# Intelligent Optimization & Analysis Tool

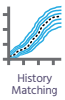
CMOST™

CMOST™ is Artificial Intelligence (AI) and machine learning enabled. Extend your capabilities and potential to improve business decisions and processes by identifying the best solution for your reservoir by combining advanced statistical analysis, machine learning and non-biased data interpretation with your engineering expertise.

- Easily build complex simulation models with advanced process wizards
- Streamline data integration and workflow management with Results™
- Import data from third-party reservoir simulators, geological or hydraulic fracture modelling software


## Sensitivity Analysis (SA)

Use the Sensitivity Analysis workflow to confidently identify and assess the impact of uncertain reservoir parameters on objective functions for improved history matching and reliable production forecasts.




## Augmented Intelligence History Matching (HM)

Augmented Intelligence HM adjusts the simulation model properties to accurately reproduce past reservoir behaviour and to simulate future behaviour with increased confidence. The automated machine learning-based workflow finds the optimal solution using minimal engineering time, in as few runs as possible.


## Optimization

Leverage AI and modern machine learning algorithms to vary dozens to hundreds of parameters simultaneously to find an optimal solution. CMOST™ AI optimizes field development and operational strategies to increase production, Net Present Value (NPV) and ultimate recovery.


## Uncertainty Analysis (UA)

Automatically incorporate all uncertainties into a model, through a combination of simulation runs and Proxy-based algorithms to quantify and understand the impact reservoir and operational uncertainties will have on project economics.

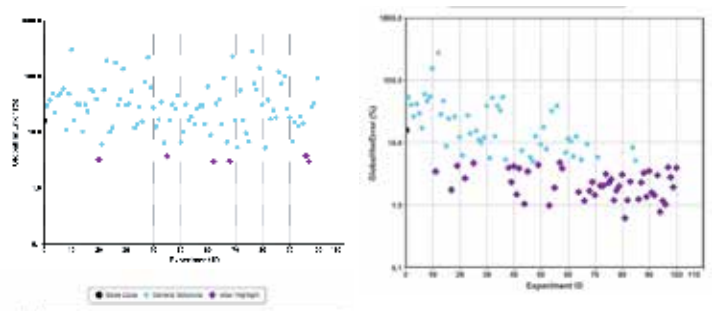
### Benefits

- Leverage neutral, non-biased data interpretation with human expertise and analysis to identify the best solution
- Achieve a new level of machine learning and intelligence in simulation studies
- Upload simulation models directly to the Cloud to run jobs on hardware optimized specifically for CMG software
- Calculate and reduce operational risk for new or existing fields
- Improve project delivery and reduce time to decision by running simulations on the Cloud
- Generate accurate forecasts through automated workflows

## Cloud-Enabled

CMG Cloud is the next revolution in technology that effectively meets on-demand needs while helping organizations avoid long-term financial commitment. CMOST enables engineers to upload simulation jobs directly to the Cloud.

- Elastic and scalable hardware and software solutions, to address varying project complexities
- Rely on two-factor authentication to securely access from anywhere in the world, 24/7 Probabilistic Forecasting



Utilize the Bayesian Engine to identify an ensemble of probable history matches

## Probabilistic Forecasting

Identify several possible solutions and generate accurate forecasts to reduce risk and make better business decisions. CMOST applies CMG's proprietary Proxy-based Acceptance-Rejection (PAR) sampling to define the posterior probability density function by using "misfit" simulation results and measured production data.

- Capture uncertainties in forecasts while honouring observed production/injection data
- Reduce computational costs and significant project turn-around time
- Use multiple history matched models to generate P10, P50 and P90 forecasts to determine the expected range of results during field application

## Robust Optimization

Solve the industry-wide issue of geological uncertainty by using multiple geological realizations to create a risk-weighted optimization solution for a field development plan. The automated Robust Optimization workflow enables companies to make better informed decisions, leading to a higher probability of success and profitability.

- Increase accuracy by considering as many geological realizations as appropriate
- Utilize the simple Robust Optimization workflow wizard to set up "master" and "dependent" studies

## Proxy Modelling

CMOST employs machine learning to build relationships between reservoir input behaviour and the response of cumulative oil, water and gas when parameters change.

- Proxy modelling alogorithms (polynomial regression, Radial Basis Function (RBF) and machine learning) use predictions from the simulator to rapidly estimate simulation results without additional runs
- Build multi-layer neural network proxy models for analyzing objective function results
- Achieve instantaneous prediction response with the interactive proxy dashboard
- Create experiments manually and use filters to analyze results
- Use an advanced calculation engine to create experiments with classical experimental design, Latin hypercube plus proxy or user-defined parameter values

## Easy to Use

Effortlessly optimize the placement of wells, fracture spacing, infill drilling plans, injection rates and pressure maintenance, using virtually any reservoir model parameter to improve economics, reduce risk and quantify uncertainty.

- Organize multiple simulation studies to easily compare information and improve productivity
- Create user-specified grouping criteria for individual experiments
- Continuously update/change parameters and utilize include files as parameter values
- Intelligent job submission to improve accuracy of results

## Open & Extensible

Customize CMOST to meet project/company requirements, enhance optimization results, and generate more realistic models for history matching and sensitivity analysis.

- Formula editor improves usability and helps to interactively define variables
- Create user-specified grouping criteria for individual experiments, using a 0 to 5-star rating to intuitively organize results
- Create or plug-in user-specified optimization algorithms
- Coupled to IPSM software (CoFlow and CoFlow-X), and geology & geophysics packages (Petrel† & GOCAD†)

**Contact**

For more information please contact marketing@cmgl.ca

**R&D Investment**

CMG reinvests 20% annual revenue back into R&D, to further innovation and drive technology forward

**Superior Software**

CMG delivers easy to use software that provides the most accurate results

**Dedicated Support**

Experienced technical sales & support personnel, deliver highquality, timely and personalized customer support

**Relevant Training**

CMG's industry renowned reservoir software training provides the skills to improve productivity and efficiency