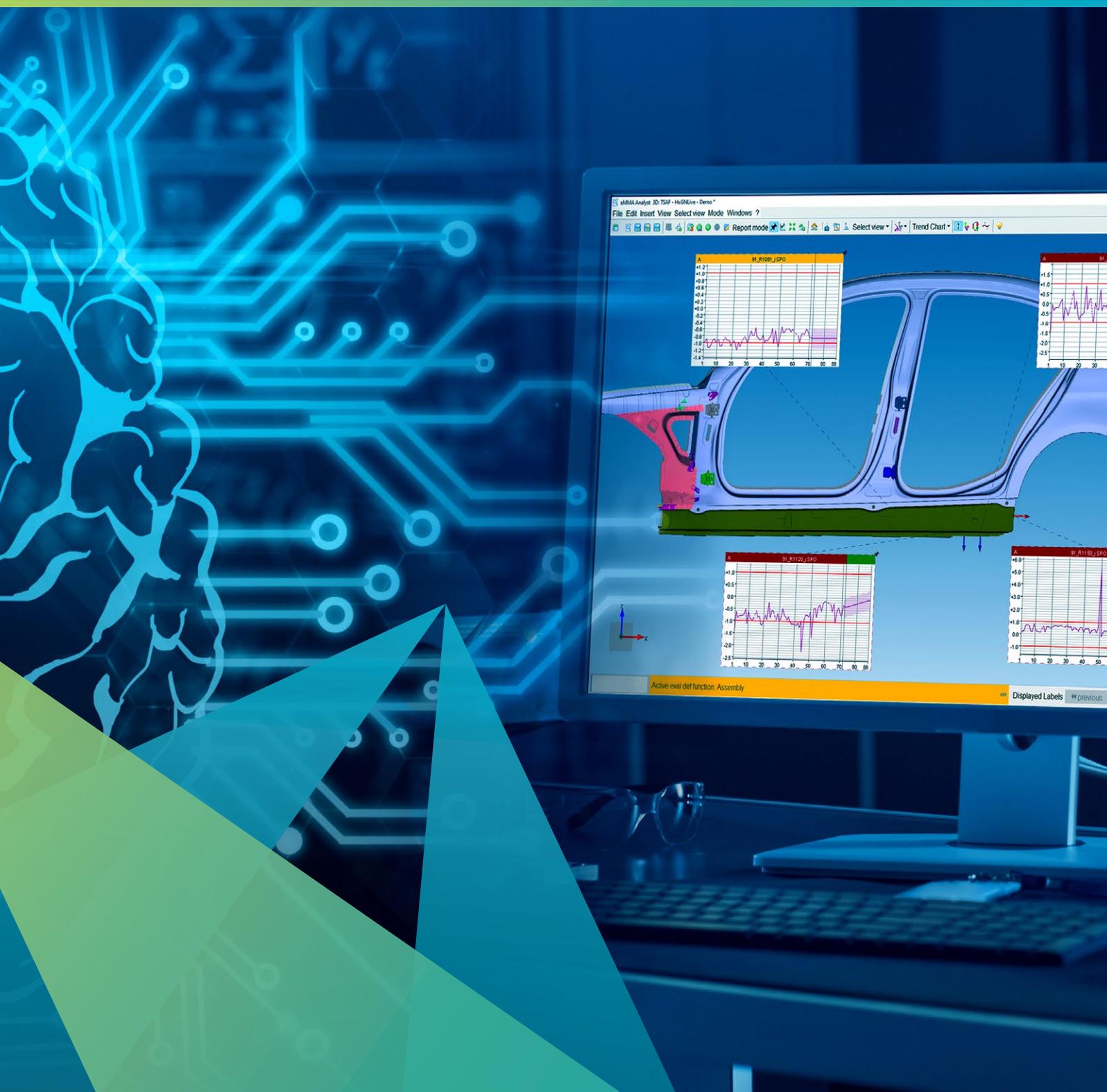# HEXAGON

Time series analysis and forecasting in eMMA 3.4.0

Integrated AI for advanced analysis and forecasting

What is TSAF?

TSAF stands for "Time-Series Analysis and Forecasting" and is an A.I. software module by IconPro A.I. solutions that can be integrated as an add-on into almost any other software.

If you input a series of values over time, e.g., representing an arbitrary parameter over time or a sensor value over time, TSAF predicts and outputs future values 100% automatically.

Additionally, TSAF can identify, and output all found outliers and change points in the given values over time if requested.

Figure 1: TSAF Illustration: Inputs and outputs including comparison with test data

Figure 2: TSAF in eMMA: Classification and filtering of features based on tolerance utilisation

Where is TSAF in Q-DAS eMMA from v3.4.0.?

The TSAF module can be enabled in any of the eMMA 3D analysis modules (eMMA Analyst, eMMA Inspector, or eMMA Assembler). With the help of TSAF users can now not only see historical quality results for each characteristic in the value charts, but they can also see predicted quality values. All predictions in the value charts come with confidence intervals to show the prediction uncertainty.

If TSAF is licensed, it can be easily activated and configured within the menu panel of the Analyst 3D. Configuration parameters for the prediction include the length of the prediction and the desired confidence level.

The predicted values can be visualised and classified and colour-coded using the Trend Chart Diagram along with the display of historical measurements. E.g., regarding their proximity to the tolerance bounds.

Users can also filter features or characteristics not only based on the classification of the historical measurement values but also based on the classification of the predicted values.

## What are typical use-cases and benefits?

- **Know if current stable processes remain stable in the future**
  Ensure stability for important process characteristics continuously

- **Identify characteristics at risk for which the quality results will get worse**
  Focus attention on process characteristics whose quality is at risk

- **Know when characteristics will violate specification limits**
  React in time before a process gets out of control

- **Predict cp/cpk values for tomorrow, next week and next month**
  Ensure that reporting targets are met by knowing KPIs beforehand and acting if needed

What is the difference to Predictive Quality?

The term "Predictive Quality" usually refers to predicting quality based on given production and process parameters for individual workpieces already in production.

The difference in comparison with TSAF is that TSAF predicts future quality values based on a series of quality values and not based on production or process parameter values.

In summary, TSAF predicts a quality value trend into the future, and "Predictive Quality" refers to predicting the quality of an given part based on its individual production information.
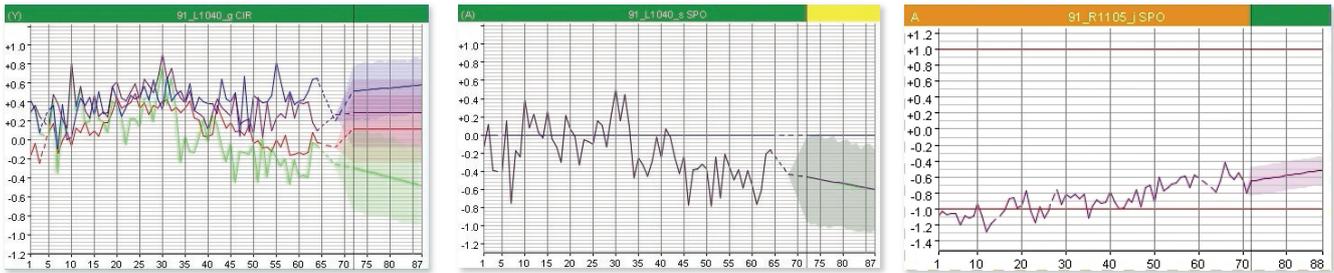
a) Feature with predicted values remaining in tolerance

b) Feature with predicted measurements out of tolerance

c) Feature with predicted measurements getting back in tolerance

Figure 3: Illustrative examples of prediction behavior with tolerance classification

How can I get a trial license for eMMA TSAF?

- The trial license for eMMA TSAF can be obtained for a period of three months and is limited to one installation per customer*.

  * Service and support fees may apply.

- TSAF is only supported in eMMA Enterprise versions 3.4.0 and later.

To learn more about eMMA TSAF trial licenses, please contact our sales team at: **emma.qdas.mi@hexagon.com**

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Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

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