TIDLAND D490 DIFFERENTIAL SHAFT

D490 Differential Shafts hold rolls straight and true. Interchangeable cartridges allow you to determine how the shaft engages the core to best suit the material and core you're running.

Choose from a heavy gauge wire spring design (D490S) for fiber cores, or a 2-row, 12-ball, torque activated design (D490B) for fiber or PVC cores. The result is improved finished roll quality, reduced scrap and fast, easy setups for even the most sensitive materials.

Because D490 Differential Shafts are manufactured in North America, Europe and China, they are easily sourced and supported worldwide. All components conform to Tidland's high quality standards and are interchangeable regardless of where the shaft is installed.

GENERAL SPECIFICATIONS

76.2 MM (3 INCH) MODELS		
	SPRING CARTRIDGE D490S	BALL CARTRIDGE D490B
CORE ID RANGE	76.3 to 76.7 mm (3.005 to 3.020 inches)	76.3 to 77.2 mm (3.005 to 3.040 inches)
CORE MATERIAL	Fiber Only	Fiber, PVC
MINIMUM SLIT WIDTH*	14 mm (0.55 inch)	20 mm (0.79 inch)
CARTRIDGE WIDTH	6, 10, and 20 mm (0.24, 0.39 and 0.79 inch)	9 and 24 mm (0.35 and 0.94 inch)
TENSION RANGE	0.25 to 2 pli (43.8 to 350.3 N/m)	0.50 to 4 pli (87.6 to 700.5 N/m)
152.4 MM (6 INCH) MODELS		
	SPRING CARTRIDGE D490S	BALL CARTRIDGE D490B
CORE ID RANGE	152.5 to 153.2 mm (6.005 to 6.030 inches)	152.5 to 153.9 mm (6.005 to 6.060 inches)
CORE MATERIAL	Fiber Only	Fiber, PVC
MINIMUM SLIT WIDTH*	52 mm (2.05 inches)	26 mm (1.02 inches)
CARTRIDGE WIDTH	25 mm (0.98 inch)	24 mm (0.94 inch)
TENSION RANGE	0.45 to 7 pli (78.8 to 1225.8 N/m)	1 to 18 pli (175.1 to 3152.3 N/m)

*Call Tidland Customer Service to discuss options for your specific application.

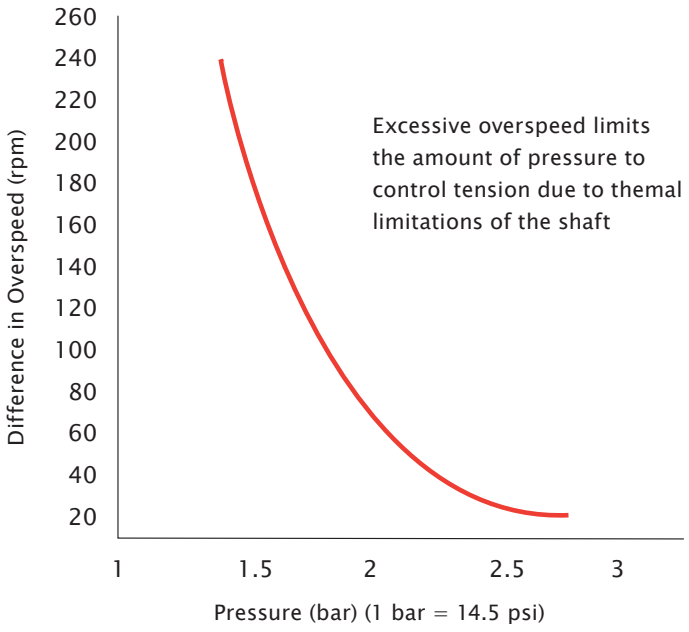
KEY FEATURES

- Eliminate dust in the roll wind process with internal slip control
- Insure best quality wound rolls with multiple-point contact on the core ID
- Consistent, predictable tension control on a variety of materials with pneumatic friction torque against a machined cartridge
- Proprietary expanding element for optimal tension control
- Slit confidently down to 14 mm (0.55 inch) wide rolls
- Suitable for simplex and duplex winding
- Low Intertia Cartridge (D490S) ideal for low tension applications
- Bi-directional Cartridge option (D490B)
- Also available for 8, 10 and 12 inch core ID (D490S)

DIFFERENTIAL CONTROL THEORY

Air pressure controls tension in a pneumatic differential shaft. However, to successfully and safely wind a roll, pressure must be controlled relative to the speed of the shaft. The greater the difference in speed between the shaft and the roll, the greater the risk of generating excessive heat (and dust) during wind-up.

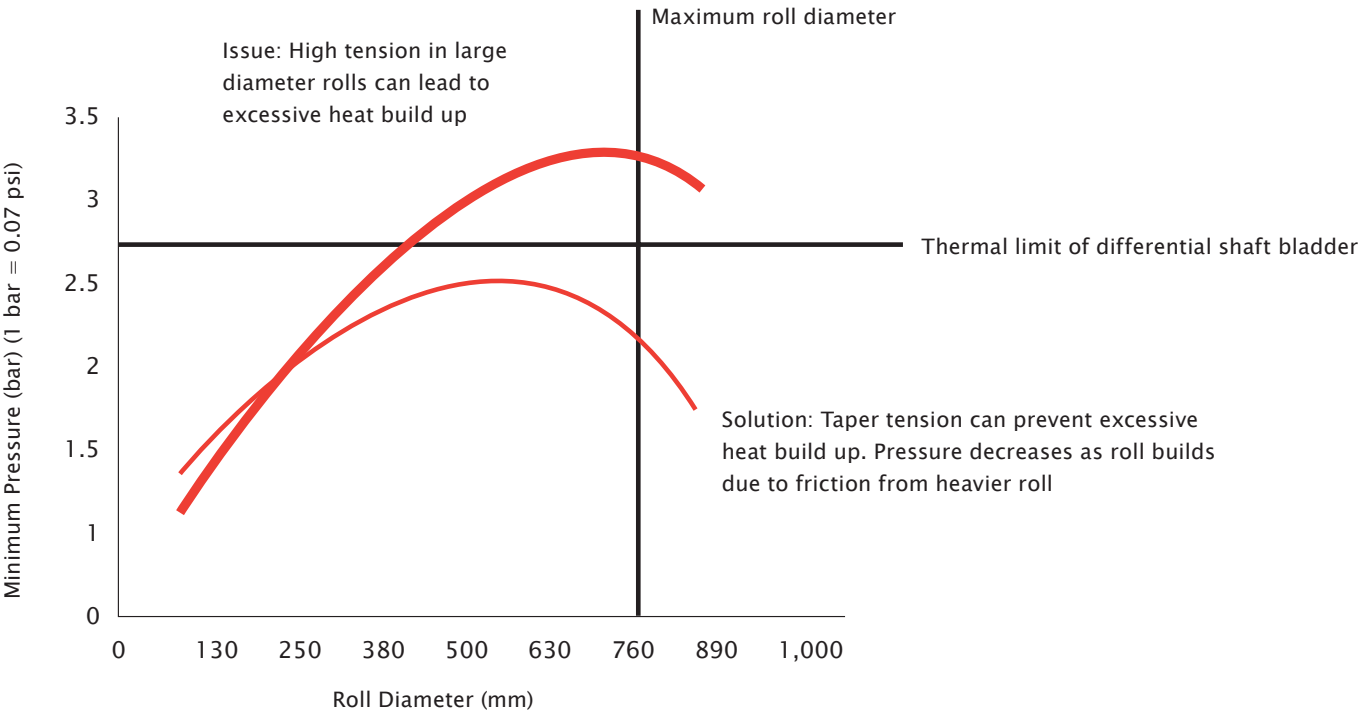
THE EFFECT OF OVERSPEED AND AIR PRESSURE ON SHAFT THERMAL LIMITS



WEB SPEED (MPM)	ROLL SPEED AT CORE (RPM)	OVERSPEED AT 101 MM (4 INCH) ROLL DIFFERENCE IN RPM*			
		1%	3%	5%	10%
152	477	5	14	24	48
229	716	7	21	36	72
305	955	10	29	48	95
381	1194	12	36	60	119
457	1432	14	43	72	143
533	1671	17	50	84	167
610	1910	19	57	95	191
762	2387	24	72	119	239
914	2865	29	86	143	286

*Maximum recommended overspeed is 30 RPM

USING TAPER TENSION TO STAY WITHIN THERMAL LIMITS



DIFFERENTIAL CONTROL APPLICATIONS

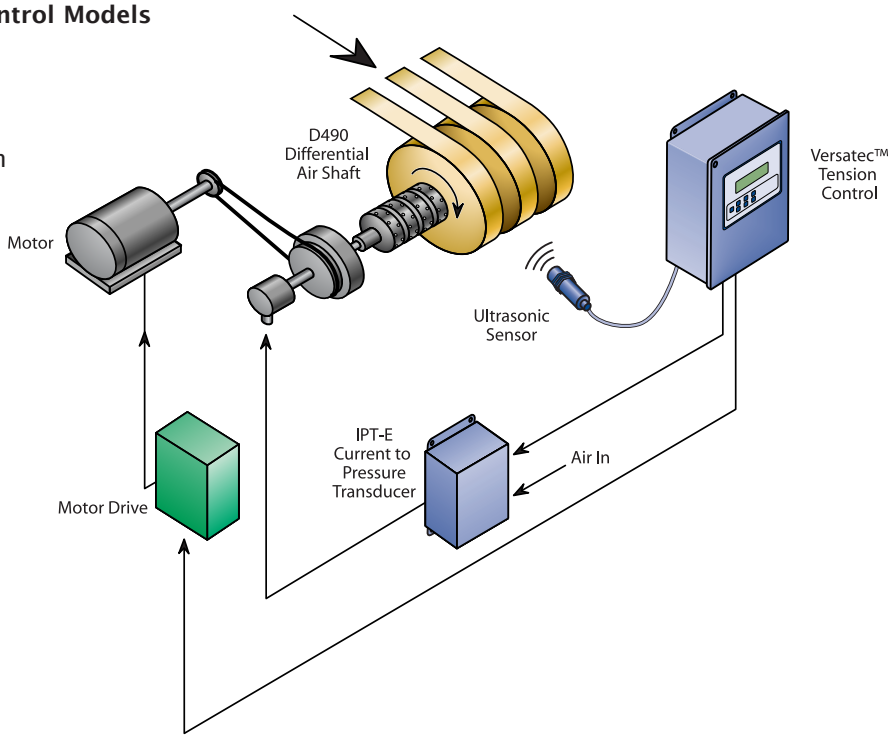
Speed Control, Inverse Diameter and Tension Control Models

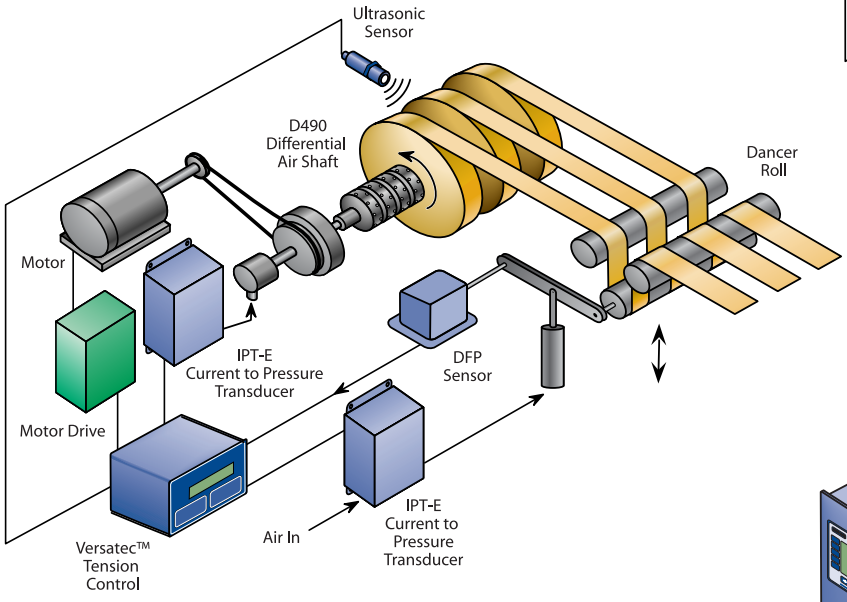
Speed Control

An ultrasonic sensor provides diameter output to the control, which uses an inverse diameter function to output a 10–0V signal to the drive to control the rotational speed of the motor.

Open Loop Tension Control with an Ultrasonic Sensor (right)

An ultrasonic sensor diameter output correlates to the required tension for a given roll diameter. The control receives the sensor input and sends an output to a current to pressure transducer, controlling pressure to the differential shaft.



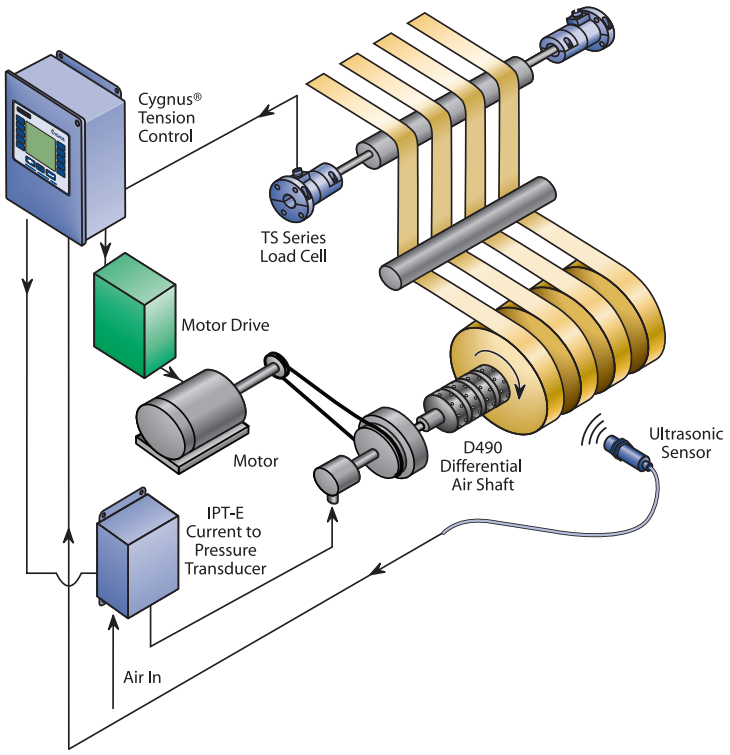


Closed Loop Tension Control with an Ultrasonic Sensor and Dancer Control (left)

A dancer system senses web tension against the dancer position and sends an output to the control, which sends an output to a current to pressure transducer, controlling pressure to the differential shaft.

Closed Loop Tension Control with an Ultrasonic Sensor for Speed Control (right)

Actual web tension (as measured by load cells) is sent to the control, which sends an output to a current to pressure transducer to control pressure to the differential shaft based upon the desired tension in the web. Ultrasonic Sensor on roll diameter or other speed measurement sends feedback to the Tension Control.



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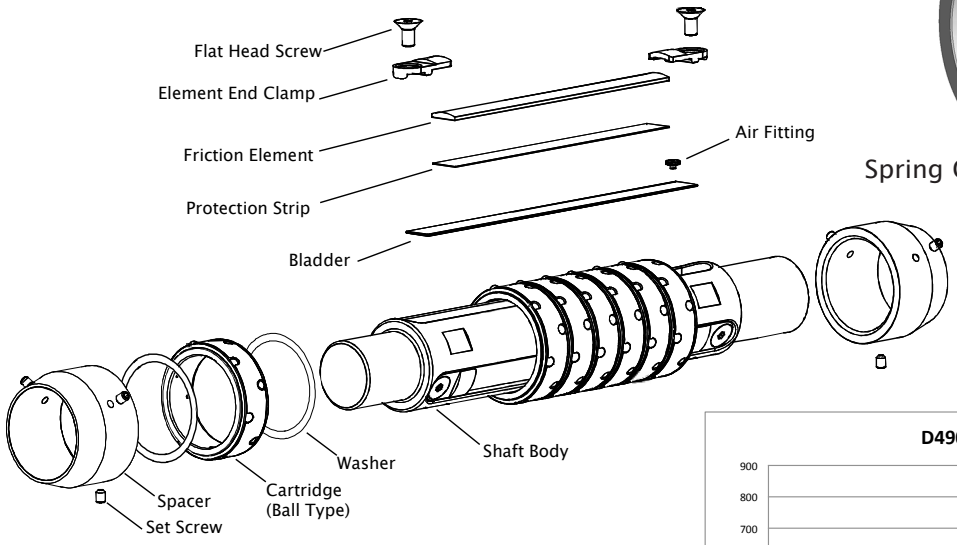
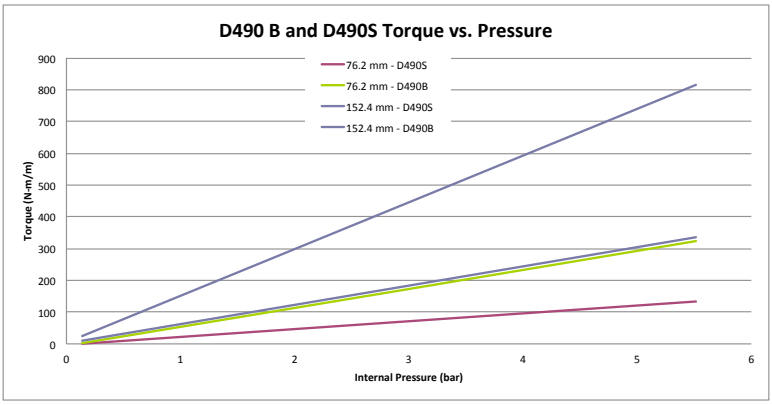
NOMENCLATURE

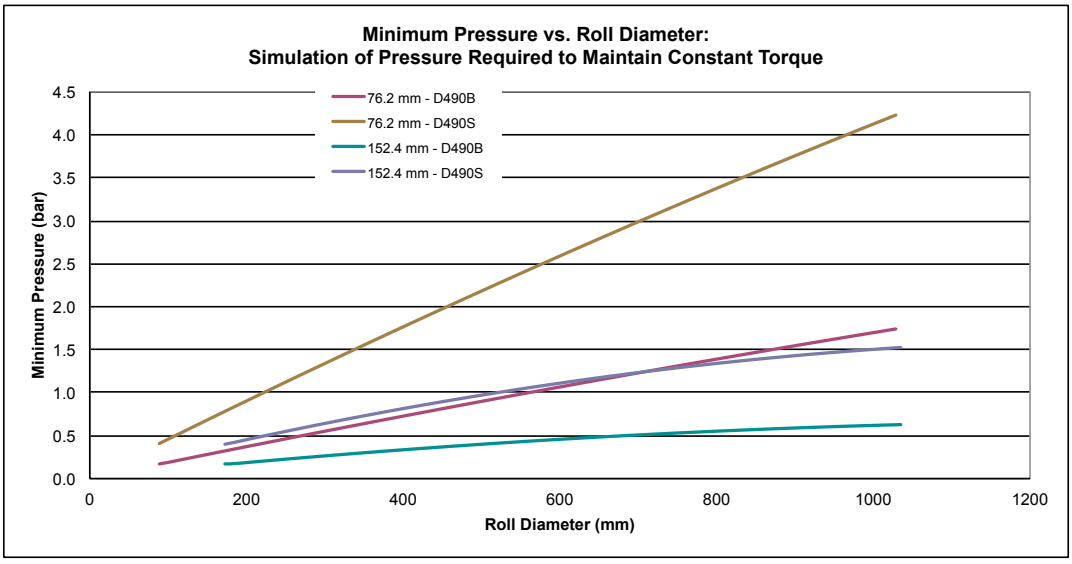


Spring Cartridge D490S

Ball Cartridge D490B



TORQUE SIMULATION GRAPHS



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