



Delivering Excellence,  
Creating Value



# SANDMASTER BROCHURE



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*Sand  
Master*

Your Solution to Manage Sand





# What is SandMaster™?

- First Software of its type in Oil & Gas Industry focusing mainly on sand management
- Developed on a patented \*workflow, Sand Master is all about Sand Management Systems & Tools for Evaluation of Risk to provide incremental production with solids production.
- Identifying the Weak-links & Develop Risk Envelopes for Erosion, Deposition & Handling risks within a facility.
- An approach to seek and evaluate the effectiveness of managing sand at surface to rejuvenate wells not producing or restricted due to sand production.
- A combination of standard & widely used industry correlations with advanced algorithms & programming have been used to generate an entire novel & unique way to manage sand at all levels & catering to all disciplines.



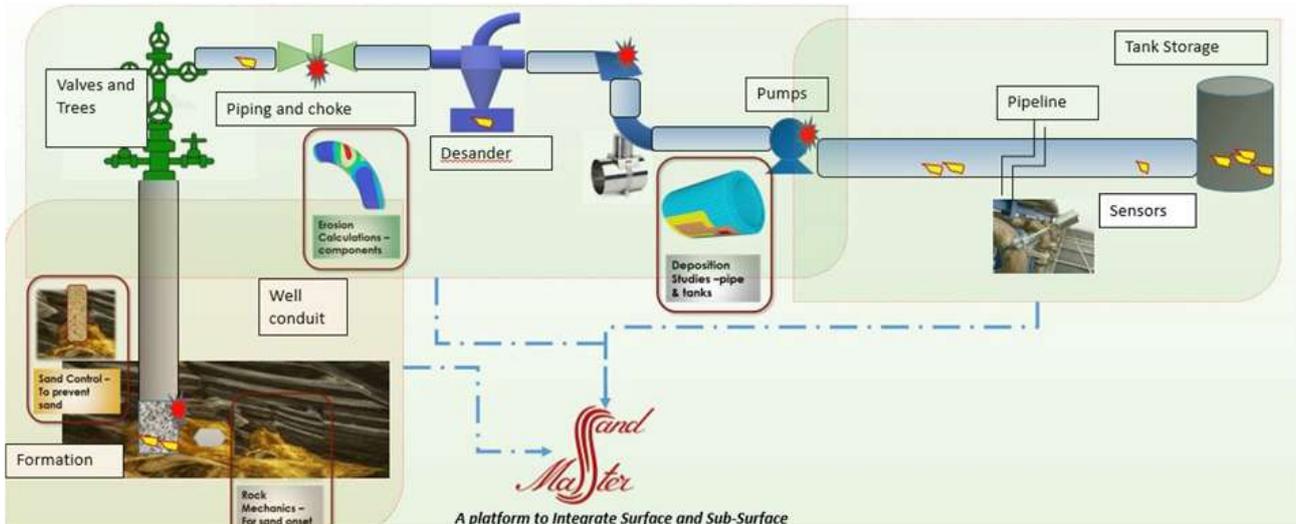
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## Current Gaps/ Challenges in Sand Management

- Decision making whether to manage Sand at surface or down hole during early field life.
- Sand control failures due to sub-optimal design or execution
- FDP & facility designing and/or brownfield rejuvenation phases
- Is there a way to simulate real field deposition and erosion conditions ?
- Estimating Equipment/Pipeline life on basis of calculated risks and erosion rate
- Selection of optimum location to install acoustic or UT sensors
- Optimum Sand production limit within which facilities can be operated without any HSE risk.
- How to plan risk evaluation if the sand concentration is unknown or inaccurate ?
- No firm solutions except producing the well at restricted potential

# Highlights of the Main features

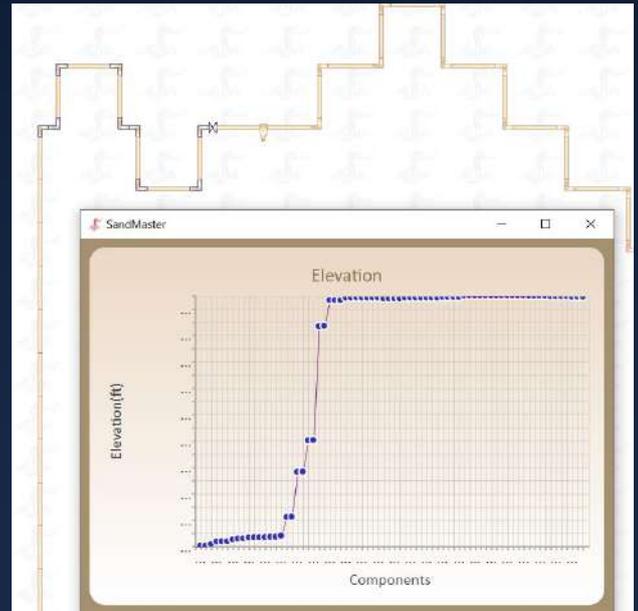
## Simulating entire facility from wellbore to surface

### Modelling of entire facility :

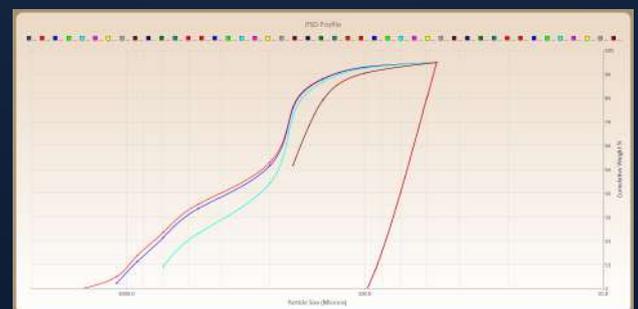
The software has the capability to develop an entire facility right from a sub surface wellbore up till top side facilities & pipelines in a single model. The block format of preparing the facility is an easy-to-use interface and helps in developing the entire model of any number of equipment.

### Particle Size Distribution profile :

The facility model with the inclusion of proprietary separation algorithm helps in identifying PSD profile of sand after each and every component for better decision making on sand management decision. It is a huge value creation while operating a sand production prone facility.



Development of model from Well to Surface Facility

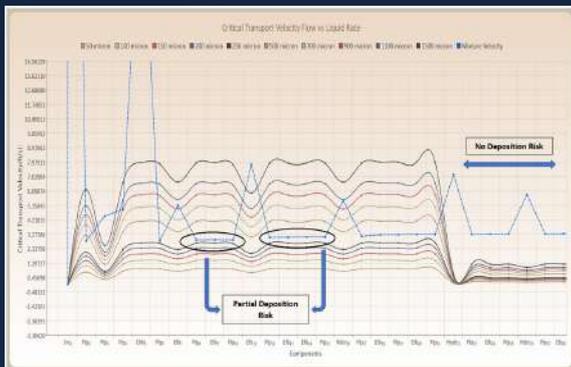


Particle Size Distribution Profile generated for each component within the facility

# Simulation of Solids Related Risks



**Deposition Risk :** Deposition of sand whether downhole or at top side is one of the biggest challenges. With state of the art algorithms and multiple deposition models, SandMaster™ brings a unique feature of simulating solid deposition for individual particle sizes in annulus, casing, production tubing, surface pipelines & Separators/ vessels.



Snapshot of deposition trend across all components

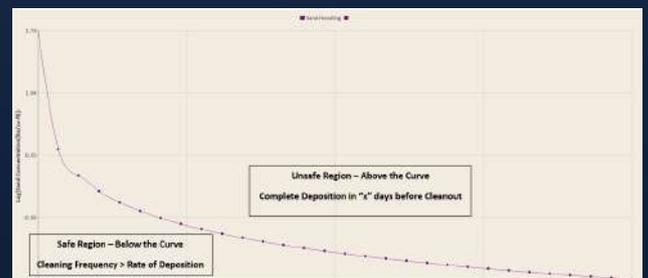
**Critical Transport velocity :** The software enables in calculating critical transport velocity via various methods ensuring every single particle size is considered and is calculated.

**Erosion risk :** Once the facility is modelled, sand flow related risks like erosion in pipes, bends, chokes & pumps can be highlighted along with wall loss predictions.

## Corrosion – Erosion :

Incorporating the corrosion correlation to evaluate erosion-corrosion combined analysis brings a unique way to model this concept. Whether its an erosion dominated corrosion or corrosion dominated erosion it can be easily detected.

**Sand Handling Risk :** This feature is an extension of Deposition risk evaluation where user can perform time based calculations to optimize removal/ flushing of filled-up solids from any location whether downhole or top-side. E.g. Coiled tubing Clean out or Separator/ desander flushing schedules.



Sand Handling and CT clean out charts



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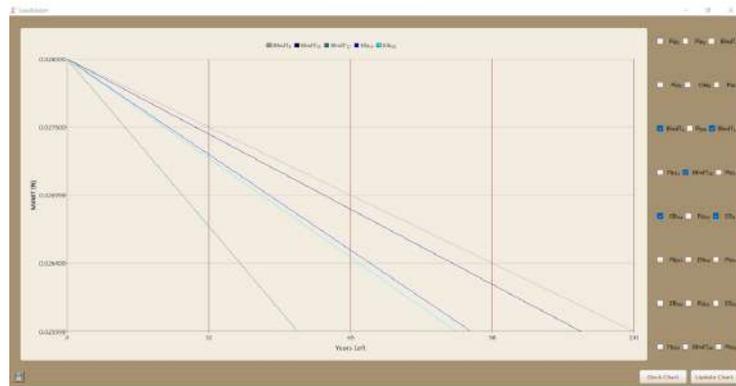
# A unique blend of Algorithms & Calculations

## Scatter point Calibration for Erosion :

It is at times challenge to calibrate, or history match the output of erosion or deposition due to different flow conditions. A special feature of application is the ability to provide the average calibration factor for a component if there are multiple such component operating in entire facility at different flow environments.

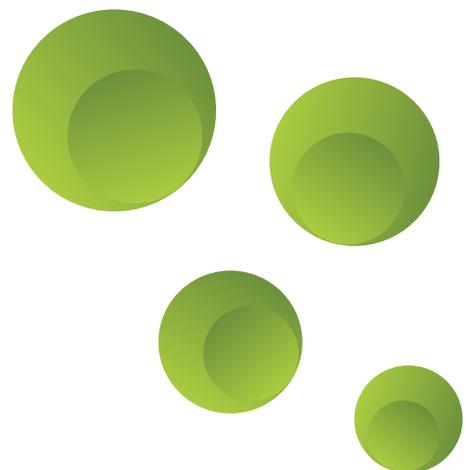
**Handling Gas injection and separation :** For a multiphase flow, expansion of gas determines the velocity of system as well as flow regime. Within SandMaster™ a special feature of overriding gas rates in an equipment is incorporated. This provides a flexibility of simulating injection or separation of gas.

**Data Analytics :** Development of a strong back-end database for component life due to metal loss, erosion rates, unique algorithms on deposition and sand management risks leading to production uplift opportunities. This not only establishes trends on the basis of flow regimes, but also enables organizations to develop their own factors and modified correlations suited to specific fields and platforms.



## Component Life :

Each component is characterized with feature of calculating the minimum allowable wall thickness on basis of working pressure and conditions. This helps in further evaluating to the end user, the duration of component life. This enables user to identify the weak links within the system & facility equipment which can be highlighted at first instance.



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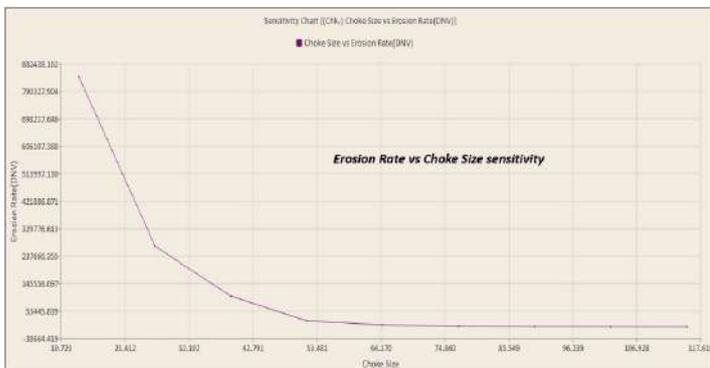




## Critical equipment design & facility Integrity

### Choke Management Plan :

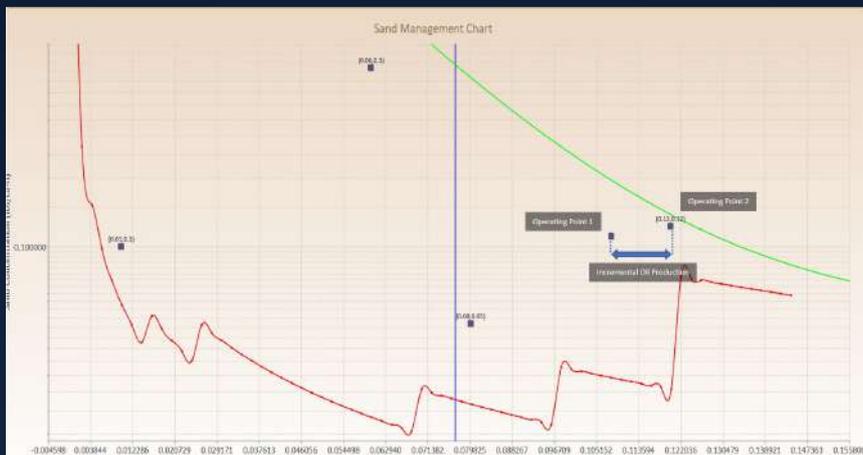
With multiple ways to predict choke erosion and choke health status, the software provides the ability for any operator/ service provider to develop a robust choke management plan.



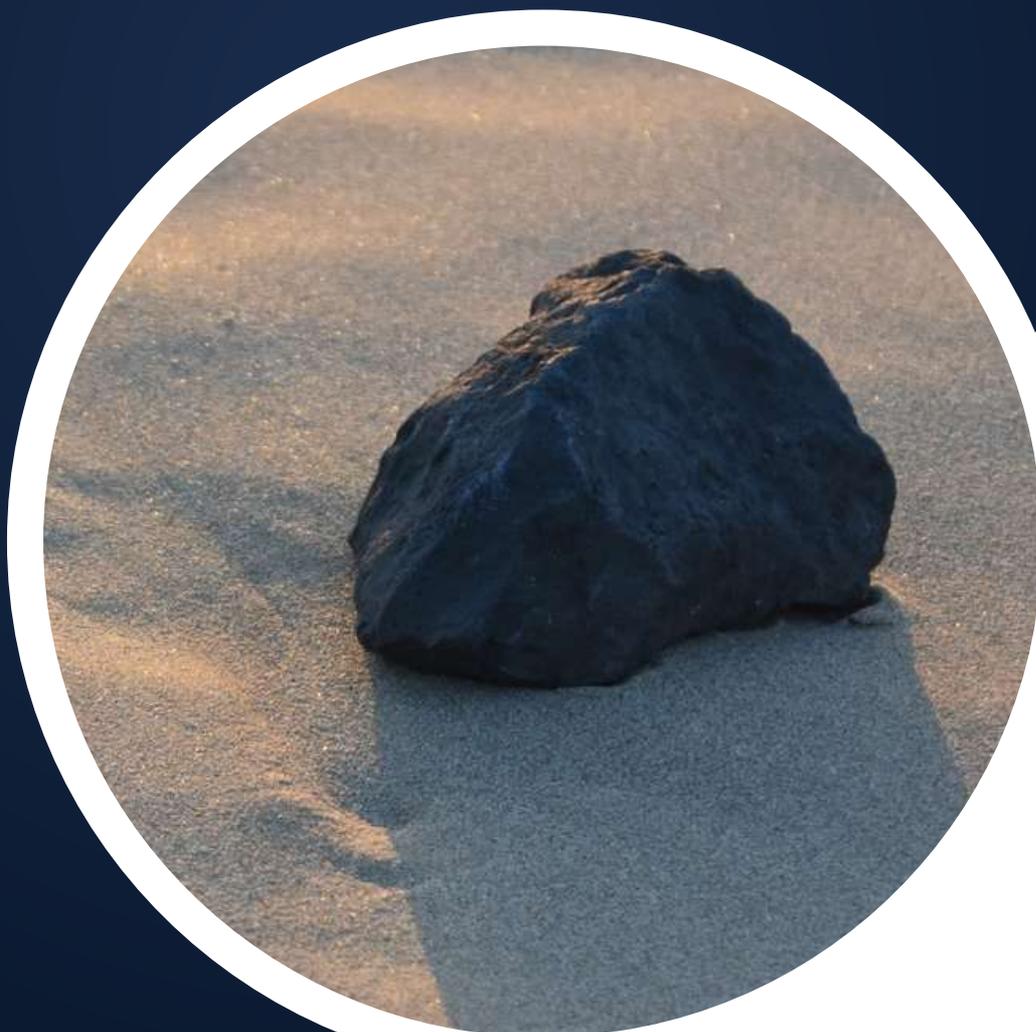
### Calculation of Choke Erosion

**Hydro-cyclone design :** Software incorporates inclusion of hydro cyclone i.e. solid separation systems with sensitivities and separation logics to provide decision making on hydro-cyclone. User can play with various geometries of hydro cyclone to evaluate cut diameter and thereby increased separation efficiencies.

**Operating Envelope** : The entire facility once modelled can be diagnosed for various risks in individual platform and an interactive patented algorithm based Sand Management Chart can be prepared as an operating envelope for the entire facility.



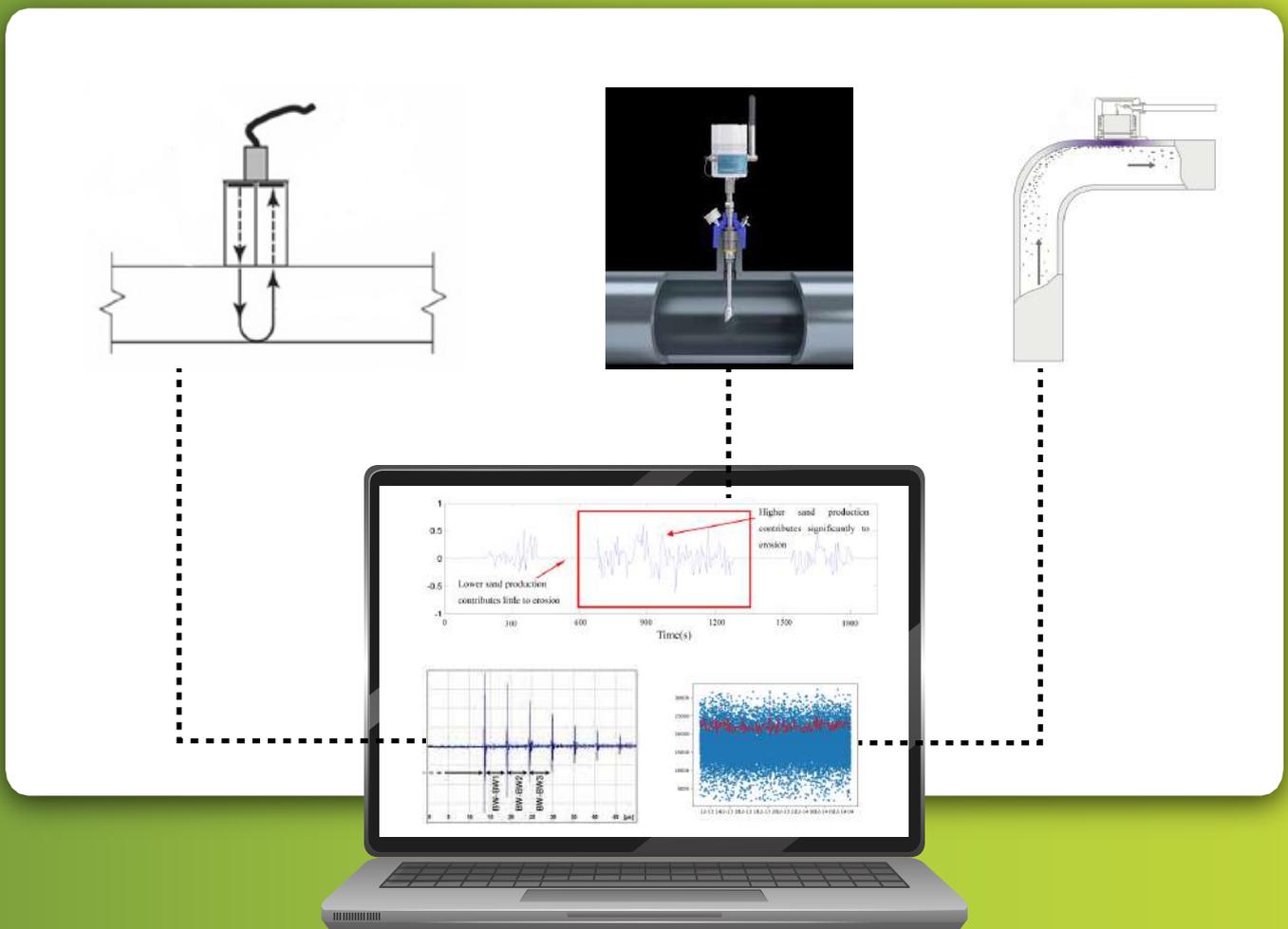
Operating Envelope for Production incremental opportunities



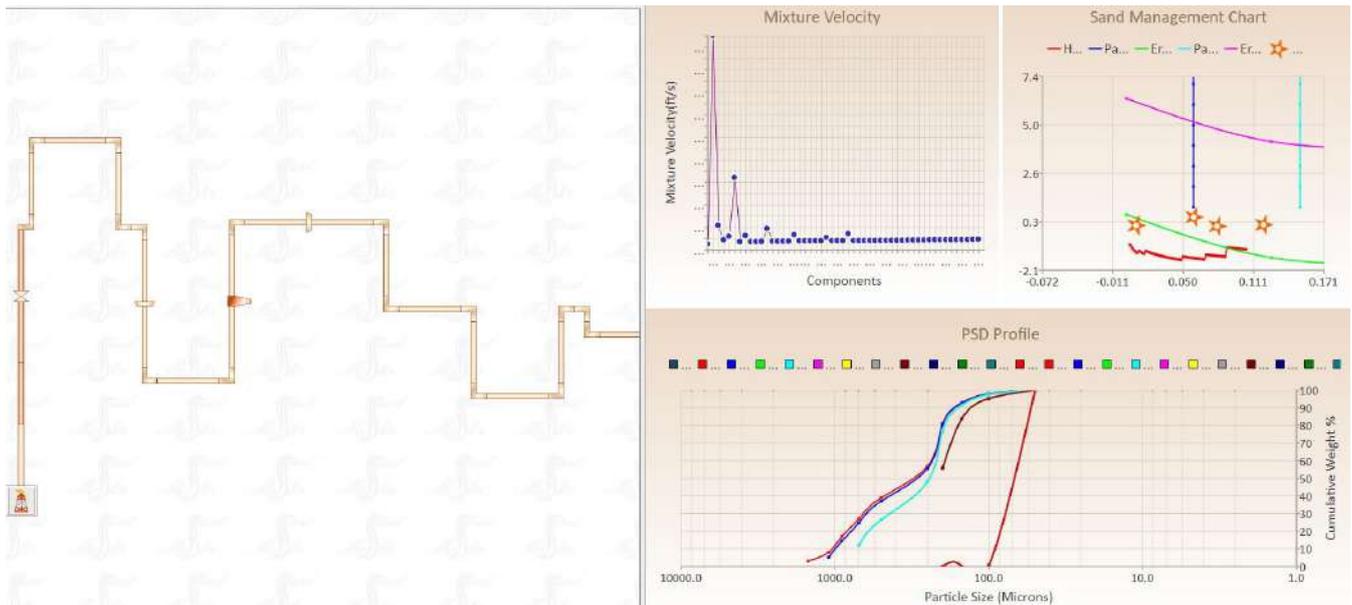
# Interpretation and Analysis of Sensors



Incorporating data of acoustic sand sensors and UT thickness devices into the software clubbed with modelling of entire piping & fittings network help in calibrating and thereby predicting accurate sand concentration and wall loss in the system. Internal algorithm using data science capability helps in reducing carbon footprint providing a state-of-art sand management operations capability.



# SandMaster Application Dashboard



## Advantages to end-user

- Opportunity of incremental production without solid related risks.
- Development of Integrated sand management dashboard including Robust choke management plan.
- Huge value creation in early identification of hazard using of risk hotspots feature.



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