

Haulage Systems

Product Overview





Shuttle Cars

The role of haulage equipment is to efficiently remove the cut material from the working face in such a manner as to enhance the performance of the continuous miner and

Joy shuttle cars continue to develop, evolve and improve.

maximize the productivity of the overall section. Joy Global fully understands this role and proactively works with the mining industry to provide comprehensive “system” solutions to suit individual application needs.

Since the introduction of our first shuttle car in 1938, Joy shuttle cars continue to be the mainstay of the industry for batch haulage vehicles. Their exceptional reliability, low operating cost and sustained high levels of productivity are unmatched. Through the extensive use of sophisticated computer-aided design systems, Joy shuttle cars continue to develop, evolve and improve.

Heavy Duty by Design

Underground mines are tough places for haulage vehicles to operate – Joy shuttle cars are designed to meet the challenge. Every element of a Joy shuttle car is engineered to balance performance and efficiency.

Joy shuttle cars have a heavy-duty, high-power drive train that enables them to haul loads in extremely arduous conditions. The permanent four-wheel drive system is powered by two 85kW VFD AC traction motors (50kW in lower seam models). Wheel units have been upgraded to be more robust and durable and the cast pivot axles are virtually indestructible. A four-wheel independent suspension system is also available to help maintain higher tram speeds and improve the operator’s comfort on uneven and/or broken roadways.

The Joy shuttle car chassis and rolling gear are designed using Finite Element Analysis (FEA) techniques to find the optimal balance of volumetric load, vehicle dimensions, load-carrying ability and fatigue life. Heavy-duty conveyor reducers and abrasion-resistant conveyor decking further improve reliability and durability.



Increased Production

Taking it to the Next Level...



With over 100 units in the field today, Joy shuttle cars are available with an optional remote control system. Remote control permits deeper cuts as the shuttle car, now unmanned, can follow the miner under unsupported roof. This significantly improves the overall productivity of a room and pillar section.



Optidrive

The Optidrive AC Variable Frequency Drive System integrates electrical, software, electronic and mechanical systems to provide every Joy shuttle car with a wealth of performance-enhancing features:

- **Increased Tram Speed** - The maximum vehicle tram speed is now at the statutory limit of 6 mph (9.6 km/hr). This is approximately a 50% increase over previous drive systems and translates into more haulage trips per shift. The Optidrive system also significantly increases the tractive effort available, improving the shuttle car’s ability to climb gradients and negotiate difficult roadway conditions.
- **Regenerative Braking** - Automatic regenerative braking by the electric motors supplements the mechanical brakes allowing the latter to run cooler with extended wear life. Regenerative braking is also highly effective at automatically maintaining the shuttle car at a constant speed when descending gradients.
- **Better Speed Control** - With infinitely variable tram speed capability, operators are easily able to precisely control the shuttle car’s speed. Smooth acceleration and deceleration leads to less operator fatigue and the ability to creep the shuttle car forward behind the miner during the cutting cycle, preventing damage caused by inadvertent machine contact.
- **Less Maintenance** - AC traction motors are typically more reliable, more durable and require less maintenance than DC traction motors because there are no commutator brushes to inspect and replace.

Operator Comfort

The latest in shuttle car suspension...

Joy shuttle car four-wheel independent suspension systems are available on select models and are recommended for applications with uneven and/or broken roadways. Each wheel rides on struts that compress and absorb the energy associated with a bump, in doing so reducing the energy transmitted to the rest of the car and the operator. Less energy transferred to the operator means being able to more comfortably maintain higher shuttle car speeds with less fatigue. Similarly, less energy transferred to the chassis means less structural damage and longer overall machine working life.



Joy Global History

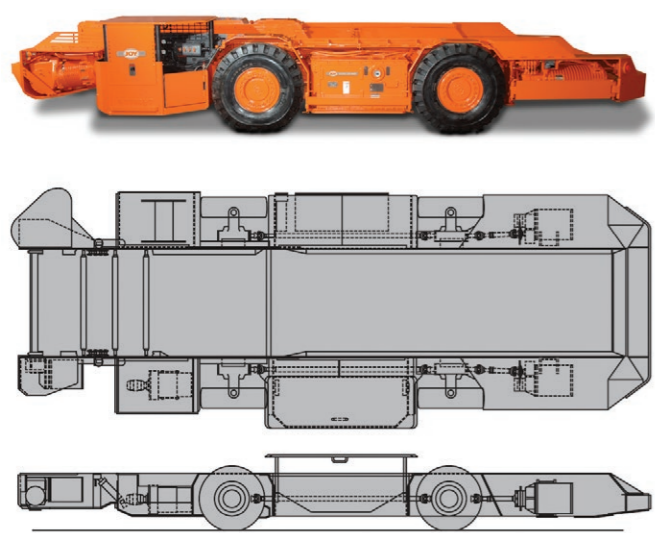
Tradition in Quality & Pride...

With over 17,500 units shipped since 1938, the Joy shuttle car is the most prolific batch haulage vehicle in the underground mining industry. This success is a result of a tradition of quality and pride in how Joy Global products are designed, engineered and built. This tradition endures today and Joy shuttle cars are expected to continue to lead the industry in terms of safety, productivity and cost-effectiveness well into the future.



General Specifications

Joy Shuttle Cars



*The rated load capacity listed for each shuttle car model is the maximum amount the drive train and chassis are rated to haul. The actual carrying capacity is dependent on numerous factors, including but not limited to, the conveyor width, the sideboard height, the density of the material as conveyed, the ability of the continuous miner to load into the shuttle car, and the mining height. Certain combinations of sideboard height, conveyor width, specific density of the material being transported, and floor gradient can exceed the allowable load rating of the car. Consult Engineering before ordering.

	21SC04	10SC32AA	10SC32A	10SC32AB
Low-to-mid Seam				
General Arrangement	5000021535	ET002961-0003	ET002947-0001	ET002947-0007
Rated Load Capacity*	8 tonnes	11 tonnes	11 tonnes	14 tonnes
Machine Weight	18,000 kg	21,000 kg	21,000 kg	23,000 kg
Ground Pressure at Max. Rated Load	8.5 kg/cm2	9.9 kg/cm2	9.9 kg/cm2	9.4 kg/cm2
Tires	35 x 15-15	12 x 20	12 x 20	14 x 20
Length	8.3 m	8.7 m	8.7 m	8.8 m
Width with 1.42 m Conveyor	3.20 m	3.43 m	3.35 m	3.35 m
Chassis Height	.9 m	1.0 m	1.0 m	1.2 m
Load End Height	.8 m	1.0 m	1.0 m	1.0 m
Minimum Canopy Height	1.0 m	1.1 m	1.2 m	1.3 m
Minimum Seam Height	1.2 m	1.3 m	1.5 m	1.6 m
Ground Clearance	212 mm	254 mm	254 mm	290 mm
Motors (with preferred OPTIDRIVE)				
Pump 60 Hz	1-30 kW	1-30 kW	1-30 kW	1-30 kW
50 Hz	1-25 kW	1-25 kW	1-25 kW	1-25 kW
Conveyor 60 Hz	1-20 kW	1-25 kW	1-25 kW	1-25 kW
50 Hz	1-16 kW	1-24 kW	1-24 kW	1-24 kW
Traction 50 or 60 Hz	2-50 kW	2-50 kW	2-50 kW	2-85 kW

	10SC32B	10SC32BC	10SC32C	Suspension Option	10SC32D
Mid-to-high Seam					
General Arrangement	ET002927-0004	5000000983	5000034965	5100022098	5000009339
Rated Load Capacity*	14 tonnes	16 tonnes	20 tonnes		30 tonnes
Machine Weight	25,000 kg	27,000 kg	30,000 kg	38,000 kg	34,000 kg
Ground Pressure at Max. Rated Load	10 kg/cm2	9.6 kg/cm2	11.1 kg/cm2		7.3 kg/cm2
Tires	14 x 20	14 x 24	14 x 24	16 x 25	18 x 25
Length	9 m	9.4 m	9.3 m	9.6 m	9.7 m
Width with 1.42 m Conveyor	3.42 m	3.51 m	3.72 m	3.88 m	3.85 m
Chassis Height	1.3 m	1.4 m	1.4 m	1.6 m	1.7 m
Load End Height	1.3 m	1.4 m	1.4 m	1.6 m	1.7 m
Minimum Canopy Height	1.6 m	1.7 m	2.0 m	2.1 m	2.4 m
Minimum Seam Height	1.9 m	2.0 m	2.3 m	2.4 m	2.7 m
Ground Clearance	290 mm	343 mm	318 mm	356 mm	350 mm
Motors (with preferred OPTIDRIVE)					
Pump 60 Hz	1-30 kW	1-30 kW	1-30 kW		1-30 kW
50 Hz	1-25 kW	1-25 kW	1-25 kW		1-25 kW
Conveyor 60 Hz	1-25 kW	1-25 kW	2-17 kW		2-22 kW
50 Hz	1-24 kW	1-24 kW	2-24 kW	2-30 kW	2-24 kW
Traction 50 or 60 Hz	2-85 kW	2-85 kW	2-85 kW		2-85 kW



Battery Haulers



Maximum Availability The Joy battery change carousel...



The Joy battery change carousel saves the overall time and space required for battery change out. Each electrically driven carousel can carry three batteries and is easily contained within a single cross-cut with no projection into the adjacent intersection. The battery hauler operator can single-handedly change the battery on the vehicle without requiring a jumper cable, thus saving time compared to other change-out station layouts.

A Joy battery hauler benefits from a variety of innovative technologies that contribute to extended battery life and/or improved maneuverability and operational flexibility. This

A market leader in battery-powered underground haulage machines.

makes the Joy battery hauler the market leader in battery-powered underground haulage machines for room and pillar applications.

The AC-Variable Frequency Drive Control System (AC-VFD) is a proven system that enhances and maximizes the efficiency and operational performance of all Joy battery-powered haulage vehicles. Having an independent traction drive design, the AC-VFD control system provides the reliability and availability benefits that customers have come to value in the DC-Lionetics control system.

Advanced diagnostics on all AC-VFD models can be queried directly from the machine display to reduce the time required to troubleshoot and repair a machine. Data logging and data acquisition allows for enhanced machine diagnostics as well as providing more user-friendly and focused preventative maintenance programs.

Auto-loading Position

The ejector bed retract cycle has been completely automated. Following an off-load, the operator presses the “auto-load” button to commence the sequence and is then free to focus on tramming back to the miner. Using pressure transducers, the control system sequences the retract process through to completion, pausing only when hydraulic pressure is required for steering. This simultaneous tram and retract process saves significant time and increases the number of trips possible during a shift.

High-efficiency Hydraulics

The hydraulic system on AC-VFD battery haulers has been redesigned to minimize resistance to the flow of fluid through piping and valves. Consequently, faster hydraulic functions create 20% shorter discharge and retract time intervals and more responsive steering. Decreased load on the pump improves motor efficiency indicated by a 40% reduction in pump motor temperature. Ultimately, the overall benefit is a 10-12% increase in battery life.



AC-VFD Control

The AC-VFD control system is the latest and most advanced battery hauler control system and is available on all Joy battery hauler models. The benefits of the AC-VFD control system relate to improved electrical efficiency and/or operational performance:

Electrical Efficiency Benefits

- An AC-VFD-equipped hauler has a 240V battery. By doubling the supply voltage from the battery, current draw and associated thermal losses are reduced.
- The electronically-activated steering assist feature promotes smooth and easy steering and relieves undue stress on motors, drive train and tire assemblies.
- Both of the above reduce consumption of energy, ultimately extending the life of the battery and minimizing the number of battery changes over time.

Operational Performance Benefits

- Regenerative braking assists operators in maintaining a safe speed on declines while reducing the wear on brakes.
- Brushless AC-traction motors require minimal maintenance and are highly reliable. This increases machine availability by reducing associated downtime and maintenance.
- The VFD drive in conjunction with AC traction motors provides increased maximum torque to the wheels allowing the machine to ascend steeper inclines under load. Combined with existing vertical articulation and two-wheel hydraulic assist capabilities, the increased torque makes the AC-VFD battery hauler the most capable vehicle of its kind.
- Although the top-end speed of the VFD-AC controlled machine is equal to that of the DC-Lionetics machine, the AC-VFD machine will maintain a higher average rate of speed during the duty cycle through the joint benefits of the increased efficiencies in the electronics and hydraulic systems of the AC-VFD machine package.

DC-Lionetics Control System

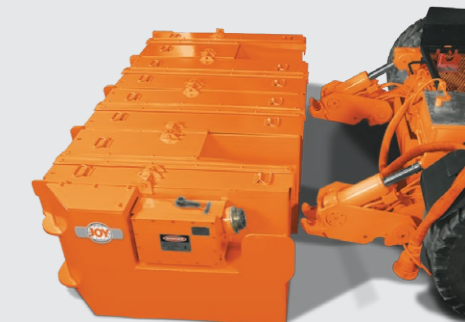
Where mining conditions do not require the performance benefits of the AC-VFD drive, the DC-Lionetics becomes the preferred control system. The DC-Lionetics Control System has also been improved to maximize its efficiency and operational performance.

The 128V battery powers left and right traction control modules. Compared to previous DC control systems, the drives have a higher current rating and improved long-term reliability and, being independent, should either side become compromised, the other side remains operational and the machine remains mobile.

The Lionetics system has improved diagnostic capabilities and all motors have current- and thermal-overload protection. Infinitely variable tram speed control and an improved cab layout promote operator comfort and reduced fatigue levels.

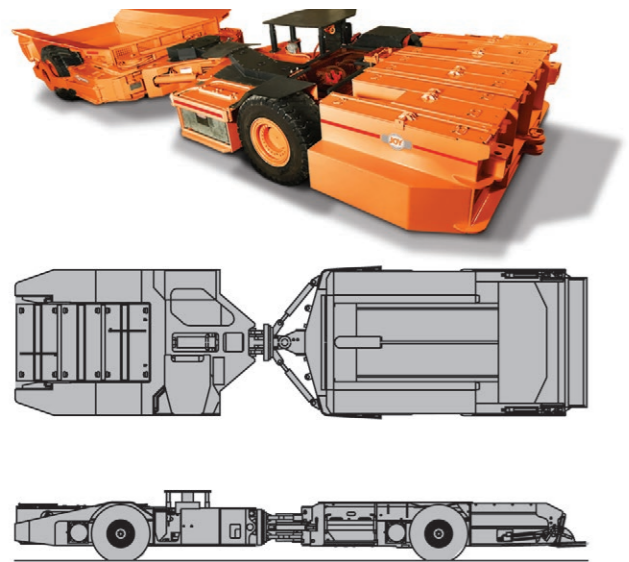
Maximum Versatility Lift-from-Grade in battery change out...

Joy battery haulers interface with their battery packs using the patented Joy ground base battery lift-arm system. This particular battery change-out system is unique to Joy battery powered haulers. The robust design of this system results in a highly reliable battery change out system that does not compromise overall equipment availability. The battery can be lifted from any surface. In addition, the lift arms are easily fitted to existing support vehicles to create effective and efficient battery movers. Increasing the overall versatility of battery change out equipment reduces the battery change out time, increasing the availability of the Joy battery hauler.



General Specifications

Joy Battery Haulers



*The rated load capacity listed for each battery hauler model is the maximum amount the drive train and chassis are rated to haul. The actual carrying capacity is dependent on numerous factors, including but not limited to the trailer capacity, sideboard height, use of a tailgate, the density of the material as mined, the ability of the continuous miner to load into the hauler, the ground clearance selected, and the mining height.

	BH-10	BH-18	BH-20
	Low-Seam Applications (AC or DC model available)	Mid-Seam Applications (AC or DC model available)	High-Seam Applications (AC or DC model available)
Rated Load Capacity	11.4 tonne	16.4 tonne	18.2 tonne
Overall Length	1183 cm	1179 cm	1151 cm
Overall Width - Tractor	348 cm	325 cm	340 cm
Overall Width - Trailer	355 cm	341 cm	362 cm
Chassis Thickness	50.8 cm	61 cm	71.1 cm
Tire Size	10:00 x 15 Duals tractor 35x15x15 Single-trailer	18L20 - 111.8 cm	50x20x20 - 127 cm 17.5R25 - 140 cm
Ground Clearance	18 cm	229 or 279 mm	292 or 445 mm
Minimum Canopy Height	94 cm	1257 mm	166 cm
Lay Down Tailgate	Optional	Standard	Standard
Sideboard Height	17.5 cm	35.5 cm	30.5 cm
Overall Height @ top of sideboard	87.6 cm	118.7 cm	148 cm
Overall Height @ top of battery	92.7 m	92.7 cm	131 cm
Wheel Base	5.76 m	5.79 m	5.7 m
Optimum Seam Height of Operation (OAH)	1.0 m to 1.5 m	1372 to 1981 mm	183 cm & up
Inside Turning Radius	3.0 m	298 cm	351 cm
Outside Turning Radius	7.1 m	717 cm	768 cm
Minimum Entry Turn	4.9 m	506 cm	488 cm
Frame Articulation	25 degrees - 15 up & 10 down	25 degrees - 15 up & 10 down	25 degrees - 15 up & 10 down
Steering Articulation Angle	Total 120 degrees - 60 L & R	Total 120 degrees - 60 L & R	Total 110 degrees - 55 L & R
Oscillation	40 degree	40 degree	40 degree
Ball Bearing	50.8 cm	61 cm	71 cm
Tram Speed	8-9.7 kph	8-9.7 kph	8-9.7 kph
Brakes	4 wheel wet disc	4 wheel wet disc	4 wheel wet disc
Motors			
Pump motor - 128 V system (DC)	*17 kW	*17 kW	*17kW
Pump motor - 240 V system (AC)	*37 kW	*37 kW	*37 kW
Traction motor - 128 V system (DC)	*30 kW x 2	*30kW x 2	*30 kW x 2
Traction motor - 240 V system (AC)	*75 kW x 2	*75 kW x 2	*75 kW x 2
*All one hour rating			



Chain Haulage Systems



Increased Production
Taking it to the Next Level...



Joy Global has two basic systems available, the lower CHS-HT25 (hydraulic tram) and the higher CHS-AC35 (electric tram). Both have high capacity throughput designs, with 36 in (914mm) conveyor widths and 350 fpm (107 mpm) chain speed. These proven systems carry a 25 to 35 tpm (23-32 tpm)throughput rating with an optional Breaker Car to match. Tram speeds are 0 - 65 fpm (20 mpm) and 0 - 80 fpm (24 mpm) to support the desired advancement, seam height and conditions.

Recognized as the most efficient method of moving mined material from the mine face for specific applications, the Joy Chain Haulage System (CHS) provides significant improvements in the areas of durability and reliability.

The Joy Chain Haulage system consists of four basic units: A breaker car module (BCM), conveyor bridge module (CBM), mobile bridge module (MBM) and rigid haulage system (RHS) or low frame. The system configuration and number of these units depends on individual mine application and production requirements.

High Performance Operation

Incorporating Joy Global proven design and construction techniques, the Joy Chain Haulage system is the most rugged continuous haulage system available and features quality components for the highest level of reliability. New maneuverability and mechanical improvements provide increased production across all applications.

- Improved visibility and reduced overall height on the breaker car module
- Narrow machine design
- Narrow pulley support section
- Maximum spillage control features
- Simplified electronics with optional diagnostics
- AC electric tram on the AC35 system
- Closed loop hydraulics on the HT25 system
- Improved cable handling system and optional cable handling dollies for incoming power and water services

Design Features

New design features focus on increased reliability and durability through robust engineering and heavy duty components. The latest industry-leading features include electric tram on the AC35 system, replaceable wear strips on the crawler frames, chrome carbide overlay (CCO) conveyor decks, heavy duty crawler chains and heavy rated conveyor chains, to name a few. The AC35 system uses the same motors, VFDs, gearcases, and chains for the traction system as a 14CM15 Continuous Miner.



Modular Approach to Match Your Needs

The Joy CHS-AC35 and CHS-HT25 systems are designed to work with corresponding size Joy continuous miners for maximum production capabilities. System capacity allows for flexibility to modify throughputs as needs change.

Maximum production capabilities

Breaker Car Module

- Optional hydraulic or mechanical conveyor drives for varying applications

Mobile Bridge Module

- Ergonomically-designed operator cab provides comfort and visibility

Conveyor Bridge Module

- Dual motor design
- 2.25 inch pitch conveyor chains

Rigid Haulage System

- Solid top rails for extra strength
- Inboard pulley bearings for better maneuverability and extended life
- 18 ft (5.5 m) long sections

Safety Features

Zero harm mentality...

Joy Global makes every effort to improve operator safety and comfort. The Joy chain haulage system has the following standard application features:

- MSHA & PA approved certifications
- Ability to tram BCM without breaker operating
- Certified canopy or operator's safety post
- Safety armrest machine shut-down feature and operational reset
- Mobile offside and dolly buttons
- Pilot-operated check valves
- Water dust suppression
- Dry chemical fire suppression



General Specifications

	CHS-HT25	CHS-AC35
Rated Capacity	23 tpm	32 tpm
Length		
BCM, pivot to dump point in hoppers	9.1 m	9.1 m
MBM, pivot to pivot connection point on dolly	8.7 m	8.7 m
CBM, pivot to pivot	12.2 m	12.2 m
BCM width	3.33 mm	3.30 mm
MBM width	2.82 mm	2.90 mm
Conveyor width (MBM and CBM)	914 mm	914 mm
Conveyor width (BCM)	965 mm	1118 mm
Minimum Stack-up Height	700 mm	1136 mm
Ground Clearance	152 mm	254 mm
Minimum Tail Dolly Stack-up at RHS	775 mm	1155 mm
RHS belt width	1.06 or 1.22 mm	1.06 or 1.22 mm
Troughing Angle	15 or 30 deg	30 deg
Seam Height	0.97 m	1.37 m



Flexible Conveyor Train

The Joy Flexible Conveyor Train (FCT) is a truly continuous haulage system that eliminates any haulage related bottlenecks from typical underground continuous miner operations.

The FCT allows continuous miners to operate at their maximum capacity.

By removing this restriction, the FCT allows today's high-production continuous miners to operate at their maximum capacity.

The key to the effectiveness of the FCT is its patented flexible conveyor and traction system that permits the

FCT to be operated as one single unit. The ability to continuously convey material along its length while simultaneously tramming to follow the continuous miner's every move, all with only one operator utilizing radio remote control, is a distinct advantage over all other types of haulage.

The productivity benefits of the FCT are equally applicable to coal-producing room and pillar and longwall development operations, as well as operations utilizing continuous miners to extract industrial minerals, such as salt, trona, potash and gypsum.

Machine Safety

The Joy 4FCT flexible conveyor train significantly enhances overall mine safety. It combines all haulage into a single, relatively slow-moving machine that follows a known path of travel, and requires only one operator using remote-control. This reduction in the total number of mobile machines in the section reduces visibility concerns for batch haulage operators and the personnel working on batch haulage sections. Also, less material movement means greater dust control.

Machine Performance

The FCT can convey coal at flow rates of up to 27 tons/minute (24.5 tonnes/minute) and salt, trona, gypsum or potash at up to 40 tons/minute (36.3 tonnes/minute). Infinitely variable control of conveyor belt speed permits maximum belt loading and minimum belt speed, consequently extending the wear life of the belt itself.

Life Cycle Management

Taking it to the Next Level...

The FCT is a product of Joy Global's commitment to enabling customers to consistently produce at the lowest cost per ton over the life cycle of the equipment. Not only does the life cycle cost per ton of the FCT itself compare favorably to other forms of haulage, the increased production and efficiencies that it unlocks in the typical continuous miner section improve the cost per ton performance of the entire operation.



Operational Benefits

The chain traction system is distributed along the entire length of the machine, resulting in incredible traction with exceptionally low ground bearing pressure, when compared to other haulage machinery.

Material degradation is minimal due to there being no transfer points along the length of the FCT. The Optidrive variable frequency drive provides infinite speed control to the conveyor belt and lumpbreaker conveyor chain allowing each to be coordinated to prevent spillage.

The lumpbreaker front-end provides ample FCT maneuverability and the material sizing and metering functions not only control the flow on the FCT belt but also negate the need for a separate feeder-breaker in the section.

The Faceboss control system coupled with the Optidrive variable frequency drive provides soft-start functionality for the FCT traction and conveyor belt systems. This significantly reduces the wear and tear on these parts, extending their operating lives and reliability levels.

FCT/DMU Configurations

Each FCT system includes a DMU (Dynamic Move-Up) unit. The DMU is the interface between the FCT and the mine's panel belt. The FCT and DMU are available in two configurations. The Side-Discharge configuration is applicable to low seam heights and wide entries whereas the Over-The-Top (OTT) configuration is more suited to higher seams with restricted entry width. The OTT system is a self-advancing unit with remote-controlled panel belt move-ups. This system can also be designed for retreat mining. The side discharge design must be advanced using the continuous miner to pull up.

Total Control

Optidrive with Faceboss control...

The traction and belt and chain conveyor motors on the FCT are driven by Optidrive and the overall system is controlled by Faceboss, Joy Global's standard machine control platform. Faceboss includes a user-friendly, graphical interface with advanced diagnostic capabilities. The Optidrive system provides infinitely variable speed control which permits controlled ramp-up of traction and conveyor motors. Optidrive and Faceboss components used on the FCT are common and interchangeable with other similarly equipped Joy Global underground machines.



Joy Global History

Tradition in Quality & Pride...

With eight global patents, the Joy FCT is the only simultaneous tram-and-convey, single-operator, underground continuous haulage system available in the world today. The continuous pursuit of innovation, extensive design and testing practices, renowned built quality, and machine reliability has kept Joy Global as the world's leader in underground mining systems and services for nearly an entire century.



Joy 4FCT



Side Discharge

	4FCT-B/C	4FCT-C
Entry Width	6.0 m	6.0 m
Seam Range	1.4 m	1.65 m
Machine Height	1.24 m	1.5 m
Capacity	25 tonnes	25 tonnes

Over the Top

	4FCT-B/C	4FCT-C
Entry Width	4.72 m	4.72 m
Seam Range	2.20 m	2.31 m
Maximum Height Lifted	2.05 m	2.16 m
Capacity	25 tonnes	25 tonnes

4FCT-B/C 4FCT-C

4FCT-B/C 4FCT-C

Smart Services

Smart Services from Joy Global combine all of Joy Global’s value-added offerings into one package, under one roof as an integrated

Joy Global service facilities have given world class service a new home.

solution to our customers. The facilities and services feature technological advancements in prognostics, remote health monitoring,

reliability and asset management, advanced training and integration of mining processes/system optimization with 24-hour support.*

Our service strategies are delivering responsive and competitive service solutions, meeting the needs of our customers and driving unprecedented value in our customers’ operations. At the core of Joy Global’s Smart Services vision is our Performance Life Cycle Management (PLCM)

strategy, which brings together all of the innovative people, services and products that Joy Global has to offer.*

Performance Life Cycle Management focuses these services, to align with our customers' needs, cultivating a zero harm mentality and delivering the highest productivity at the lowest cost per ton, from the time you receive your new equipment for the entire life cycle of the equipment.



Prognostic Intelligence - State of the art predictive software analyzes the data streamed from your machines. The software predicts malfunctions, failures or process gaps at the earliest instance.

- Responsive Technical Support
- Prognostic Intelligence
- Advanced Technical Training
- Performance Optimization
- Remote Health Monitoring
- Proactive Reliability
- Interactive Information Delivery
- 24/7 Technical and Logistical Support
- Genuine Service Products
- Machine & Component Rebuilds
- Comprehensive Asset Management
- Authentic Parts & Components
- On-Site Machine Revitalization
- Performance Life Cycle Management

*All services are not yet available in all regions of the world.



Joy Global worldwide locations

JOYGLOBAL



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