pharmaMV 4 DEVELOPMENT

APPLIED MATERIALS®

Discover the true potential of your process

- DATA IMPORT
- DATA PRE-PROCESSING
- VISUALISATION
- STATISTICAL ANALYSIS
- MODELLING FACILITIES
- PROCESS MONITORING
- PROCESS CONTROL
- OPTIMISATION
- DATA QUALITY INSPECTION
- ALARM & EVENT CONFIGURATION
- REPORT GENERATOR

YOUR JOURNEY, FROM DATA TO KNOWLEDGE TO ACTION

PharmaMV™ Development is a fully-featured platform for deriving insight and value from your process and analytical data. The software platform supports process modelling in compliance with the Pharmaceutical industry's regulatory framework including the FDA's 21 CFR Part 11 guidance. Its intuitive interface guides the user from data import to deployment:

- **Import, align, and clean multiple data sources, to develop a clear understanding of what your process is doing**
- **Quickly identify outliers, correlations and statistical normality using industry standard uni- and multivariate methods**
- **Identify and classify regions of abnormal behaviour**
- **Develop the empirical models you need to better understand the problems you need to solve in Process & Product Development**

PROCESS MODELLING

Combining a comprehensive suite of empirical modelling tools and a simplified user interface, the PharmaMV Development platform enables users to quickly start making sense of their data. State of the art model linear and non-linear identification algorithms are provided.

Models are validated using standard performance metrics and sensitivity analysis. When applicable, models may be interchanged between process monitoring, control and optimisation within the same environment, to rapidly develop the optimum improvement strategy. Models, associated training and validation data are combined with the performance report in a model-set record for GxP deployment.

PROCESS MONITORING

Design and evaluate process monitoring models for improving the detection, identification and diagnosis of faults within complex processes. Each monitor can be fully evaluated by streaming historical process data into the engine, to ensure high robustness and provide effective and meaningful alarms.

PROCESS CONTROL

Provides a user-friendly environment to test a variety of frequently used industrial control algorithms. With engines ranging from PID to Multivariable Model Predictive Control, the user has access to the ideal practical technology in the field.

PROCESS OPTIMISATION

After improved control comes optimisation. Using configurable templates for model, constraint and cost function entry, the user can quickly determine the optimal mode of operation for both continuous and batch processes.

Your Process, Improved

PLATFORM FEATURES

DATA ANALYSIS

Import data from CSV, text, MS Excel, Copy and Paste import, Data table view, Flexible Trending, Bad Data Plots, Bad Data Replacement, Outlier Detection, Wide range of Mathematical Transforms. Scatter Plots, Spectral Plots, Parallel Coordinates Correlation Analysis, Gauge R&R, Performance Benchmarking.

MULTIVARIATE MODELLING

Principal Component Analysis, Partial Least Squares, Multi-way PCA/PLS technology for batch and continuous processes, Time-series PLS/RLS modelling (FIR/ARX), PLS-based end-point prediction, Classification and Clustering Techniques, Non-linear Artificial Neural Networks (Radial Basis Functions). Spectral pre-processing library (normalisation, filtering, baseline removal) and chemometric modelling.

PROCESS MONITORING

Univariate and Multivariate SPC charts including; Shewhart, EWMA and CUSUM charts, Process Capability, Distribution and Scatter Plots, Correlation Matrix, SPE, T2 and Contribution Plots. Automated Outlier Detection, Alarm Thresholds, Operating Zone Classification, Fault Detection and Threshold Filtering. Fault Identification, Multi- Model Operating Modes, Fault Fingerprints, Fault Diagnosis, Event Detection and Pareto Analysis.

CONTROL ENGINEERING

PID Controller Tuning Analysis (Ziegler Nichols, Cohen & Coon, Lambda), Controller Design, Simulation and Evaluation with Data Streaming, Robustness Analysis, Model Based Control (Linear and non-linear Model Predictive Control with trajectory tracking, SISO, MIMO). Batch Endpoint Control.

OPTIMISATION

Steady-State Optimisation with Linear, Quadratic, Sequential Quadratic Programming Engines.

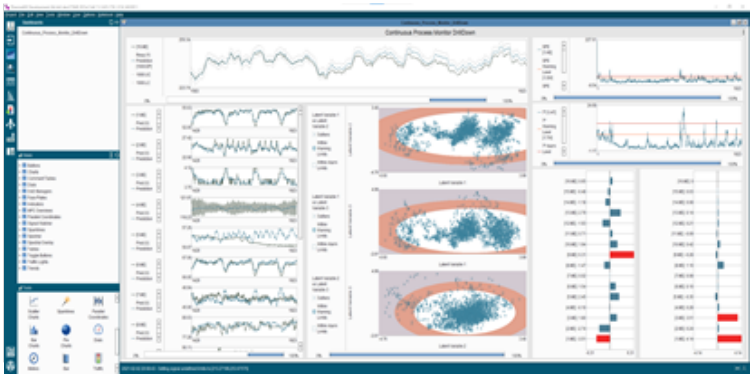
PHARMAMV PROVIDES THE RIGHT TOOL FOR SCIENTISTS AND ENGINEERS

More than ever, pharmaceutical companies strive to develop processes efficiently and improve performance of new and existing manufacturing assets. To do this, scientists and engineers need the skills and tools to evaluate opportunities and demonstrate tangible benefits in short timeframes.

PharmaMV Development incorporates a wide range of data management, statistical and model-based techniques, providing a powerful toolset in the delivery of continuous process improvement:

- **Investigate, quantify and evaluate improvement scenarios**
- **Determine, assess and prototype a model-based solution, ready for approval**
- **A logical, intuitive workflow, designed to help you quickly understand what your process is telling you**

This is why **PharmaMV Development** is being used by leading improvement teams worldwide, in pursuit of process excellence.



REAL-TIME DEPLOYMENT

PharmaMV Development is the first step towards optimising your process. Models and strategies developed offline – for improved diagnostics or control – can be deployed in Applied Material's PharmaMV Real-Time engines within SmartFactory Rx®. This allows transformation of opportunities into real, sustainable benefits whilst providing compliance with the Pharmaceutical industry's regulatory framework.

TRAINING

We place great emphasis on training to make sure our clients are familiar and comfortable with our technology, allowing them to exploit fully the opportunities identified by PharmaMV Development. Full details of our training offers can be found on our website.

e:Perceptive_Info@amat.com
w: perceptiveapc.com