GRT GLOBAL REMOTE TECHNOLOGIES

Product Summary

January 2015

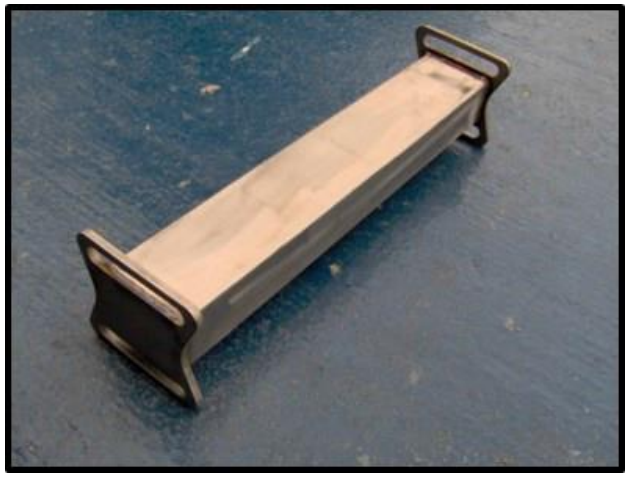
Version 2.0

MAGNETIC PARTICLE COLLECTION AND DRILLING

OPTIMIZATION USING AEROSPACE PRINCIPLES

History

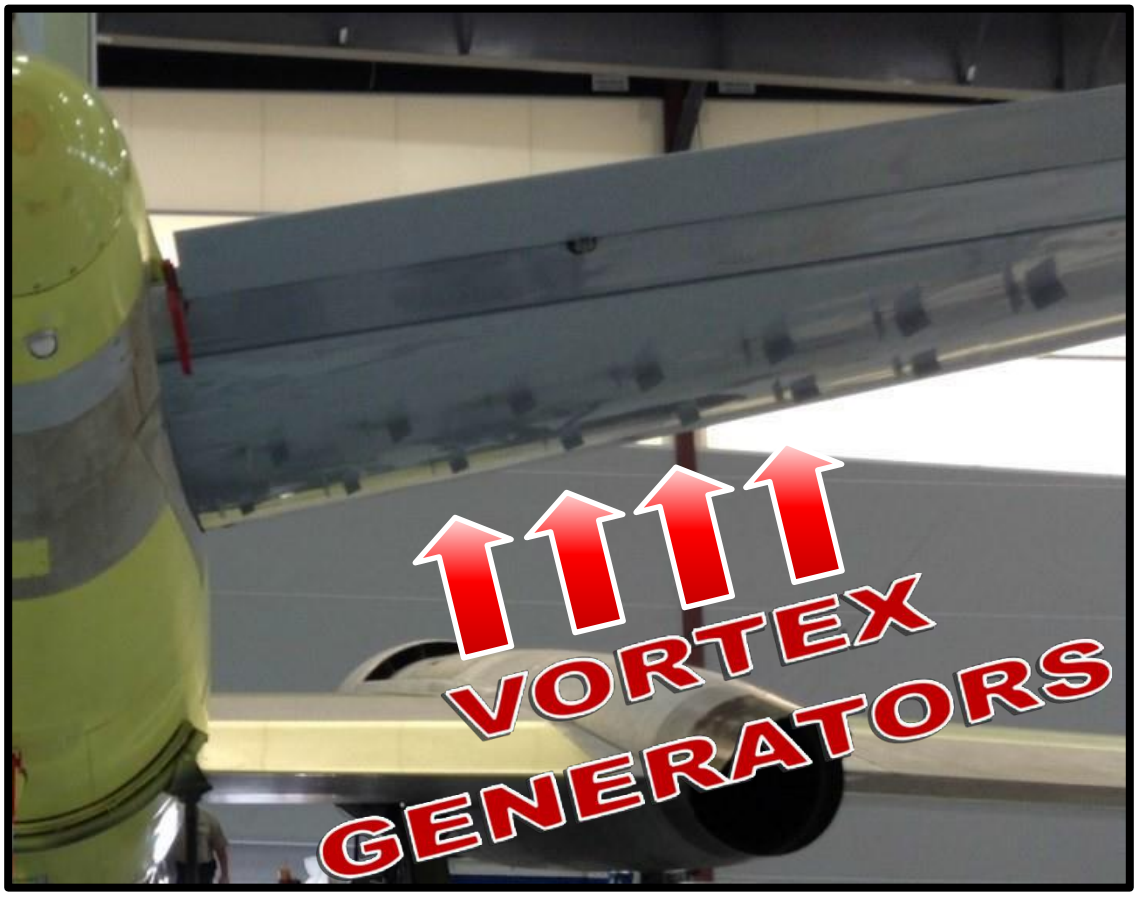
One of the key components of oil production is the drill operation performed in the field. When drilling through the different layers of rock and sand, it is crucial to maintain pressure in the wellbore, while simultaneously maintaining the integrity of the drilling bit. To achieve this, a water-based fluid is pumped through the drill shaft and then up through the well. The drilling fluid (mostly mud) carries destructive metal shavings to the surface from the drill bit, pipe, pipe casings, and mud motor, where it is then recycled. If ingested in the pumps, severe damage will occur. This causes costly delays in the drilling schedule, stopping the drill operation for hours, even days. To prevent this from happening, particle collectors are placed in fluid ditches to collect as many metal particles (SWARF) as possible.

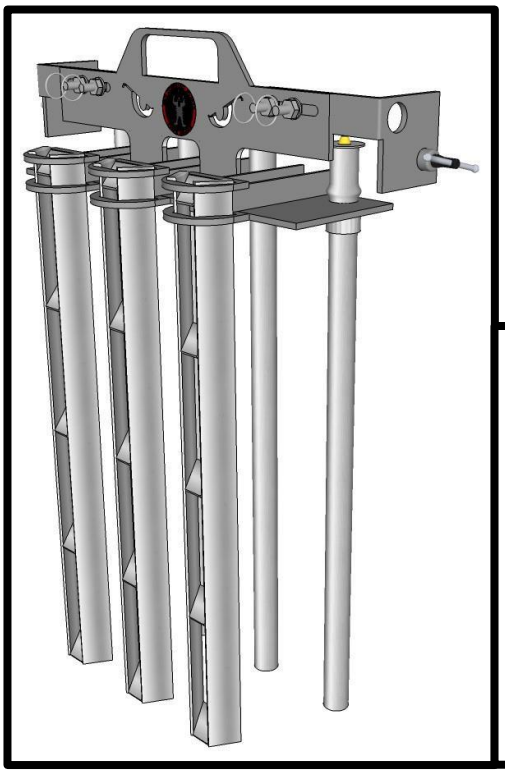


Currently, most drilling rigs use "particle collectors" to support a smooth drilling operation and to prevent damage to the pumps. The available designs in the market use passive magnetic technology to collect as many shavings as possible, employing passive magnetic methodology. The collectors are heavy, requiring cranes to lift and position, while only collecting on the bottom of the ditch. This design misses potentially 36% of metal particles suspended in the mud column near the surface.

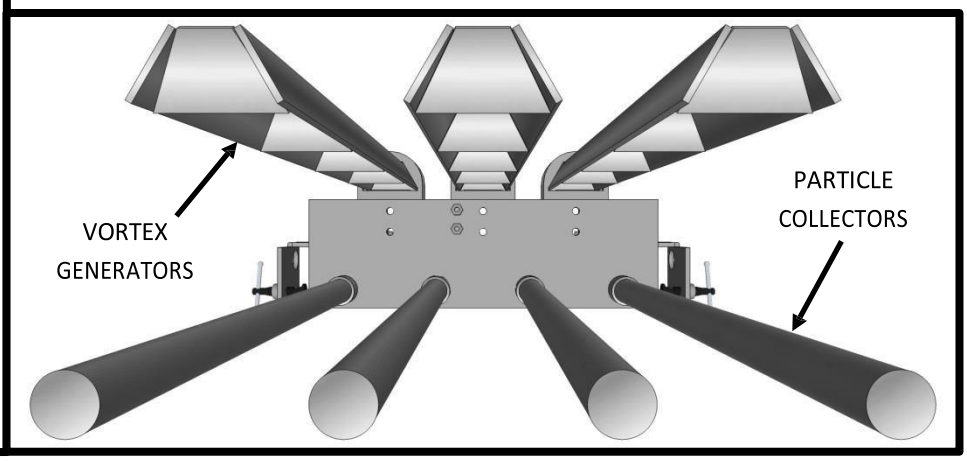
Prospector Approach

Drawing upon our company's aerospace engineering experience, the Ditch Demon™ improves the process on several fronts: lighter weight, greater collection efficiency, and ease ofuse, and it also establishes a base of measurement for use in our proprietary algorithm software package (Part B). Inspired by the NASA WB-57 high-altitude research aircraft, the Ditch Demon™ uses the aerospace principle of vortex generation in order to actively force a particle collision with the magnetic field of the collectors. This measurably increases the rate of particle collection.

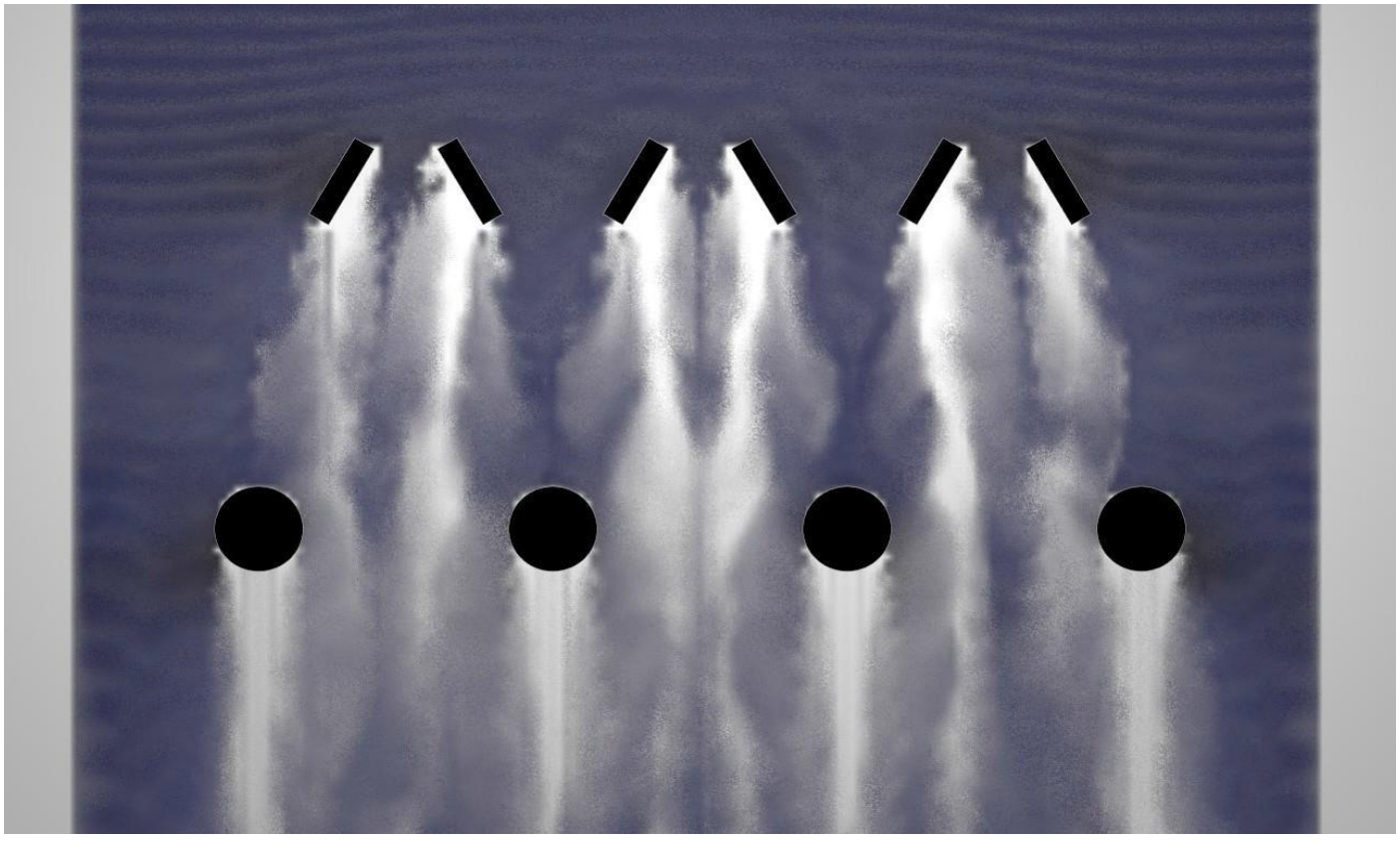




The Ditch Demon™ generates turbulence using the same design principles. As you can see from the bottom up view, the shape of the turbulence generators mimics the design from the WB-57 tail wing.

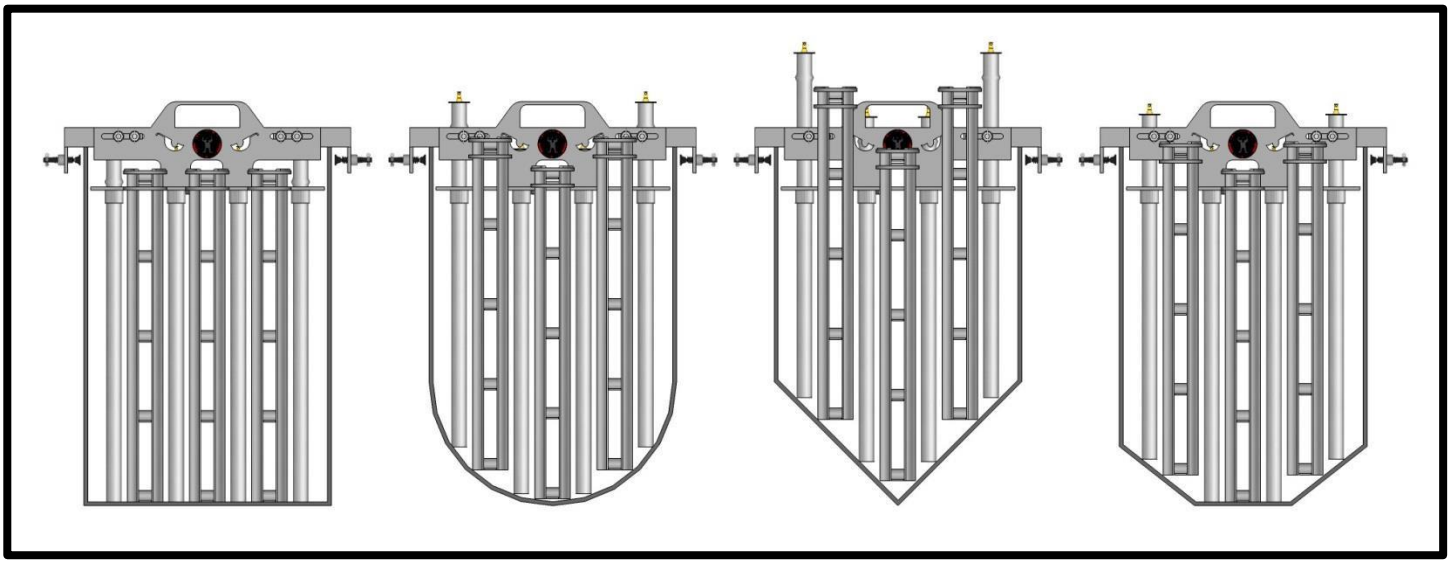


Prospector laboratories tested this design and compared results to other shapes for turbulence generation efficiency. The results showed that the WB-57 vortex generator provided the most efficient churn of fluid vs. the other shapes. This research was the inspiration for our final design.

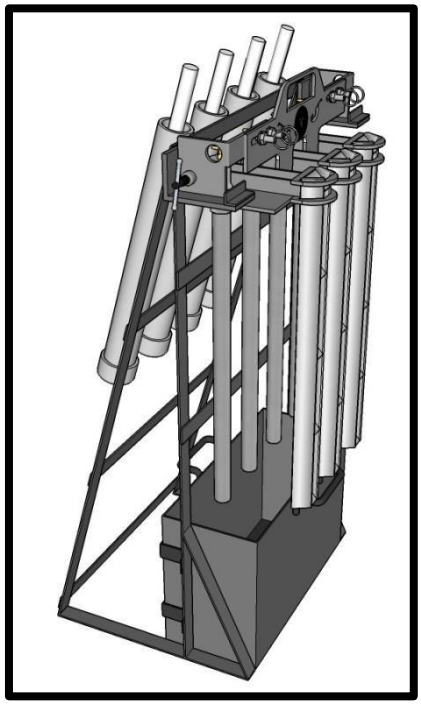


Practical Application—Part A
Mud Pump Protection

To accommodate ditches of different shapes, the Ditch Demon™ incorporates a floating collector and turbulence generator design, allowing it to adapt to any shape of ditch while eliminating the need for costly custom sizing.



At periodic intervals, utilizing our mag-neutral stand, samples are taken and analyzed (or quickly disposed of if not using the Part B functions of the Ditch Demon™). With no high-pressure spraying or scraping required, this process is quick and efficient.



Practical Application—Part B Drilling Optimization

The collected particles are processed and analyzed. The Ditch Demon's™ proprietary algorithm and software uses those results in conjunction with WITS rig data to forecast the following:

- Pipe wear analysis
- Casing wear analysis
- Drag and hydraulic analysis
- Failure points along the drill string
- Bit and motor failure projections

Video Demo

Ditch Demon

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