PAWNEE II, A MODERN DUSTPAN DREDGE

Robert B. Wetta, Kendall Christensen and Brad Morton

LOUP POWER DISTRICT
"Serving You Electrically"
www.loup.com

DSC Dredge LLC

WEDA

TEXAS A&M UNIVERSITY

WEDA 33rd Technical Conference
Texas A&M 44th Annual Dredging Seminar

CONSERVATION · POWER · PROGRESS
LOUP POWER DISTRICT

THE LOUP CANAL

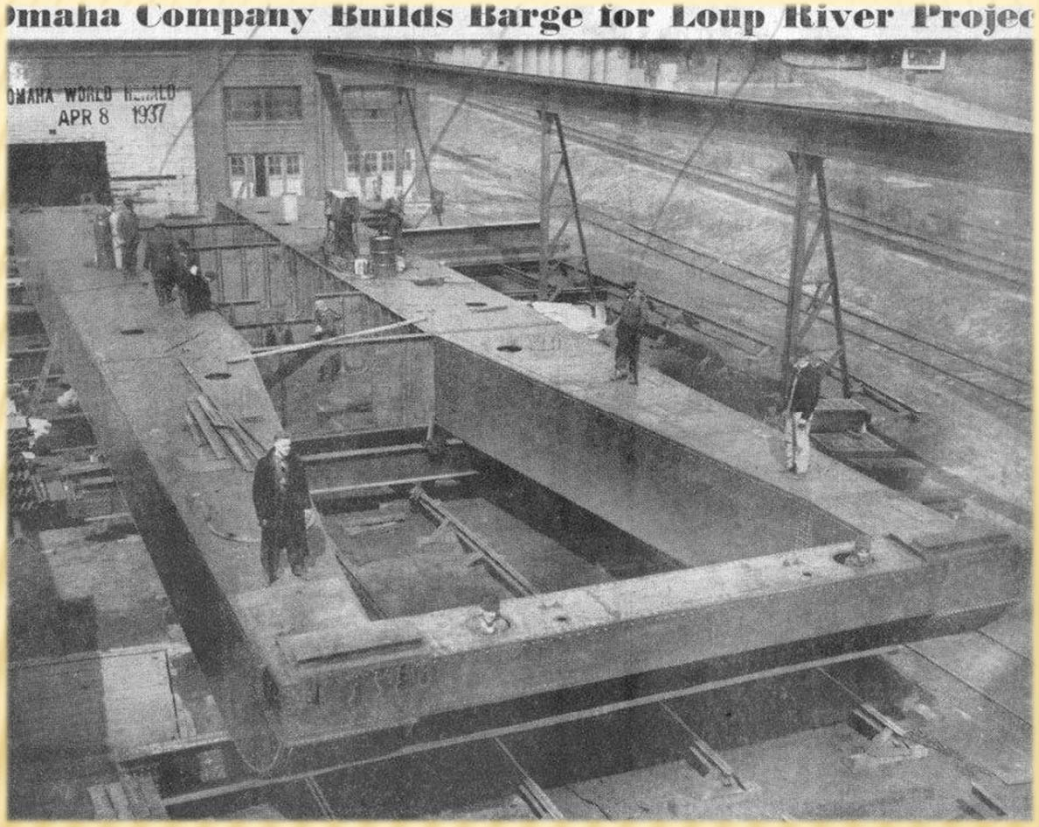
53 km canal system and reservoir
3.2 km settling basin
The water speed = 7.2 to 8 km-hr

WHY DREDGE THE LOUP CANAL?

Water from the Loup River is diverted into the manmade canal and used for hydro generation and irrigation. The first two miles of the canal was established as a settling basin to permit silt and sand to settle to the bottom.

The dredge will typically remove 3 m of sediment from the canal. Approximately 1.2 million cubic meters of sand is taken from the canal each year.

THE PAWNEE

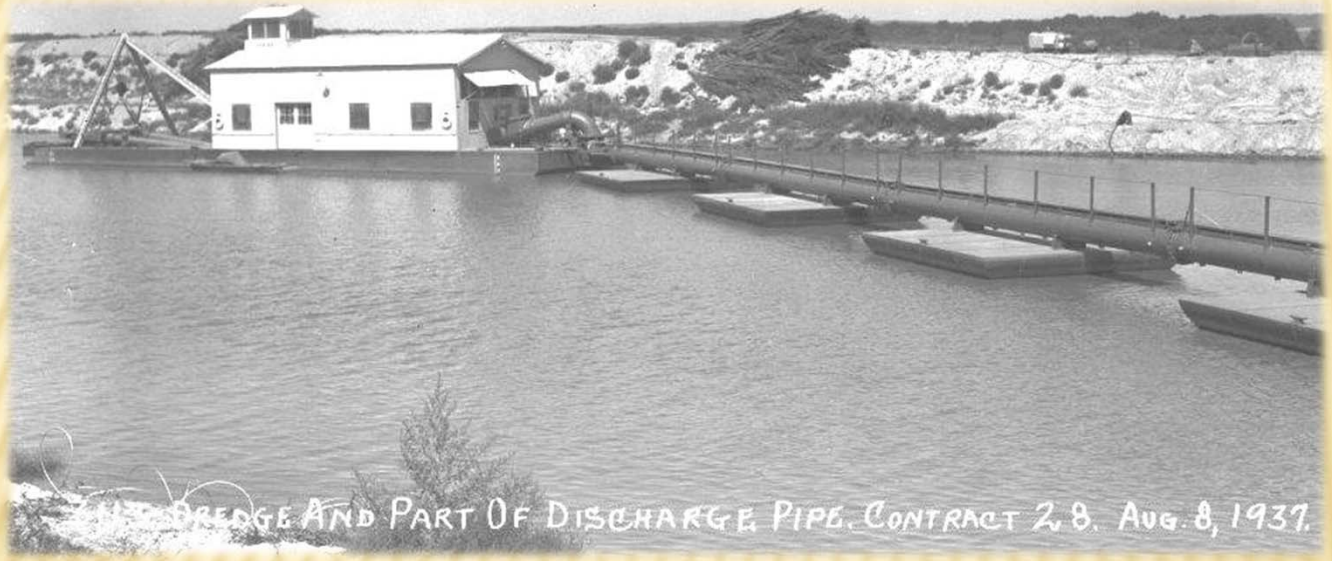


designed and built by Omaha Steel Works in 1937

33 m long x 9 m wide x 1.8 m hull depth

original cost = $186,000

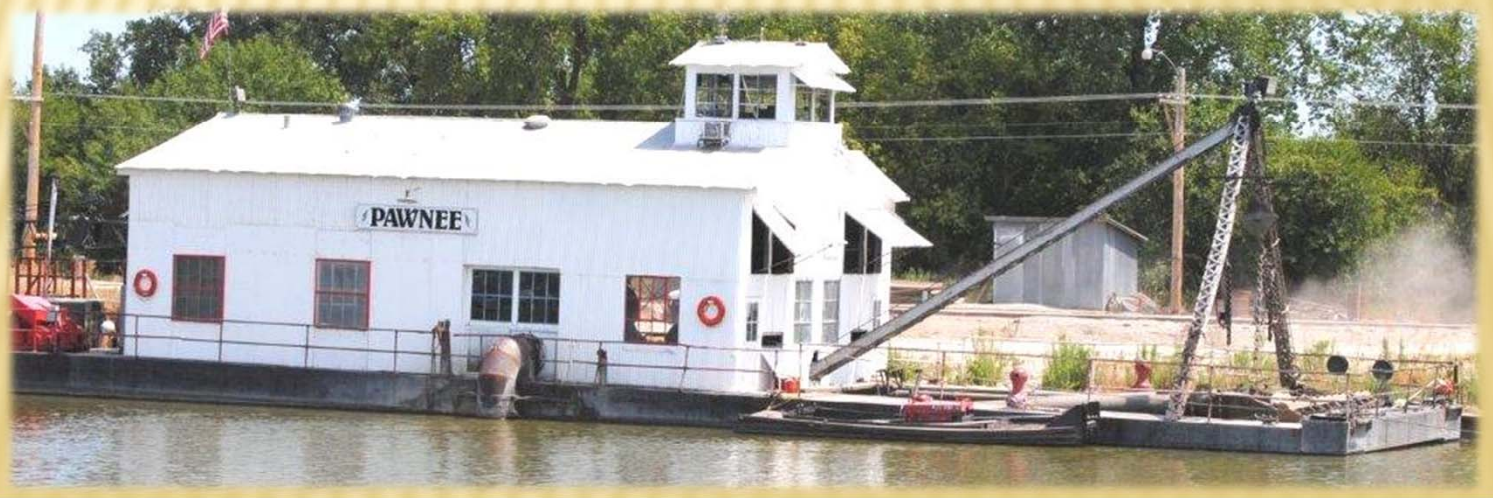
THE PAWNEE



Original pump motor = 895 kW

Replaced pump motor in 1984 = 1,864 kW

15 kW digging jet



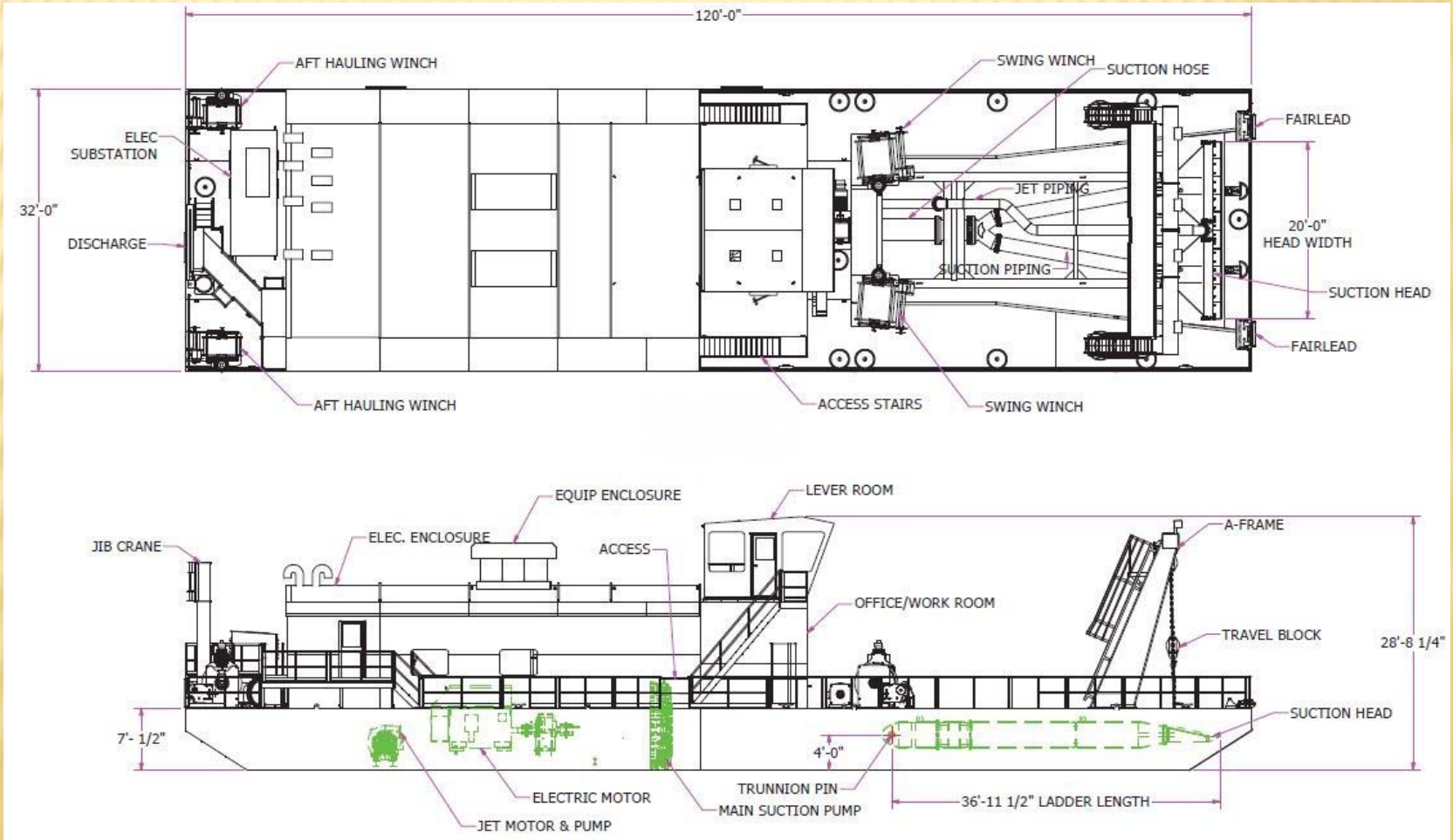
THE NEED FOR A NEW DREDGE

Contributing Factors to Replace the Dredge Pawnee

- The age of the Pawnee was a factor in the replacement, including hull integrity
- Need to upgrade pumping and digging power
- Efficiency (power consumption)
- Monitoring and control technology
- Maintenance parts availability
- Reliability
- Rising maintenance costs

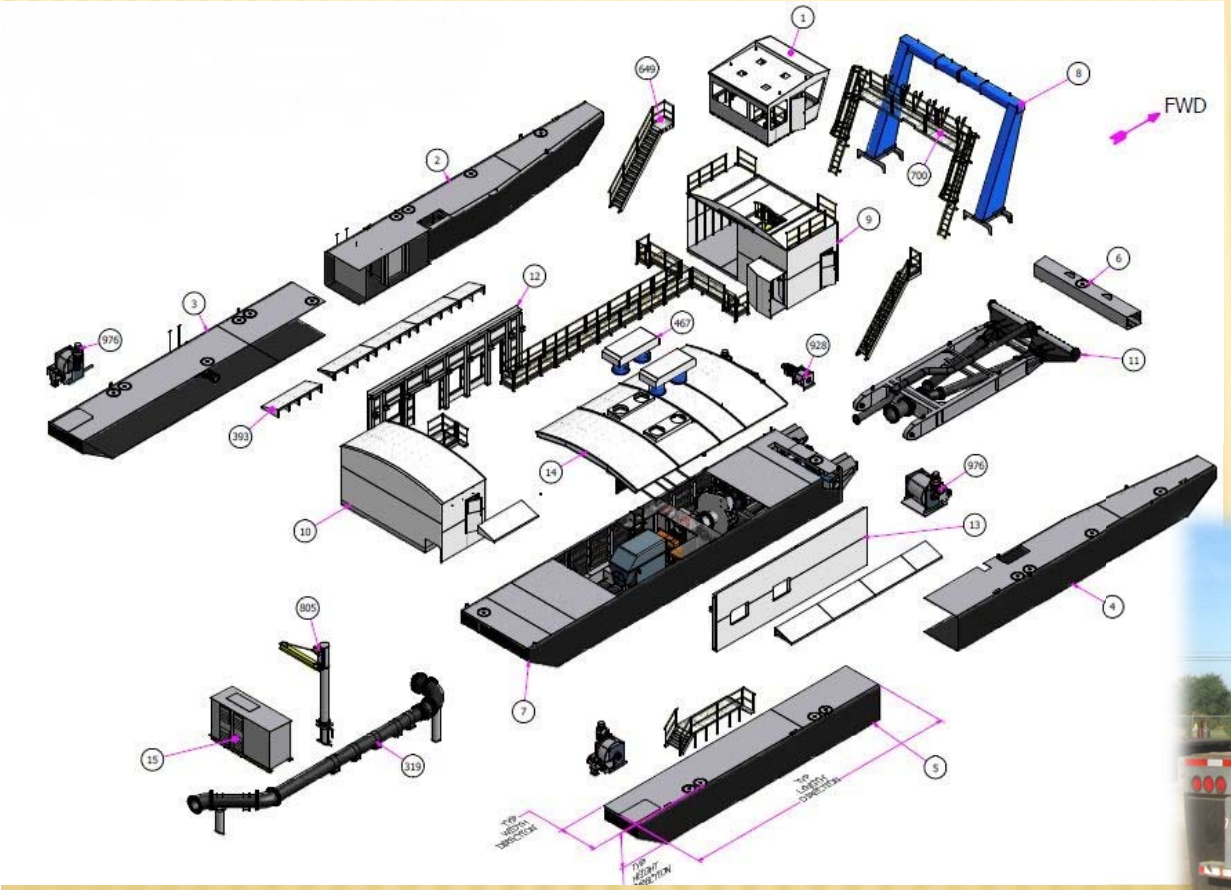
WELCOME PAWNEE II

General Arrangement



WELCOME PAWNEE II

Shipment/Delivery



19
truckloads

WELCOME PAWNEE II

Commissioned August 2012

Pawnee II Principal Data	
Hull Dimensions (LxWxD)	37 m x 9.8 m x 2.3 m (120' x 32' x 7')
Suction Head Width	6 m (20')
Suction Diameter	650 mm (26")
Discharge Diameter	600 mm (24")
Total Installed Power	2,667 kW (3,577 HP)
Prime Mover Power	2,237 kW (3,000 HP)
Digging Jet Power	298 kW (400 HP)
Dredging Depth	1.5 m to 5.5 m (5' to 18')
Displacement	322 tonnes (710,000 lb)

Manufacturer responsible for transportation, field assembly, launching & training

WELCOME PAWNEE II

Design Info

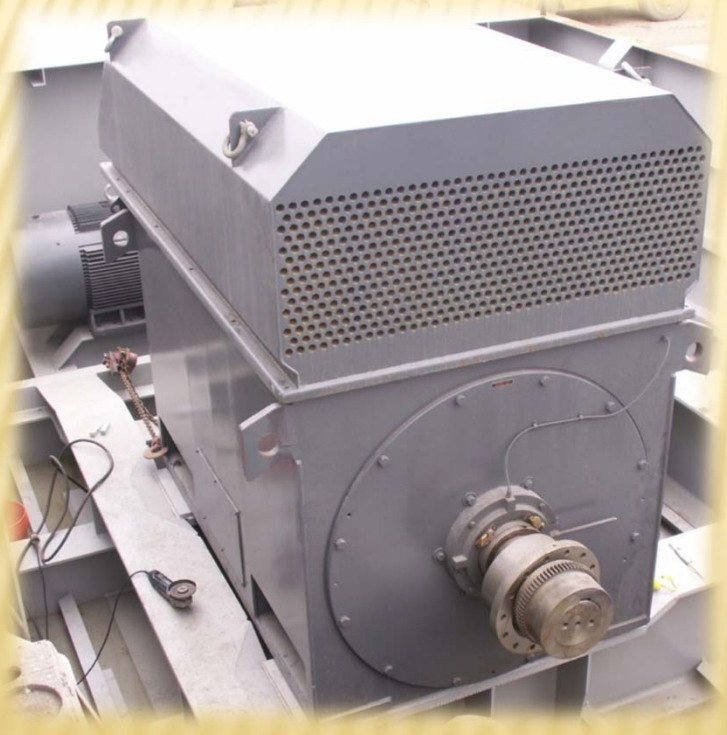
- 10,000+ engineering man-hours
- 30,000+ manufacturing man-hours
- the dredge is energized by a single 4160v input trailing cable
- the dredge was manufactured as a mono-hull design and the final mating of the hull sections took place at the assembly site
- efficiency, efficiency, efficiency
- increased digging jet power
- good availability or wear components
- electric winches with level-wind
- similar operating techniques as Pawnee – familiarity
- modern operating systems
- data monitoring – control system

The Pawnee II's VFD drive is a major upgrade from the Pawnee's dredge pump motor that was started across the line. The VFD drive allows for an increased efficiency and allows the operators to start and stop the dredge pump when required for servicing or shutdown. The VFD drive allows the operator to easily adjust dredge pump speed to accommodate bank conditions and required feed rates

WELCOME PAWNEE II

Primary Features

The dredge pump motor is a 2,237 kW AC motor that is driven by a Variable Frequency Drive (VFD)



WELCOME PAWNEE II

Primary Features

Dredge Pump - GIW model 24x28TBC

WELCOME PAWNEE II

Primary Features

Lufkin Pump Reduction Gear

WELCOME PAWNEE II

Primary Features

Dustpan Head and Jets

WELCOME PAWNEE II

Primary Features

Electric Equipment

WELCOME PAWNEE II

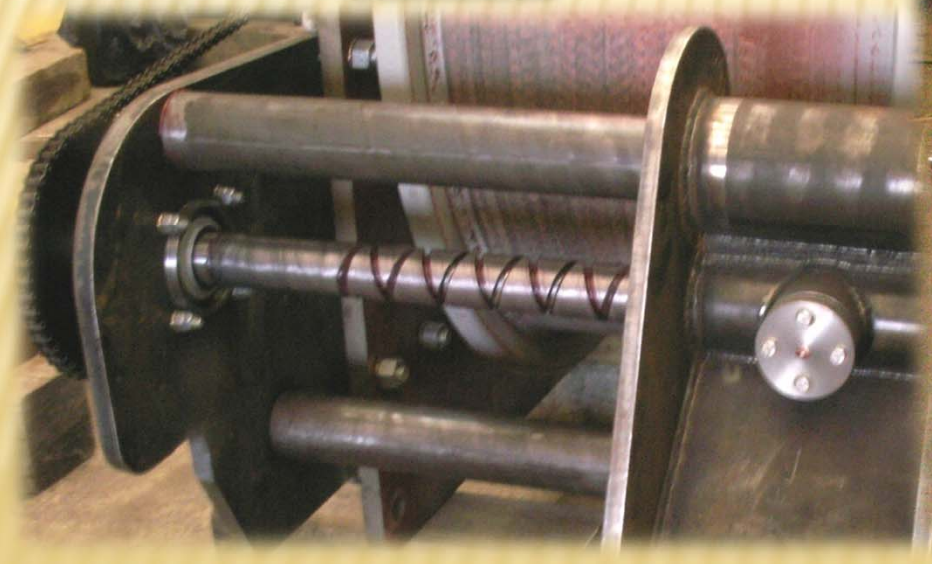
Primary Features

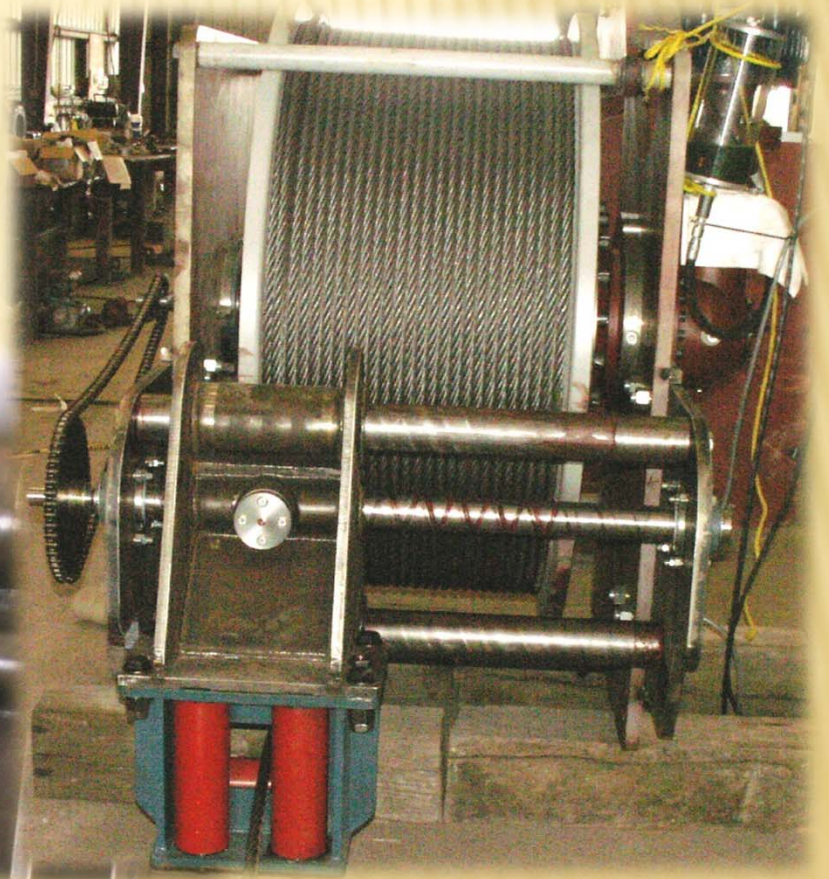
Electric Equipment

WELCOME PAWNEE II

Primary Features

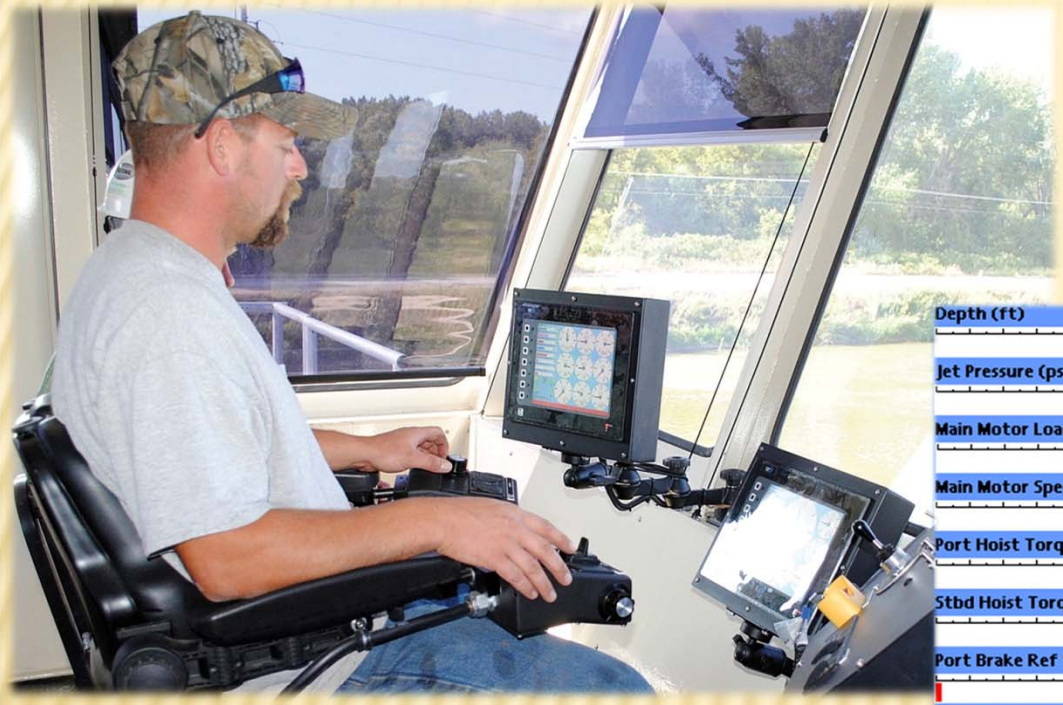
Winches



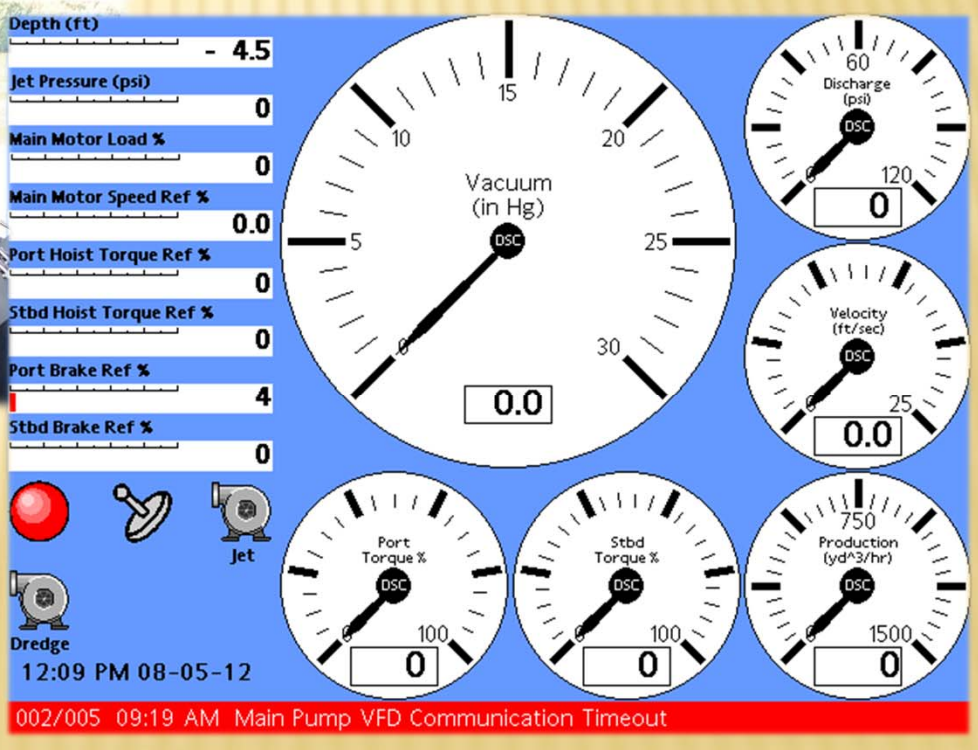


WELCOME PAWNEE II

Controls/Control System

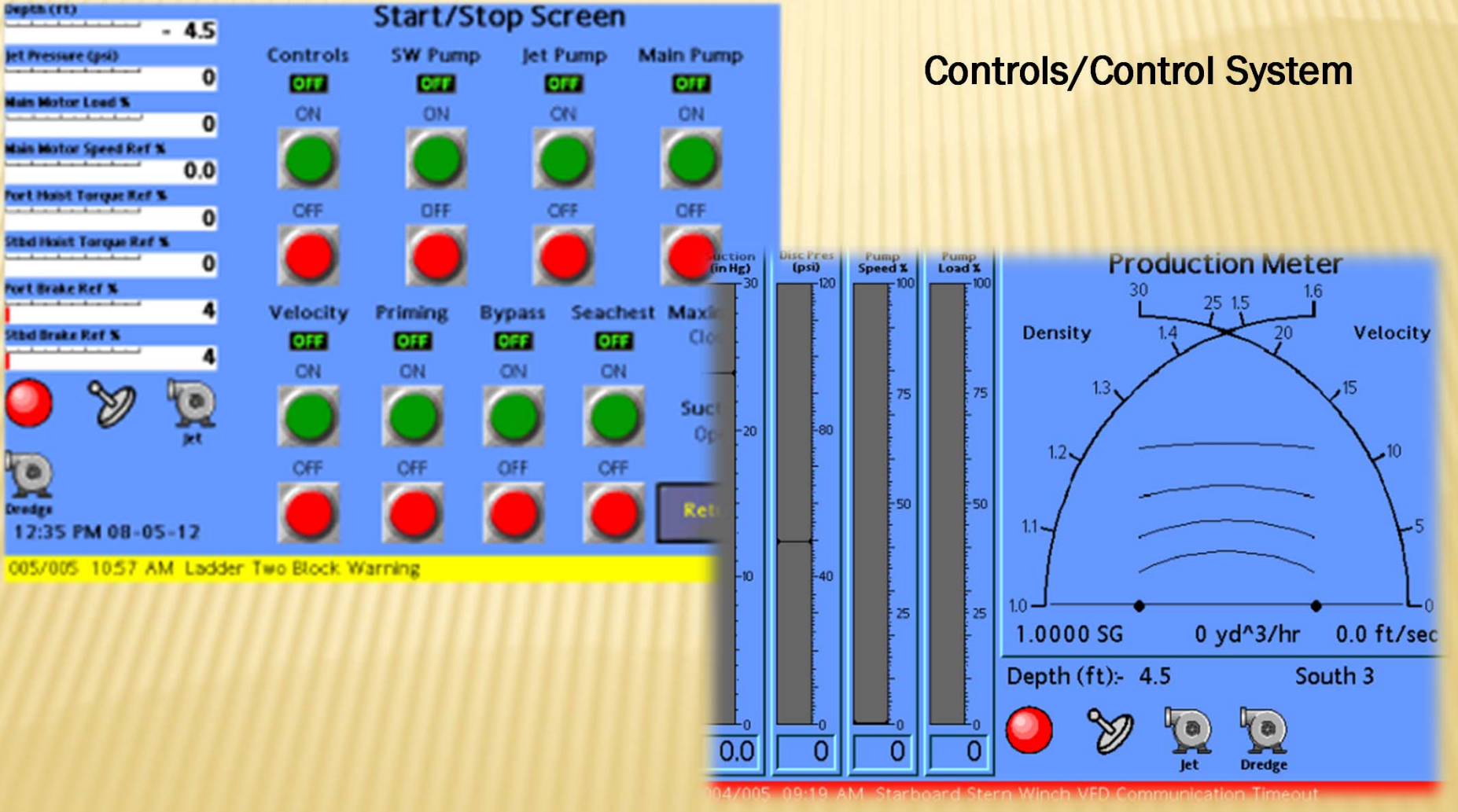


Remote monitoring through telemetry



PLC based operating system allows for high level of automation

WELCOME PAWNEE II



Controls/Control System

WELCOME PAWNEE II

Convenience

Maintenance Crane/Trolley

WELCOME PAWNEE II

Convenience

WELCOME PAWNEE II

Lighting

WELCOME PAWNEE II

Pumping

Dredge designed to pump on existing pipeline system

Nozzle test

WELCOME PAWNEE II

WELCOME PAWNEE II

Conclusions

From the manufacturers perspective and because this was their first dustpan dredge design/build, DSC was skeptical that a dustpan dredge truly had defined application. Once the Pawnee II was operational it was evident that a dustpan dredge does indeed serve a niche application. The Loup Canal was certainly identified as one of these niches. When working in this type of waterway and when bulk natural removal of sediments are required, a dustpan dredge should be considered as an option to the type of dredging equipment to be used. When used in the right application a dustpan dredge can produce higher densities than a conventional cutter suction dredge and might be the most economical and efficient tool for the job.

WELCOME PAWNEE II

Questions ???