DODGE
AN RBC COMPANY

GEARING

Controlled Start Transmission (CST)

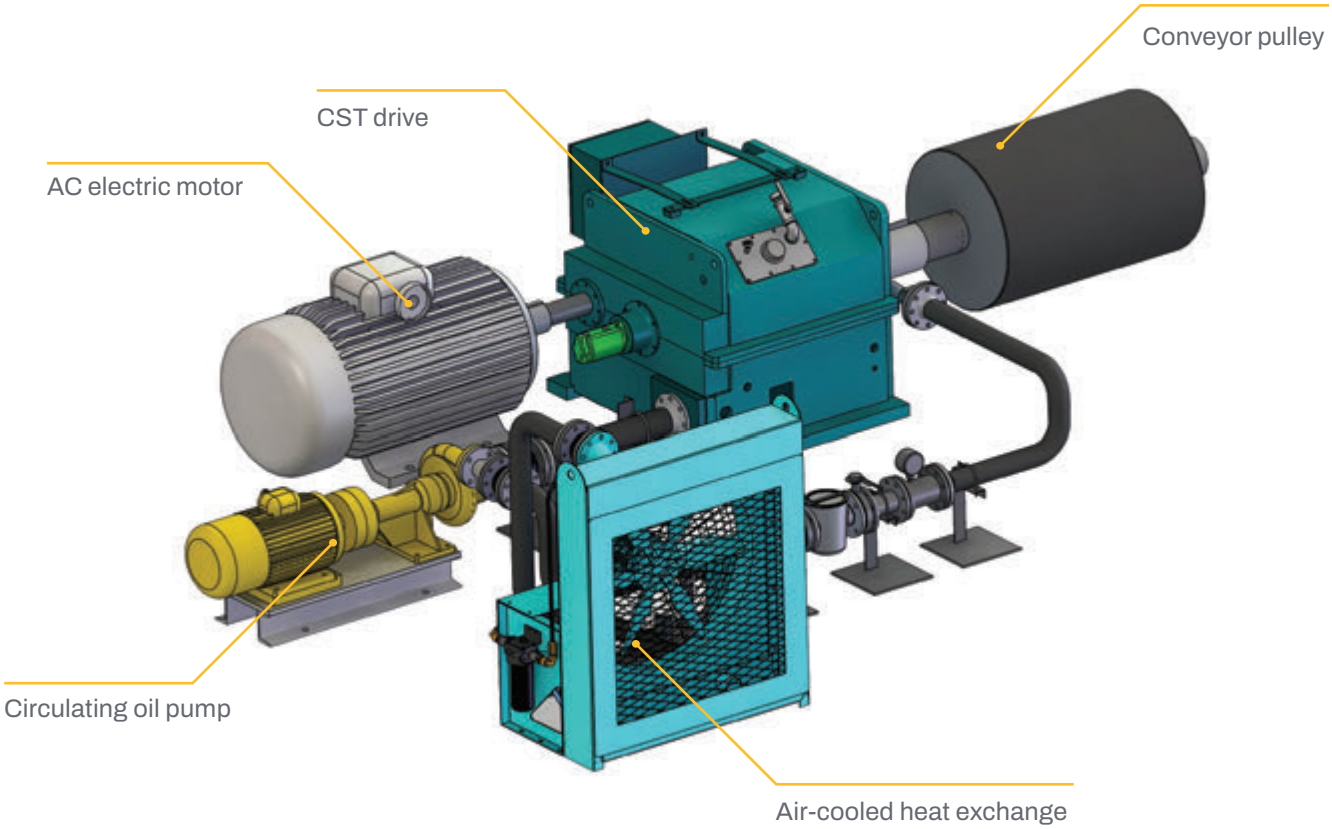
Intelligent drive solutions for long belt conveyors

A proven solution for total conveyor control

The Controlled Start Transmission (CST) is a 2-in-1 drive specifically engineered to handle difficult, high-inertia load applications—making it ideal for operations with long belt conveyors spanning up to 10 km or synchronized multi-drive conveyor systems.

CST combines a planetary gear reducer with an integral, hydraulic clutch system to provide efficient transmission of motor power and torque for consistent acceleration and deceleration, regardless of varying loads or ambient conditions.

When coupled to an AC induction motor, its reduction gears convert the motor's high-speed, low-torque input to a low-speed, high-torque output when coupled to an AC-induction motor while its integrated hydraulic clutch provides smooth, consistent power for direct coupling to a high inertia load such as a belt conveyor pulley.

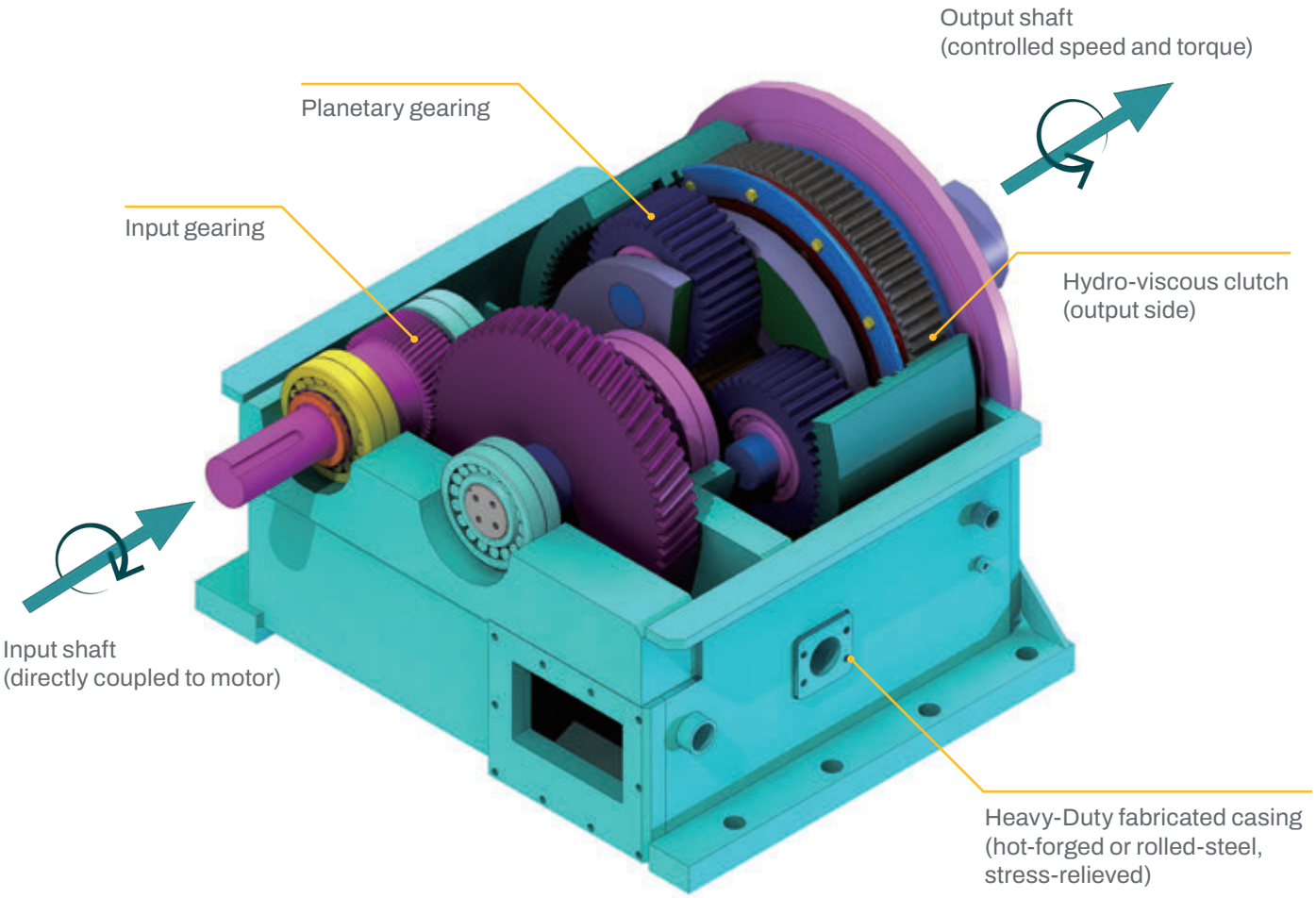


Innovative and durable features

CST incorporates a hydro-viscous clutch system on the gearbox's output shaft side, allowing the motor to be started under no-load conditions. The clutch system is comprised of a set of rotating friction plates and opposing stationary plates, an oil pressure-activated piston for engagement, and a spring mechanism for clutch release.

Oil is circulated between the plates by a closed-circuit pump and cooled through a heat exchanger. When hydraulic oil pressure is applied to the piston, the clutch plates engage to rotate the output shaft, gradually accelerating to the driving speed in a predetermined, controlled time.

The drive control and feedback equipment are mounted on the gearcase which includes a hydraulic manifold, proportional valve, pressure adjustment valve, filters, gauges, and sensors. The components are interfaced via a hardwire or data network connection with a Programmable Logic Controller (PLC) capable of controlling up to four different CST units for synchronized, multi-drive applications.



Enhanced system reliability and safety

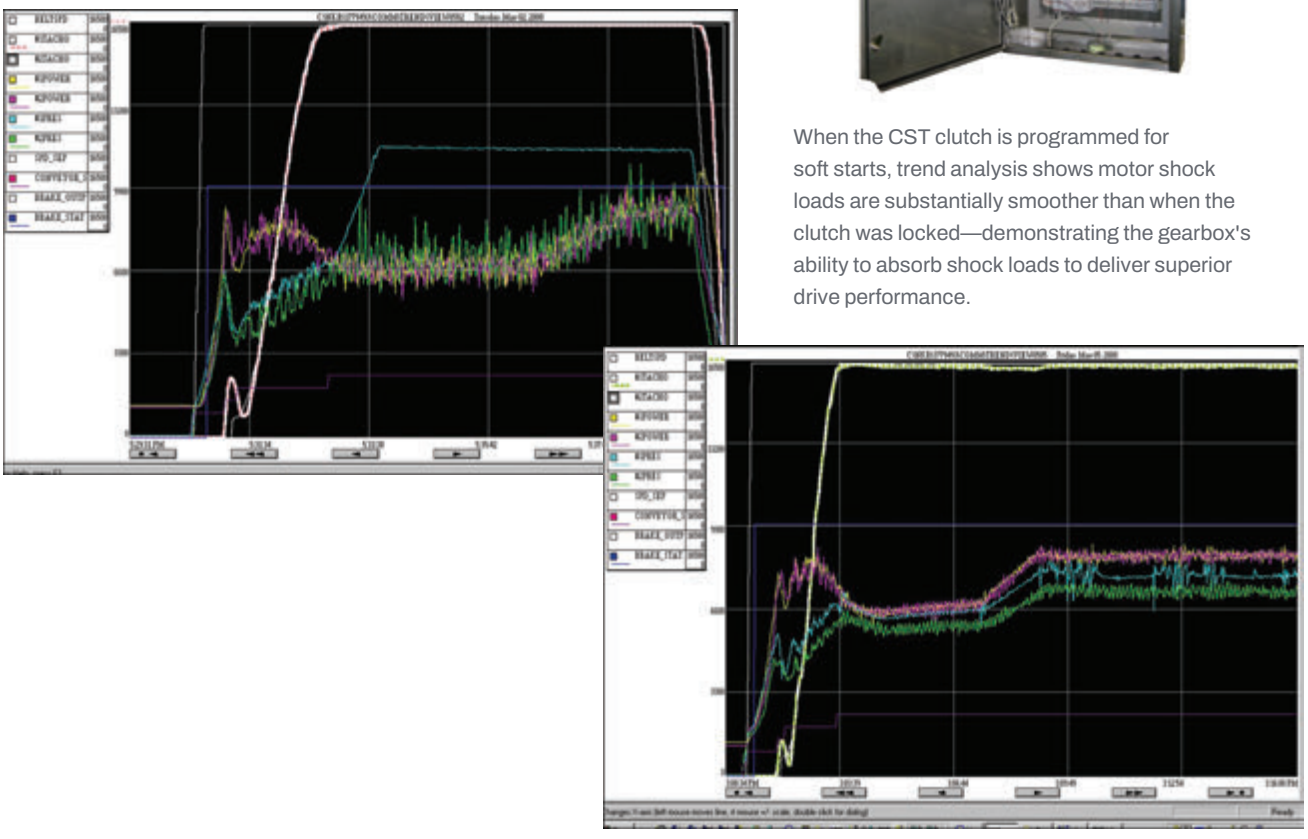
Dodge CST delivers a range of benefits not available from variable frequency drive motor controls. In multiple gear drive configurations, CST delivers excellent motor load sharing to within ± 2%, minimizing loading and stresses on all conveyor components. Maximum motor power is available throughout the controlled speed profile. The clutch unit absorbs shock loads and protects the motor, gearbox, bearings, belt idlers, pulleys, and conveyor belt. The CST control system delivers an S-curve acceleration ramp, which further enhances safety, reliability, and mechanical component protection.

Other advantages include:

- Significant reduction in peak motor torque demand.
- Lower probability of slippage between the drive pulley and conveyor belt.
- Decreases in belt tensile stress, shock, and surge loads on all non-drive pulleys and structures.
- Belt peak stress is lowered by up to 15%, resulting in significant potential belt cost savings.
- Minimized take-up travel resulting in improvements in load sharing and control in multiple dirve configurations.

When the CST clutch is programmed for soft starts, trend analysis shows motor shock loads are substantially smoother than when the clutch was locked—demonstrating the gearbox's ability to absorb shock loads to deliver superior drive performance.

Trend analysis shows the motor experiencing heavy shock loads when the CST clutch is locked.



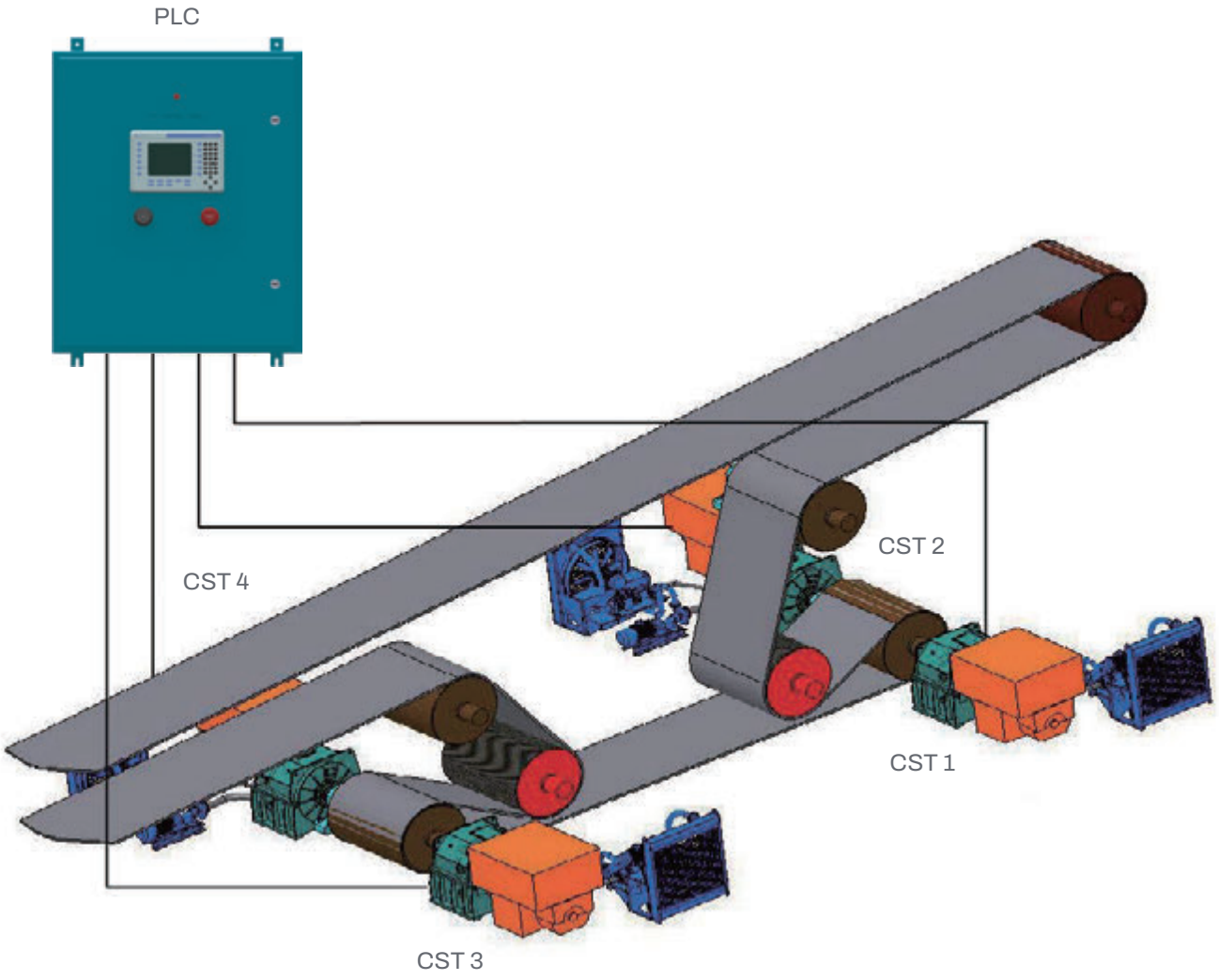
Synchronized control and improved efficiency

The intelligent PLC is integrated with the gearbox and can be used to monitor its running status in real-time. A combination of digital and analog sensors provides you with insight into current oil temperature, oil pressure, output speed, cooling flow, and more to ensure your operations are running safely and reliably.

CST's controller has a variety of communication interfaces with the ability to transmit the unit's running data to your centralized center room via a network for viewing data remotely and further enhancing on-site safety.

For comprehensive condition monitoring, you can utilize a customized remote monitoring and control system with CST to review performance history with wired communication or wirelessly to reduce labor intensity for improved job site efficiency.

In the case of emergencies, you can troubleshoot CST via remote control to ensure the application is stable and safe before anyone accesses the unit.

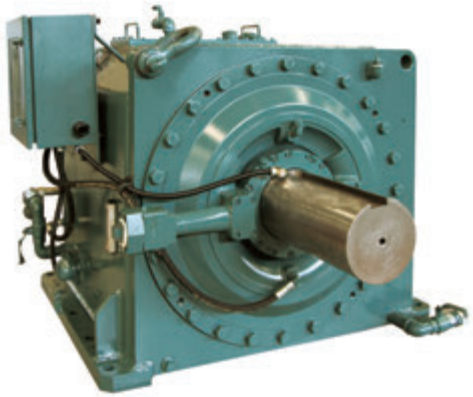


Unmatched power and performance

The unique CST clutch design delivers smooth speed and load control during start-up and shutdown. Its precision-engineered planetary gearing converts the high-speed, low-torque input from the AC motor to a low-speed, high-torque output efficiently and safely.

Once the motor is up to speed, full torque is available to the clutch, and pretension torque is applied to the belt up to its movement breakaway point. Additional torque is then applied to overcome the loaded belt system's inertia requirements to accelerate the system to its final running speed. This minimizes system transient forces and belt stretch while delivering all the power and torque required to drive the load, irrespective of load conditions.

H450K



H650/550K

750K/1120K

1950/2500K

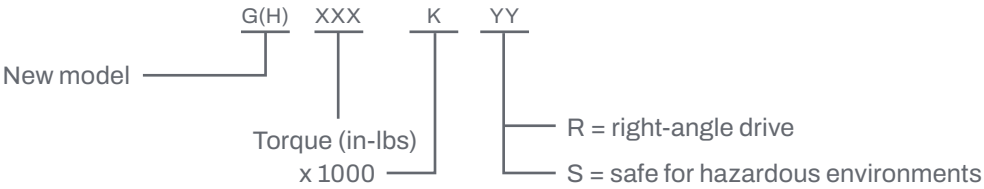
Options for application versatility

To match the growing size and complexity of applications, our CST solutions are continuously refined and improved to provide you with more powerful models.

Currently, CST is offered in inline and right-angle drive options supporting up to 2,500,000 inch-pounds of torque. Its various control options provide you with the ability to pair the drive with your plant's digital interface controls and condition monitoring services.

Additionally, specific models are available to meet the demands of hazardous environments in overland or underground applications as needed.

Nomenclature



Model	Gear ratio	Input shaft speed @ 1780 rpm (60 Hz)			Input shaft speed @ 1480 rpm (50 Hz)		
		Nominal power (hp)	Nominal power (kW)	Output speed (rpm)	Nominal power (hp)	Nominal power (kW)	Output speed (rpm)
H250K/KS	15.7500—35.3813	491—279	366—208	113.0—50.3	521—232	389—173	93.9—41.8
280K/KS	15.3750—38.1563	560—303	418—226	115.8—46.7	560—252	418—188	96.3—38.8
280KR/KRS	15.2190—57.2128	673—201	502—150	117.0—31.1	560—168	418—125	97.2—25.9
H350K/KS	17.2941—30.5455	672—452	501—337	102.9—58.3	665—375	496—280	85.6—48.5
420K/KS	16.8636—38.3478	840—452	627—337	105.6—46.4	839—375	626—280	87.8—38.6
420KR/KRS	16.7334—57.2174	791—303	590—226	106.4—31.1	657—252	490—188	88.4—25.9
H450K/KS	17.2941—34.3000	865—519	645—387	102.9—51.9	855—432	638—322	85.6—43.1
H450K/KRS	16.8261—58.8730	848—302	633—225	105.8—30.2	706—251	526—187	87.9—25.1
H550/KS	16.3902—40.9500	1354—542	1010—404	108.6—43.5	1126—450	840—336	90.3—36.1
630K/KS	16.6250—38.5333	1260—677	940—505	107.1—46.4	1260—563	940—420	89.0—38.6
H650K/KS	16.3902—40.9500	1287—639	960—477	108.6—43.5	1331—532	993—397	90.3—36.1
G750K/KS	15.6214—38.9118	1980—795	1477—593	113.9—45.7	1645—661	1227—493	94.7—38.0
G750KR/KRS	15.4339—40.3964	2003—765	1494—571	115.3—44.1	1665—637	1242—475	95.9—36.6
750K/KS	16.7143—38.5325	1680—803	1253—599	106.5—46.2	1723—747	1285—557	88.5—38.4
750KR/KRS	16.6517—55.5909	1412—556	1053—415	106.9—32.0	1174—762	876—345	88.9—26.6
G1000K/KS	12.0582—38.5325	2448—1068	1826—797	147.6—46.2	2446—889	1825—663	122.7—38.4
G1000KR/KRS	12.0751—61.5049	1883—661	1405—493	147.4—28.9	1566—550	1168—410	122.6—24.1
1000K/KS	16.7143—38.5325	2448—1068	1826—797	106.5—46.2	2051—889	1530—663	88.5—38.4
1120K/KS	17.0769—34.9091	2101—1323	1567—987	104.2—51.0	2351—1358	1754—1013	86.7—42.4
1120KR/KS	16.8587—57.6261	2103—802	1569—598	105.6—30.9	1749—666	1305—497	87.8—25.7
1500K/KS	17.0769—34.9091	2450—1772	1828—1322	104.2—51.0	2449—1473	1827—1099	86.7—42.4
G1500K/KS	12.3673—34.9091	3621—1772	2701—1322	143.9—51.0	3621—1473	2701—1099	119.7—42.4
G1500KR/KRS	14.0347—62.3077	2976—992	2220—740	126.8—28.6	2475—824	1846—615	118.8—23.8
1950K/KS	17.1000—8.3727	3500—2095	2611—1563	104.1—46.4	3918—1590	2923—1455	86.5—38.6
2500K/KS	17.1000—8.3727	4059—2685	3028—2003	104.1—46.4	4059—2233	3028—1666	86.5—38.6
G2500KR/KRS	17.1483—38.4476	4059—2527	3028—1885	103.8—46.3	4059—2137	3028—1594	86.3—38.5

World-class quality and reliability

For more than 30 years, CST drives have kept operations running around the world—being a testament to its performance, strength, simplicity, reliability, and serviceability. CST boasts a proven clutch life of more than 10 years and gearing life of over 30 years in operations within specific conditions.

One of the prime reasons operations continually include CST in their expansion plans is its simple design that results in high reliability. In addition to reliability, ease of serviceability is extremely important as many sites are in isolated locations, making maintenance the responsibility of on-site engineering teams. Nobody can afford lengthy shutdowns, and CST has an average availability greater than 98 percent provides you with maximum uptime and very low total cost of ownership.

Over 4,500 CST drives across five continents

Global reputation

Since the original CST was introduced in 1982, its reputation for performance and reliability has grown at an ever-increasing rate with more than 4,500 units in operations across the globe.

CST units have been implemented in mines, power plants, harbors, and other bulk material handling applications with conveyor systems as the prime drive component in countries with rapid development such as China, Australia, Mexico, Peru, Norway, Turkey, India, and more.

Remanufacturing capabilities

Dodge offers professional remanufacturing services for CST drives to revitalize units that have been in operation for several years. Remanufactured units use original equipment manufacturer (OEM) parts to bring them back to factory specifications to significantly extend service life and reduce your total cost of ownership.

More than 900 CST units have been remanufactured since 2005, and with Dodge, we're your partner for the life of your products—products designed, built, and remanufactured by the name you trust.

- Remanufactured warranty is equivalent to a new product warranty
- Short lead times with common parts kept in stock
- Work done by factory-trained technicians

Before

After

Expert service and support

While many CST operators may prefer to manage their recurring engineering and maintenance needs, personnel and skill-set shortages are impacting operations where external support can help you overcome these labor challenges.

At Dodge, we can provide you with comprehensive, tailored service solutions for CST. Our expert service technicians can help you service your CST units based on your exact application requirements.

- Routine and preventative maintenance
- Scheduled recurring maintenance: daily, monthly, or bi-annual
- On-site parts and service for minor repairs
- Dedicated manpower for emergency breakdowns
- Full lifecycle support for remanufacturing and warranty services

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