

INTELLIGENT PUMP CONTROL SYSTEM



Record of Revisions

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Revision Data

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Revision Number	Date	Brief Description
1	_____	_____
2	_____	_____
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About This Manual

This manual is not a textbook on mechanics, electronics, or hydraulics. Sufficient descriptive material and illustrations are included to enable the operator to understand the basic construction and theory of operation of this equipment. The intent of this manual is to guide the operators and maintenance personnel in the proper use of the equipment. This manual is not a substitute for properly trained personnel or common sense.

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All information in this manual is based on the latest production information available at the time of publication. Direct any questions concerning the contents or format of this manual to:

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1.0 Overview

Chapter

1

Stewart & Stevenson's Intelligent Pump Control System (IPC) is capable of monitoring and controlling multiple fracturing pumps simultaneously from a single location, giving the operator precise, remote control over an entire fracturing spread. The IPC System allows users to control various functions of the equipment through a touch screen interface. Status lights are used to notify the operator of alarms when a problem exists with the engine, transmission, or the pump. Functions, such as start/shutdown of the engine, increasing/decreasing throttle, and gear selection, can be controlled via the pump control panel.

The IPC is a microprocessor-based system with a touchscreen operator interface that can be stored in a weather tight suitcase or panel-mounted inside a Control Center. The display is a touch sensitive 8.5" X 6.25" graphical display. IPC simplifies operations by reducing the amount of electronic components required to control the various functions of fracturing equipment.

Control Functions

- Engine throttle
- Transmission shift
- Transmission brake
- Engine emergency shutdown (optional)
- Engine normal shutdown
- Engine start

Control Parameters

- Engine fault codes with translations
- Engine speed
- Engine oil pressure and temperature
- Engine water temperature
- Transmission oil pressure
- Torque converter status indicator for converter and lockup modes
- Pump speed
- Pump oil pressure and temperature
- Pump discharge pressure with overpressure module
- Pump discharge rate and total hydraulic horsepower production (calculated)

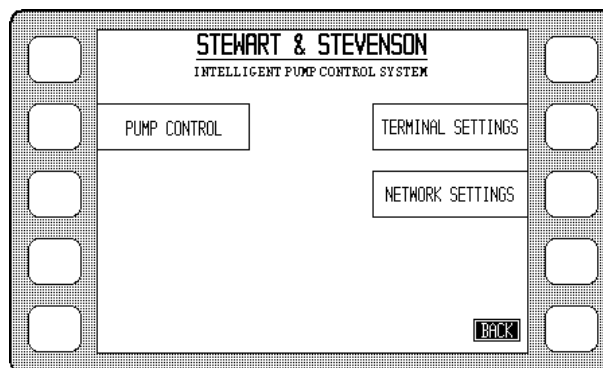


Figure 1: Main Menu

2.0 Operation

Chapter

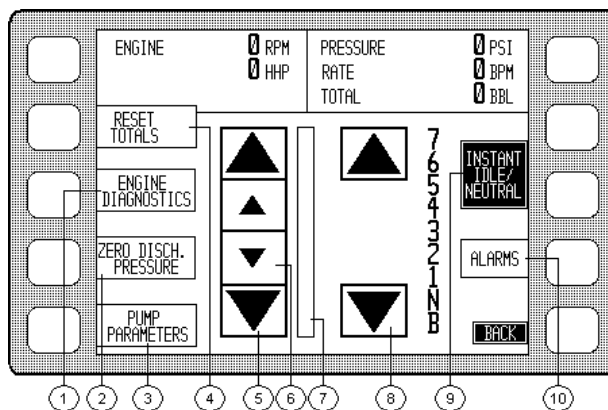
2

This chapter covers the specific details of operating the Intelligent Pump Control System. It also explains the many different abbreviations, buttons, screens, and controls used on the following display windows, how they are used, and what they mean. These display windows include the *Control Screen*, *Engine Diagnostics Screen*, *Alarms Screen*, and *Over Pressure Trip Point*.

2.1 Control Screen

The *control screen* is the main screen from which the operator controls the pump. From this window the operator can view engine diagnostics, zero discharge pressure, modify the alarms, increase engine throttle, and switch between gears.

- To access the control screen clicking the **Control** button on the *Intelligent Pump Control* screen.



Values displayed across the top of the screen come from the Electronic Control Module (ECM) sensors, and calculated values.

Below the ECM values, the operator can increase/decrease the engine RPM's and change gears by pushing the up/down arrows. Refer to Figure 2 for more details on the Control Screen.

Figure 2: Control Screen

1. Takes the operator to the *Engine Diagnostics* screen, which will display all the values from the engine's ECM.
2. Clicking the **Zero Discharge Pressure** button will reset the Pressure (PSI) to 0.
3. Allows the operator to quickly modify the various features on the *Pump Characteristics* screen.
4. **Reset Totals** will reset the slurry total (BBL).
5. Adjusts the **Small Throttle**.
6. Adjusts the **Large Throttle**.
7. Throttle indicator that graphically displays when the operator increases/decreases the throttle.
8. Shifts the transmission.
9. Will set the transmission to neutral and the engine to idle.
10. Takes the operator to the *Alarms* screen. This button will blink when an alarm is active.

2.2 Engine Diagnostics

The *Engine Diagnostics* screen will allow the operator to view any diagnostic message from the ECM. The message will display the date, time, and description of the problem. The operator can then use the available information to correct any engine problem or malfunction.

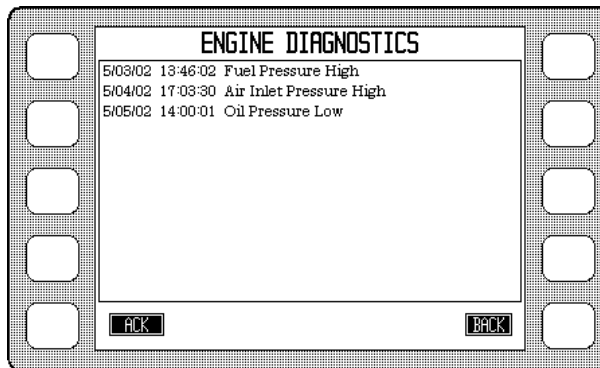


Figure 3: Engine Diagnostics

2.3 Alarms

The *Alarms* screen is setup to allow the operator to view in real time all the incoming data from the engine, transmission, and pump sensors.

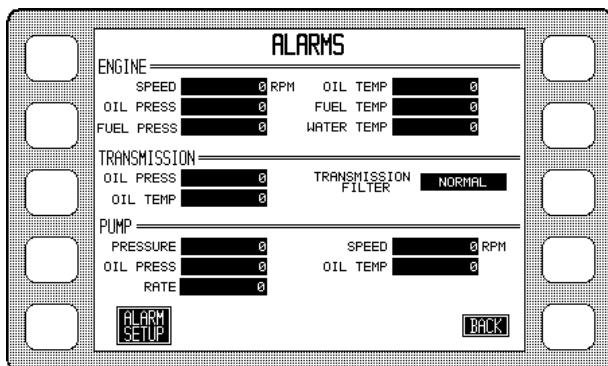


Figure 4: Alarms

To access the *Alarms* control screen press the **Alarms** button on the *Control* screen.

To configure the alarms and their high and low limits refer to the Configuring the Alarms section (**Refer to page 9**).

2.4 Configuring the Over Pressure Trip Point

The **Over Pressure Trip Point** is a fail-safe designed to prevent damage to the well by idling the engine, and switching the transmission to neutral if the trip point is reached.

The over pressure trip point can be set by clicking the **Pump Parameters** button on the *control* screen.

If the over pressure trip point value is reached, the pressure on the *control* screen will blink and the fail-safe will be engaged. The operator **must** select the **Instant Idle/Neutral** button in order to regain engine and transmission control.

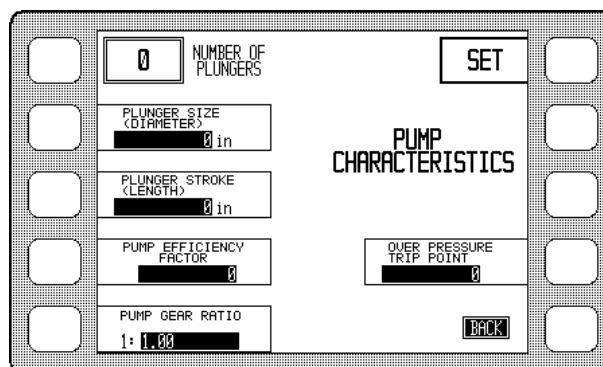


Figure 5: Pump Characteristics

3.0 Maintenance

Chapter

3

The maintenance section covers setting up and configuring the various pump, transmission, and engine control parameters.

3.1 Setting Up the Terminal

3.1.1 Terminal Settings

The *Terminal Settings* display window allows the operator to modify the contrast, backlight, and keyclick. From the *Terminal Settings* screen, the operator can increase/decrease the contrast and backlight. Keyclick volume can be turned on and off. The default keyclick setting is on.

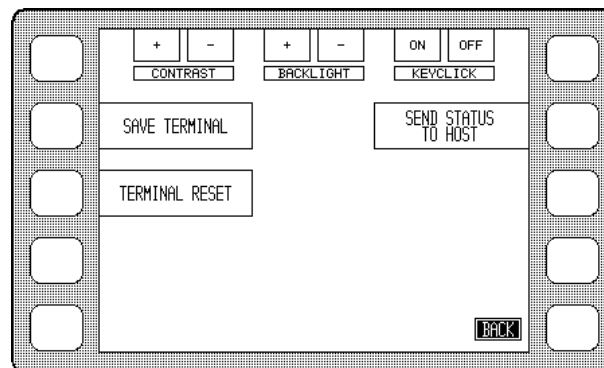


Figure 6: Terminal Settings

Other functions found on the *Terminal Settings* window include:

Save Terminal

Stores the configured display settings into memory. In order to save your settings, **Save Terminal** must be selected prior to exiting the *Terminal Settings* window.

Terminal Reset

Cycles the terminal's power and resets terminal settings to their saved values.

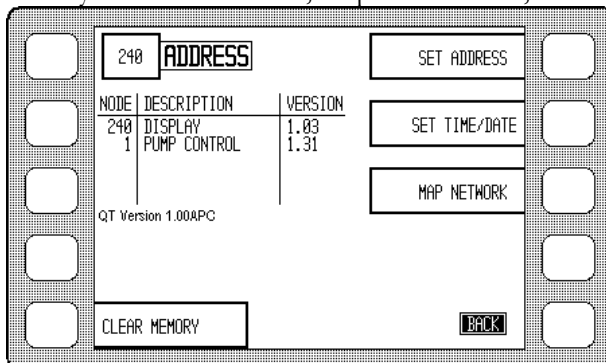
Send Status To Host

Sends the information currently associated with the Intelligent Pump Control terminal will be sent via a RS232 serial cable to the desired host.

Note: Exiting this screen without selecting the **Save Terminal** button will cause the desired changes to be lost when power is turned off.

3.1.2 Network Settings

The *Network Settings* screen allows the user to set the address of the current workstation, modify the time and date, map the network, and clear the memory.



The screen will graphically display the node on the network, description, and version of the software.

Display refers to the network controller software. **Pump Control** refers to the black box software. **QT Version** refers to the touch screen software. Version numbers help determine if hardware or software needs to be updated.

Figure 7: Network Settings Screen

Note: The address should be set to 240.

By clicking the “Clear Memory” button the unit **will not** reset all the data stored in memory. Only the *Small Throttle Step* and the *Large Throttle Step* will be cleared of their user defined values.

Note: Clearing the memory will default the display units to English.

Another feature that the operator can edit is the **time** and **date**. When clicking the “Set Time/Date” button the user will be forwarded to the following screen:

On the left portion of the screen are all the options related to date while on the right side are all the options relating to time. These can be modified by:

1. Click the desired field.
2. Entering the desired numbers on the keypad.
3. Click **Enter** when finished.

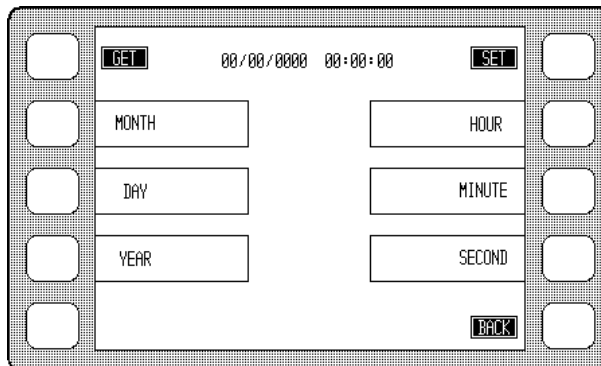


Figure 8: Time & Date

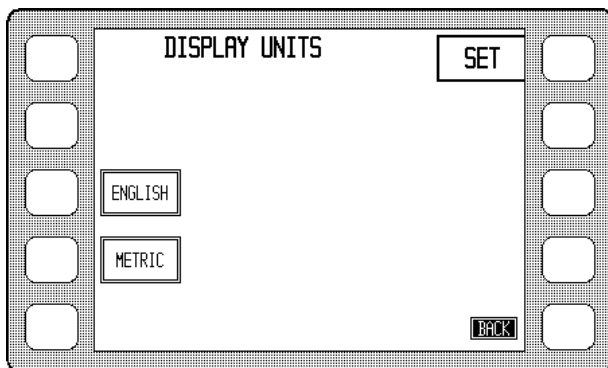
Note: The operator must click the **Set** button before exiting the screen or the information **will not** be stored into memory.

The operator can also automatically set the date and time by clicking the “Get” button on the top left corner of the screen. This option retrieves the date and time from the network if available.

3.1.3 Display Units

The display units screen allows the operator to switch between the English and Metric system units. The display units screen can be reached by clicking:

Pump Control > Display Units



English Units:

- PSI ➤ RPM
- DegF ➤ BPM
- BBL ➤ HHP

Metric Units:

- Mpa ➤ DegC
- MP3M ➤ mm
- M3

Figure 9: Display Units

3.1.4 Communication Test

The communication test screen allows the operator to test the stability of the network and will report back how many iterations, packets, retries, lost packets, and the success rate. The communication test screen can be reached by clicking:

Pump Control > Communication Test

Iterations per second: How many times one cycle of a set of instructions is repeated.

Total Packets: Number of packets sent.

Retries: Reports how many communication failures occurred between devices.

Lost Packets: Total number of packets lost during transmission.

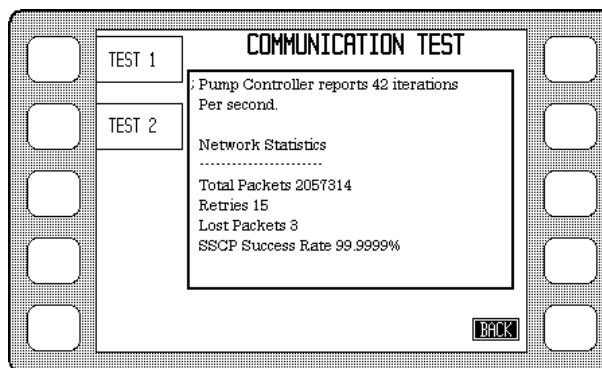


Figure 10: Communication Test

Note: Test two uses every letter in the alphabet to check the transmission of certain bytes; therefore, it is important that the operator run both test.

3.2 Setting Up the Engine

3.2.1 Engine Setup

This screen allows the operator to modify the large and small throttle step. When the operator presses ▲ ▼ the engine RPM increases/decreases by **large** throttle step. When the operator presses ▲ ▼ the engine RPM increases/decreases by **small** throttle step.

The operator can get to this screen in a few easy steps by clicking:

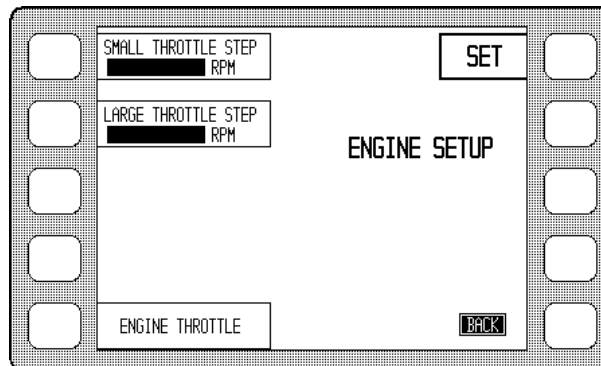


Figure 11: Engine Setup

Pump Control > Hardware Setup > Engine

From here the operator can then alter the engine throttle characteristics by clicking on the “Engine Throttle” button.

3.2.2 Engine Throttle

The settings on this display screen are crucial to accurately controlling the throttle. If the **offset** and **gain** are not properly configured then the DAC (Digital Analog Converter) counter **will not** correspond to the right RPM.

Use the coefficient calculator located on the Stewart & Stevenson website to calculate the **offset** and **gain**.

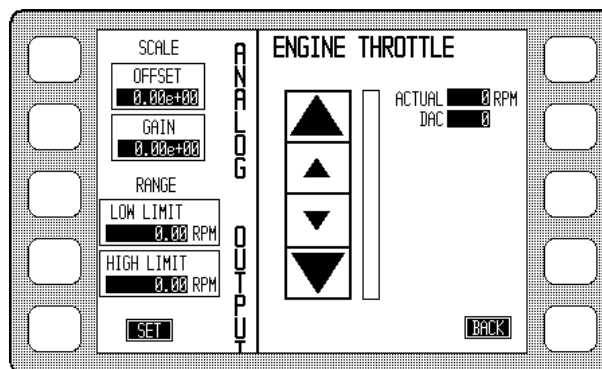


Figure 12: Engine Throttle

Note: To get the coefficient calculator, go to www.ssss.com/petroleum/download.asp

Below the **offset** and **gain** fields are the **low limit** and **high limit** fields. It is imperative that the operator input acceptable RPM's into these fields otherwise engine complications may result. The operator should check with S&S on what these settings should be.

The **throttle control increments** are shown in **Figure 8**. The speed of the engine will adjust depending on the increment values and whether or not the operator is increasing or decreasing the throttle control.

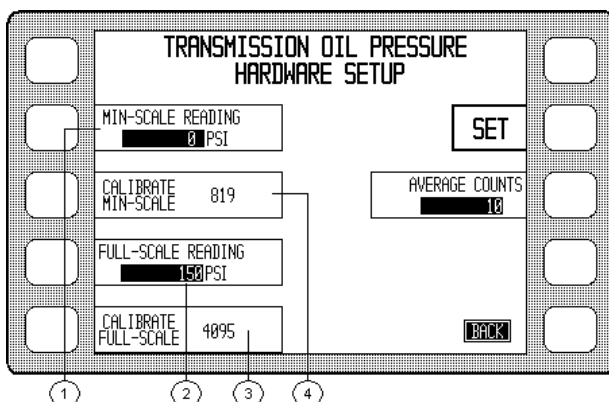
3.3 Setting Up the Transmission

3.3.1 Transmission Oil Pressure

To access the *Transmission Oil Pressure* screen, press:

Hardware Setup > Transmission > Transmission Sensor > Trans Oil Pressure

Note: There are four other screens (Transmission Oil Temperature, Pump Oil Pressure, Pump Oil Temperature, Pump Discharge Pressure) that have the same layout as the Transmission Oil Pressure screen. Since these screens are identical, only the **Transmission Oil Pressure** screen will be covered in detail



This screen in particular is measured in PSI. The sensors ADC will be calibrated based on what the user inputs in the “Min-Scale Reading” and “Full-Scale Reading” fields. To calibrate:

1. Input the desired PSI into the field.
2. Click the calibrate button.
3. Click the **set** button.
4. Repeat process for each field pairs.

Figure 13: Hardware Calibration

1. **Min-Scale Reading** is the minimum value for the sensor being used. For example on a 0-15,000 PSI transducer, the min-scale reading would be 0.
2. **Full-Scale Reading** is the maximum value for the sensor being used. For example on a 0-15,000 PSI transducer, full-scale reading would be 15,000.
3. **Calibrate Full-Scale** adjusts the unit to read correctly at a high end set point.
4. **Calibrate Min-Scale** captures the current input level from the sensor.

3.3.2 Transmission Filter Switch

The transmission filter switch notifies the operator when the transmission filter needs to be changed.

- When the *state* is zero the filter is bad.
- When the *state* is one the filter is good.

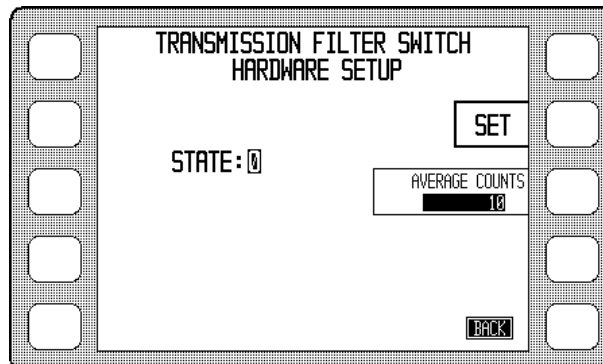


Figure 14: Transmission Filter Switch

3.4 Setting Up the Pump

3.4.1 Pump Characteristics

The **Pump Characteristics** screen is used to calculate the total barrels per minute. The **Pump Characteristics** screen requires the operator to input the values for each field depending on the manufacturers specifications. The **Pump Characteristics** screen can be reached by:

Hardware Setup > Pump > Pump Parameters

To change the number of plungers:

1. Click the top left box.
2. Continue cycling through until the desired number appears.

Enter the plunger size, stroke, and pump gear ratio based on the manufacturers specifications.

Figure 15: Pump Characteristics

The efficiency factor is used to correct the theoretical displacement.

- A rating of “1.00” is equal to one hundred percent efficiency.
- A rating of “0.50” is equal to fifty percent efficiency.

Note: As a pump wears the efficiency tends to decrease.

3.4.2 Pump Rate

The main point of focus on this screen is setting up the K-Factor. A K-Factor is used to convert a frequency into an engineering unit. To set the K-Factor:

If the operator knows the K-Factor:

1. Input it directly into the K-Factor field

OR

If the operator knows the current rate:

1. Input “1” into the K-Factor field and click **SET**.
2. Input the current BPM into the provided field.
3. Click **AUTO-SCALE > SET**.

Figure 16: Pump Rate

3.5 Configuring the Alarms

As stated earlier there are three different alarm setup pages. The first page consists of all engine alarms, the second page all transmission alarms, and the third page all pump alarms.

Note: The *Engine Alarms*, *Transmission Alarms*, and *Pump Alarms* screens follow the same setup procedures.

Each alarm setup page will consist of a **High Limit** and **Low Limit** configurable field.

To change these fields click on them, input the desired value with the number pad, click **Enter** > **SET**.

Click **Next** to continue to the next Alarm Setup page.

SPEED		OIL PRESS		FUEL PRESS		ENGINE ALARMS
LOW LIMIT	0 RPM	LOW LIMIT	0 PSI	LOW LIMIT	0 PSI	
HIGH LIMIT	0 RPM	HIGH LIMIT	0 PSI	HIGH LIMIT	0 PSI	
[SET]		[SET]		[SET]		[NEXT]
OIL TEMP		FUEL TEMP		WATER TEMP		
LOW LIMIT	0 degF	LOW LIMIT	0 degF	LOW LIMIT	0 degF	
HIGH LIMIT	0 degF	HIGH LIMIT	0 degF	HIGH LIMIT	0 degF	
[SET]		[SET]		[SET]		[BACK]

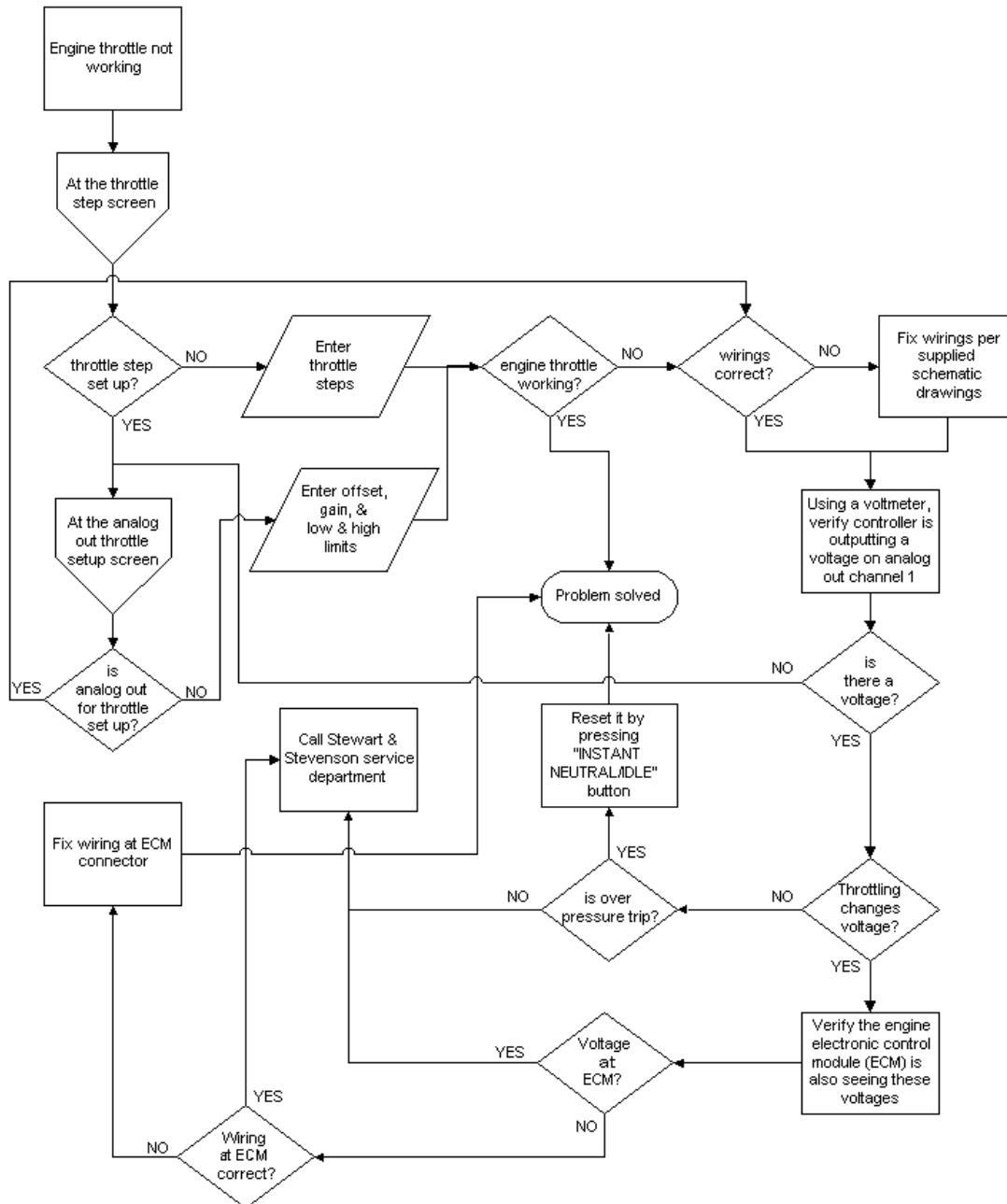
Figure 17: Engine Alarms

Note: The unit characteristics will vary between each of the different alarm setup screens. Each screen will either have **degF**, **PSI**, and or **BBL** units.

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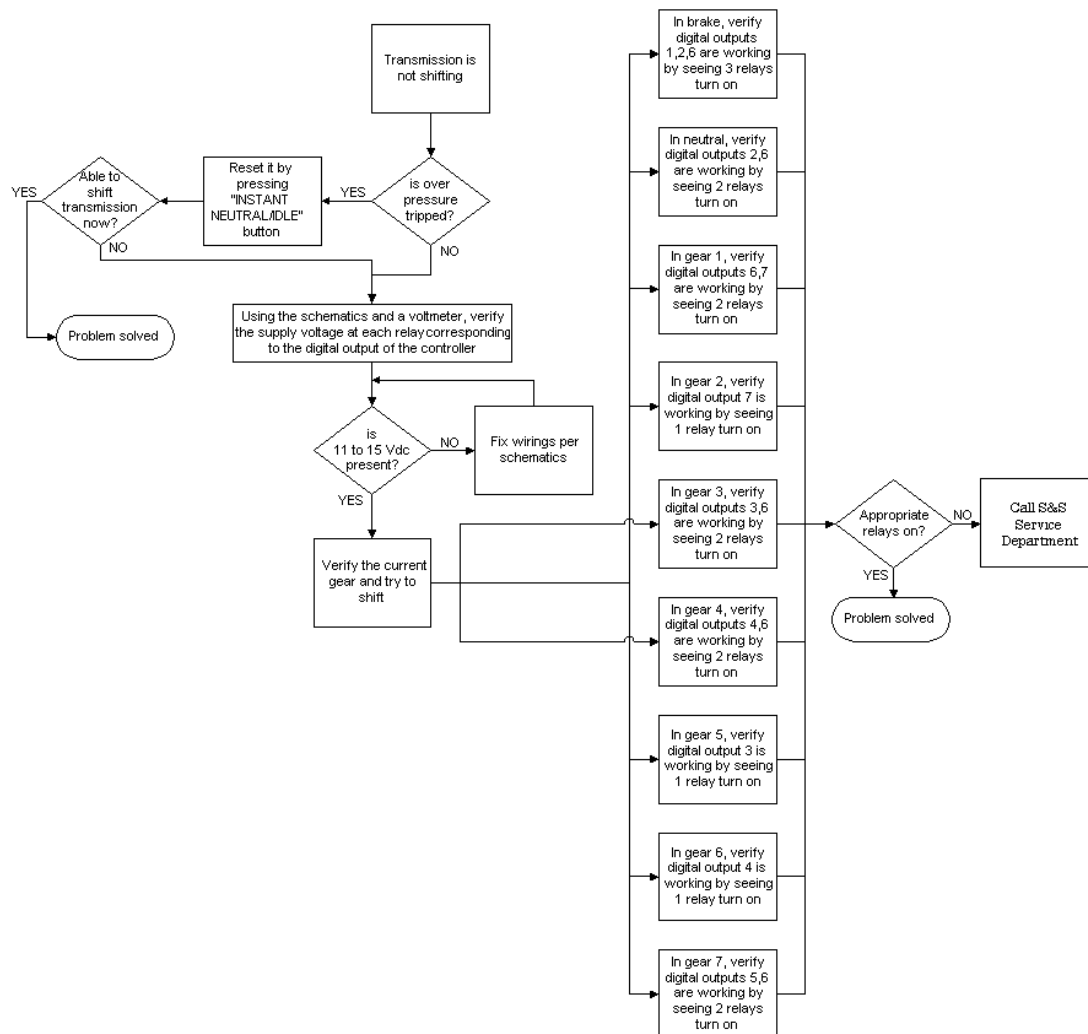
Intelligent Pump Control

Troubleshooting Engine Throttle



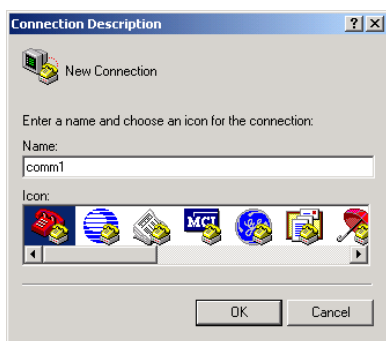
Intelligent Pump Control

Troubleshooting Allison Transmission

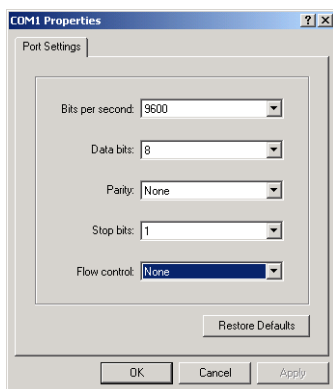
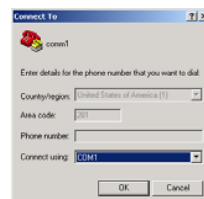


Saving Parameters to a Computer

- Set all the dipswitches to the **OFF** position **EXCEPT** for 6 and 7.

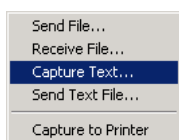


- Cycle the power of the pump control board.
- Start up hyper terminal.
- Input a connection description.
- Click **OK**.
- Select the COM Port in which the data transfer will take place.
- Click **OK**.

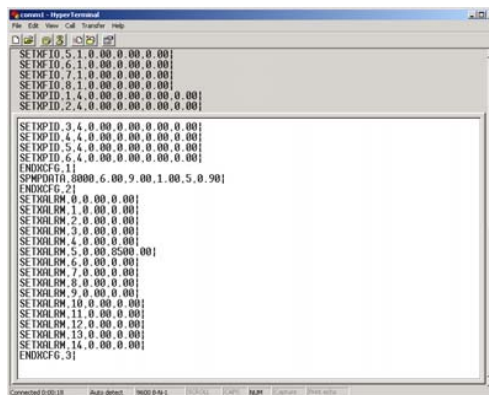


- Set **Baud Rate** (Bits per second) to *9600*.
- Set **Data Bits** to *8*.
- Set **Parity** to *None*.
- Set **Stop bits** to *1*.
- Set **Flow control** to *None*.
- Click **OK**.

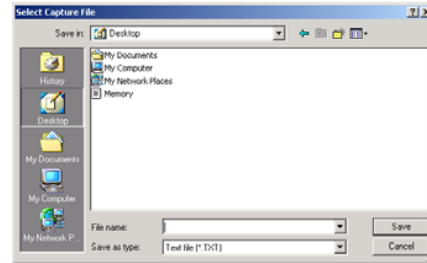
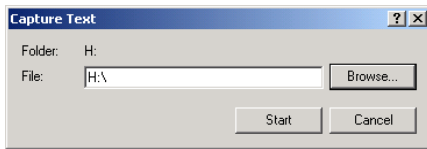
- Click **Transfer** at the top of the screen.
- Select **Capture text...** from the menu.
- Click **Transfer** at the top of the screen.
- Select **Capture Text...** from the menu.



- Click **Browse**.
- Select a folder for storage.

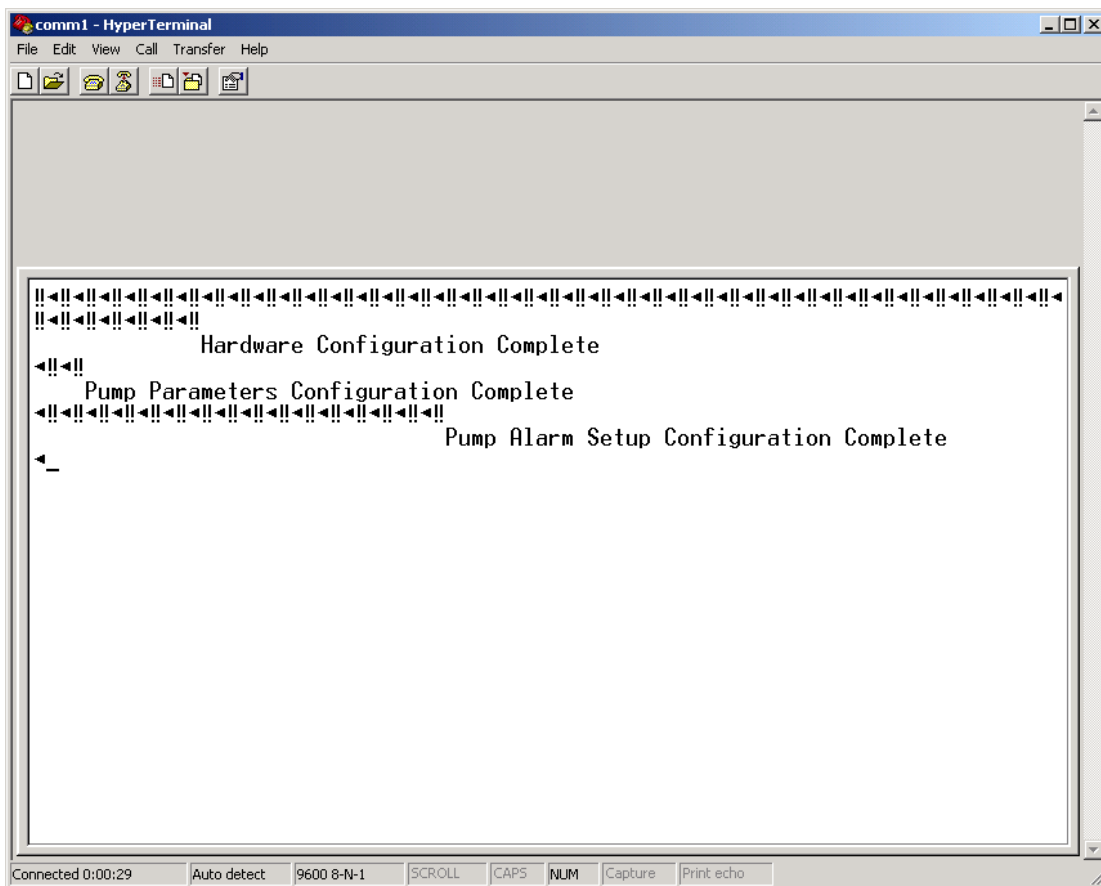


20. Input file name and click **Save**.
21. Click the **Start** button.
22. Press **CTRL-A** to retrieve data from the IPC.



To upload the saved file:

1. Click **Send text file...** from the **transfer** menu.
2. Find the desired file and click **OK**.
3. A screen similar to the one below will appear.



Average Counts – Number of readings used to acquire an average value.

BBL - Barrel.

BPM - Barrels per minute.

Calibrate Full-Scale – Adjust the unit to read correctly at a high-end set point.

Calibrate Min-Scale – Captures the current input level from the sensor.

Current Value – Is the current value of the signal being monitored.

degC - Degree Celsius.

degF - Degree Fahrenheit.

Full-Scale Reading – The maximum value for the sensor being used. For example on a 0 – 15,000 PSI transducer, the Full-Scale Reading would be 15,000.

Gear Ratio - Speed of rotation ratio of the powered gear to the driven gear.

HHP - Hydraulic Horsepower.

in - inches.

K - Factor – Converts a frequency to an engineering unit.

M3 - Meters cubed.

M3PM - Meters cubed per minute.

Min-Scale Reading – The minimum value for the sensor being used. For example on a 0 – 15,000 PSI transducer, the Min-Scale Reading would be 0.

mm - Millimeters.

MPa - Mega Pascal.

Node - A point on a network that either relays the transmission of data or terminates it.

Plunger - A piston used to create pressure pumps.

PSI - Pounds per square inch.

RPM - Rotations per minute.

SSCP - Stewart & Stevenson Communication Protocol.

Torque - Twisting or turning force.

Transducer – An electronic apparatus that converts energy from one form to another.

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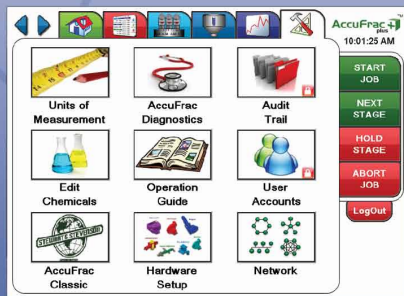
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STATE:			JOB PROGRESS		START JOB NEXT STAGE HOLD STAGE ABORT JOB
Base Fluid SG	1.000		End of Job	0.0	
Target SGU	1.000		Stage 000 of 000		
Calculated SGU	0.000		End of Stage	0.0	
Measured SGU	0.307				
Discharge psi	0.0				
DESCRIPTION	RATE	TOTAL			
Suction	0.00 bbl / min	0.0 bbl			
Discharge	0.00 bbl / min	0.0 bbl			
Proppant	0.00 lbs / min	0.0 lbs			
Chemical 1	0.00 gal / min	0.0 gal			
Chemical 2	0.00 gal / min	0.0 gal			
Chemical 3	0.00 gal / min	0.0 gal			
Chemical 4	0.00 gal / min	0.0 gal			
Chemical 5	0.00 lbs / min	0.0 lbs			
Chemical 6	0.00 lbs / min	0.0 lbs			
Chemical 7	0.00 gal / min	0.0 gal			
Chemical 8	0.00 gal / min	0.0 gal			



AccuFrac⁺
plus

Next Generation Fracturing Equipment Control Suite

AccuFrac+, Stewart & Stevenson's next generation fracturing equipment controls suite, incorporates industry-leading equipment control, diagnostics and data acquisition. Backwards compatible with previous generation AccuFrac equipment, AccuFrac+ easily updates your existing fracturing spread with the following benefits:

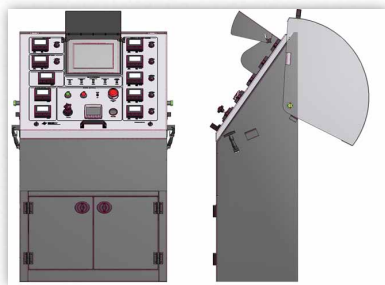
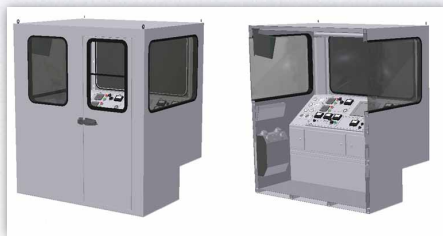
- Expanded operational capability
- Improved reliability
- Enhanced user interface

AccuFrac+ offers simplified setup, calibration and tuning. The new controls are easier to understand, easier to operate and easier to service than previous controls. AccuFrac+ incorporates a foreign language interface for international customers.

AccuFrac+ Controls Equipment

AccuFrac+ controls are provided for the complete family of well stimulation products:

- Blenders (Standard Cabin)
- Fracturing Pumps
- Hydration Units (Cabin Optional)
- Chemical Additive Systems
- Data Vans



Control Functions

Tub Level (Blenders and Hydration Units)

- Controls the suction pump based on feedback from a level sensor
- Quick reaction prevents spills and loss of charge pressure
- Smooth control minimizes fluctuations in suction rate
- Feed-forward corrects for disturbances before the level is affected

Proppant (Blenders)

- Up to 3 screw auger delivery devices
- Precision instrumentation and drive systems provide extreme control range
- Accurate proppant rates with empirically derived delivery tables
- Automatic auger selection or user-controlled priority
- Proppant rate can be based on suction (clean) rate or on discharge (slurry) rate

Chemical Additives (Blenders, Chemical Additive Units, and Hydration Units)

- Up to 8 chemical circuits (up to 12 on CAS units)
- Chemicals are programmed in parts-per-thousand
- Supports liquid and dry chemical additive systems
- Chemical rates can be based on suction (clean) rate, discharge (slurry) rate or an external rate

Engine and Transmission Control (Fracturing Units)

- Direct digital communication provides faster, more accurate engine control with no throttle calibration
- Direct digital communication allows the transmission to control the shift
- On-board interface allows running, testing, and troubleshooting of the unit without a suitcase
- Alarm indicators give technicians engine and transmission codes in easy-to-understand terms (e.g. "coolant level sensor failure")

AccuFrac+ TM
plus

AccuFrac+ Features

Hardware

Outstanding performance made possible by a high-speed, RISC architecture microcontroller with parallel processing and a real-time operating system

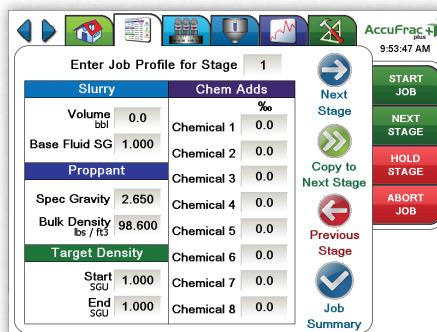
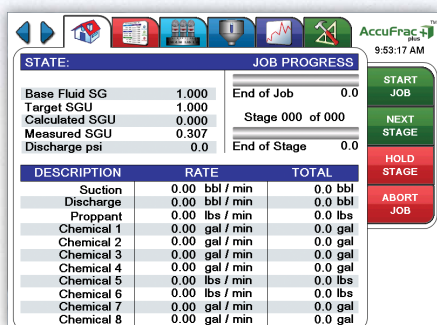
High-speed CAN networks provide reliability and serviceability

- Reduces wiring
- Reduces setup and calibration
- Uses standard CAN diagnostic tools and techniques
- Provides native digital communication to engines and transmissions for control, information and alarms

Large, rugged, panel-mounted human machine interface (HMI) provides high visibility and easy operation

Panel display meters greatly enhance user information and control

- No calibrations or settings of any kind are required
- Rates and totals on one screen
- Target rates displayed
- Units of measure automatically match the HMI selections
- Chemical labels match the name entered in the HMI (e.g. "pH Buffer")
- Auger displays can read in rpm, lb/min, kg/min, etc.



Software

- Easy navigation with quick access tabs instead of menus
- Multi-language support
- Multi-level passwords allow you to control access

Alarm indicator

- Lets the operator know immediately if there is a problem
- Logging system shows active and inactive alarms

Audit trail

- Maintains a log of user-entered changes to the system, who made the change, when, what the value was before and what it was changed to
- The log can be exported to a thumb-drive for review on a computer (.CSV file)

A chart screen allows a user to view data trends

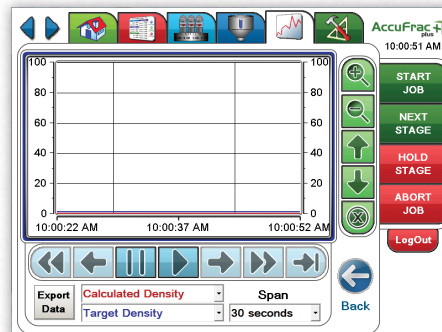
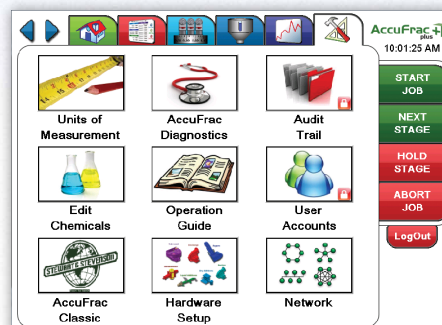
- The data can be exported to a thumb-drive for review on a computer (.CSV file)

Easy job programming and adaptation on-the-fly

Built-in PDF reader

- Software user's guide is provided
- The user can add standard operating procedures, MSDS, charts, etc... via USB thumb drive

Flexible units of measure





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Fracturing Pumping Units

Fracturing Pumping Units

Since building the first pumping units in the 1940s, Stewart & Stevenson has provided the oil and gas industry with the most advanced and reliable equipment available, featuring:

- Innovative Trailer, Truck, or Skid Mounted configurations
- Triplex and Quintuplex 2,250 bhp units meeting US non-permit weight requirements with a full compliment of operating fluids (400 gallons of fuel) and treating iron
- Performance enhancing features, including high ambient cooling packages, low centers of gravity, real time fault code and sensor monitoring
- Stewart & Stevenson Intelligent Pump Control (IPC) System
- Integrated shift energy & torque management system
- Wireless or wired remote control

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Power Generation



Stewart & Stevenson



Building For The Next Century

Power Generation

Stewart & Stevenson has provided innovative power generation solutions for world markets since 1938. During World War II we were the second largest supplier of generators under the Lend-Lease program. After the war, we developed increasingly advanced power generation equipment for military, municipal and industrial users around the globe.

A Power Generation Solutions Provider

As an integrated services company today, Stewart & Stevenson is a major supplier of power generation packages utilized by the oil and gas and other industries. Onshore and offshore, our power generation products and services provide essential support. Our emissions certified custom power packages offer:

- Excellent reliability
- Less downtime
- High fuel efficiency

Stewart & Stevenson's power generation solutions also serve municipalities, hospitals, chemical and power plants, manufacturing facilities and numerous other clients. On-site continuous, emergency standby and peak-shaving power generator packages are available in stationary, mobile and containerized configurations. We are the power solutions source for emergency and disaster relief.

Stewart & Stevenson provides resistive and reactive load bank testing, planned maintenance and quality aftermarket service and parts support for every power generation product that we sell. Stewart & Stevenson product support centers are located close to major onshore and offshore oil and gas fields in the United States and in a number of the world's major energy producing countries.





Power Generation Packages for the Oilfield

Stewart & Stevenson offers the broadest line of oilfield power generation products available in the market. Included are new and refurbished engines, power units, generator packages and pump packages that increase productivity, improve efficiencies and reduce costs.

Stewart & Stevenson provides essential, auxiliary and emergency power packages for workover and well servicing, onshore and offshore drilling, and production facilities. We have in-house capabilities to design, engineer, build, install, commission, test and certify every package we sell.

Designed using advanced three-dimensional computer modeling technology and built on our efficient, lean manufacturing flow lines, our power generation packages come with the assurance that:

- The engine generator alignment is factory certified
- The technical documentation package is comprehensive
- Appropriate interface data is readily available
- Technical manuals are interactive CD ROM based and are linked to the engineering documentation for accuracy and improved aftermarket support

Stewart & Stevenson's power generation packages are powered by the most reliable, high-performance engines available:

- MTU Detroit Diesel diesel and gas engines
- EMD diesel engines
- MAN diesel engines and dual fuel systems
- Deutz diesel and natural gas engines



Power Generation

Stewart & Stevenson's Offshore Packages provide electrical power for platform habitation modules as well as a wide range of power for drilling and well servicing. Decades of engineering expertise go into every project to ensure our customers get the exact power solution to meet their need.



OFFSHORE PACKAGES

The rugged offshore power generation units Stewart & Stevenson offers today are the result of 75-plus years of generator set design experience. We offer:

- 16 models, 3 engine families, 932 to 11,995 hp (661 to 8680 kW)
- Essential rig power packages
 - Prime rig power
 - SCR systems
 - VFD systems
- Emergency and auxiliary power
- Generators oversized to meet low power factor requirements
- Latest emissions standards available on most applications
- Generator sets for IMO and Marine Classification Society certifications are available

MODEL	DM600M	DM800M	DM1500M	DM2000M
Ratings @ 60 Hz				
Drilling (prime) kW output ¹	661	884	1520	2020
Prime Power output (bhp)	932	1247	2145	2820
Speed, rated (rpm)	1800	1800	1800	1800
Engine Manufacturer	MTU	MTU	MTU	MTU
Engine Model	12V2000	16V2000	12V4000	16V4000

MTU features:

- High power to weight ratio
- Compact footprint
- Increased variable deck load capabilities
- Series 4000 with common rail fuel system for enhanced performance and reduced emissions

MODEL	DM1440E	DM2150E	DM2865E	DM3580E
Ratings @ 60 Hz				
Continuous kW output ¹	1432	2148	2865	3581
Continuous Power output (bhp)	2000	3000	4000	5000
Speed, rated (rpm)	900	900	900	900
Engine Manufacturer	EMD	EMD	EMD	EMD
Engine Model	8-710	12-710	16-710	20-710

EMD features:

- Proven offshore history
- Durable medium speed engines
- Extended TBO intervals

MODEL	DM1520B	DM1880B	DM2820B	DM4350B	DM4670B	DM6220B	DM6520B	DM8680B
Ratings @ 60 Hz								
Continuous kW output ¹	1520	1880	2820	4345	4670	6220	6520	8680
Continuous Power output (bhp)	2145	2654	3981	6032	6515	8686	9010	11,995
Speed, rated (rpm)	900	720	720	720	900	900	720	720
Engine Manufacturer	MAN DIESEL	MAN DIESEL	MAN DIESEL	MAN DIESEL	MAN DIESEL	MAN DIESEL	MAN DIESEL	MAN DIESEL
Engine Model	8L21/31	6L27/38	9L27/38	8L32/44	12V28/33	16V28/33	12V32/44	16V32/44

MAN DIESEL features:

- Wide range of available models
- Dual fuel capabilities
- Proven marine history

¹According to ISO 3046/1 conditions and based on generator efficiencies 95-97%.

Power Generation

Stewart & Stevenson's versatile packages for land based drilling operations are designed, engineered, and built to be energy efficient, operator friendly, and easy to service. Engine controls provide for safety shutdowns and self-diagnostics. Quality components ensure continuous operation in the challenging oilfield environment. Stewart & Stevenson product support centers are located close to major onshore and offshore oil and gas fields in the United States and in a number of the world's major energy producing countries.



Onshore Packages

The rugged onshore power generation units Stewart & Stevenson offers today are the result of 75-plus years of generator set design experience. We offer:

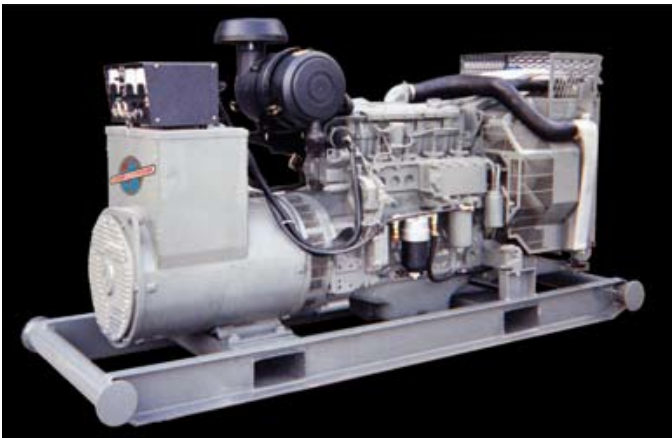
- 10 models, 2 engine families, 141 to 2425 hp (85 to 1633 kW)
- 1800 rpm and 1200 rpm
- 60 Hz and 50 Hz applications
- Latest emissions standards available on most applications
- Essential rig power packages
 - Prime rig power
 - SCR systems
 - VFD systems
- Emergency and auxiliary power
- A variety of options to allow customer tailoring for application
- Stewart & Stevenson also provides pump packages, pump drivers, and natural gas power packs

MODEL	DL700M		DL900M		DL1000M	DL1200M		DL1250M	DL1600M	
Ratings	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	60 Hz	50 Hz	60 Hz	60 Hz	50 Hz
Drilling (prime) kW output ¹	687	564	912	727	997	1223	1088	1254	1633	1445
Prime Power output (bhp)	1020	838	1354	1080	1481	1817	1616	1863	2425	2146
Speed, rated (rpm)	1800	1500	1800	1500	1200	1800	1500	1200	1800	1500
Engine Manufacturer	MTU		MTU		MTU	MTU		MTU	MTU	
Engine Model	12V2000		16V2000		12V4000	12V4000		16V4000	16V4000	

¹At 600 V, frequency and 0.7 PF according to ISO 3046/1 conditions.
All data is preliminary and subject to change without notice.

MODEL	DX85D	DX130D	DX175D	DX370M
Ratings				
Prime kW/kVA ratings ¹	85/106	130/162	175/219	370/462
Rated Voltage	480/277 VAC	480/277 VAC	480/277 VAC	480/277 VAC
Rated Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Rated Power Factor (lagging)	0.8	0.8	0.8	0.8
Engine manufacturer	DEUTZ	DEUTZ	DEUTZ	MTU
Engine Model	BF4M1013EC	BF6M1013EC	BF6M1013FC	Series 60
Power output (hp)	141	208	273	550
Speed, rated (rpm)	1800	1800	1800	1800

¹At rated voltage, frequency and PF according to ISO 3046/1 conditions.



Power Generation for Other Markets

Stewart & Stevenson provides capital equipment from world-class manufacturers of power generation packages, prime movers, engines, and gas compression systems.

We provide prime and standby emergency power generation solutions for business and industrial markets that include agriculture, chemical, construction, entertainment, marine, military, mining, municipal, and more. We are the power solutions source for disaster relief.

Our business partner offerings include:

- DDC/MTU diesel generator sets featuring digital engine and generator controls for superior performance and response time, proven reliability, reduced maintenance costs, and the latest in emissions technology.
- Deutz power generating solutions, from the entry level 1015 Series natural gas generator for small projects to the powerful, scalable, efficient 600 Series for unbeatable energy production. Deutz electrical power generating sets feature an electronic controller that allows the engine to be configured to run on diesel and natural gas.
- EMD diesel powered stationary units that provide 800 to 5000 bhp. Heavy-duty units are applied as base load generating sets in remote locations, pipeline and dredge pump applications, nuclear power generating plants, and emergency standby sets in hospitals.
- Generac power generation systems, ranging from 3 kW to 6000 kW, that provide prime and standby power for industrial, commercial and institutional markets. Offered with diesel, gaseous and bi-fuel engines and as modular power systems.
- Waukesha spark-ignited, gaseous fueled, reciprocating engines and Enginator engine-driven generator sets. Utilized for power generation, Waukesha 60 Hz and 50 Hz natural gas engines provide standby, peakshaving and continuous power.
- Larger units, up to 20 MW, are available for special requirements.

Auxiliary Products

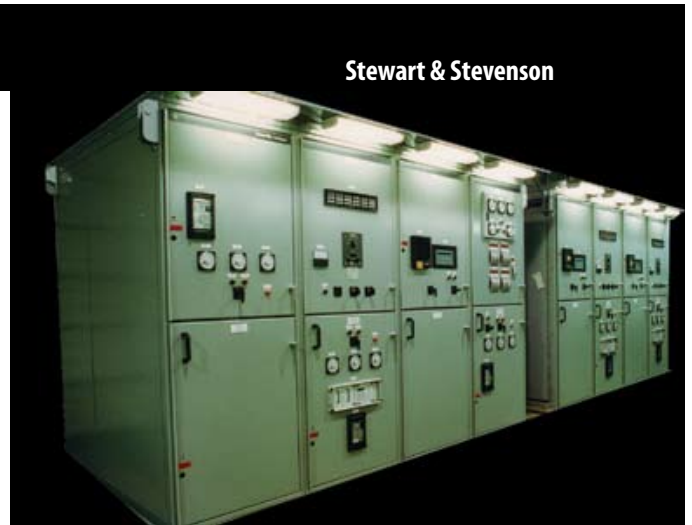
Drive Systems

Stewart & Stevenson is a world class supplier of AC (Variable Frequency Devices, or VFD) and DC (SCR) systems to various industries including, but not limited to, land based and offshore oilwell drilling and marine propulsion.

Each system is custom designed to meet the client's requirements. Additional subsystems, as required, are integrated to provide a complete troublefree system:

- Motor control centers
- Driller and mud pump consoles
- Engine generator switchgear
- Distribution panels
- Transformers
- Air conditioning systems

Each system undergoes a thorough factory production test to ensure any potential problems are resolved in our facility. Fault current, coordination and load analysis studies can also be provided. Combining Stewart & Stevenson power generation modules with the drive systems ensures a seamlessly integrated, trouble free, "single source" electrical system.



Power Generation



Micro Plus SCR

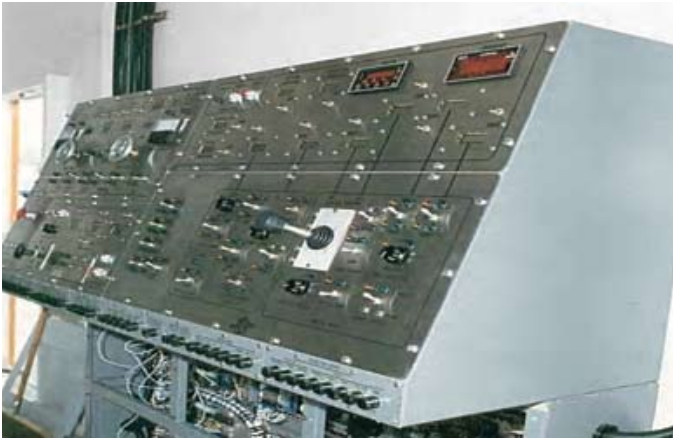
The Stewart & Stevenson Micro Plus SCR meets compact size and simple operating requirements while providing up to 2000A DC power. Built to withstand harsh environments and maintain a high level of performance, Micro Plus SCR combines ease of maintenance with simple operation. The digital controls are not susceptible to "thermal drift" problems experienced by analog control systems. Each system incorporates a diagnostic display for information and trouble-shooting purposes.

Stewart & Stevenson's Micro Plus SCR systems are operating in some of the world's most severe environments with exceptional results.

Micro Plus AC Drive

The Stewart & Stevenson Micro Plus AC Drive is an integral part of today's oilwell drilling system. When integrated with the Stewart & Stevenson digital engine/generator switchgear and engine generator power modules, unsurpassed trouble free performance is the result.

The Micro Plus AC Drive has many advantages over other systems. Drives rated 1200 to 3500 horsepower are available in very compact modules. All units undergo a full load test prior to shipment. A system stage test is also performed on every system prior to shipment from our factory.



Switchgear

Stewart & Stevenson brings more than 60 years of experience and capability to the low and medium voltage industry. We are a major supplier to the power generation market:

- Frame turbines
- Aero derivative turbine
- Diesel and gas engines

We also provide switchgear and support for the industrial, commercial, military and marine businesses. All Stewart & Stevenson switchgear is custom designed to meet the customer's requirements. System engineering studies, including fault current, coordination and load analysis studies, can be provided if required. A thorough production system test is performed on every system before shipment.

Codes & Standards

Stewart & Stevenson has the capability to custom design systems in conformance with most national and international standards including:

- | | |
|--------|--------------------|
| ■ ABS | ■ IEEE |
| ■ ANSI | ■ Lloyd's Register |
| ■ DNV | ■ NEC |
| ■ IEC | ■ NEMA |

SmartLink 2000™

Stewart & Stevenson's SmartLink 2000™ system is a simplified way to save money while troubleshooting and maintaining oil rig operating systems. This unique system allows rig operators to solve problems by computer modem or broadband connection, reducing the demand for specialized rig-based technicians and on-site trouble-shooting procedures.

The system also features new software programs that can be written and downloaded via the same high speed connection, giving operators the flexibility to custom tailor their control systems for new situations. This feature is especially useful when on-board drilling systems must be modified from location to location around the world.

The SmartLink 2000™ is available either as an upgrade to an existing Stewart & Stevenson AC or DC Drilling system, or as an option installed on new systems from the factory.



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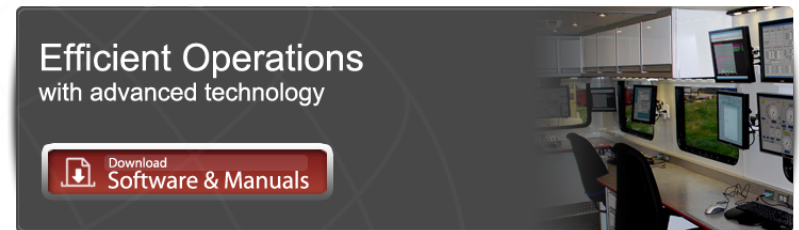
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CONTROL SYSTEMS & SOFTWARE



The Leader in Field Proven Controls

Stewart & Stevenson's data acquisition and control centers provide a centralized command center to control all of the critical well site equipment while monitoring, recording and supervising the fracturing treatment. Data vans reduce the number of equipment operators required to complete the treatment while greatly improving job quality through centralized real-time data gathering and presentation.

Stewart & Stevenson's IPC-PC interface provides control of up to 24 fracturing pumps at a single operator workstation. The AccuFrac-PC interface provides control of multiple blenders, hydration units and chemical additive units from the Data Acquisition and Control Center. UPS systems and solid-state CPU components provide reliable operation with backup systems.

Our control systems are available as discrete components, giving our customers the ability to upgrade existing equipment.

- Fracturing Pump Control System: IPC-PC
- Fracturing Blender Control System: AccuFrac
- Chemical Additive and Hydration Units Control System: AccuFrac
- Multiple Blenders, Hydration Units and Chemical Additive Units: AccuFrac-PC

Control Systems & Software Equipment:



AccuFrac™ Systems

Stewart & Stevenson pioneered the development of advanced electronic control systems for well servicing equipment.

[learn more](#)



Control Centers

Stewart & Stevenson's data acquisition and control centers provide a centralized command center to control all of the critical well site equipment while at a single operator workstation.

[learn more](#)



Digital Process Controls

Stewart & Stevenson's EMM660 Digital Process Controller and Display features a high visibility, sunlight readable, backlit 6-digit display.

[learn more](#)



IPC™ Pump Controllers

Stewart & Stevenson's Intelligent Pump Control System (IPC-PC) is capable of monitoring and controlling of up to 24 fracturing pumps at a single operator workstation, giving you precise, remote...

[learn more](#)

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A Century of Innovation



Well Stimulation & Intervention Systems

Stewart & Stevenson - Well Stimulation & Intervention Systems

Quality engineered oilfield equipment manufactured by Stewart & Stevenson has supported the worldwide oil and gas industry since the 1950s. Today Stewart & Stevenson's integrated well stimulation and intervention equipment aids in the production of oil and gas in onshore and offshore fields from Texas to China, in the Gulf of Mexico and the Caspian Sea, in Middle East deserts and the coldest regions of Siberia, and at numerous other locations around the globe.

Stewart & Stevenson uniquely is a single source manufacturer of all individual well stimulation and intervention equipment, complete with technically advanced controls, enabling customers to obtain a fully integrated system ready for immediate operation at delivery.

Specialized Support

Stewart & Stevenson technicians travel to customer locations around the globe to provide equipment training, commissioning and servicing. Customers have access to equipment service on a global basis.

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www.stewartandstevenson.com

Well Stimulation Equipment

Fully Integrated Stimulation Systems

Stewart & Stevenson's fully integrated stimulation equipment works as a system to perform the fracturing treatment. It includes:

- Fracturing Pumps
- Blenders
- Chemical Additive and Hydration Systems
- Acidizing Equipment
- Support Equipment
- Data Acquisition and Control Centers

Combining more than 50 years of fracturing equipment experience with in-house engineering, software development and quality control expertise, Stewart & Stevenson develops leading edge stimulation equipment that offers maximum reliability.

We tailor equipment to meet each operating region's specific environment with advanced control systems to serve as a single control platform for multiple pieces of equipment. Our data vans have controls, data acquisition software and communication technology that makes complete control of field operations possible locally or remotely. Quality control in all phases of equipment design and construction ensures consistent quality that minimizes maintenance requirements.

Stewart & Stevenson's fully integrated stimulation systems offer simplified operation and improved job quality while requiring fewer trained operators to perform a fracturing treatment.



Fracturing equipment on a barge job.



Stewart & Stevenson's integrated fracturing equipment on a dual simultaneous fracturing job.



Integrated Stimulation Systems.

Fracturing Pumps

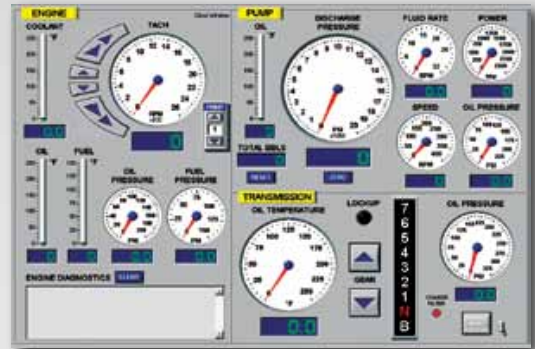
Stewart & Stevenson's fracturing pumps are designed to provide optimal horsepower in a maneuverable package. Our field-proven units provide reliable operation in the harshest environments. Intelligent Pump Control (IPC), which combines advanced unit controls and diagnostics with a touch screen interface, provides control of up to 24 units from a single workstation.

Trailer-mounted units, available with triplex or quintuplex pumps in high ambient cooling packages, are weight-legal. Bodyload units are designed to traverse the roughest terrain and operate in the harshest environments. Skid-mounted units are available in radiator-cooled configurations for independent operation or seawater-cooled configurations for fully integrated stimulation vessels. Maintenance-friendly features and high strength materials ensure reliable operation.

Specialized combination blender and fracturing pumps provide complete fracturing capabilities in a single unit.



Combination fracturing pump and blender.



IPC-PC Advanced control system.



SRP 2500 / FT-2501 Trailer mounted fracturing unit.



FC-2251 Bodyload fracturing pump.



FS-3001 3,000 bhp Skid mounted fracturing unit.

FT-2251 Trailer Mounted Fracturing Unit



Pioneering Technology: Stewart & Stevenson has pioneered the development of high horsepower fracturing units with emissions compliance.

STEWART & STEVENSON FRACTURING PUMPS					
Model	FT-2251 Trailer Mounted	FC-2251 Bodyload	FS-2251 Skid Mounted	FT-2501 Trailer Mounted	FC-3001 Bodyload
Carrier Type	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson oilfield skid	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem or Tridem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8	N/A	Tridem Air Ride	8x4 or 8x8
Size: L x W x H	42'0" x 8'6" x 13'6"	37'7" x 8'6" x 13'2"	27'0" x 8'0" x 10'6"	45' x 8'6" x 13'6"	40' x 8'6" x 13'6"
Engine*	MTU 12V4000	MTU 12V4000	MTU 12V4000	MTU 12V4000	MTU 16V4000
Engine Rating	2250 bhp	2250 bhp	2250 bhp (2500 and 3000 optional)	2500 bhp	3000 bhp (2500 optional)
Maximum Ambient Operating Temperature	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
Transmission*	Allison S9820	Allison S9820	Allison S9820	Allison 9825 (others optional)	Twin Disc TA-8500
Pump	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex
Control System	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC
Cold Weather Package	Optional	Optional	Optional	Optional	Optional
* Other manufacturers available					

Fracturing Blenders

Stewart & Stevenson's fracturing blenders provide industry-leading job performance and reliability. Our blenders allow operators to mix complex fracturing slurries with varying densities for the most demanding treatments.

Stewart & Stevenson's AccuFrac System provides automated density and chemical controls in a user-friendly interface from the unit or data van. The unique concentric mixing chamber provides accurate and homogenous proppant mixing at both low and high rates without air entrainment. Highly efficient closed loop hydraulic systems provide faster response than open loop systems, while consuming less power and producing less waste heat for longer component life and reduced maintenance requirements.



MS-60 Skid mounted blender.



MT-132 Trailer mounted fracturing blender.



MC-60 Bodyload fracturing blender for extreme cold weather operations.



MT-102 Trailer mounted fracturing blender.



MC-60 Bodyload fracturing blender with closed chamber mixing system.



MT-132 Trailer mounted fracturing blender.

STEWART & STEVENSON FRACTURING BLENDERS

MODEL	MT-132 Trailer Mounted Blender	MT-102 Trailer Mounted Blender	MC-100 Bodyload Blender	MC-60 Bodyload Blender	MS-60 Skid Mounted Blender	MS-30 Skid Mounted Blender
Maximum Discharge Rate	130+ bbl/min	100 bbl/min	100 bbl/min	60 bbl/min (75 bbl/min optional)	60 bbl/min	30 bbl/min
Maximum Discharge Density	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal
Maximum Proppant Input Rate	21,250 lb/min (optional higher rates available)	21,250 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	6000 lb/min (optional higher rates available)
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis	Oilfield Skid	Oilfield Skid
Size: L x W x H	48'0" x 8'6" x 13'6"	48'0" x 8'6" x 13'6"	36'8" x 8'6" x 13'2"	34'8" x 8'6" x 13'2"	24'8" x 8'6" x 12'0"	19'6" x 8'6" x 8'0"
Mixing Chamber	Concentric tub with automatic level control	Concentric tub with automatic level control	Concentric tub with automatic level control	Pressurized mixing chamber or concentric tub	Pressurized mixing chamber or concentric tub	Hydrojet tub
Drive System*	(2) Deck engines	(2) Deck engines	(1) Truck engine and (1) deck engine	(1) Truck engine	(1) Deck engine	(1) Deck engine
Total Horsepower	1550 bhp	1550 bhp	1050 bhp	500 bhp	600 bhp	330 bhp
Number of Liquid Additive Systems	6 or more	6 or more	6 or more	6 or more	6 or more	6 or more
Number of Dry Additive Systems	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2
Discharge Pump	14x12	14x12	14x12	Not Required	Not Required	5x6
Suction Pump	12x12	12x10	12x10	8x10	8x10	5x6
Automated Control System	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac
Cold Weather Package	Optional	Optional	Optional	Optional	Optional	Optional

* Other manufacturers available

Chemical Additive & Hydration Systems

Stewart & Stevenson's combination chemical additive and hydration units provide on-the-fly polymer injection and hydration to eliminate post job waste while increasing slurry viscosity. Stewart & Stevenson also offers stand alone chemical additive units to inject chemicals at multiple sites, depending upon each specific chemical's requirement.

Stewart & Stevenson's AccuFrac chemical controller provides automated chemical injection dosage control with varying rates from the blender, hydration unit and other external sources. Our variable level hydration chamber allows for final stage rundown to eliminate gelled fluid disposal problems. The chemical additive units are equipped with quick changeout tank systems to allow operators to replenish chemicals at the yard in a few minutes versus hours required for a refill.



CS-10CAS/BS-200.



CT-10CAS Trailer mounted chemical additive unit.



CC-6CAS Bodyload chemical additive unit.



CC-5CAS Chemical additive unit for use in extreme cold weather applications.



CT-5CAS/BT-200 Trailer mounted chemical additive and hydration unit.

STEWART & STEVENSON CHEMICAL ADDITIVE & HYDRATION UNITS					
MODEL	CT-5CAS/BT-200	CT-5CAS/BT-100	CT-10CAS	CC-6CAS	CS-10CAS/S-200
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Oilfield skid
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	Tandem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8	N/A
Size: L x W x H	48'0" x 8'6" x 13'6"	44'0" x 8'6" x 13'6"	46'0" x 8'6" x 13'6"	37'6" x 8'6" x 12'6"	39'6" x 11'0" x 25'0"
Engine*	MTU Series 60	MTU Series 60	Dual MTU D706	Truck chassis engine driven	MTU Series 60
Engine Rating	600 bhp	500 bhp	110 bhp (each)	400 bhp (minimum)	500 bhp
Number of Chemical Injection Circuits	5	5	10	6	10
Pump Type	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear
Hydration Tank Volume	200 bbl	100 bbl	N/A	N/A	200 bbl
Maximum Hydration Tank Pump Inlet Rate	100 bbl/min	60 bbl/min	N/A	N/A	100 bbl/min
Control System	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac
Transfer Pump System	Standard	Standard	Standard	Standard	Standard
Environmental Enclosure	Optional	Optional	Optional	Optional	Optional
* Other manufacturers available					

Data Acquisition & Control Centers (Data Vans)

Stewart & Stevenson's data acquisition and control centers provide a centralized command center to control all of the critical well site equipment while monitoring, recording and supervising the fracturing treatment. Data vans reduce the number of equipment operators required to complete the treatment while greatly improving job quality through centralized real-time data gathering and presentation.

Stewart & Stevenson's IPC-PC interface provides control of up to 24 fracturing pumps at a single operator workstation. The AccuFrac-PC interface provides control of multiple blenders, hydration units and chemical additive units from the Data Acquisition and Control Center. UPS systems and solid-state CPU components provide reliable operation with backup systems.

Our control systems are available as discrete components, giving our customers the ability to upgrade existing equipment.



Data acquisition interior.



EC-22ACD Data van for cold weather.



ET-40ACD Data van command center provides control of critical well site equipment.



ET-26ACD Trailer Mounted Data Acquisition and Control Center.

STEWART & STEVENSON DATA ACQUISITION & CONTROL UNITS				
MODEL	ET-26ACD	ET-40ACD	EC-26ACD	EC-22ACD
Control Cabin Size L x W x H	12'0" x 7'0" x 6'6"	40'0" x 8'0" x 7'8"	26'0" x 8'0" x 7'8"	22'0" x 8'0" x 7'8"
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	4x2, 4x4, 6x4, or 6x6	4x2, 4x4, 6x4, or 6x6
Maximum Number of Fracturing Unit Controls	24	24	24	24
Maximum Number of Blender Controls	2	2	2	2
Maximum Number of Chemical Additive/Hydration Controls	2	2	2	2
Number of Discrete Physical Data Channels	16	16	16	16
Number of Virtual Data Channels	500	500	500	500
Fracturing Pump Control System	IPC - PC	IPC - PC	IPC - PC	IPC - PC
Blender, Chemical Additive and Hydration Control System	AccuFrac - PC	AccuFrac - PC	AccuFrac - PC	AccuFrac - PC
Touchscreen IPC - PC Interfaces	2	3	3	3
Industrial Computers	2	3	3	3
ACCUFRAC - PC and Modeling Software Screens	4	7	7	6
Printers	2	2	2	2
Generator System	20 kW stand alone diesel engine driven	20 kW stand alone diesel engine	20 kW chassis engine driven	10 kW stand alone diesel engine
Communication System	3-station internal intercom, 12 external radios	5-station internal intercom, 12 external radios	5-station internal intercom, 12 external radios	4-station internal intercom, 12 external radios

Acidizing Units

Stewart & Stevenson's acidizing units bring high horse-power pumping, acid transportation and fluid mixing capabilities to the well site in a single unit package. The efficient and fully integrated design of the units allows operators to accomplish multiple acidizing treatments in rapid succession. Our flexible designs allow many different configurations with varying power options, which enables us to tailor units to meet the specific demands of various formations and treatment programs.

Acidizing units are available in trailer-mounted, bodyload and tractor-mounted with transport trailer versions. Skid-mounted blending systems can be provided for offshore applications.

Different piping system materials (stainless steel, hastalloy, and carbon steel) are available to fit any application and budget. Stand-alone data acquisition systems (Stewart & Stevenson DAQPAQ) can be added to any unit to provide real time monitoring and recording with a post-job report for the customer.



AC-501 Truck mounted acidizing unit.



Skid mounted acid injection system.



AC-501 Tractor mounted acidizing unit.



DAQPAQ can be added to any unit.



AT-851 Trailer mounted acidizing unit.

STEWART & STEVENSON ACIDIZING UNITS					
MODEL	AT-601 Trailer Mounted Unit	AT-851 Trailer Mounted Unit	AT-1001 Trailer Mounted Unit	AC-501 Bodyload Unit	AC-501 Tractor Mounted Unit
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	Tandem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8	6x4 or 6x6
Size: L x W x H	37'11" x 8'6" x 13'6"	41'6" x 8'6" x 13'6"	41'6" x 8'6" x 13'6"	37'7" x 8'6" x 13'2"	25'10" x 8'6" x 13'2"
Engine Rating	600 bhp	850 bhp	1000 bhp	500 bhp	500 bhp
Max. Ambient Temp.	115 °F	115 °F	115 °F	115 °F	115 °F
Transmission	Allison 4700 OFS	Allison S6610	Allison S8610	Truck chassis transmission	Truck chassis transmission
Pump	Triplex	Quintuplex	Quintuplex	Triplex	Triplex
Acid Transportation Capability	1500 gal	1500 gal	1500 gal	1000 gal	Transport trailer (3000–5000 gal)
Mixing Tub	Optional	Optional	Optional	Optional	Optional
Cold Weather Package	Optional	Optional	Optional	Optional	Optional
Data Acquisition System	Optional	Optional	Optional	Optional	Optional

Stimulation Support Equipment

Stewart & Stevenson can provide all stimulation support equipment required to complete various treatments.

- Quality control and lab units
- CO₂ equipment
- High and low pressure manifold trailers, trucks and skids
- Proppant transport and storage systems
- Mobile jobsite laboratories
- Treating line safety restraint trailers
- Field iron transports
- Centrifugal pump units



Truck mounted CO₂ boost pump.

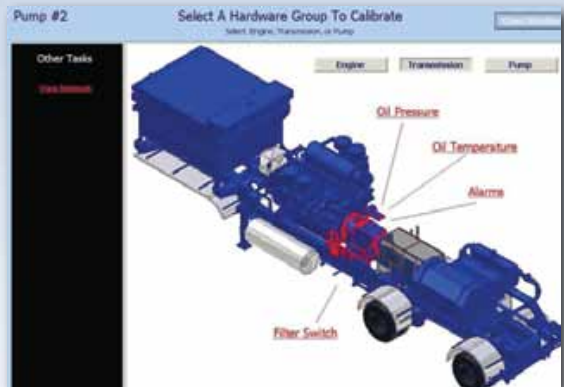


Trailer mounted proppant transport.



Truck mounted manifold and iron transport.

Well Stimulation Equipment



Well Intervention Equipment

Stewart & Stevenson's lightweight, high-strength coiled tubing units offer high mobility, fast set up, low maintenance and superior unit control.



Well Intervention Equipment

Equipment for Well Servicing Applications

Stewart & Stevenson, manufacturer of well intervention equipment since 1989, provides customers the unique benefit of sourcing an integrated system of products, including coiled tubing, nitrogen and fluid pumping units, all from a single location. Designed for land or offshore use, Stewart & Stevenson's standard line of intervention equipment can be tailored for specific customer needs and geographic areas.

Applications include workover, cleanouts, jetting/lifting, acid spotting, fishing, frac thru coil, drilling and logging. Products can be certified for areas requiring Zone 2, ATEX, NORSOK, and CE compliance.



M-100L Injector head.



TT-100-XC Coiled tubing unit.

Coiled Tubing Units

Stewart & Stevenson's coiled tubing units are configured in skid-mounted, trailer-mounted and truck-mounted versions for onshore and offshore applications.

Various options are available to meet any need. Please see the table on the following page for a list of standard units and options. Units can be tailored to meet specific needs.

Land Coiled Tubing Units

"XC" trailerized coiled tubing units carry up to 19,000 feet of 2-inch coiled tubing. They utilize injector heads from 40,000 lb pull capacity up to 100,000 lb pull capacity. A choice of stand-alone diesel hybrid power pack or wet kit style power pack is available. Trailer-mounted units are available with and without a crane.

Truck-mounted coiled tubing units utilize a variety of truck models to suit customer needs and operating conditions. Truck coiled tubing units are designed to fit the chosen chassis and can be provided with or without an integral crane.

API certified masts can be integrated into the coiled tubing unit for quick and safe rig-up. Masts can significantly reduce the rig-up time. Varying mast ratings and rig-up heights are available.

Offshore Coiled Tubing Units

Stewart & Stevenson's offshore units consist of skidded and containerized equipment suitable for use on offshore platforms or on purpose-built well intervention vessels. Units are split into multiple skids/lifts. The control cabin and power pack can be combined into a single skid/lift for faster rig up. Options include containerization/sound attenuation, exhaust gas-cooling system with integral flame traps, gas detection system, explosion-proof wiring and certified lifting frames.



TT-100-XC Trailer-mounted high capacity coiled tubing unit.



Offshore coiled tubing unit..



Bobtail coiled tubing unit.



TT-100-XC Coiled tubing unit.



TT-100-XC Coiled tubing unit.

COILED TUBING UNITS						
CARRIER	SKID		TRAILER		TRUCK	
MODEL	3-Piece	4-Piece	Crane	High Capacity	1-Truck	2-Truck
Hydraulic Power Source	Stand-alone	Stand-alone	Stand-alone or wet kit	Stand-alone or wet kit	Wet kit	Wet kit
Truck	N/A	N/A	N/A	N/A	Kenworth, Western Star or Mercedes Benz	Kenworth, Western Star or Mercedes Benz
Injector Head (lb pull)	40, 60, 80, 100k	40, 60, 80, 100k	40, 60, or 80k	80, 100k	40, 60k	40, 60k
Reel	RS-09, 19, 20	RS-09, 19, 20	RS-09, 19	RS-20, 24	RS-09, 11	RS-09, 11
Well Control	3.06", 4.06"	3.06", 4.06"	3.06", 4.06"	3.06", 4.06", or 5.12"	3.06" or 4.06"	3.06" or 4.06"
Working Pressure	10M or 15M	10M or 15M	10M or 15M	10M or 15M	10M	10M
Cabin Size	4.5' (1.37M), 6' (1.82M), 8' (2.44M)	4.5' (1.37M), 6' (1.82M), 8' (2.44M)	4.5' (1.37M), 6' (1.82M), 10' (3.04M)	4.5' (1.37M), 6' (1.82M), 10' (3.04M)	4.5' (1.37M), 6' (1.82M)	4.5' (1.37M), 6' (1.82M)
Accumulators	2, 3 or 4	2, 3 or 4	2, 3 or 4	4	2	2
BOP Controls	4, 6, 8	4, 6, 8	4, 6, 8	6, 8, 10	4 or 6	4 or 6
Crane	N/A	N/A	National 638 or 647	N/A	National 638	National 638 or 647
Tubing, downhole tools, data acquisition, tubing fatigue software, modeling software and special certification (CE, ATEX, NORSOK, ZONE 2 DNV 2.7-1) are quoted upon request.						

Injectors

The injector head is the heart of the Stewart & Stevenson coiled tubing system. Our M Series injectors include many features and advancements to provide the reliability and performance that Stewart & Stevenson's customers have become accustomed to since building our first injector heads over 20 years ago:

- Industry leading pull to weight ratio
- VBIII Chain and Traction System
- Balanced Drive System
- Available with 72", 90", 108" and 120" gooseneck sizes.



90" Hydraulic folding gooseneck.



M-100 Injector.

INJECTOR HEADS							
MODEL	Pull Capacity (lb)	Snub Capacity (lb)	Speed (ft/min)	L (in)	W (in)	H (in)	Weight (lb)
M-80	80,000	40,000	200	50	52	82	7,000
M-80L	80,000	40,000	200	50	52	96	8,500
M-100	100,000	40,000	200	50	52	82	7,000
M-100L	100,000	40,000	200	50	52	96	8,500
D-40	40,000	20,000	300	46	54	72	5,000
*Ratings and dimensions subject to change. Gooseneck sizes available: 72-, 90-, 108- and 120-inch. Hydraulic folding option available.							

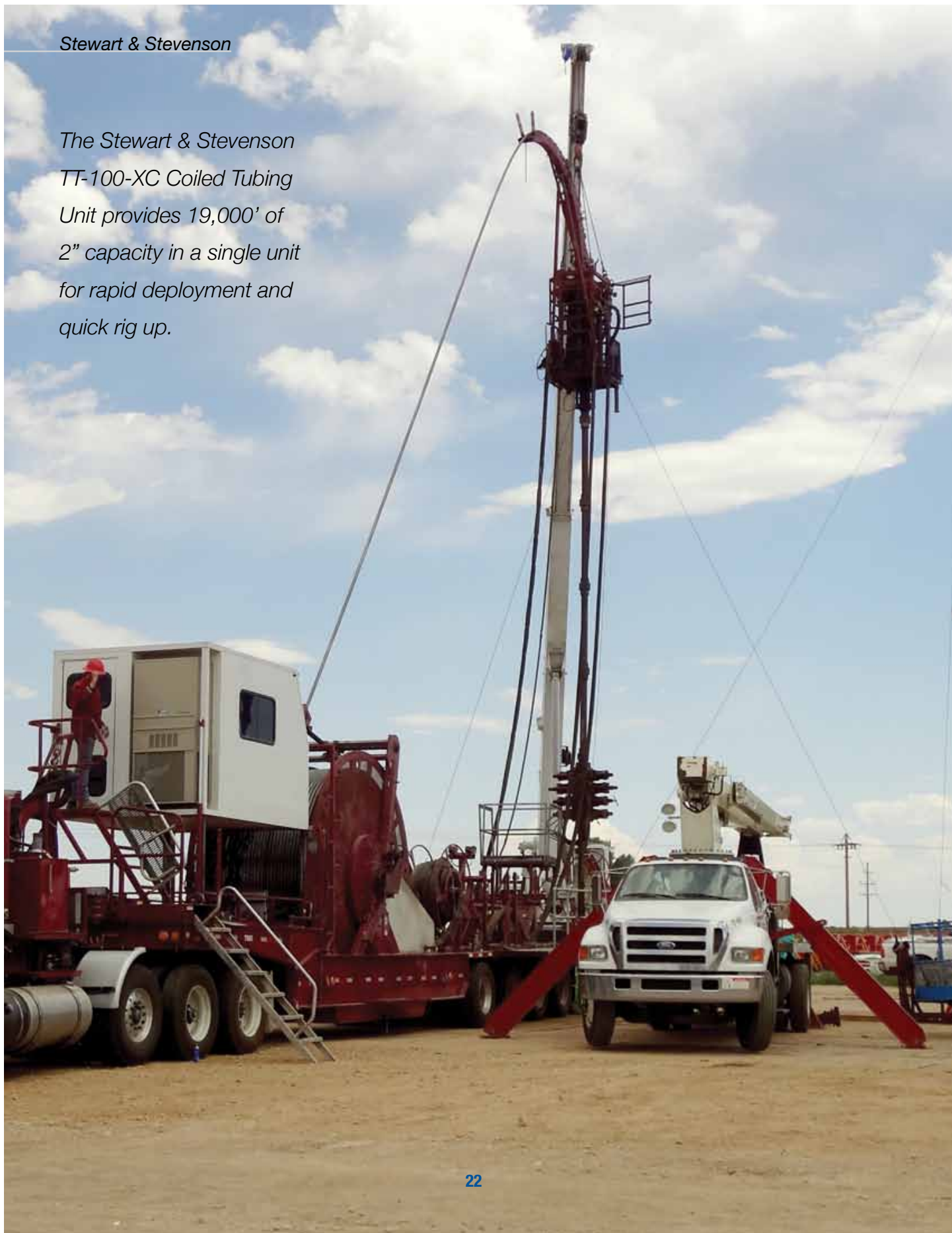
*Stewart & Stevenson
injector heads provide
industry leading weight to
pull ratios.*



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Stewart & Stevenson

*The Stewart & Stevenson
TT-100-XC Coiled Tubing
Unit provides 19,000' of
2" capacity in a single unit
for rapid deployment and
quick rig up.*



Coiled Tubing Reels

Stewart & Stevenson manufactures coiled tubing reels in sizes to fit any application and to be compatible with other manufacturer's hydraulic systems. The reels feature high torque, high speed motors to handle today's tripping speeds and a bearing system with steel roller and tapered roller bearings for smooth, efficient operation under the heaviest loads. We offer the newest technology in tubing reels:

- Rapid replacement drum systems
- Cartridge style swivels
- Stand-alone spooling bases

Reel Trailers

Stewart & Stevenson provides reel trailers to support coil units with specialty strings. Available in both conventional and oversized loads, Stewart & Stevenson can provide reel trailers for many different applications.



Direct drive reel skid.



Reel trailer with operator's cabin.

STANDARD REEL SIZES*					
MODEL	Tubing Capacity 1	Tubing Capacity 2	Flange Diameter	Core Diameter	Drum Width
RS-09	22,000 ft–1.25 in	16,000 ft–1.50 in	109 in	68 in	69 in
RS-19	25,000 ft–1.25 in	18,000 ft–1.50 in	121 in	70 in	69 in
RS-20	21,000 ft–1.75 in	15,000 ft–2.00 in	144 in	80 in	69 in
RS-24	19,000 ft–2.00 in	17,500 ft–2.00 in	154 in	80 in	69 in
RS-40	25,000 ft–2.00 in	20,000 ft–2.375 in	175 in	96 in	84 in
*Other reel sizes are available.					

Drilling & Masted Coiled Tubing Rigs

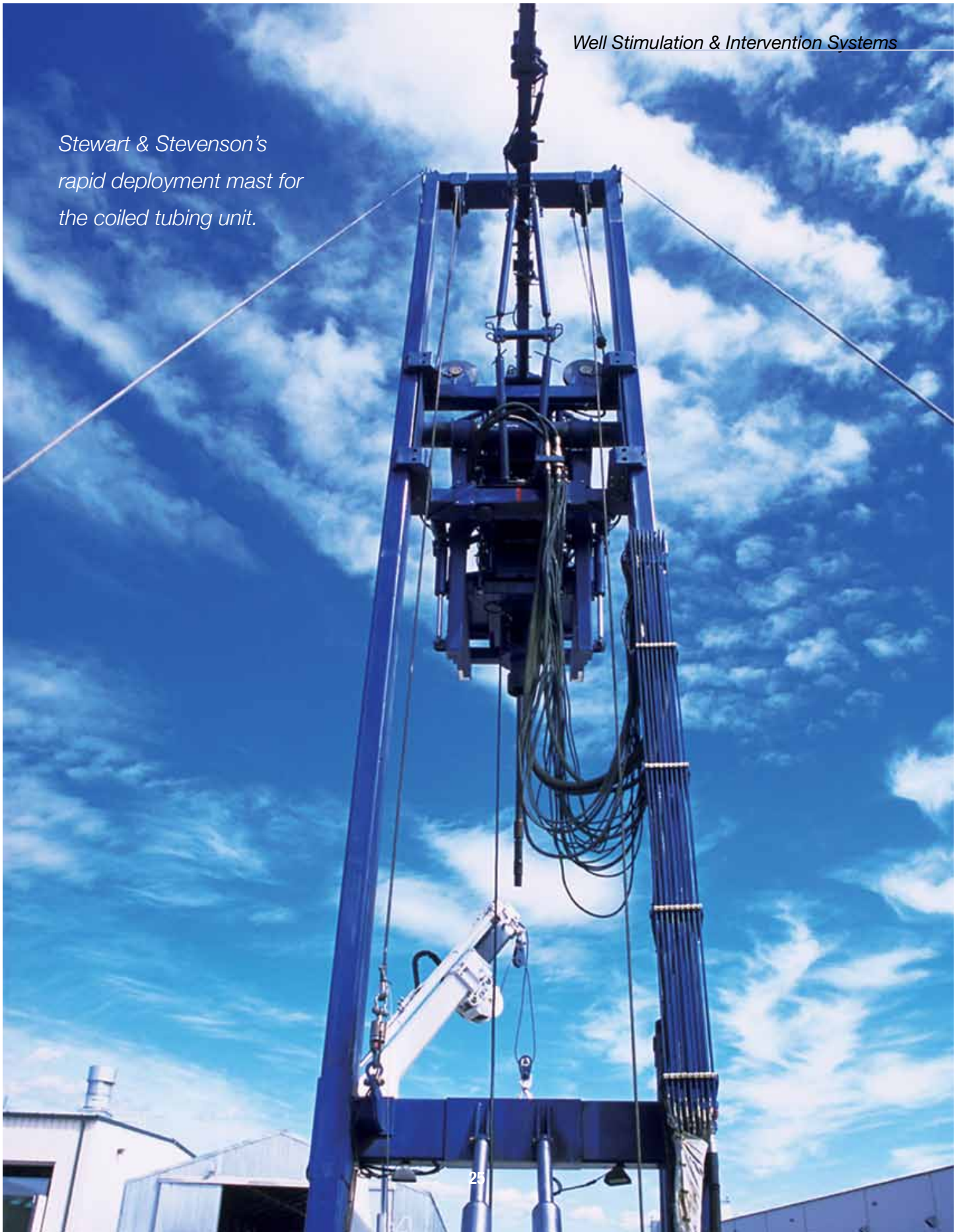
Masted Coiled Tubing Reels

Stewart & Stevenson manufactures specialized masted coiled tubing to perform conventional operations. Masted coiled tubing rigs can be built in multiple configurations and customized for specific applications.



Masted coiled tubing unit.

*Stewart & Stevenson's
rapid deployment mast for
the coiled tubing unit.*



Nitrogen & Industrial Gas Systems

Stewart & Stevenson's Nitrogen and Industrial Gas Systems feature the widest range of nitrogen pumping equipment in the industry. We manufacture nitrogen pumping units in fired and non-fired (heat recovery) versions for both onshore and offshore use.

Heat recovery versions employ a unique method of loading the diesel engine, indirectly providing heat to vaporize liquid nitrogen. Standard units are available in 90K and 180K SCFH versions capable of pumping pressures of 15,000 psi.

Direct-fired units use electronic controls and advanced hydraulics to deliver nitrogen gas at high rates and pressures. Available in 540K, 660K and 1.2MM SCFH, these units are equipped with high horsepower engines to provide maximum performance in stimulation treatments.

Stewart & Stevenson packages units with high quality cryogenic components from leading manufacturers, ACD and Cryoquip. The components are industry-proven designs with more than 40 years of service in the application.



WNT-601-181-NF Combination nitrogen and fluid pumper.



NS-181-NF 180K SCFH Nitrogen skid on a trailer.

STEWART & STEVENSON NITROGEN UNITS				
MODEL	NS-181-NF	NT-181-NF	WNT-601-181-NF-Combo	NC-181-NF
Vaporization Type	Heat recovery	Heat recovery	Heat recovery	Heat recovery
Maximum Discharge Rate	180,000 scfh (5097 m ³ /h)	180,000 scfh (5097 m ³ /h)	180,000 scfh (5,097 m ³ /h)	180,000 scfh (5097 m ³ /h)
Maximum Discharge Pressure	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)
Carrier Type	Stewart & Stevenson oilfield skid	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	N/A	Tandem or Tridem Air Ride	Tandem or Tridem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8
Size: L x W x H	14'0" x 8'0" x 8'6"	40'0" x 8'6" x 13'6"	44'6" x 8'6" x 13'5"	39'6" x 8'6" x 12'2"
Engine	MTU Series 60	MTU Series 60	MTU Series 60	Truck engine driven
Engine Rating	600 bhp	600 bhp	600 bhp	550 bhp
Maximum Ambient Operating Temperature	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
LN ² Tank	N/A	3,000 gallon	2,000 gallon	2,000 gallon
Pump Drive	Closed loop hydraulic	Closed loop hydraulic	Closed loop hydraulic	Closed loop hydraulic
Cryogenic Pump	Triplex	Triplex	Triplex	Triplex
Data Acquisition System	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac



NT-661-DF 660K SCFH Nitrogen trailer.



540K SCFH Nitrogen truck.



NC-181-NF 180 K SCFH Bodyland nitrogen unit.



NT-181-NF 180K SCFH Trailer nitrogen unit with control cabin.

NC-362-NF	NT-661-DF	NC-661-DF	NT-1201-DF
Heat recovery	Direct fired	Direct fired	Direct fired
360,000 scfh (10,194 m³h)	660,000 scfh (20,388 m³h)	660,000 scfh (20,388 m³h)	1,270,000 scfh (36,000 m³h)
10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)
Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson trailer
6×4, 6×6, 8×4, 8×6, or 8×8	Tandem or Tridem Air Ride	6×4, 6×6, 8×4, 8×6, or 8×8	Tandem or Tridem Air Ride
39'6" × 8'6" × 13'2"	39'0" × 8'6" × 13'6"	39'6" × 8'6" × 12'2"	45'0" × 8'6" × 13'6"
Truck engine and MTU Series 60	MTU Series 60 and D706	Truck engine driven and D706	MTU 16V2000 and D706
1150 bhp	630 bhp and 110 bhp	550 bhp and 110 bhp	1500 bhp and 110 bhp
122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
2,000 gallon	2,000 gallon	2,000 gallon	N/A
Closed loop hydraulic	Direct Drive via Allison transmission	Direct Drive via Allison transmission	Direct Drive via Allison transmission
Two (2) Triplex	Triplex	Triplex	Quintuplex
Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac

Fluid Pumping Equipment

Stewart & Stevenson manufactures a line of fluid pumping equipment designed to perform high-pressure well service treatments. Available in skid, trailer and truck mounted versions, our fluid pumping units deliver high flow rates at high pressure while providing excellent turndown for low rate applications.

Units are commonly manufactured within the range of 500 to 2,000 horsepower, with automatic transmissions and fluid displacement tanks. They are available in single and twin configurations.

Coiled Tubing Support

Mounted on a rugged oilfield trailer, our twin pumping unit features two high pressure pumping systems, fluid handling system and operator's control console. Units are commonly equipped with two MTU engines, two Allison powershift transmissions, two triplex pumps with gear reducers and 2-speed gear boxes for low rate pumping. Quintuplex pumps can be installed for greater flow rates.



WT-601 Single pump trailer with control cabin.

High efficiency horizontal triplex pumps equipped with hard surface plungers have the capability to pump cement slurries, inhibited acid, sand-laden fluids, water, drilling or other well servicing fluids in ambient temperatures up to 122 °F.

The fluid handling system has a dual compartment, 22-barrel displacement tank with all fill, load, suction manifolds and two centrifugal pumps. One pump transfers fluid from external sources to the holding tank and one boosts slurry/fluids to the triplex pumps from the fluid holding tank.

STEWART & STEVENSON FLUID PUMPING UNITS

Carrier	Trailer	Trailer	Trailer (combination fluid and nitrogen pump)
Model	WT-601	WT-1202	WNT-601-181-NF
Truck	N/A	N/A	N/A
Engine (standard)	MTU Series 60	2 each MTU Series 60	2 each MTU Series 60
LN ² System	-	-	180,000 SCFA Heat Recovery
Transmission	Allison 4700 OFS	2 each Allison 4700 OFS	Allison 4700 OFS
Auxiliary Transmission	Eaton Fuller 2:1 Transmission	2 each Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission
Positive Displacement Pump	Triplex or quintuplex	2 each triplex or quintuplex	2 each quintuplex
Power End Lube	Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system
Fluid End Lube	Automatic grease injection	Automatic grease injection	Automatic grease injection
Suction Connections	2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206
Discharge Line	2" 1502	2" 1502	2" 1502
Controls	Platform mount	Triplex	Triplex
Climatized Control Cabin	Optional	Optional	Optional
Displacement Tank	22 bbl, two compartment	22 bbl, two compartment	11 bbl, two compartment
Centrifugal Pumps (fill, boost)	2 each Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4



WT-1202 Twin pump trailer.

Skid	Skid	Truck	Truck
WS-601	WS-1202	WC-601	WC-1202
N/A	N/A	Kenworth, Western Star or Mercedes Benz	Kenworth, Western Star or Mercedes Benz
MTU Series 60	2 each MTU Series 60	MTU Series 60	MTU Series 60
-	-	-	-
Allison 4700 OFS	Allison 4700 OFS	Allison 4700 OFS	Allison 4700 OFS
Eaton Fuller 2:1 Transmission	2 each Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission
Triplex or quintuplex	2 each triplex or quintuplex	Triplex or quintuplex	2 each triplex or quintuplex
Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system
Automatic grease injection	Automatic grease injection	Automatic grease injection	Automatic grease injection
2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206
2" 1502	2" 1502	2" 1502	2" 1502
Side mount	Platform mount	Triplex	Triplex
N/A	N/A	Optional	Optional
Optional	22 bbl, two compartment	22 bbl, two compartment	22 bbl, two compartment
Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4

Aftermarket

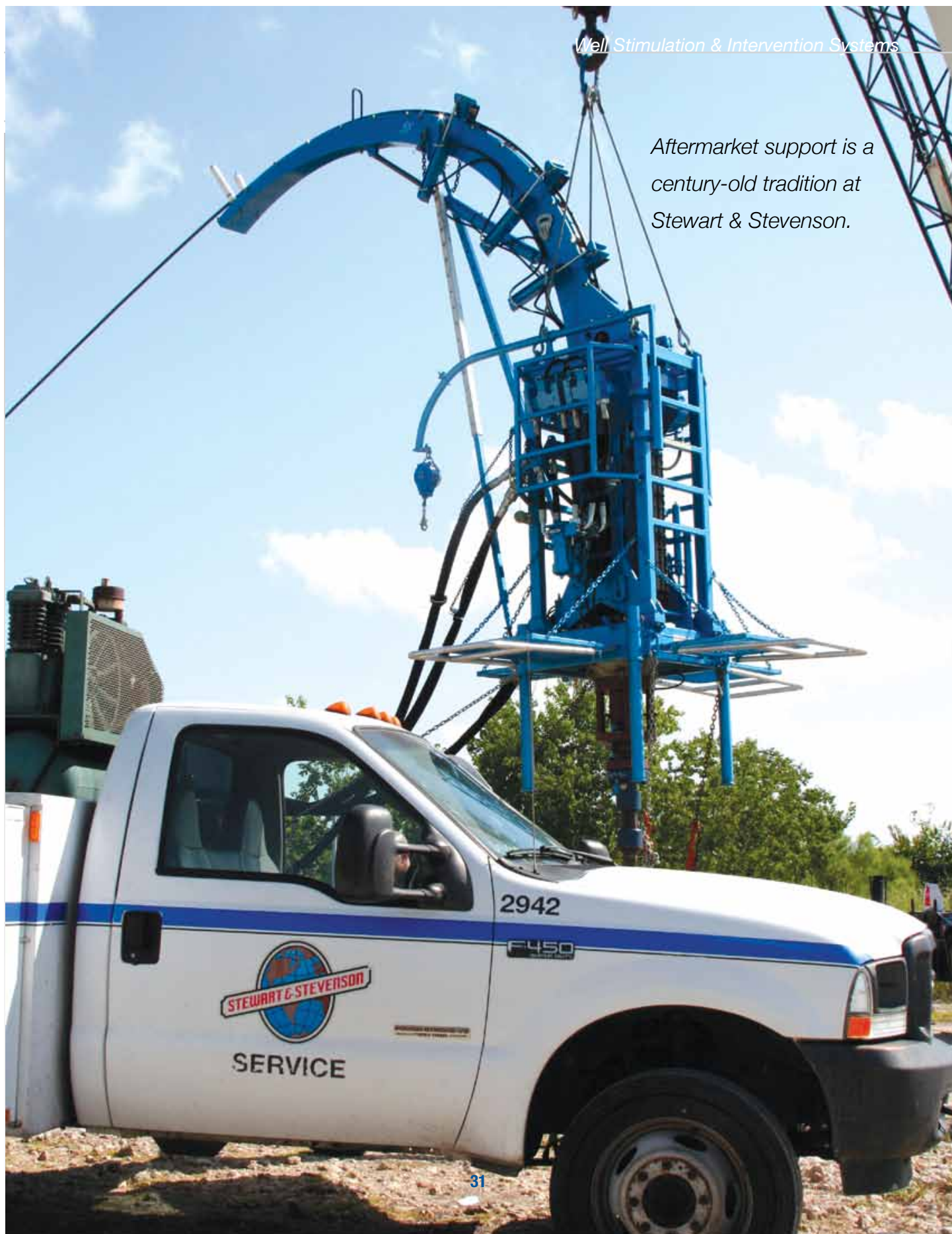
Like the quality craftsmanship that goes into our products, aftermarket support is a century-old tradition at Stewart & Stevenson. We provide:

- **Equipment Commissioning**
Wherever your equipment is put into service, our certified technicians and trainers will travel there to ensure that your equipment is properly installed, fully serviced, fully operational, and that your personnel are trained to operate your equipment.
- **Service and Maintenance**
Life-cycle service management of your oilfield equipment includes periodic maintenance, emergency repair, refurbishment, overhauls and upgrades. Stewart & Stevenson's certified technicians provide worldwide equipment repair and service.
- **Parts**
We stock certified OEM parts and have a wide network of vendor suppliers of parts and components, with an experienced, knowledgeable staff to handle your needs.

From 3-D design to lean manufacturing flow line to after-market support, Stewart & Stevenson provides state-of-the-art stimulation and intervention equipment and service.



Aftermarket support is a century-old tradition at Stewart & Stevenson.





A Century of Innovation

For all well stimulation and intervention solutions contact us today.

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A Century of Innovation



Well Stimulation & Intervention Systems

Stewart & Stevenson - Well Stimulation & Intervention Systems

Quality engineered oilfield equipment manufactured by Stewart & Stevenson has supported the worldwide oil and gas industry since the 1950s. Today Stewart & Stevenson's integrated well stimulation and intervention equipment aids in the production of oil and gas in onshore and offshore fields from Texas to China, in the Gulf of Mexico and the Caspian Sea, in Middle East deserts and the coldest regions of Siberia, and at numerous other locations around the globe.

Stewart & Stevenson uniquely is a single source manufacturer of all individual well stimulation and intervention equipment, complete with technically advanced controls, enabling customers to obtain a fully integrated system ready for immediate operation at delivery.

Specialized Support

Stewart & Stevenson technicians travel to customer locations around the globe to provide equipment training, commissioning and servicing. Customers have access to equipment service on a global basis.

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www.stewartandstevenson.com

Well Stimulation Equipment

Fully Integrated Stimulation Systems

Stewart & Stevenson's fully integrated stimulation equipment works as a system to perform the fracturing treatment. It includes:

- Fracturing Pumps
- Blenders
- Chemical Additive and Hydration Systems
- Acidizing Equipment
- Support Equipment
- Data Acquisition and Control Centers

Combining more than 50 years of fracturing equipment experience with in-house engineering, software development and quality control expertise, Stewart & Stevenson develops leading edge stimulation equipment that offers maximum reliability.

We tailor equipment to meet each operating region's specific environment with advanced control systems to serve as a single control platform for multiple pieces of equipment. Our data vans have controls, data acquisition software and communication technology that makes complete control of field operations possible locally or remotely. Quality control in all phases of equipment design and construction ensures consistent quality that minimizes maintenance requirements.

Stewart & Stevenson's fully integrated stimulation systems offer simplified operation and improved job quality while requiring fewer trained operators to perform a fracturing treatment.



Fracturing equipment on a barge job.



Stewart & Stevenson's integrated fracturing equipment on a dual simultaneous fracturing job.



Integrated Stimulation Systems.

Fracturing Pumps

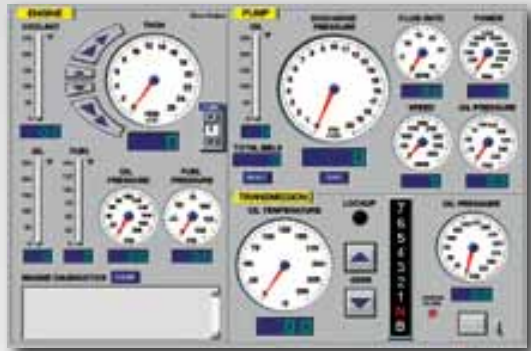
Stewart & Stevenson's fracturing pumps are designed to provide optimal horsepower in a maneuverable package. Our field-proven units provide reliable operation in the harshest environments. Intelligent Pump Control (IPC), which combines advanced unit controls and diagnostics with a touch screen interface, provides control of up to 24 units from a single workstation.

Trailer-mounted units, available with triplex or quintuplex pumps in high ambient cooling packages, are weight-legal. Bodyload units are designed to traverse the roughest terrain and operate in the harshest environments. Skid-mounted units are available in radiator-cooled configurations for independent operation or seawater-cooled configurations for fully integrated stimulation vessels. Maintenance-friendly features and high strength materials ensure reliable operation.

Specialized combination blender and fracturing pumps provide complete fracturing capabilities in a single unit.



Combination fracturing pump and blender.



IPC-PC Advanced control system.



SRP 2500 / FT-2501 Trailer mounted fracturing unit.



FC-2251 Bodyload fracturing pump.



FS-3001 3,000 bhp Skid mounted fracturing unit.

FT-2251 Trailer Mounted Fracturing Unit



Pioneering Technology: Stewart & Stevenson has pioneered the development of high horsepower fracturing units with emissions compliance.

STEWART & STEVENSON FRACTURING PUMPS					
Model	FT-2251 Trailer Mounted	FC-2251 Bodyload	FS-2251 Skid Mounted	FT-2501 Trailer Mounted	FC-3001 Bodyload
Carrier Type	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson oilfield skid	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem or Tridem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8	N/A	Tridem Air Ride	8x4 or 8x8
Size: L x W x H	42'0" x 8'6" x 13'6"	37'7" x 8'6" x 13'2"	27'0" x 8'0" x 10'6"	45' x 8'6" x 13'6"	40' x 8'6" x 13'6"
Engine*	MTU 12V4000	MTU 12V4000	MTU 12V4000	MTU 12V4000	MTU 16V4000
Engine Rating	2250 bhp	2250 bhp	2250 bhp (2500 and 3000 optional)	2500 bhp	3000 bhp (2500 optional)
Maximum Ambient Operating Temperature	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
Transmission*	Allison S9820	Allison S9820	Allison S9820	Allison 9825 (others optional)	Twin Disc TA-8500
Pump	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex	Triplex or Quintuplex
Control System	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC	Stewart & Stevenson IPC
Cold Weather Package	Optional	Optional	Optional	Optional	Optional
* Other manufacturers available					

Fracturing Blenders

Stewart & Stevenson's fracturing blenders provide industry-leading job performance and reliability. Our blenders allow operators to mix complex fracturing slurries with varying densities for the most demanding treatments.

Stewart & Stevenson's AccuFrac System provides automated density and chemical controls in a user-friendly interface from the unit or data van. The unique concentric mixing chamber provides accurate and homogenous proppant mixing at both low and high rates without air entrainment. Highly efficient closed loop hydraulic systems provide faster response than open loop systems, while consuming less power and producing less waste heat for longer component life and reduced maintenance requirements.



MS-60 Skid mounted blender.



MT-132 Trailer mounted fracturing blender.



MC-60 Bodyload fracturing blender for extreme cold weather operations.



MT-102 Trailer mounted fracturing blender.



MC-60 Bodyload fracturing blender with closed chamber mixing system.



MT-132 Trailer mounted fracturing blender.

STEWART & STEVENSON FRACTURING BLENDERS

MODEL	MT-132 Trailer Mounted Blender	MT-102 Trailer Mounted Blender	MC-100 Bodyload Blender	MC-60 Bodyload Blender	MS-60 Skid Mounted Blender	MS-30 Skid Mounted Blender
Maximum Discharge Rate	130+ bbl/min	100 bbl/min	100 bbl/min	60 bbl/min (75 bbl/min optional)	60 bbl/min	30 bbl/min
Maximum Discharge Density	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal	21 lb/gal
Maximum Proppant Input Rate	21,250 lb/min (optional higher rates available)	21,250 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	16,000 lb/min (optional higher rates available)	6000 lb/min (optional higher rates available)
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis	Oilfield Skid	Oilfield Skid
Size: L x W x H	48'0" x 8'6" x 13'6"	48'0" x 8'6" x 13'6"	36'8" x 8'6" x 13'2"	34'8" x 8'6" x 13'2"	24'8" x 8'6" x 12'0"	19'6" x 8'6" x 8'0"
Mixing Chamber	Concentric tub with automatic level control	Concentric tub with automatic level control	Concentric tub with automatic level control	Pressurized mixing chamber or concentric tub	Pressurized mixing chamber or concentric tub	Hydrojet tub
Drive System*	(2) Deck engines	(2) Deck engines	(1) Truck engine and (1) deck engine	(1) Truck engine	(1) Deck engine	(1) Deck engine
Total Horsepower	1550 bhp	1550 bhp	1050 bhp	500 bhp	600 bhp	330 bhp
Number of Liquid Additive Systems	6 or more	6 or more	6 or more	6 or more	6 or more	6 or more
Number of Dry Additive Systems	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2
Discharge Pump	14x12	14x12	14x12	Not Required	Not Required	5x6
Suction Pump	12x12	12x10	12x10	8x10	8x10	5x6
Automated Control System	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac
Cold Weather Package	Optional	Optional	Optional	Optional	Optional	Optional

* Other manufacturers available

Chemical Additive & Hydration Systems

Stewart & Stevenson's combination chemical additive and hydration units provide on-the-fly polymer injection and hydration to eliminate post job waste while increasing slurry viscosity. Stewart & Stevenson also offers stand alone chemical additive units to inject chemicals at multiple sites, depending upon each specific chemical's requirement.

Stewart & Stevenson's AccuFrac chemical controller provides automated chemical injection dosage control with varying rates from the blender, hydration unit and other external sources. Our variable level hydration chamber allows for final stage rundown to eliminate gelled fluid disposal problems. The chemical additive units are equipped with quick changeout tank systems to allow operators to replenish chemicals at the yard in a few minutes versus hours required for a refill.



CS-10CAS/BS-200.



CT-10CAS Trailer mounted chemical additive unit.



CC-6CAS Bodyload chemical additive unit.



CC-5CAS Chemical additive unit for use in extreme cold weather applications.



CT-5CAS/BT-200 Trailer mounted chemical additive and hydration unit.

STEWART & STEVENSON CHEMICAL ADDITIVE & HYDRATION UNITS					
MODEL	CT-5CAS/BT-200	CT-5CAS/BT-100	CT-10CAS	CC-6CAS	CS-10CAS/S-200
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Oilfield skid
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	Tandem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8	N/A
Size: L x W x H	48'0" x 8'6" x 13'6"	44'0" x 8'6" x 13'6"	46'0" x 8'6" x 13'6"	37'6" x 8'6" x 12'6"	39'6" x 11'0" x 25'0"
Engine*	MTU Series 60	MTU Series 60	Dual MTU D706	Truck chassis engine driven	MTU Series 60
Engine Rating	600 bhp	500 bhp	110 bhp (each)	400 bhp (minimum)	500 bhp
Number of Chemical Injection Circuits	5	5	10	6	10
Pump Type	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear	Progressive cavity, lobe, piston or gear
Hydration Tank Volume	200 bbl	100 bbl	N/A	N/A	200 bbl
Maximum Hydration Tank Pump Inlet Rate	100 bbl/min	60 bbl/min	N/A	N/A	100 bbl/min
Control System	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac	Stewart & Stevenson AccuFrac
Transfer Pump System	Standard	Standard	Standard	Standard	Standard
Environmental Enclosure	Optional	Optional	Optional	Optional	Optional
* Other manufacturers available					

Data Acquisition & Control Centers (Data Vans)

Stewart & Stevenson's data acquisition and control centers provide a centralized command center to control all of the critical well site equipment while monitoring, recording and supervising the fracturing treatment. Data vans reduce the number of equipment operators required to complete the treatment while greatly improving job quality through centralized real-time data gathering and presentation.

Stewart & Stevenson's IPC-PC interface provides control of up to 24 fracturing pumps at a single operator workstation. The AccuFrac-PC interface provides control of multiple blenders, hydration units and chemical additive units from the Data Acquisition and Control Center. UPS systems and solid-state CPU components provide reliable operation with backup systems.

Our control systems are available as discrete components, giving our customers the ability to upgrade existing equipment.



Data acquisition interior.



EC-22ACD Data van for cold weather.



ET-40ACD Data van command center provides control of critical well site equipment.



ET-26ACD Trailer Mounted Data Acquisition and Control Center.

STEWART & STEVENSON DATA ACQUISITION & CONTROL UNITS				
MODEL	ET-26ACD	ET-40ACD	EC-26ACD	EC-22ACD
Control Cabin Size L x W x H	12'0" x 7'0" x 6'6"	40'0" x 8'0" x 7'8"	26'0" x 8'0" x 7'8"	22'0" x 8'0" x 7'8"
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	4x2, 4x4, 6x4, or 6x6	4x2, 4x4, 6x4, or 6x6
Maximum Number of Fracturing Unit Controls	24	24	24	24
Maximum Number of Blender Controls	2	2	2	2
Maximum Number of Chemical Additive/Hydration Controls	2	2	2	2
Number of Discrete Physical Data Channels	16	16	16	16
Number of Virtual Data Channels	500	500	500	500
Fracturing Pump Control System	IPC - PC	IPC - PC	IPC - PC	IPC - PC
Blender, Chemical Additive and Hydration Control System	AccuFrac - PC	AccuFrac - PC	AccuFrac - PC	AccuFrac - PC
Touchscreen IPC - PC Interfaces	2	3	3	3
Industrial Computers	2	3	3	3
ACCUFRAC - PC and Modeling Software Screens	4	7	7	6
Printers	2	2	2	2
Generator System	20 kW stand alone diesel engine driven	20 kW stand alone diesel engine	20 kW chassis engine driven	10 kW stand alone diesel engine
Communication System	3-station internal intercom, 12 external radios	5-station internal intercom, 12 external radios	5-station internal intercom, 12 external radios	4-station internal intercom, 12 external radios

Acidizing Units

Stewart & Stevenson's acidizing units bring high horse-power pumping, acid transportation and fluid mixing capabilities to the well site in a single unit package. The efficient and fully integrated design of the units allows operators to accomplish multiple acidizing treatments in rapid succession. Our flexible designs allow many different configurations with varying power options, which enables us to tailor units to meet the specific demands of various formations and treatment programs.

Acidizing units are available in trailer-mounted, bodyload and tractor-mounted with transport trailer versions. Skid-mounted blending systems can be provided for offshore applications.

Different piping system materials (stainless steel, hastalloy, and carbon steel) are available to fit any application and budget. Stand-alone data acquisition systems (Stewart & Stevenson DAQPAQ) can be added to any unit to provide real time monitoring and recording with a post-job report for the customer.



AC-501 Truck mounted acidizing unit.



Skid mounted acid injection system.



AC-501 Tractor mounted acidizing unit.



DAQPAQ can be added to any unit.



AT-851 Trailer mounted acidizing unit.

STEWART & STEVENSON ACIDIZING UNITS					
MODEL	AT-601 Trailer Mounted Unit	AT-851 Trailer Mounted Unit	AT-1001 Trailer Mounted Unit	AC-501 Bodyload Unit	AC-501 Tractor Mounted Unit
Carrier Type	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	Tandem Air Ride	Tandem Air Ride	Tandem Air Ride	6×4, 6×6, 8×4, 8×6, or 8×8	6×4 or 6×6
Size: L × W × H	37'11" × 8'6" × 13'6"	41'6" × 8'6" × 13'6"	41'6" × 8'6" × 13'6"	37'7" × 8'6" × 13'2"	25'10" × 8'6" × 13'2"
Engine Rating	600 bhp	850 bhp	1000 bhp	500 bhp	500 bhp
Max. Ambient Temp.	115 °F	115 °F	115 °F	115 °F	115 °F
Transmission	Allison 4700 OFS	Allison S6610	Allison S8610	Truck chassis transmission	Truck chassis transmission
Pump	Triplex	Quintuplex	Quintuplex	Triplex	Triplex
Acid Transportation Capability	1500 gal	1500 gal	1500 gal	1000 gal	Transport trailer (3000–5000 gal)
Mixing Tub	Optional	Optional	Optional	Optional	Optional
Cold Weather Package	Optional	Optional	Optional	Optional	Optional
Data Acquisition System	Optional	Optional	Optional	Optional	Optional

Stimulation Support Equipment

Stewart & Stevenson can provide all stimulation support equipment required to complete various treatments.

- Quality control and lab units
- CO₂ equipment
- High and low pressure manifold trailers, trucks and skids
- Proppant transport and storage systems
- Mobile jobsite laboratories
- Treating line safety restraint trailers
- Field iron transports
- Centrifugal pump units



Truck mounted CO₂ boost pump.

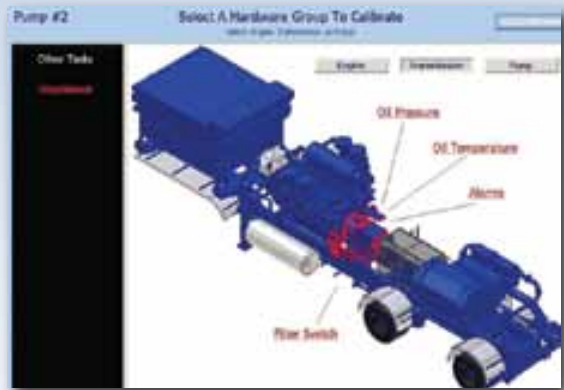


Trailer mounted proppant transport.



Truck mounted manifold and iron transport.

Well Stimulation Equipment



Well Intervention Equipment

Stewart & Stevenson's lightweight, high-strength coiled tubing units offer high mobility, fast set up, low maintenance and superior unit control.



Well Intervention Equipment

Equipment for Well Servicing Applications

Stewart & Stevenson, manufacturer of well intervention equipment since 1989, provides customers the unique benefit of sourcing an integrated system of products, including coiled tubing, nitrogen and fluid pumping units, all from a single location. Designed for land or offshore use, Stewart & Stevenson's standard line of intervention equipment can be tailored for specific customer needs and geographic areas.

Applications include workover, cleanouts, jetting/lifting, acid spotting, fishing, frac thru coil, drilling and logging. Products can be certified for areas requiring Zone 2, ATEX, NORSOK, and CE compliance.



M-100L Injector head.



TT-100-XC Coiled tubing unit.

Coiled Tubing Units

Stewart & Stevenson's coiled tubing units are configured in skid-mounted, trailer-mounted and truck-mounted versions for onshore and offshore applications.

Various options are available to meet any need. Please see the table on the following page for a list of standard units and options. Units can be tailored to meet specific needs.

Land Coiled Tubing Units

"XC" trailerized coiled tubing units carry up to 19,000 feet of 2-inch coiled tubing. They utilize injector heads from 40,000 lb pull capacity up to 100,000 lb pull capacity. A choice of stand-alone diesel hybrid power pack or wet kit style power pack is available. Trailer-mounted units are available with and without a crane.

Truck-mounted coiled tubing units utilize a variety of truck models to suit customer needs and operating conditions. Truck coiled tubing units are designed to fit the chosen chassis and can be provided with or without an integral crane.

API certified masts can be integrated into the coiled tubing unit for quick and safe rig-up. Masts can significantly reduce the rig-up time. Varying mast ratings and rig-up heights are available.

Offshore Coiled Tubing Units

Stewart & Stevenson's offshore units consist of skidded and containerized equipment suitable for use on offshore platforms or on purpose-built well intervention vessels. Units are split into multiple skids/lifts. The control cabin and power pack can be combined into a single skid/lift for faster rig up. Options include containerization/sound attenuation, exhaust gas-cooling system with integral flame traps, gas detection system, explosion-proof wiring and certified lifting frames.



TT-100-XC Trailer-mounted high capacity coiled tubing unit.



Offshore coiled tubing unit..



Bobtail coiled tubing unit.



TT-100-XC Coiled tubing unit.



TT-100-XC Coiled tubing unit.

COILED TUBING UNITS						
CARRIER	SKID		TRAILER		TRUCK	
MODEL	3-Piece	4-Piece	Crane	High Capacity	1-Truck	2-Truck
Hydraulic Power Source	Stand-alone	Stand-alone	Stand-alone or wet kit	Stand-alone or wet kit	Wet kit	Wet kit
Truck	N/A	N/A	N/A	N/A	Kenworth, Western Star or Mercedes Benz	Kenworth, Western Star or Mercedes Benz
Injector Head (lb pull)	40, 60, 80, 100k	40, 60, 80, 100k	40, 60, or 80k	80, 100k	40, 60k	40, 60k
Reel	RS-09, 19, 20	RS-09, 19, 20	RS-09, 19	RS-20, 24	RS-09, 11	RS-09, 11
Well Control	3.06", 4.06"	3.06", 4.06"	3.06", 4.06"	3.06", 4.06", or 5.12"	3.06" or 4.06"	3.06" or 4.06"
Working Pressure	10M or 15M	10M or 15M	10M or 15M	10M or 15M	10M	10M
Cabin Size	4.5' (1.37M), 6' (1.82M), 8' (2.44M)	4.5' (1.37M), 6' (1.82M), 8' (2.44M)	4.5' (1.37M), 6' (1.82M), 10' (3.04M)	4.5' (1.37M), 6' (1.82M), 10' (3.04M)	4.5' (1.37M), 6' (1.82M)	4.5' (1.37M), 6' (1.82M)
Accumulators	2, 3 or 4	2, 3 or 4	2, 3 or 4	4	2	2
BOP Controls	4, 6, 8	4, 6, 8	4, 6, 8	6, 8, 10	4 or 6	4 or 6
Crane	N/A	N/A	National 638 or 647	N/A	National 638	National 638 or 647
Tubing, downhole tools, data acquisition, tubing fatigue software, modeling software and special certification (CE, ATEX, NORSOK, ZONE 2 DNV 2.7-1) are quoted upon request.						

Injectors

The injector head is the heart of the Stewart & Stevenson coiled tubing system. Our M Series injectors include many features and advancements to provide the reliability and performance that Stewart & Stevenson's customers have become accustomed to since building our first injector heads over 20 years ago:

- Industry leading pull to weight ratio
- VBIII Chain and Traction System
- Balanced Drive System
- Available with 72", 90", 108" and 120" gooseneck sizes.



90" Hydraulic folding gooseneck.



M-100 Injector.

INJECTOR HEADS							
MODEL	Pull Capacity (lb)	Snub Capacity (lb)	Speed (ft/min)	L (in)	W (in)	H (in)	Weight (lb)
M-80	80,000	40,000	200	50	52	82	7,000
M-80L	80,000	40,000	200	50	52	96	8,500
M-100	100,000	40,000	200	50	52	82	7,000
M-100L	100,000	40,000	200	50	52	96	8,500
D-40	40,000	20,000	300	46	54	72	5,000

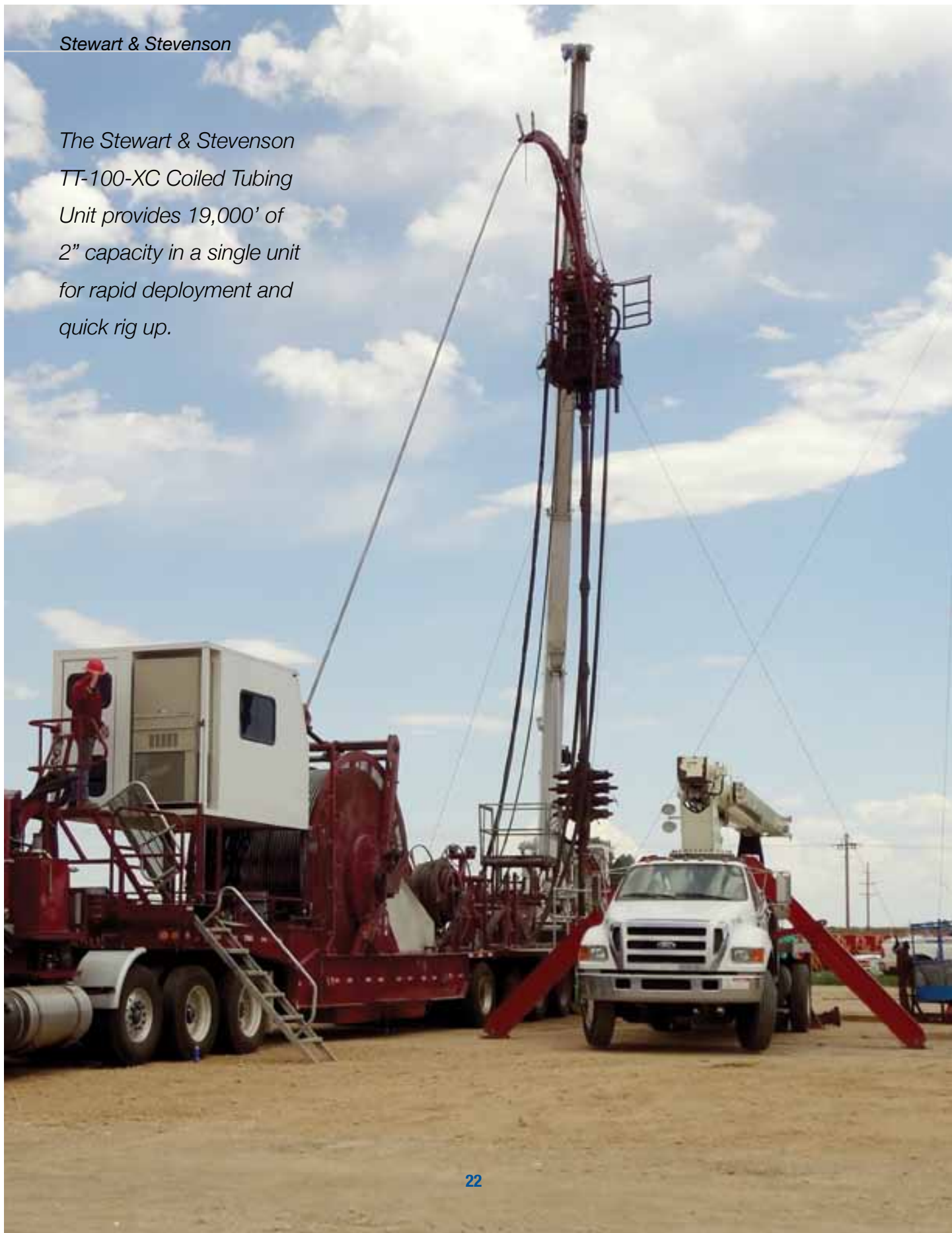
*Ratings and dimensions subject to change. Gooseneck sizes available: 72-, 90-, 108- and 120-inch. Hydraulic folding option available.

*Stewart & Stevenson
injector heads provide
industry leading weight to
pull ratios.*



Stewart & Stevenson

*The Stewart & Stevenson
TT-100-XC Coiled Tubing
Unit provides 19,000' of
2" capacity in a single unit
for rapid deployment and
quick rig up.*



Coiled Tubing Reels

Stewart & Stevenson manufactures coiled tubing reels in sizes to fit any application and to be compatible with other manufacturer's hydraulic systems. The reels feature high torque, high speed motors to handle today's tripping speeds and a bearing system with steel roller and tapered roller bearings for smooth, efficient operation under the heaviest loads. We offer the newest technology in tubing reels:

- Rapid replacement drum systems
- Cartridge style swivels
- Stand-alone spooling bases

Reel Trailers

Stewart & Stevenson provides reel trailers to support coil units with specialty strings. Available in both conventional and oversized loads, Stewart & Stevenson can provide reel trailers for many different applications.



Direct drive reel skid.



Reel trailer with operator's cabin.

STANDARD REEL SIZES*					
MODEL	Tubing Capacity 1	Tubing Capacity 2	Flange Diameter	Core Diameter	Drum Width
RS-09	22,000 ft–1.25 in	16,000 ft–1.50 in	109 in	68 in	69 in
RS-19	25,000 ft–1.25 in	18,000 ft–1.50 in	121 in	70 in	69 in
RS-20	21,000 ft–1.75 in	15,000 ft–2.00 in	144 in	80 in	69 in
RS-24	19,000 ft–2.00 in	17,500 ft–2.00 in	154 in	80 in	69 in
RS-40	25,000 ft–2.00 in	20,000 ft–2.375 in	175 in	96 in	84 in
*Other reel sizes are available.					

Drilling & Masted Coiled Tubing Rigs

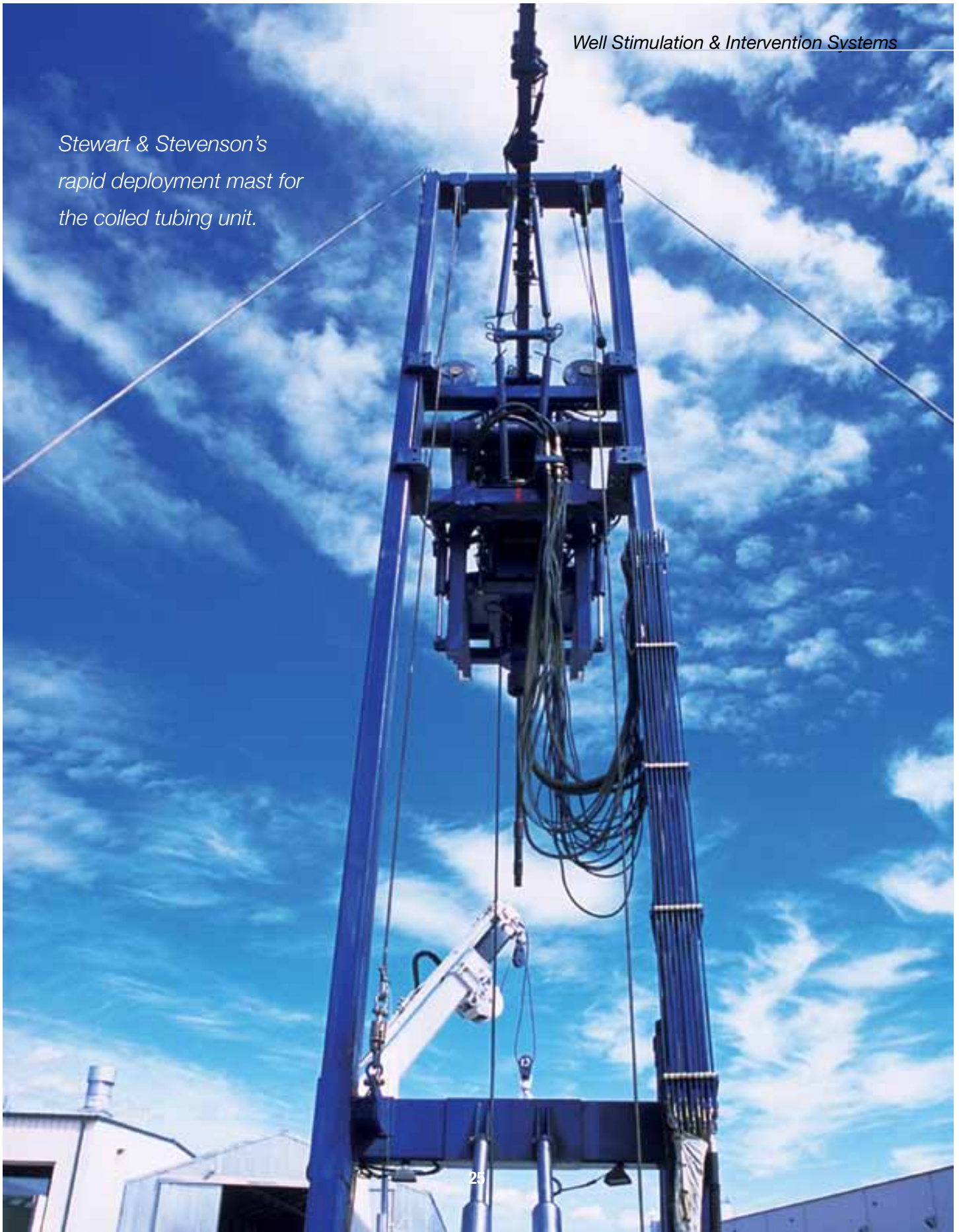
Masted Coiled Tubing Reels

Stewart & Stevenson manufactures specialized masted coiled tubing to perform conventional operations. Masted coiled tubing rigs can be built in multiple configurations and customized for specific applications.



Masted coiled tubing unit.

*Stewart & Stevenson's
rapid deployment mast for
the coiled tubing unit.*



Nitrogen & Industrial Gas Systems

Stewart & Stevenson's Nitrogen and Industrial Gas Systems feature the widest range of nitrogen pumping equipment in the industry. We manufacture nitrogen pumping units in fired and non-fired (heat recovery) versions for both onshore and offshore use.

Heat recovery versions employ a unique method of loading the diesel engine, indirectly providing heat to vaporize liquid nitrogen. Standard units are available in 90K and 180K SCFH versions capable of pumping pressures of 15,000 psi.

Direct-fired units use electronic controls and advanced hydraulics to deliver nitrogen gas at high rates and pressures. Available in 540K, 660K and 1.2MM SCFH, these units are equipped with high horsepower engines to provide maximum performance in stimulation treatments.

Stewart & Stevenson packages units with high quality cryogenic components from leading manufacturers, ACD and Cryoquip. The components are industry-proven designs with more than 40 years of service in the application.



WNT-601-181-NF Combination nitrogen and fluid pumper.



NS-181-NF 180K SCFH Nitrogen skid on a trailer.

STEWART & STEVENSON NITROGEN UNITS

MODEL	NS-181-NF	NT-181-NF	WNT-601-181-NF-Combo	NC-181-NF
Vaporization Type	Heat recovery	Heat recovery	Heat recovery	Heat recovery
Maximum Discharge Rate	180,000 scfh (5097 m ³ /h)	180,000 scfh (5097 m ³ /h)	180,000 scfh (5,097 m ³ /h)	180,000 scfh (5097 m ³ /h)
Maximum Discharge Pressure	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)
Carrier Type	Stewart & Stevenson oilfield skid	Stewart & Stevenson trailer	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis
Carrier Drive Configuration	N/A	Tandem or Tridem Air Ride	Tandem or Tridem Air Ride	6x4, 6x6, 8x4, 8x6, or 8x8
Size: L x W x H	14'0" x 8'0" x 8'6"	40'0" x 8'6" x 13'6"	44'6" x 8'6" x 13'5"	39'6" x 8'6" x 12'2"
Engine	MTU Series 60	MTU Series 60	MTU Series 60	Truck engine driven
Engine Rating	600 bhp	600 bhp	600 bhp	550 bhp
Maximum Ambient Operating Temperature	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
LN ² Tank	N/A	3,000 gallon	2,000 gallon	2,000 gallon
Pump Drive	Closed loop hydraulic	Closed loop hydraulic	Closed loop hydraulic	Closed loop hydraulic
Cryogenic Pump	Triplex	Triplex	Triplex	Triplex
Data Acquisition System	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac



NT-661-DF 660K SCFH Nitrogen trailer.



540K SCFH Nitrogen truck.



NC-181-NF 180 K SCFH Bodyland nitrogen unit.



NT-181-NF 180K SCFH Trailer nitrogen unit with control cabin.

NC-362-NF	NT-661-DF	NC-661-DF	NT-1201-DF
Heat recovery	Direct fired	Direct fired	Direct fired
360,000 scfh (10,194 m³h)	660,000 scfh (20,388 m³h)	660,000 scfh (20,388 m³h)	1,270,000 scfh (36,000 m³h)
10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)	10,000 psi (15,000 optional)
Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson trailer	Kenworth, Mercedes Benz or other truck chassis	Stewart & Stevenson trailer
6×4, 6×6, 8×4, 8×6, or 8×8	Tandem or Tridem Air Ride	6×4, 6×6, 8×4, 8×6, or 8×8	Tandem or Tridem Air Ride
39'6" × 8'6" × 13'2"	39'0" × 8'6" × 13'6"	39'6" × 8'6" × 12'2"	45'0" × 8'6" × 13'6"
Truck engine and MTU Series 60	MTU Series 60 and D706	Truck engine driven and D706	MTU 16V2000 and D706
1150 bhp	630 bhp and 110 bhp	550 bhp and 110 bhp	1500 bhp and 110 bhp
122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C	122 °F / 50 °C
2,000 gallon	2,000 gallon	2,000 gallon	N/A
Closed loop hydraulic	Direct Drive via Allison transmission	Direct Drive via Allison transmission	Direct Drive via Allison transmission
Two (2) Triplex	Triplex	Triplex	Quintuplex
Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac	Optional - Stewart & Stevenson DaqPac

Fluid Pumping Equipment

Stewart & Stevenson manufactures a line of fluid pumping equipment designed to perform high-pressure well service treatments. Available in skid, trailer and truck mounted versions, our fluid pumping units deliver high flow rates at high pressure while providing excellent turndown for low rate applications.

Units are commonly manufactured within the range of 500 to 2,000 horsepower, with automatic transmissions and fluid displacement tanks. They are available in single and twin configurations.

Coiled Tubing Support

Mounted on a rugged oilfield trailer, our twin pumping unit features two high pressure pumping systems, fluid handling system and operator's control console. Units are commonly equipped with two MTU engines, two Allison powershift transmissions, two triplex pumps with gear reducers and 2-speed gear boxes for low rate pumping. Quintuplex pumps can be installed for greater flow rates.



WT-601 Single pump trailer with control cabin.

High efficiency horizontal triplex pumps equipped with hard surface plungers have the capability to pump cement slurries, inhibited acid, sand-laden fluids, water, drilling or other well servicing fluids in ambient temperatures up to 122 °F.

The fluid handling system has a dual compartment, 22-barrel displacement tank with all fill, load, suction manifolds and two centrifugal pumps. One pump transfers fluid from external sources to the holding tank and one boosts slurry/fluids to the triplex pumps from the fluid holding tank.

STEWART & STEVENSON FLUID PUMPING UNITS

Carrier	Trailer	Trailer	Trailer (combination fluid and nitrogen pump)
Model	WT-601	WT-1202	WNT-601-181-NF
Truck	N/A	N/A	N/A
Engine (standard)	MTU Series 60	2 each MTU Series 60	2 each MTU Series 60
LN ² System	-	-	180,000 SCFA Heat Recovery
Transmission	Allison 4700 OFS	2 each Allison 4700 OFS	Allison 4700 OFS
Auxiliary Transmission	Eaton Fuller 2:1 Transmission	2 each Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission
Positive Displacement Pump	Triplex or quintuplex	2 each triplex or quintuplex	2 each quintuplex
Power End Lube	Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system
Fluid End Lube	Automatic grease injection	Automatic grease injection	Automatic grease injection
Suction Connections	2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206
Discharge Line	2" 1502	2" 1502	2" 1502
Controls	Platform mount	Triplex	Triplex
Climatized Control Cabin	Optional	Optional	Optional
Displacement Tank	22 bbl, two compartment	22 bbl, two compartment	11 bbl, two compartment
Centrifugal Pumps (fill, boost)	2 each Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4



WT-1202 Twin pump trailer.

Skid	Skid	Truck	Truck
WS-601	WS-1202	WC-601	WC-1202
N/A	N/A	Kenworth, Western Star or Mercedes Benz	Kenworth, Western Star or Mercedes Benz
MTU Series 60	2 each MTU Series 60	MTU Series 60	MTU Series 60
-	-	-	-
Allison 4700 OFS	Allison 4700 OFS	Allison 4700 OFS	Allison 4700 OFS
Eaton Fuller 2:1 Transmission	2 each Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission	Eaton Fuller 2:1 Transmission
Triplex or quintuplex	2 each triplex or quintuplex	Triplex or quintuplex	2 each triplex or quintuplex
Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system	Pressurized lubrication system
Automatic grease injection	Automatic grease injection	Automatic grease injection	Automatic grease injection
2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206	2 each 4" FIG 206
2" 1502	2" 1502	2" 1502	2" 1502
Side mount	Platform mount	Triplex	Triplex
N/A	N/A	Optional	Optional
Optional	22 bbl, two compartment	22 bbl, two compartment	22 bbl, two compartment
Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4	2 each Mission 5 × 4

Aftermarket

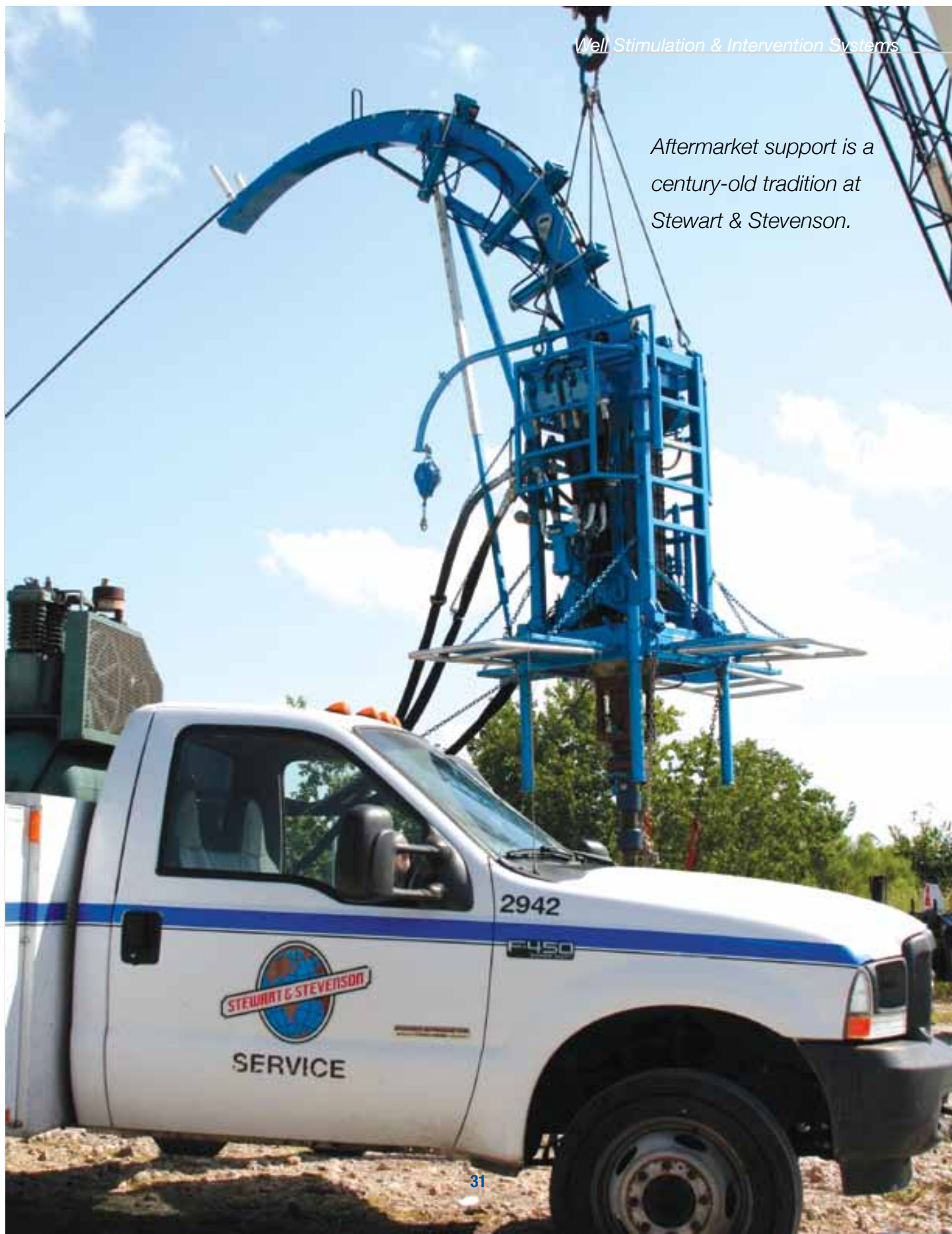
Like the quality craftsmanship that goes into our products, aftermarket support is a century-old tradition at Stewart & Stevenson. We provide:

- **Equipment Commissioning**
Wherever your equipment is put into service, our certified technicians and trainers will travel there to ensure that your equipment is properly installed, fully serviced, fully operational, and that your personnel are trained to operate your equipment.
- **Service and Maintenance**
Life-cycle service management of your oilfield equipment includes periodic maintenance, emergency repair, refurbishment, overhauls and upgrades. Stewart & Stevenson's certified technicians provide worldwide equipment repair and service.
- **Parts**
We stock certified OEM parts and have a wide network of vendor suppliers of parts and components, with an experienced, knowledgeable staff to handle your needs.

From 3-D design to lean manufacturing flow line to after-market support, Stewart & Stevenson provides state-of-the-art stimulation and intervention equipment and service.



Aftermarket support is a century-old tradition at Stewart & Stevenson.





A Century of Innovation

For all well stimulation and intervention solutions contact us today.

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Equipment by Market »

- Agriculture
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- Material Handling
- Marine
- Military & Government
- Mining
- Oil & Gas »
 - Air Compressors
 - Cementing & Pumping
 - Coiled Tubing & Well Intervention
 - Control Systems & Software
 - Engines
 - Fracturing & Well Stimulation
 - Gas Compression Services
 - Mud Pumps
 - Nitrogen & Industrial Gas
 - Power Generation
 - Power Units
 - Pumps
 - Repowers
- Rig Systems »
 - Drilling Rigs
 - Workover & Well Servicing
 - Rig Components
 - Support Units
 - Rig Refurbishment
- Torque Converters
- Transmissions

- On-Highway & Transportation
- Power Generation
- Rail

Equipment by Category

WORKOVER & WELL SERVICING



Workover & Well Servicing Rigs

Stewart & Stevenson's workover & well servicing rigs are lightweight, durable and versatile, designed for fast and easy rig up and user-friendly operation and maintenance. These self-contained units have very few removable parts and require little or no assembly at the job site, thus benefiting customers with reduced down time and saved man-hours. We also offer pole and swabbing rigs configured to your needs.

Features/Benefits

- Available in carrier (drive-in or back-in), trailer or skid-mounted configurations to accommodate any of our clients' oilfield service requirements
- Rigs feature state-of-the-art drawworks, which are self-supporting, modular units designed for flexibility, ease of maintenance, performance and durability
- Designed to accommodate varying climates from desert to arctic
- All equipment is designed to be safe for personnel and environmentally responsible
- Freestanding or externally guyed masts are all API monogrammed and certified
- Design configurations can accommodate specialized transportation requirements, for example, via train and helicopter

Flushby Rapid Service Rigs

Flushby Rapid Service Rigs are light weight, smaller and more mobile than a standard service rig. Also known as a Rod Rig, the Flushby is built on a carrier with one 50 bbl aluminum tank, free-standing API 4F hydraulically raised and telescoping mast, 165 hp triplex pump, and 200 or 500 model drawworks. It is configured for the following applications:

- Polished rod changes
- Trip and hang double rods
- Pump changes
- Well flushing
- Pumping — triplex high pressure
- Well abandonments

Flushby, Workover, Well Servicing & Drilling Rigs												
Drawworks	Horsepower	Bbl	Triplex	HP	Model	Depth Ratings			Configuration			WFO SCF
						Well Service ft. lift	Workover ft. lift	Drilling ft. lift	Module	Skid	Mast	
500 Flushby	65,000	29	200	74	72'-05K	10,000 (2,048)			✓	✓	✓	
					72'-05K	10,000 (2,048)			✓	✓	✓	
500 Flushby	65,000	29	500	233	72'-05K	10,000 (2,048)			✓	✓	✓	
					72'-05K	10,000 (2,048)			✓	✓	✓	
200	190,000	45	200	199	72'-18K	6,000 (1,216)			✓	✓	✓	
					72'-18K	6,000 (1,216)			✓	✓	✓	
200	190,000	63	200	149	72'-18K	6,000 (1,216)			✓	✓	✓	
					72'-18K	6,000 (1,216)			✓	✓	✓	
250	190,000	63	200	196	72'-18K	6,000 (1,216)	7,000 (1,411)		✓	✓	✓	
					72'-18K	6,000 (1,216)	7,000 (1,411)		✓	✓	✓	
350	190,000	81	200	200	94'-18K	10,000 (2,048)	10,000 (2,048)		✓	✓	✓	
					94'-18K	10,000 (2,048)	10,000 (2,048)		✓	✓	✓	
500	225,000	103	500	470	94'-18K	10,000 (2,048)	10,000 (2,048)	7,000 (1,411)	✓	✓	✓	
					94'-18K	10,000 (2,048)	10,000 (2,048)	7,000 (1,411)	✓	✓	✓	
500	280,000	113	500	470	104'-20K	16,000 (3,277)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					104'-20K	16,000 (3,277)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
600	300,000	136	600	447	110'-20K	18,000 (3,619)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					110'-20K	18,000 (3,619)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
600	300,000	136	600	484	108'-20K	18,000 (3,619)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					108'-20K	18,000 (3,619)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
750	380,000	158	750	559	118'-20K	22,000 (4,419)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					118'-20K	22,000 (4,419)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
750	375,000	170	750	559	118'-20K	16,000 (3,277)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					118'-20K	16,000 (3,277)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
800	450,000	161	800	571	118'-20K	11,000 (2,202)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					118'-20K	11,000 (2,202)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
1000	440,000	169	1000	745	118'-20K	10,000 (2,048)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					118'-20K	10,000 (2,048)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
1000	500,000	227	1000	745	124'-20K	14,000 (2,812)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	
					124'-20K	14,000 (2,812)	10,000 (2,048)	8,000 (1,639)	✓	✓	✓	

View Chart: Flushby, Workover, Well Servicing & Drilling Rigs

Literature

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