Detroit Engineered Products (DEP) is an engineering services, product development, software development, consulting and talent acquisition company. Founded in 1998 in Troy, USA, DEP has expanded globally with operations in Europe, China, Korea, Japan and India. DEP employs an accelerated and transformed product development process, facilitated by our proprietary platform, DEP MeshWorks, which significantly reduces product development time across multiple industries.

The field of engineering simulation is undergoing significant changes due to advances in AI and ML technologies. These advances are refining numerical methods such as Finite Element Analysis (FEA), Finite Volume Methods (FVM) and Finite Difference Time Domain (FDTD), which in turn are streamlining the solution of complex 3D physics problems with increased speed and accuracy. These enhancements not only increase solver efficiency, but also introduce dynamic visualisation capabilities, improving the overall user experience in engineering simulation.

DEP MeshWorks AI/ML technology is a robust framework that integrates a wide range of algorithms and models, including Convolutional Neural Networks (CNNs), Deep Neural Networks (DNNs), and Approximation and Response Surface models. Its adaptability is a key feature, with models continuously trained on customer data to ensure ongoing relevance and accuracy. By integrating AI/ML capabilities, design iterations can be performed in the early stages of product development, enabling training and generation of predictive information tailored to specific needs. A key feature of the module is its ability to generate models from geometric data alone. The software seamlessly handles multiple neural networks without crashing, ensuring that the more neural networks used for different models, the more accurate the predictions become. Once the data is uploaded, the process becomes a one-time effort, providing ongoing benefits.

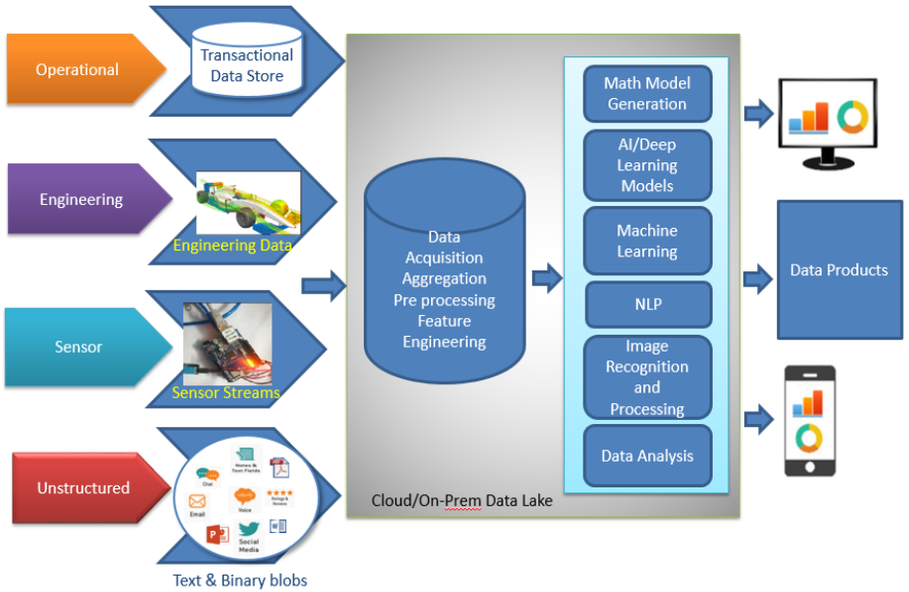
DEP

Smarter solutions. Realized.

AI/ML FRAMEWORK

Intelligent model creation technology

- MeshWorks AI/ML technology is a framework comprising a wide range of algorithms/models, including neural network (CNN/DNN) models, approximation models, response surface models, etc.
- The models are adaptive and can be continuously trained on customer data.
- The framework allows different AI/ML models to be applied to different responses to achieve the best accuracy and prediction.
- The framework then links the predictive models to parametric CAE models, where the visual parameters are linked to the output responses (for example, an automotive rail cross section to a crash pulse).
- This link enables users to create Design Advisor applications that provide an instant visual experience between geometric changes and predicted responses.
- In addition to creating Design Advisors, the framework can also be used for sensitivity and optimisation studies.

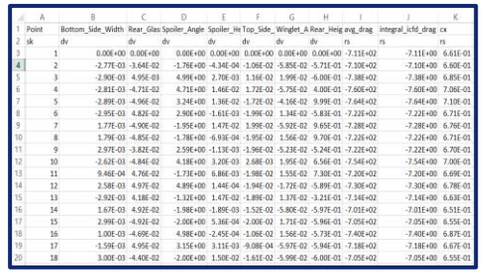


Value Proposition for MeshWorks Users

- Design advisors with a visual interface enabled by MeshWorks AI/ML technology provide critical guidance during early stages in the new product development.
- Applying the right AI/ML model for the right output response greatly increases the predictive ability of design advisors.
- In-house expertise from existing data can be institutionalised.

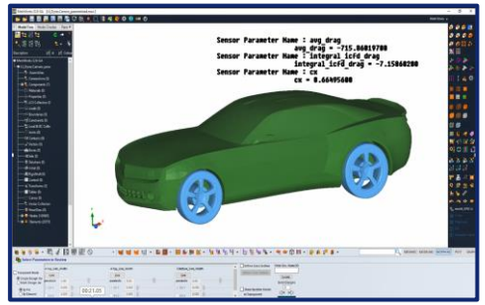
Uniqueness of MeshWorks

- The link between the parametric geometric FE model and an underlying AI/ML model is the uniqueness of the framework in MeshWorks.
- The parametric CAE capability within MW also provides the unique ability to generate multi-sample data for customers who do not have extensive in-house data.

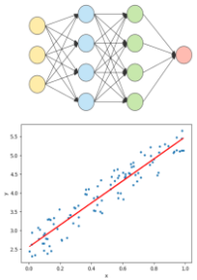


Data Extracted and saved in learning database 1

Appropriate AI/ML models are executed based on the relationship between input and output responses. 2



As input parameters change in Design Advisor, output responses are calculated in real time by the underlying AI/ML models and fed back to Design Advisor. 3



Advanced Update in the AI/ML MeshWorks module:

Customization of predictive information	Rapid prediction of outcomes	Geometric Data Model Generation
Stability with multiple neural networks	Streamlined Design Advisor	One-time Effort for Data Upload
Enhanced Visualization	Resilient Adaptability	Elevated Accuracy through CNN

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