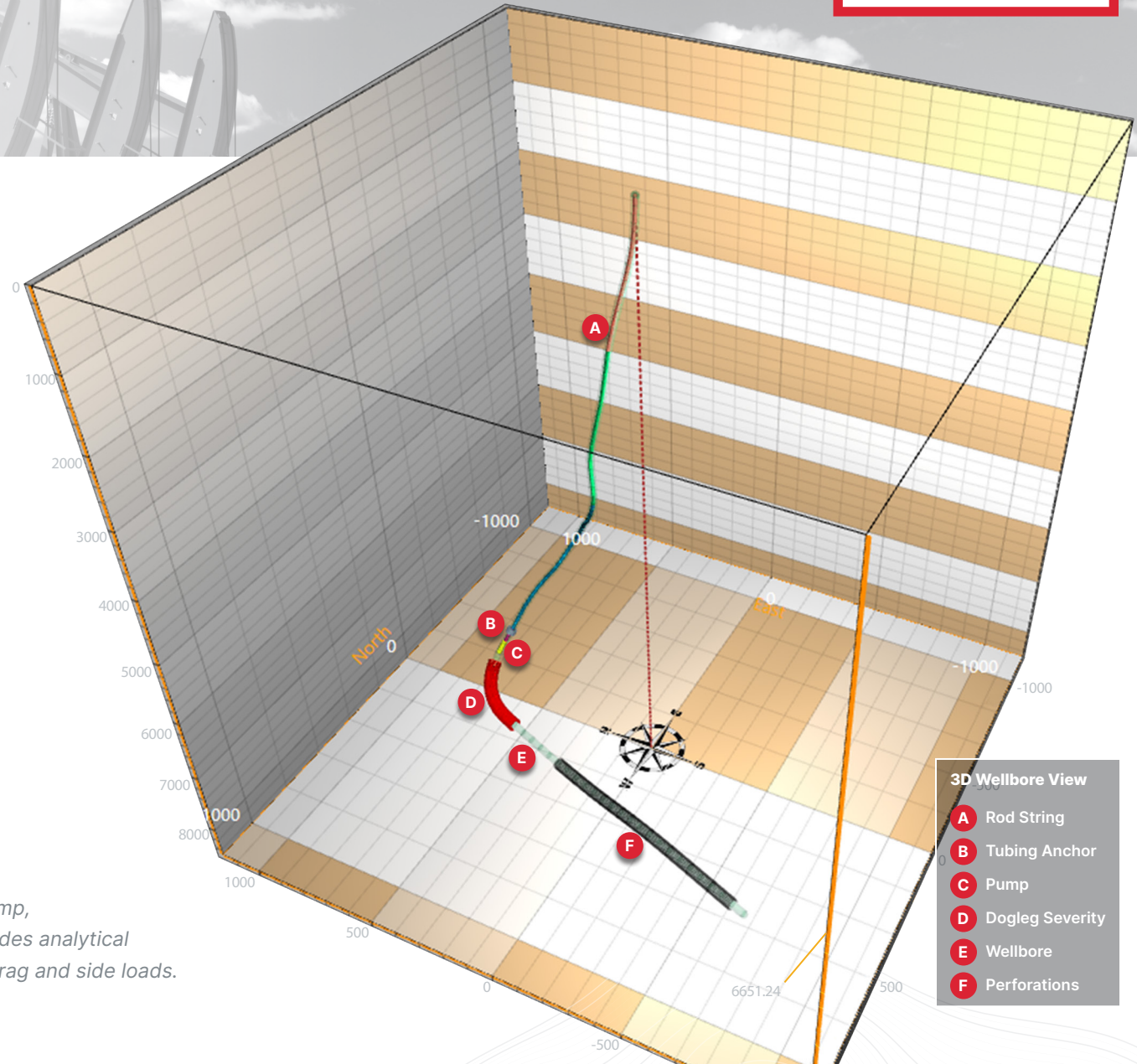


# SROD™

## INTELLIGENT ROD PUMP DESIGN SOFTWARE

**ACCURATE PREDICTIVE DESIGN**  
**OPTIMAL ROD-PUMP PERFORMANCE**  
**FASTER ROI**

*3D Wellbore view displays individual rod tapers, pump, anchor and perforations along the well path. It includes analytical features to evaluate downhole conditions such as drag and side loads.*



SROD™ is a trademark of LUFKIN Industries



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## EVERY BASIN, FIELD, AND WELL IS UNIQUE

Each has its own set of production characteristics and constraints. Accounting for those constraints can be a heavy lift when designing the right rod pump system for a well.

**SROD™ intelligent rod pump design software** takes on the challenge to tackle the complex array of surface and downhole parameters that are unique to each wellbore, enabling users to create the optimal rod-lift system for their well.

## MAXIMIZE ASSET VALUE, MINIMIZE OPERATING EXPENSE

When it comes to rod-lift systems, operators run the risk of incorporating surface or downhole pump equipment that may be oversized or undersized. If oversized, too much capital is spent—if undersized, the required production targets may not be met or the pumping system may be over stressed. Customers can capitalize on the wide variety of SROD predictive design and evaluation modules to develop a better system with the right-sized components rated for their unique well.

SROD is a design tool—and more. Advanced algorithms and an extensive equipment database with automated design suggestions, enhance its predictive design capability, so users can be assured that the best equipment is specified to fit the system and fit the job.

The screenshot shows the SROD software interface. On the left is a tree view of wellbore components, including 'LUFKIN CHURCHILL CONVENTIONAL (CHURCHILL)' and 'LUFKIN CONVENTIONAL' with various sub-components. The main area displays a table for counterweights and a diagram of the rod pump assembly.

	Master Weight	Auxiliary Weight	Position (in)
Left Lag	00LH		6.6
Left Lead	00LH		6.6
Right Lag	00LH		6.6
Right Lead	00LH		6.6

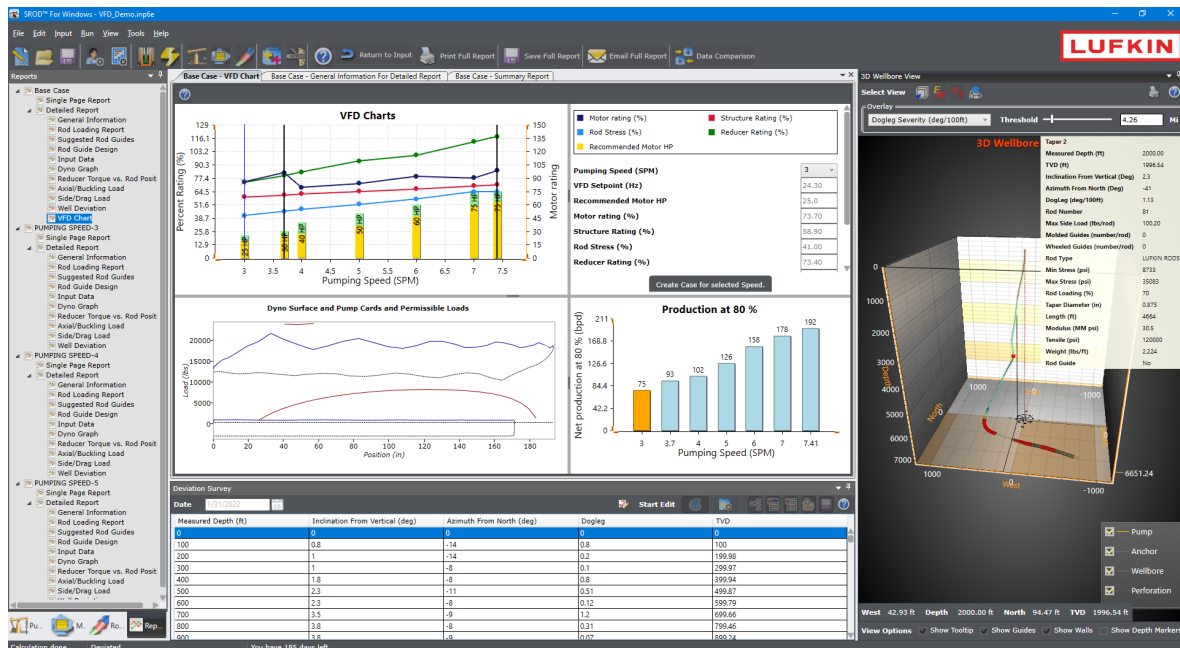
  

Min Moment (m in-lbs)	876.984	Existing Moment (m in-lbs)	2580.65
Max Moment (m in-lbs)	2777.33	Balanced Moment (m in-lbs)	2579.5
		Moment Difference (m in-lbs)	-1.15

Balanced Counterweight Positions from Long End of Crank (in)  
The existing unit is in good balance. The existing moment is within 2% of balance moment.

*Every pumping unit must be balanced to minimize torque and energy use. The **SROD C-Balance tool** calculates the amount of required counterweight and the correct location on the cranks for installation.*





*Multi-display capability uses an array of windows to help operators get the big picture.*

## UNSURPASSED DIAGNOSTIC CAPABILITY

With a few mouse clicks, SROD software enables operators to design new installations, or diagnose and optimize current systems. SROD software delivers accurate solutions for balancing pumping units, determining pump speed to achieve a given production rate and designing motor size optimized for VSD users. SROD deviated well analysis sets the standard for handling friction and understanding sucker rod performance in any well. The SROD system is easy to use, with intuitive tools that can direct novice users through the design process, and with sophisticated features that expert users will appreciate.

## ADVANCED EVALUATION AND DESIGN FEATURES COME STANDARD

Rod lift design doesn't have to be complicated. With its predictive design and comprehensive analysis modules, the SROD system helps simplify the job.

**SROD design software includes an extensive list of value-added features—all of which come standard, including:**

- State-of-the-art 3D Wellbore View, presenting comprehensive information along the well path
- Advanced algorithms for calculating Drag, Side loads, buckling, equipment loading, reducer torque, rod stress, and much more
- CBAL Counterbalance / Counterweight placement calculations
- **Multi-Case Generation Wizard: select the best design case**
- Multiple-case comparison (export to Excel)
- Pump capacity calculations using sheaves or variable frequency drives (VFD) parameters
- Rod guide design
- Electrical analysis
- Inertia effects on reducer torque
- Enhanced reporting interface for single-page or comprehensive, tailored reports that can be printed or emailed.
- On-demand assistance via machine-accessible offline help files.
- Extensive pump and crank database includes details on rods, motors, and pumping units, and is updated frequently to keep current with new products and standards for pump design and operation.
- Single and Multi-User network licensing
- User customized pumping units, motors, rods
- Configure the # of guides per individual rod taper
- Export surface & downhole dynagraph cards
- **Automated on-line check for software updates**



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	A	B		
Legends/Case Names	Base Case	SPM = 3	SPM = 4	SPM = 5
<b>General Information</b>				
Comments				
Well Name	Lufkin #1	Lufkin #1	Lufkin #1	Lufkin #1
<b>PRIME MOVER</b>				
Motor	Nema D Motor 125 hp (Recommended)	Nema D Motor 25 hp (Recommended)	Nema D Motor 40 hp (Recommended)	Nema D Motor 50 hp (Recommended)
Max Power Required (hp)	96.36	22.03	31.87	44.61
Cyclic Load Factor	2.131	1.601	1.685	1.816
Motor Load (% of Rating)	77.1	88.1	79.7	89.2
<b>Overall Efficiency (%)</b>				
<b>PUMPING UNIT</b>				
Pumping Unit	LUFKIN C912-305-240	LUFKIN C912-305-240	LUFKIN C912-305-240	LUFKIN C912-305-240
Surface maximum load (lbs)	27724	21306	22509	23706
Surface minimum load (lbs)	5785	9635	8933	8055
Average Pumping Speed (SPM)	8.00	3.00	4.00	5.00
Max Load (% of Rating)	90.9	69.9	73.8	77.7
Polished Rod Horse Power (hp)	40.69	12.29	17.02	22.11
<b>SUMMARY OF REDUCER LOADING</b>				
In-balance Counter/Balance Moment (m in-lbs)	2586.7	2316.4	2379.2	2429.3
In-balance Counter/Balance Effect (X100 lbs)	204.00	179.82	185.44	189.92
In-balance Gearbox Load (% Of Rating)	156.6	87.1	99.6	110.5
<b>DOWNHOLE PERFORMANCE</b>				
Net production at 100% pump efficiency (bpd)	336	119	160	201
Net production at % of pump efficiency (bpd)	268.8	95.2	128.0	160.8
Tubing Size (in)	2.875	2.875	2.875	2.875
Tubing Anchor Location (ft)	6500	6500	6500	6500
Pump Fillage (%)	100	100	100	100
<b>Non-Dimensional Variables</b>				
F <sub>o</sub> /S/K <sub>r</sub>	0.07	0.07	0.07	0.07
N/N <sub>o</sub>	0.20	0.07	0.10	0.12
<b>OTHER BASIC DATA</b>				
Max Buckling (lbs)	436	199	199	199
Location of Max Buckling (ft)	4467	6700	6700	6700
Neutral Point Measured Depth (ft)	3026	4366	4355	3942
Max Side Load (lbs/rod)	296	227	265	265
Pump Diameter (in)	1.25	1.25	1.25	1.25
Pump Depth (ft)	6700	6700	6700	6700
Pump Intake Pressure (psi)	100	100	100	100
Max Rods Loading (% of Rating)	74	51	59	64
<b>Rod Loading</b>				
1) Min Stress at Bottom (psi)	4309	6981	6241	5895
2) Min Stress at Bottom (psi)	-110	2026	2012	1410
3) Min Stress at Bottom (psi)	-2114	-2001	-2012	-2046
4) Min Stress at Bottom (psi)	-3131	-3131	-3131	-3131
<b>** WARNINGS / NOTIFICATIONS **</b>				
Base Case	Slimhole couplings have been added to the Rod 'LUFKIN RODS DS(US ROD)' for Taper diameter of 1 in.			
SPM = 3	Slimhole couplings have been added to the Rod 'LUFKIN RODS DS(US ROD)' for Taper diameter of 1 in.			

The multi-case comparison tool provides the user with a single table/page output to compare results for alternative design parameters.

- A Base Case
- B Comparison Cases
- C Power Required
- D Motor Load
- E Overall Efficiency
- F Average Pumping Speed
- G Structure Load
- H Net bpd
- I Warnings

### SROD SYSTEM REQUIREMENTS

- 4 Core Intel® Xeon® E51603, 2.80 GHz equivalent or above
- 4 GB RAM or more
- 1 GB 3D video card or better
- 1280 X 768 resolution or higher (1600 X 1024 dpi small fonts recommended for better visual effects)
- Microsoft .NET Framework 4.5.1 or later
- Windows (7, 8, 10, 11, Server 2008, Server 2012, Server 2019)

### SROD LICENSING

The SROD licensing structure supports single and multi-user network licensing. Contact the SROD licensing support team for a personalized demo and a trial license.  
[SRod.Licensing.Support@Lufkin.com](mailto:SRod.Licensing.Support@Lufkin.com)

### TECHNICAL SUPPORT

[SRod.Technical.Support@Lufkin.com](mailto:SRod.Technical.Support@Lufkin.com)

## INFORMATION AT YOUR FINGERTIPS

The SROD program presents the information users need to create the most efficient rod pump design— no more jumping from one resource to another to get the data one needs.

A wellbore can be configured using the SROD 3D Wellbore View. The user can analyze critical data from the single-page report, and drill down for more detail using the SROD custom-designed reporting capability. Users may run the Multi-Case Generation Wizard to find the best design case. Additionally, SROD utilizes an up-to-date database, which includes the latest new pumping units, cranks, rods, and guides. LUFKIN is committed to continuously update SROD with the latest industry data.



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**Multi-Case Generation Wizard**

**Results**

Parameters/ Filters	SPM	PIP (psi)	Pump Diameter (in)	Crank Hole	Crank Rotation (C°WISE)	Net production at % of pump efficiency (bpd) (Min: 345 - Max: 400)	Surface maximum load (lbs) (Max: 36500)	Surface minimum load (lbs) (Min: 2000)	Max Load (% of Rating) (Max: 90)	In-balance Gearbox Load (% Of Rating) (Max: 110)	Max Power Required (hp) (Max: 150)	Max Rods Loading (% of Rating) (Max: 80)	Motor Load (% of Rating)	Polished Rod Horse Power (hp)
Failures = 4,704 (95 Failures = 977 (20%) Failures = 1,78 Failures = 42 (1%) Failures = 1,666 (3)														
Passed	8	340	2	1 - 145.6 (in)	False	349.6	31823	7776	87.2	101.6	60.23	74	60.2	37.77
Passed	8	320	2	1 - 145.6 (in)	False	348.8	32031	7802	87.8	101.9	60.68	74	60.7	37.82
Passed	8	220	2	1 - 145.6 (in)	True	347.2	32532	7385	89.1	105.3	61.6	78	61.6	38.69
Passed	8	280	2	1 - 145.6 (in)	False	347.2	32217	7642	88.3	102.9	61.27	76	61.3	38.22
Passed	8	140	2	1 - 145.6 (in)	True	346.4	32792	7202	89.8	107.3	61.99	80	62	39.67
Passed	8	160	2	1 - 145.6 (in)	True	346.4	32675	7204	89.5	107.2	61.65	78	61.7	39.49
Passed	8	300	2	1 - 145.6 (in)	False	346.4	32127	7759	88	102.4	60.78	75	60.8	37.97
Passed	8	200	2	1 - 145.6 (in)	True	345.6	32497	7452	89	106.2	61.73	78	61.7	38.85
Failed	8	400	2.75	1 - 145.6 (in)	False	440.8	40684	7294	111.5	111.5	71.44	107	71.4	44.18
Failed	8	360	2.75	1 - 145.6 (in)	False	439.2	40957	7291	112.2	112.1	72	108	72	44.53
Failed	8	380	2.75	1 - 145.6 (in)	False	439.2	40826	7316	111.9	112	71.71	107	71.7	44.34
Failed	8	340	2.75	1 - 145.6 (in)	False	437.6	41068	7413	112.5	112.7	72.25	108	72.2	44.69
Failed	8	300	2.75	1 - 145.6 (in)	False	433.6	41487	7365	113.7	112.4	72.75	110	72.8	44.99
Failed	8	400	2.5	1 - 145.6 (in)	True	433.6	37182	7391	101.9	104.2	63.13	94	63.1	42.85
Failed	8	320	2.75	1 - 145.6 (in)	False	432.8	41264	7345	113.1	113.2	72.66	109	72.7	44.9

Passing Cases Tools: Create Case(s), Export Case(s) To File, Export To Excel

Export: All (selected), Details (Up to first 10 passing cases)

Statistics: Total Number of Cases: 4928, Number of Passing Cases: 20, Number of Failing Cases: 4908

Filters: Average Pumping Speed (SPM) [3.0 To 10.5], Net production at % of pump efficiency (bpd) [345 To 400], Surface minimum load (lbs) [2000 To 36500], Max Load (% of Rating) [90 To 110], In-balance Gearbox Load (% Of Rating) [110 To 150], Max Power Required (hp) [150 To 3], Max Rods Loading (% of Rating) [80 To 80]

\* Cases that don't match the selected filters will be considered failing cases.

Close

## TAMING A COMPLEX PROCESS

The **Multi-Case Generation Wizard** is an advanced and powerful module embedded in the SROD software. The Wizard assists to identify the optimal well design by automatically creating multiple design cases, using user-defined design criteria (parameters). The **Multi-Case Comparison Wizard** automatically filters all results for the best possible permutation(s) based on the user specified filters. Ultimately, it produces a report featuring the most optimized case(s)—those that satisfy all the user-defined filters.



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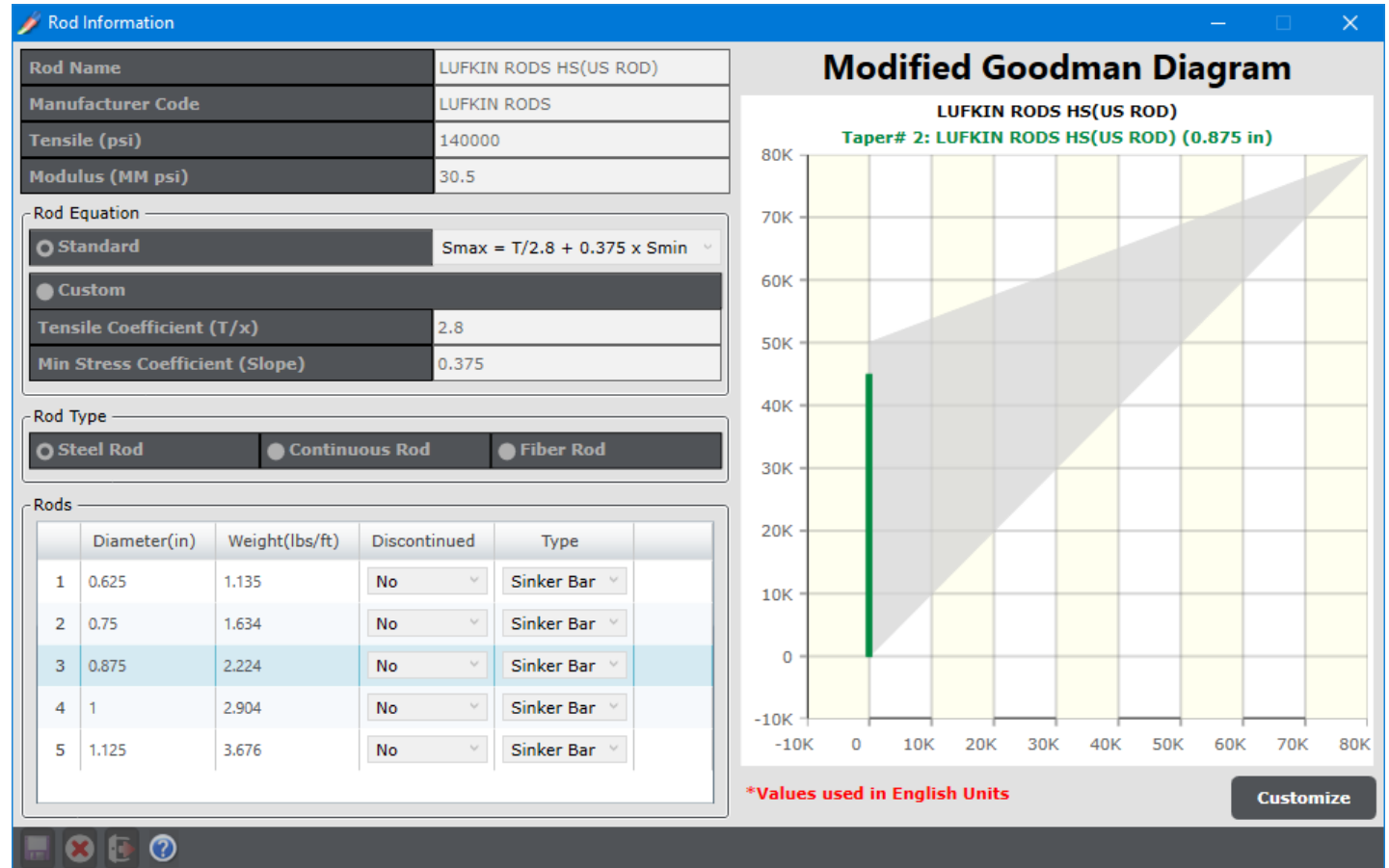
## ACCURATE PREDICTIVE DESIGN

SROD software provides system design guidance, equipment selection options, and multi-case comparison producing a rod-pump system that aims to surpass performance standards.

The **Rod Information** module allows for seamless addition to, and display of rod data from the SROD database. This includes corresponding rod maximum stress equations. User defined custom rods may be added to the existing database.

## ALWAYS READY TO HELP

Comprehensive help files provide on-demand guidance whenever assistance is required. For additional assistance, LUFKIN SROD experts are available to troubleshoot operating and maintenance requirements. To locate the closest service engineer, visit [lufkin.com](http://lufkin.com).



Graphical representation of the current rod-loading for each individual rod taper in the **Modified Goodman Diagram**.

