

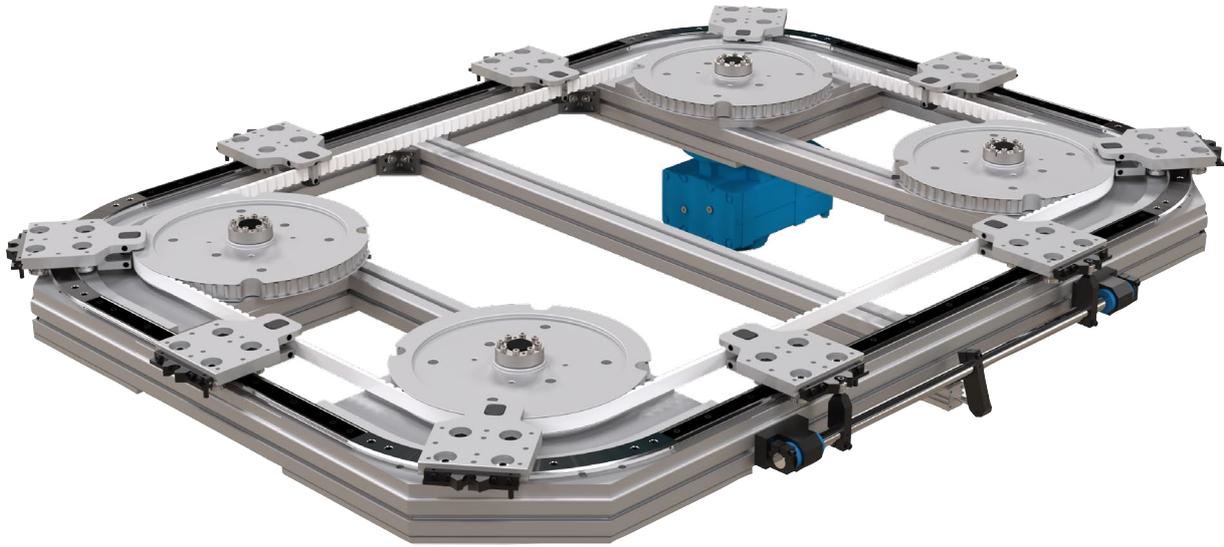
This data sheet interacts with
PRT2 Catalogue
Pages 50-51



This data sheet interacts with
DTS Catalogue

DTS+ Driven Track System

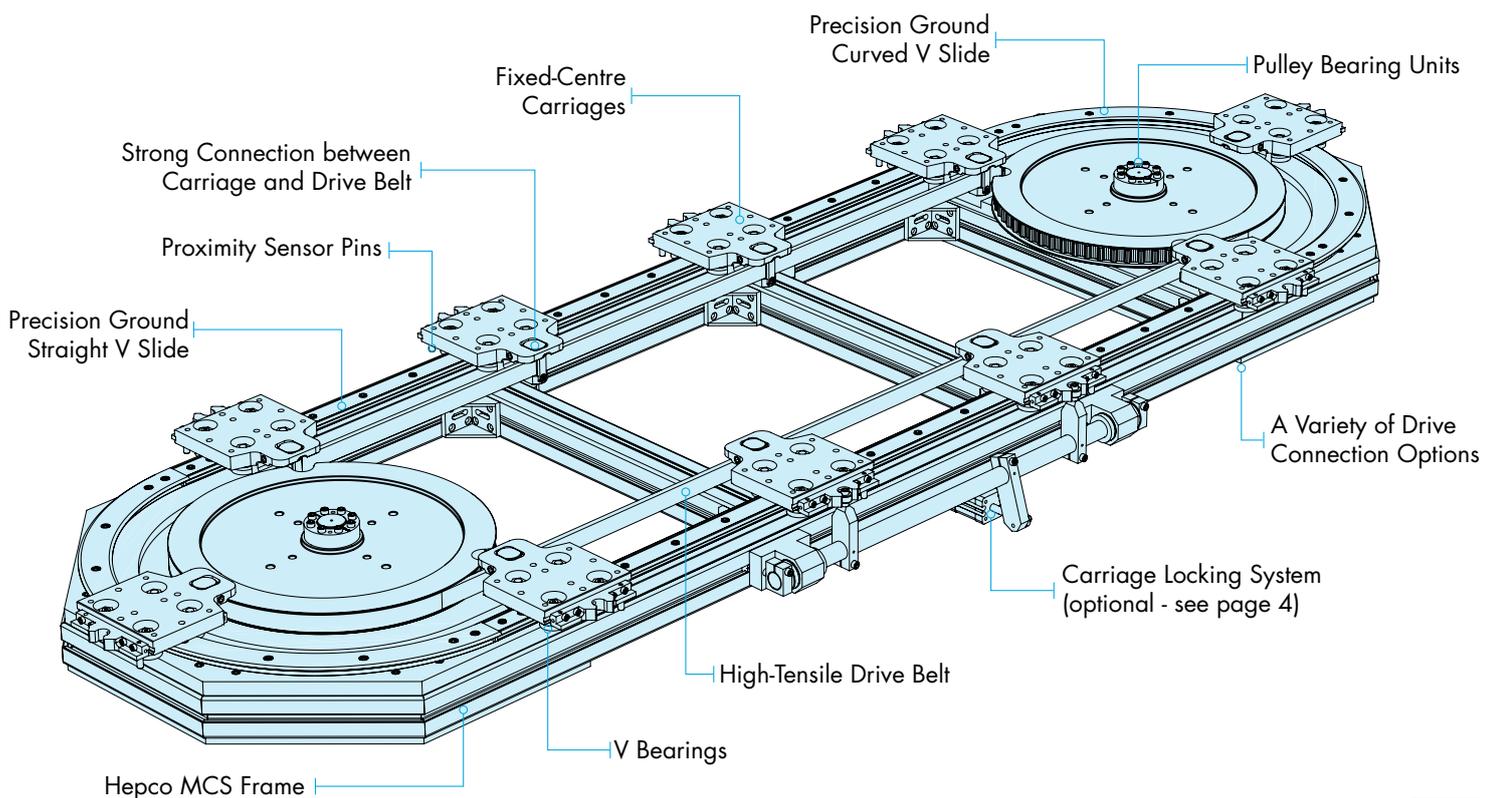
The HepcoMotion DTS+ system design has been improved and updated whilst retaining a strong connection between carriages and drive belt. The new design integrates the carriage and belt connection, creating a single-height surface for mounting fixtures and equipment to carriage assemblies. A wider range of drive shaft diameters is offered, increasing the selection of drive options for each system size. A 44-612 system with Ø40mm bearings and 76-799 system have also been added to the range.



The DTS+ system incorporates key features of Hepco's PRT track system and original DTS, combining them with a high load capacity connection between carriages and the drive belt. The carriages will not disengage from the belt, allowing transmission of higher forces compared to the original DTS system.

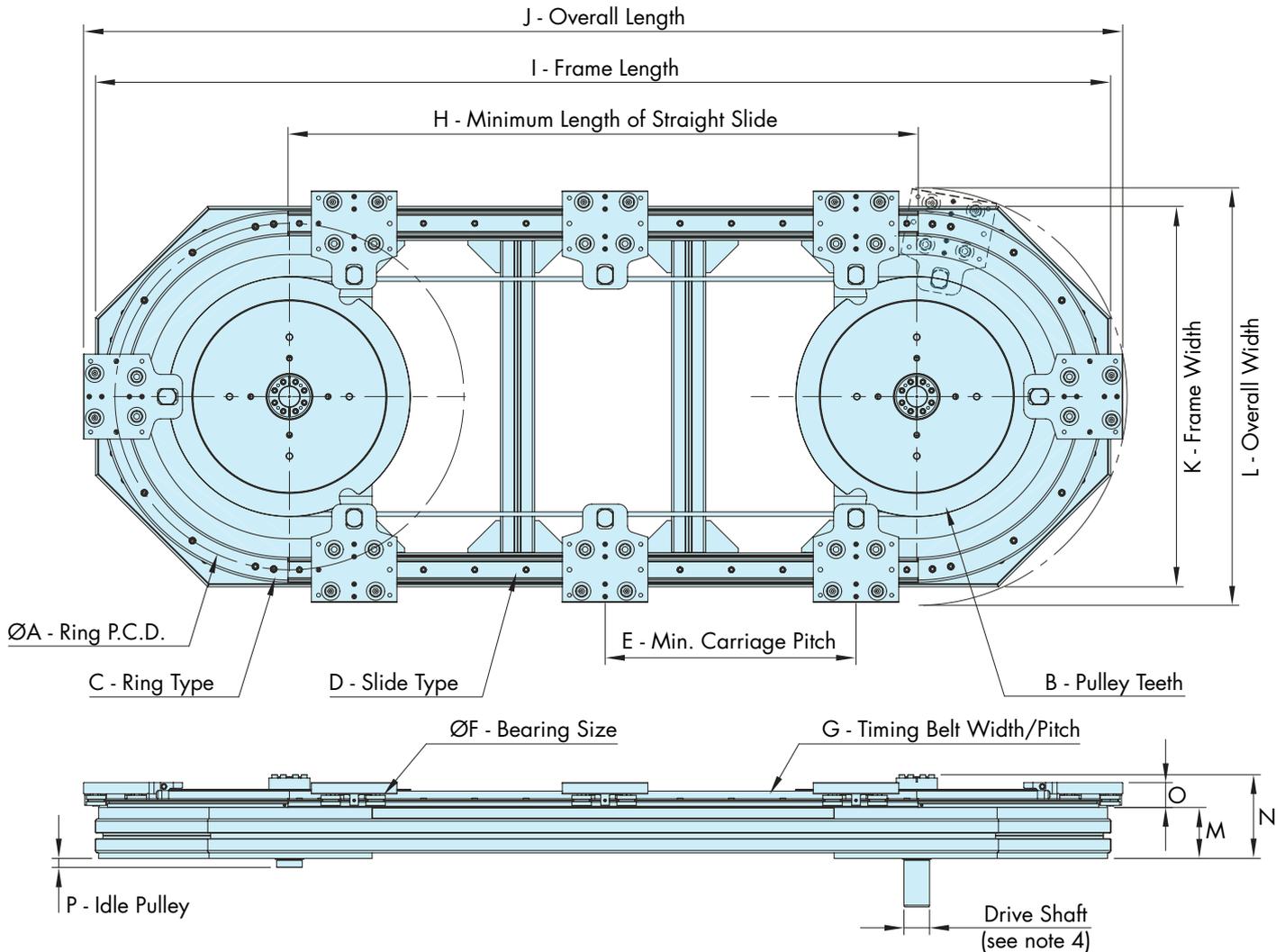
Whilst the original DTS will continue to be the right choice for many applications, DTS+ may be of particular interest in applications with high loads, a vertical orientation, or where the free space inside the track circuit is required to integrate additional equipment.

Construction of the DTS+



DTS+ System Dimensions

The layout of each DTS+ system is adapted to suit customers' individual application requirements. As it is not practical to detail every dimension within the range, key dimensions are provided in this datasheet. For information or advice on system suitability for a particular application, please contact Hepco's Technical Department. An approval drawing is created for every design ordered.



A system with 180° ring segments in an oval circuit is shown above. Rectangular systems with 90° segments are also available.

System Size	ØA (Ring PCD)	B*1 (No. Pulley Teeth)			C	D	E	ØF	G
25-351X	351	60	63	66	TR25-351	TNS25	110	25	25/AT10
44-468X	468	40			TR44-468	TNM44	160	34	25/AT20
44-612X	612	60	66	70	TR44-612	TNM44	200	34	25/AT20
44-612XB		60		66				40	25/AT20
76-799-32	799	72	78	80	TR76-799	TNL76	240	54	32/AT20
76-799-50									50/AT20

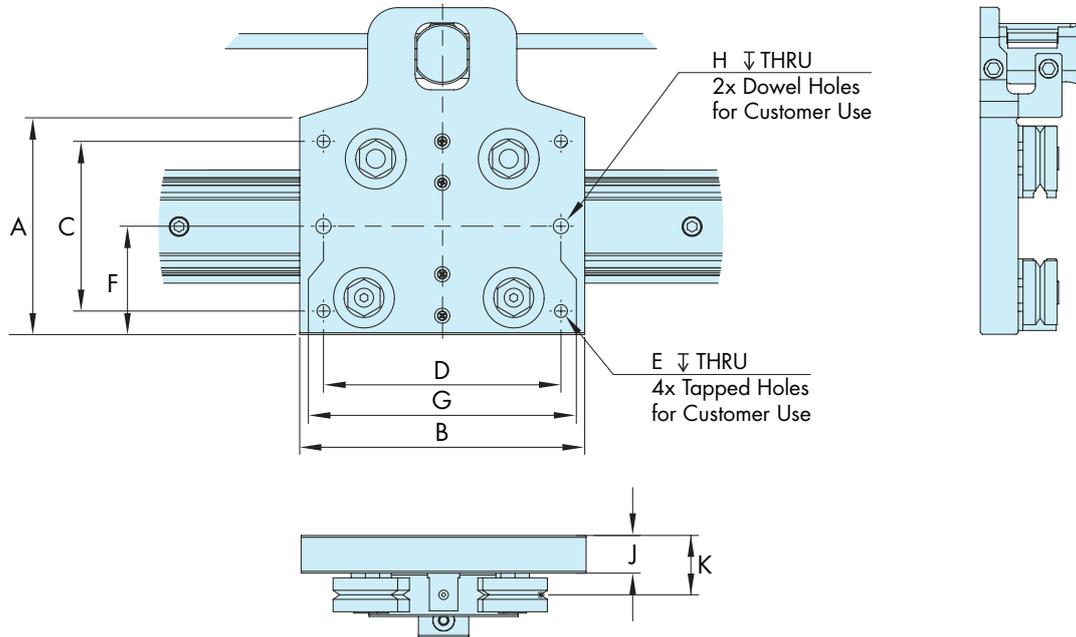
System Size	H	I	J*2	K*3	L*2,3	M	N	O	P
25-351X	470	H + 411	H + 428	411	430.5	90	145	39	17.5
44-468X	500	H + 528	H + 578	528	582.5	90	148	44	16
44-612X	650	H + 672	H + 722	672	726.5	90	148	44	16
44-612XB			H + 740		746.5				
76-799-32	820	H + 889	H + 973	889	996	140	227.5	68.5	16
76-799-50									

1. Pulley size is determined by carriage pitch and will be confirmed during specification of a system. Refer to page 5 for a list of carriage pitch options.
2. Dimensions J and L are for a system without Carriage Locking. Please refer to page 4 of this datasheet for locking system dimensions.
3. Dimensions K and L relate to oval format systems only.
4. Drive shaft dimensions vary depending on gearbox specification and will be confirmed at time of order.

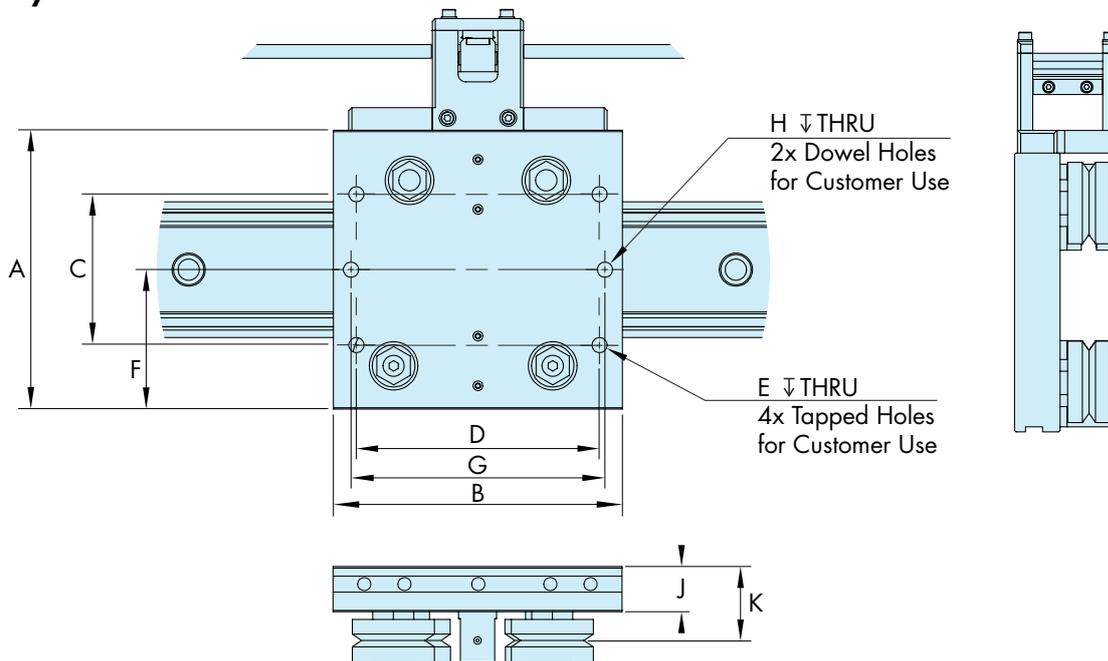
DTS+ Carriage Assembly Dimensions

Typical carriage assembly information is given below. Carriages are supplied as standard with four customer mounting holes 'E' on a C x D pattern.

25-351, 44-468, 44-612 and 44-612B systems:



76-799 systems:



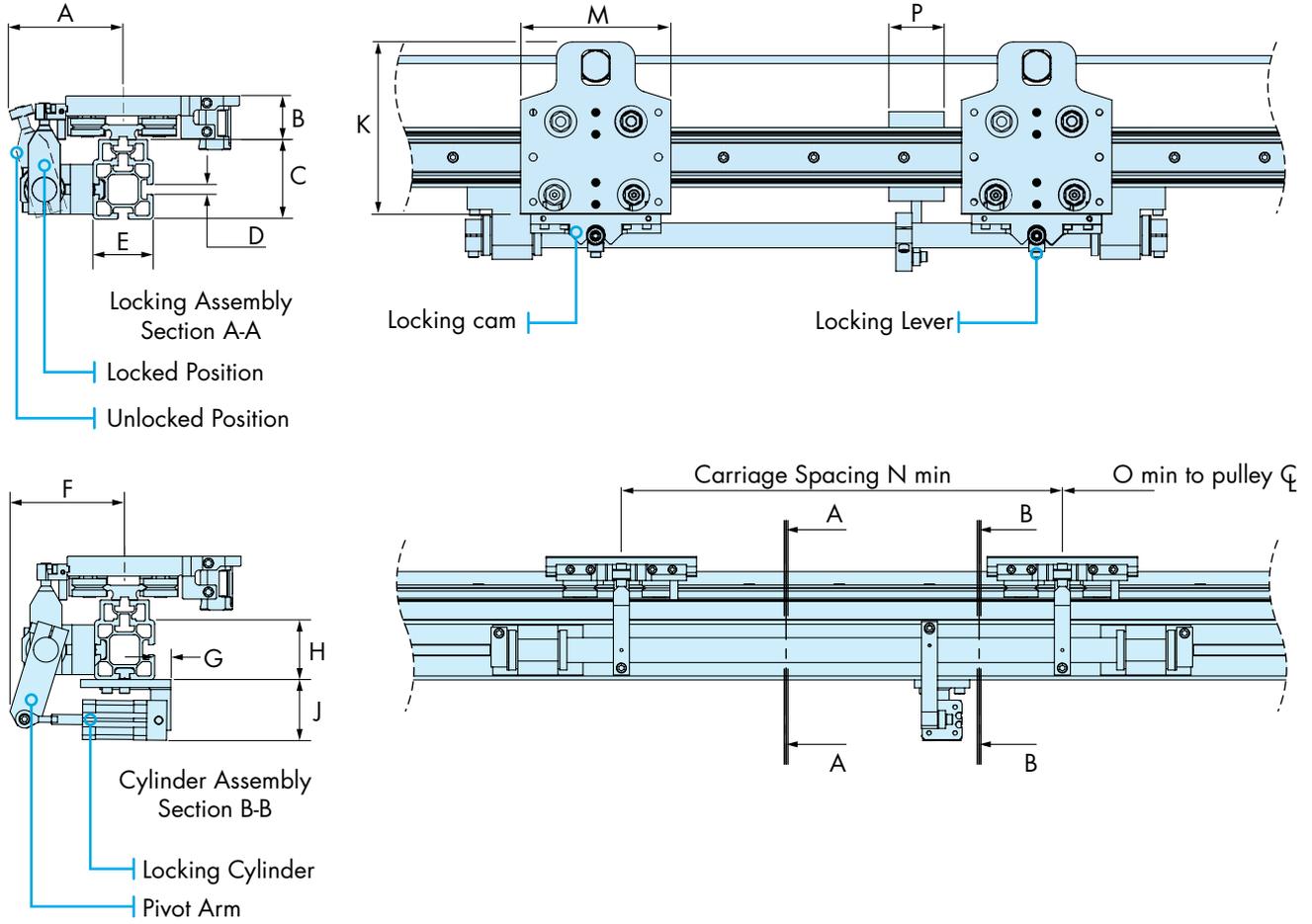
System Size	A	B	C x D	E	F	G	H	J	K
25-351X	80	105	50 x 85	M6 x 1 - 6H	40	90	Ø6 H7	20	29
44-468X	115	145	90 x 125	M8 x 1.25 - 6H	57.5	125	Ø8 H7		31.5
44-612X	115	150	90 x 125	M8 x 1.25 - 6H	57.5	125			31.5
44-612XB	135	160	110 x 140	M8 x 1.25 - 6H	67.5	140			31.5
76-799	185	190	100 x 160	M10 x 1.5 - 6H	92.5	165	Ø10 H7	30	49

Note: The table above lists the standard dimensions for each system size. Whilst some dimensions of the carriage assembly change depending on the size of pulley required to fulfil the system specification, the fixed dimensions are given above. An approval drawing for every system ordered will be produced prior to manufacture.

DTS+ Carriage Locking System Dimensions (for intermittent motion)

The carriage locking system aligns specific carriages to a repeatable position, anywhere along any straight section of the circuit. The slight compliance of the belt allows each carriage to be guided to its exact stop position by a cam roller. Please specify the stations on the track system where carriages need to be locked in position.

Carriage Locking System Dimensions



System Size	A	B	C	D	E	F	G
25-351X	95	29	80	10	60	100	24
44-468X	114	38	80	10	60	118	6
44-612X	114	38	80	10	60	118	6
44-612XB	124	44	80	10	60	128	24
76-799	199	68.5	110	10	90	172	-

System Size	H	J	K	M	N	O	P
25-351X	60	61	105	80	110	30	50
44-468X	60	60	150	115	160	40	50
44-612X	60	60	150	115	200	40	50
44-612XB	60	60	160	135	200	40	50
76-799	90	98	190	185	240	40	120

DTS+ Carriage Pitch Intervals & Compatible System Sizes

The DTS+ design requires that the circumference of the pulley is a whole number multiple or simple fraction of the carriage pitch. This ensures that carriages always coincide with pulley pockets as they travel around the DTS+ unit. Also, the total length of the belt must be a whole number multiple of the carriage pitch. Carriage pitches must also be a multiple of the belt tooth pitch. Only certain combinations are possible, and these are detailed in the table below:

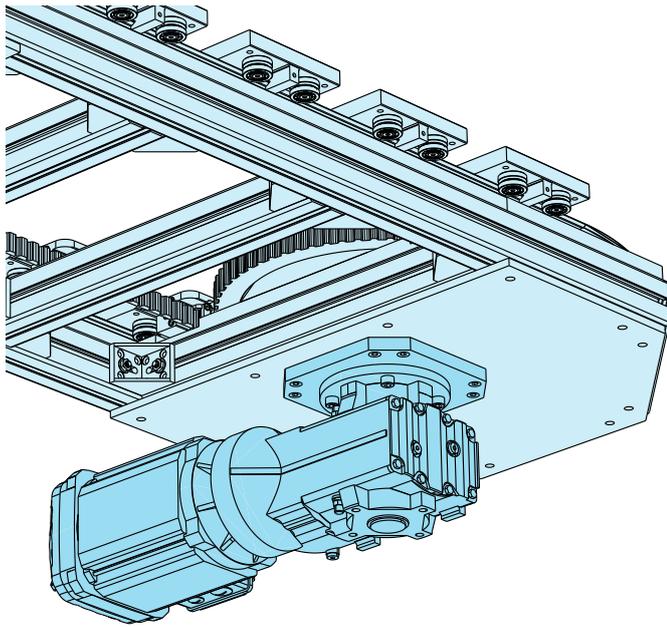
Pitch	25-351X	44-468X	44-612X	44-612BX	76-799	Pitch	25-351X	44-468X	44-612X	44-612BX	76-799
110	✓					700	✓		✓		
120	✓					720	✓		✓	✓	✓
150	✓					750	✓				
160		✓				770	✓				
180	✓					780					✓
200	✓	✓	✓	✓		800	✓	✓	✓	✓	✓
210	✓					840	✓		✓		
220	✓		✓	✓		880	✓		✓	✓	
240	✓		✓	✓	✓	900	✓		✓	✓	✓
260					✓	960	✓	✓	✓	✓	✓
270	✓					980			✓		
280			✓			990	✓				
300	✓	✓	✓	✓		1000	✓	✓	✓	✓	✓
320		✓			✓	1040					✓
330	✓					1050	✓				
350						1080	✓				✓
360	✓		✓	✓	✓	1100	✓		✓	✓	
400	✓	✓	✓	✓	✓	1120		✓	✓		✓
420	✓		✓			1200	✓	✓	✓	✓	✓
440	✓		✓	✓		1210	✓				
450	✓					1260	✓		✓		✓
480	✓	✓	✓	✓	✓	1280		✓			✓
500	✓					1300	✓				✓
520					✓	1320	✓		✓	✓	
540					✓	1350	✓				
550	✓					1400	✓	✓	✓	✓	✓
560			✓			1430	✓				
600	✓	✓	✓	✓	✓	1440	✓	✓	✓	✓	✓
630	✓					1470	✓				
640		✓			✓	1500	✓		✓	✓	
660	✓		✓	✓		Please consult our Technical Sales team for carriage pitches above 1500mm.					

The length and width of systems must also satisfy the following equation:

$$L_{\text{BELT}} = 2 \times L_{\text{PCRS}} + 2 \times W_{\text{PCRS}} + P_{\text{CIRC}} = N \times C_{\text{Pitch}}$$

Where L_{BELT} is the belt length, L_{PCRS} is the length of the system between the pulley centres, W_{PCRS} is the width of the rectangular system between the pulley centres (= zero for oval systems) and P_{CIRC} is the circumference of a single pulley. C_{Pitch} is the carriage pitch and N is the number of carriages.

DTS+ Drive Connections: Helical Bevel Gearboxes and Geared Motors

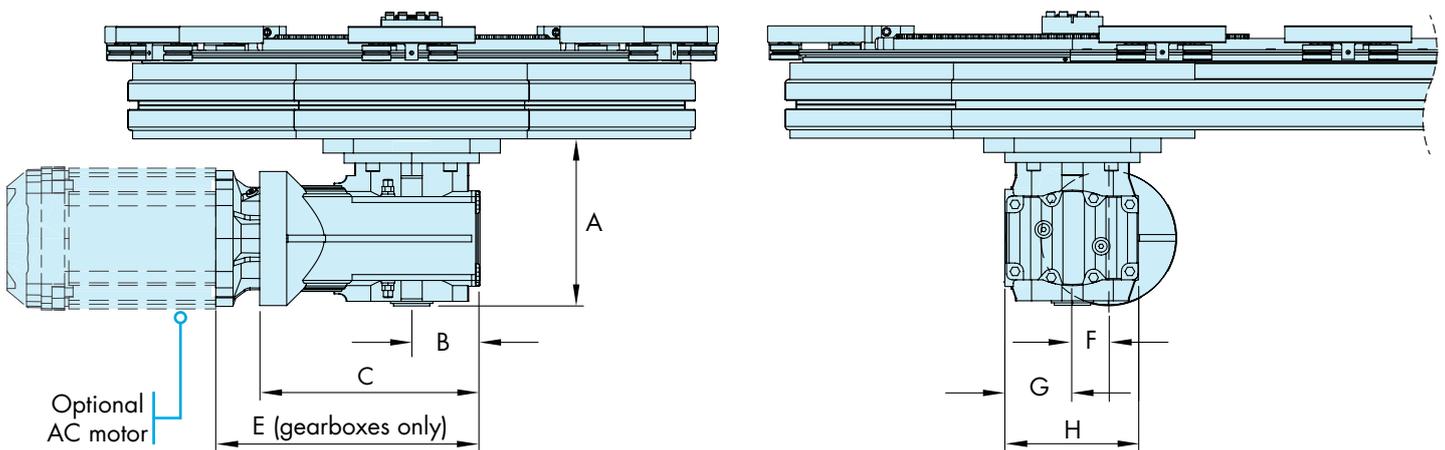


HepcoMotion DTS+ systems can be supplied with a helical bevel gearbox, with optional fitted AC motor, providing a simple and low-cost means of driving the DTS+. Helical bevel gearboxes with hollow-shafts are specified as standard. The available range of motor sizes and gearbox ratios means a suitable specification can be found for most applications.

AC geared motors and helical bevel gearboxes are available in a variety of sizes and ratios to suit many different types of application. Various power ratings are also available.

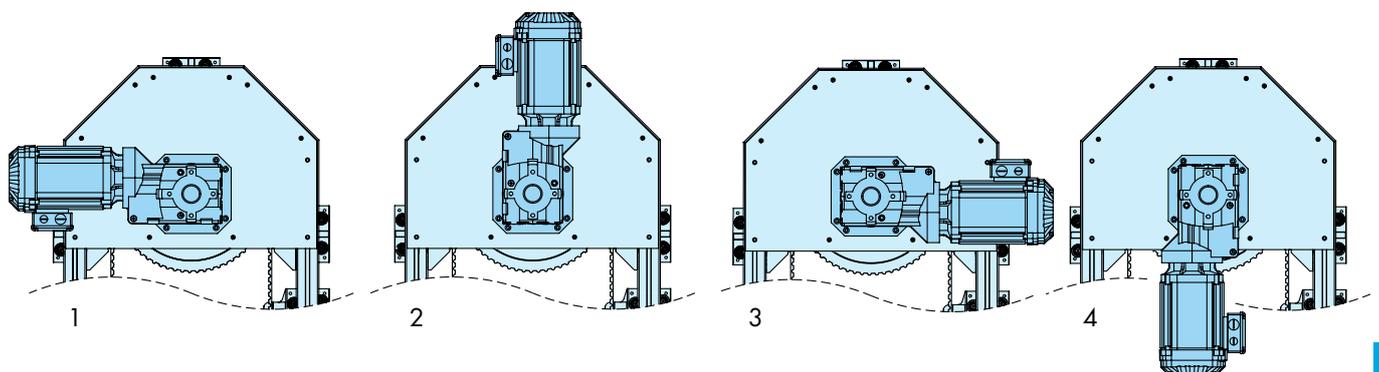
In all cases, customers are required to discuss their application with Hepco's Technical Sales Team, who will specify the correct choice of motor or gearbox.

The geared motor is mounted to the base of the DTS+ unit using a mounting flange. Dimensions are shown below for the purposes of initial selection.



System Size	Drive Shaft	A	B	C	E	F	G	H
25	Ø25	172.5	61	195	(Gearboxes only) Varies according to IEC flange size.	23.5	63.5	127
	Ø30	201.5	81	251		42.5	80	160
44	Ø30	201.5	81	251		42.5	80	160
	Ø40	232.5	99	306		50	100	200
76	Ø50	244	110	312		31.3	180	286
	Ø60	275	133	390		25.9	212	338

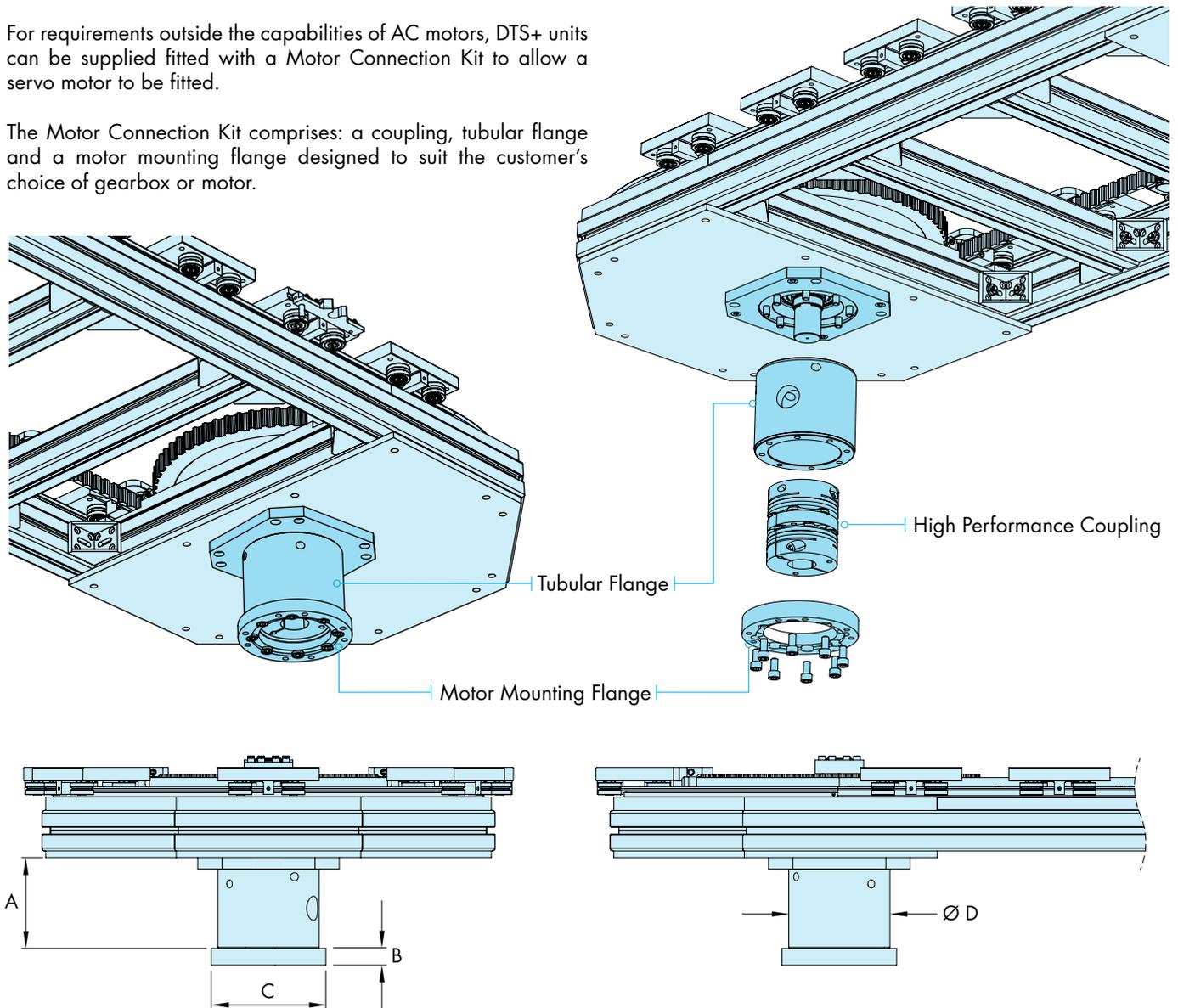
AC geared motors and gearboxes can be mounted to the DTS+ in a variety of orientations. Please state your preferred motor orientation (1 - 4) when ordering. For gearboxes with an in-built motor, terminal box position can also be specified. An approval drawing is created for every design ordered.



DTS+ Drive Connections: Motor Connection Kits

For requirements outside the capabilities of AC motors, DTS+ units can be supplied fitted with a Motor Connection Kit to allow a servo motor to be fitted.

The Motor Connection Kit comprises: a coupling, tubular flange and a motor mounting flange designed to suit the customer's choice of gearbox or motor.



System Size	A	B	C	Ø D
25	135	Dimensions vary according to custom motor-mounting flange.		150
44	135			150
76	199			200

The dimensions of the custom motor-mounting flange will vary depending on the specification of motor that is selected. Dimensions are given in the table, above, to illustrate the size and layout of the Motor Connection Kit assembly. The table below details the coupling information for each system size, including the available bore diameters for the customer motor.

Whether an AC geared motor or Motor Connection Kit is required, customers are requested to contact Hepco's technical department before ordering so that a solution can be tailored to your drive needs.

DTS+ System Size	Coupling Size	Coupling bore at DTS+ Drive Shaft (mm)	Coupling bore diameter options for customer motor (mm) ^{*1}	Max. torque (Nm) ^{*2}
25	36	Ø30	19, 20, 22, 24, 25, 28, 30, 32, 35, 38, 40, 42, 45	194
44	43	Ø40	24, 25, 28, 30, 32, 35, 38, 40, 42, 45, 48, 50, 55	397
76	61	Ø60	38, 40, 42, 45, 48, 50, 55, 58, 60, 65, 70, 75, 80	1640

Notes:

- Up to Ø55mm hub diameter, the hub/shaft tolerance fit is H7/k6. From Ø55mm, the hub/shaft tolerance fit is G7/m6.
- The published maximum torque figure is a guide; positional accuracy may be affected by the amount of torque applied through the coupling. For more information please discuss with our Technical Team.

Load Capacity and Life

The load capacity and life expectancy of HepcoMotion DTS+ track systems is determined by many factors including: the ring size and carriage assembly specification, the presence of lubrication, the magnitude and direction of loads and the speed and distance travelled. To prolong system life, systems are typically operated with payloads much lower than the maximum load. System life can be calculated using the formulae on this page. DTS+ Carriage assemblies are supplied as standard with lubricators to oil the track system. Where possible, a bleed lubrication system can also be specified to extend system life.

When calculating life, the load on each carriage should first be resolved into the direct load components L_1 and L_2 and moment loads M , M_v and M_s . Carriage load capacities are shown below for carriage assemblies with twin or Double-Row bearings. It is assumed that all DTS+ systems will be lubricated for life. Values are based on shock-free duty.

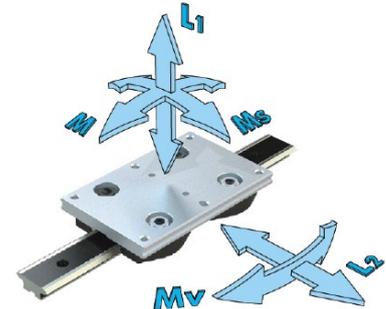
DTS+ System Size	Lubricated System, Twin Type Bearings					Lubricated System, Double Row Bearings				
	$L_1(\text{max.})$	$L_2(\text{max.})$	$M_s(\text{max.})$	$M_v(\text{max.})$	$M(\text{max.})$	$L_1(\text{max.})$	$L_2(\text{max.})$	$M_s(\text{max.})$	$M_v(\text{max.})$	$M(\text{max.})$
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm
25-351X	1280	1200	14	24	27	1600	3000	18	63	33
44-468X	3200	2800	64	95	110	3600	6000	73	210	120
44-612X	3200	2800	64	100	115	3600	6000	73	220	130
44-612XB						4800	4600	97	184	192
76-799						10000	10000	360	470	470

To determine life, calculate the load factor L_F using the equation below:

$$L_F = \frac{L_1}{L_{1(\text{max.})}} + \frac{L_2}{L_{2(\text{max.})}} + \frac{M_s}{M_{s(\text{max.})}} + \frac{M_v}{M_{v(\text{max.})}} + \frac{M}{M_{(\text{max.})}}$$

For DTS+ 25-351, 44-468, 44-612 and 76-699 systems: $L_F \leq 1$

For DTS+ 44-612B systems: $L_F \leq 0.5$



With L_F determined, the life in km can be calculated using the equation below. Basic life should be taken from the table to the left in respect of bearing size and type (twin or double-row).

DTS+ System Size	Bearing Size	Basic Life (km)	
		Twin Bearings	DR Bearings
25-351X	...J25...	40	45
44-468X	...J34...	70	160
44-612X	...J34...	70	160
44-612XB	...J40...	-	640
76-799	...J54...	-	280

$$\text{System life (km)} = \frac{BL}{(0.03 + 0.97 L_F)^3}$$

Industry Standard Bearing Load Capacities

HepcoMotion are the originators of V guide technology, with over 50 years of system testing and real-world application experience. The load capacities and calculations provided below are based on this extensive practical knowledge and rigorous in-house testing. In contrast, many competitor systems rely on theoretically derived, industry standard figures for static and dynamic bearing load capacities, which we advise customers not to rely on for system specification. These theoretical figures are generally higher than true working load capacities and are stated below for comparison only. For system specification and life calculations, the figures and equations above should be used instead.

The table below shows the industry standard static (C_{OR} & C_{OA}) and dynamic (C_R & C_A) load figures for PRT2 bearings (R & A subscripts indicate Radial and Axial loading). These are included principally to allow the comparison of HepcoMotion components with those of other manufacturers. It is not recommended that they are used to determine system life.

Bearing Dynamic & Static Load Capacities (N)									
Bearing Size	Twin Bearing Assembly				Bearing Size	Double Row Bearing Assembly			
	C_R	C_A	C_{OR}	C_{OA}		C_R	C_A	C_{OR}	C_{OA}
...J25...	3237	791	1333	326	...J25DR...	5214	1618	2646	821
...J34...	5291	1270	2600	557	...J34DR...	9293	2523	5018	1362
					...SUJ40...	10700	4967	5870	2737
					...J54DR...	21373	4601	12899	2777

The load capacities listed above apply to standard steel bearings. Data for stainless steel bearings may differ.

Belt Connection Capacity, Payload and Linear Speed

Thanks to the specially designed connection between carriages and the drive belt, the DTS+ system can accommodate increased driving forces. This makes DTS+ ideal for continuous and intermittent motion applications where loads exceed those that can be accommodated by the original DTS system, or the carriage pitch cannot be met with DTS2.

In the original DTS system, a feature is engineered into the design to disengage the carriage from the drive belt in the event of an overload. This prevents damage to the belt connections, which can be costly and time-consuming to replace, but limits the loads that can be transmitted. The superior drive strength of DTS+ means carriages will not disengage from the drive belt. As such, it is recommended to have a torque limiter in place to avoid mechanical failure in the event of a blockage in the system.

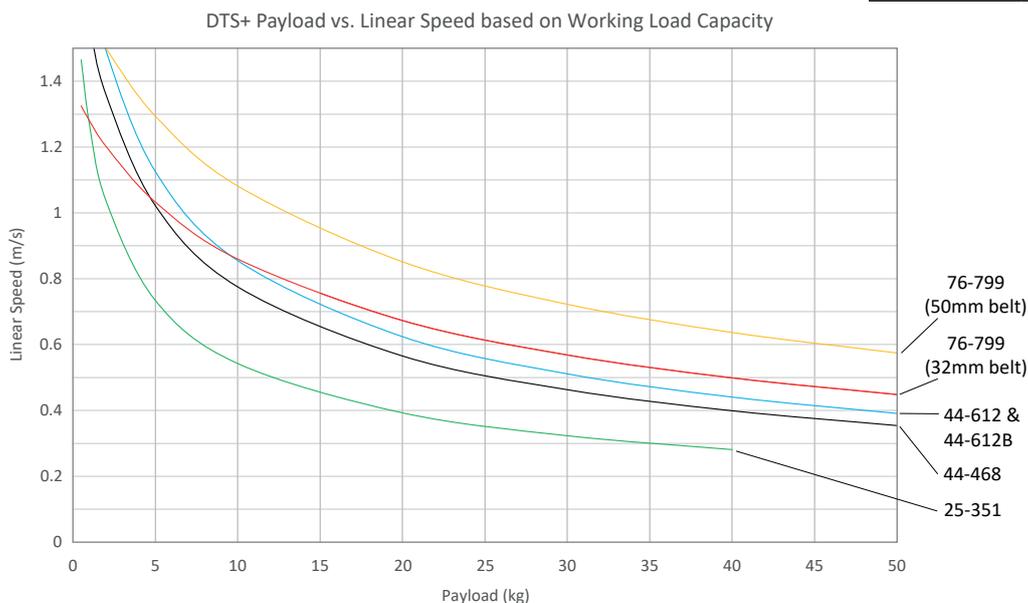


There is no fundamental limit to the number of carriages that can be used in a configuration, but the loads applied to the belt and belt connection will generally be the factor which determines the most appropriate system size for an application. The linear speed and rate of acceleration will affect the load on the belt connections and torque through the drive assembly.

As carriages travel faster through the curves than on the straights of the track system, they experience acceleration and deceleration in the transition between straight and curve. This means that, for any given mass on a carriage, there is a maximum straight speed that can be achieved. In typical operation, the peak load on the belt connection should not exceed the working load capacity of the belt connection. In some applications, it may be possible to exceed the working load capacity, but this depends on a number of application factors and should be confirmed by our Technical Sales Team. The table, right, gives the working load capacity for each DTS+ system size.

DTS+ System Size	Belt Connection Working Load Capacity
25-351X	250N
44-468X	500N
44-612X	
44-612XB	
76-799-32	650N
76-799-50	1000N

The graph below can be used as a quick guide to DTS+ performance in terms of linear speed and carriage mass, and is based on the working load capacity for each system size. If the application you are specifying sits comfortably below the curve for that system size, it is likely to be within the capacity of that system. The curves relate to a horizontally mounted system and are given as an approximate guide only. Please contact our Technical Sales Team to discuss feasibility of systems with linear speeds in excess of 1.5m/s, or those mounted in a vertical orientation.



To confirm system specification and suitability, please speak with a member of our Technical Sales Team, who will discuss the requirements and parameters of your application to determine the most suitable system specification.

Notes:

- Maximum allowable load capacities for DTS+ belt connections are provided in the table, right, as a means of comparison with other systems. Please use the working load capacity to determine system performance.

DTS+ System Size	25-351X	44-468X	44-612X	44-612XB	76-799-32	76-799-50
Belt Connection Maximum Allowable Load¹	500N	1000N			1300N	2000N

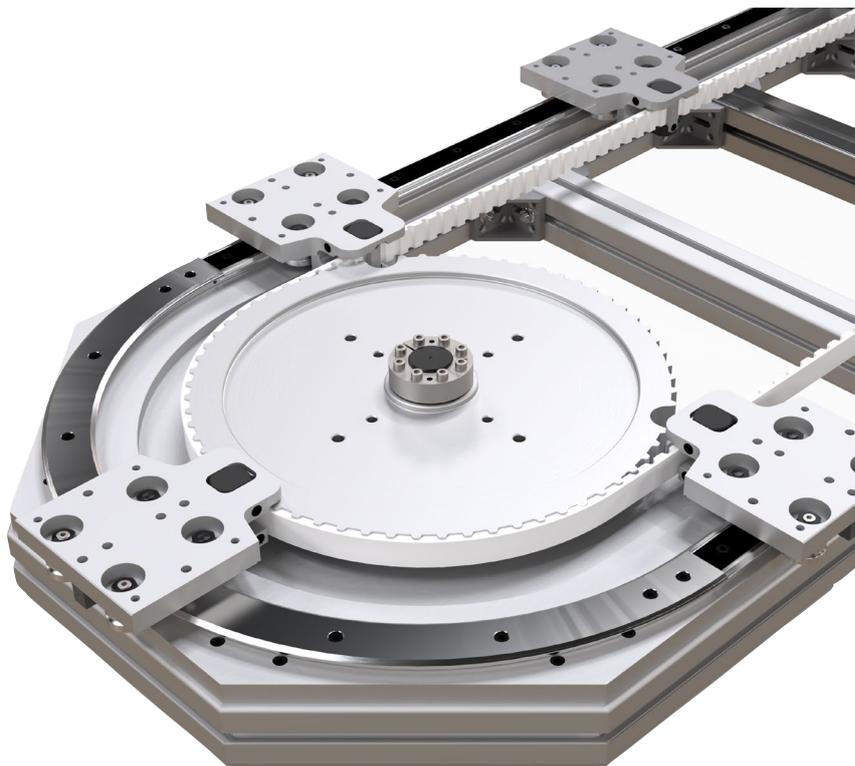
DTS+ Pulley Types

The majority of DTS+ applications will be specified with flanged pulleys as standard. In some instances, it may be beneficial to utilise flange-free pulleys. This page illustrates the different pulley types. The most suitable option for your application can be discussed with our Technical Sales Team.

Pulleys with flanges



Flange-free pulleys



DTS+ Application Examples

The following pages illustrate example applications for the DTS+ system.

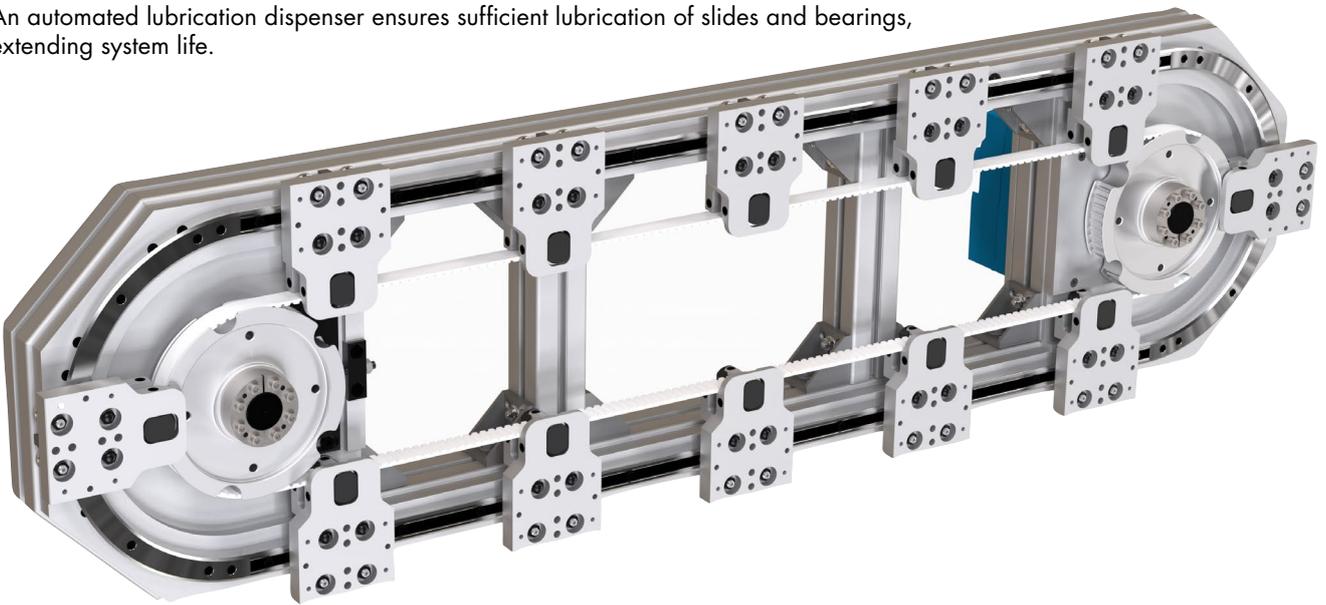
In continuous motion applications, the predictable path and high stiffness of the DTS+ track system means accurate tasks can be performed while moving, in precise registration with other mechanisms. Performing tasks on the move can enable processes to be carried out at a higher rate.

A great advantage of the DTS product family is the ability to be programmed to stop at any position or number of positions around the circuit. In systems with intermittent motion, a key requirement is reliable product positioning with stability for operations and processes during both the stationary and moving portions of the motion cycle. The DTS+ is an obvious choice in preference to friction-driven pallet systems, which are slow and complex.

25-351 Oval

This system has a carriage pitch of 180mm. It has 12 carriages which are driven around two 63-tooth AT10 profile pulleys. This system is driven by an AC geared motor.

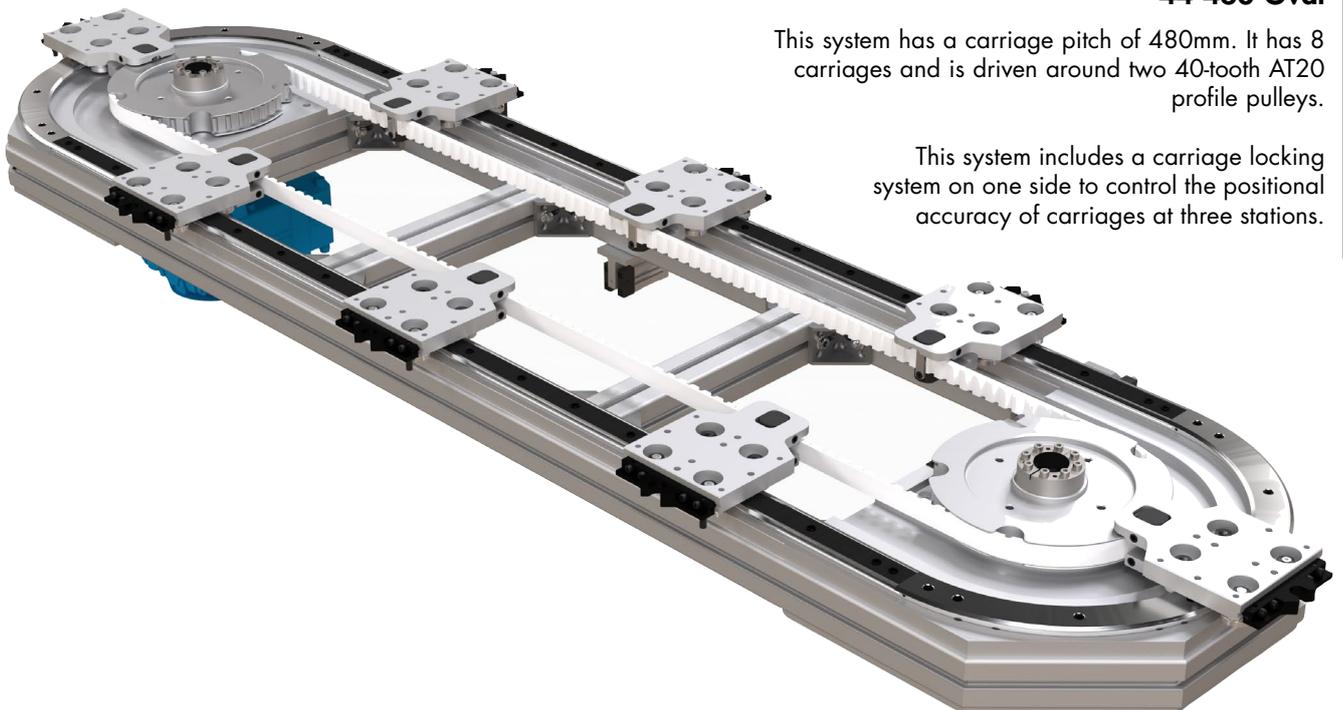
An automated lubrication dispenser ensures sufficient lubrication of slides and bearings, extending system life.



44-468 Oval

This system has a carriage pitch of 480mm. It has 8 carriages and is driven around two 40-tooth AT20 profile pulleys.

This system includes a carriage locking system on one side to control the positional accuracy of carriages at three stations.



44-612 Rectangle

This rectangular system has 6 carriages at a pitch of 1200mm. It is driven around four 70-tooth AT20 profile pulleys. The space inside the track system can be used to house customer components.

The position of each carriage is controlled by a carriage locking system with a single locking lever.

Bleed lubrication is fitted at two locations to supply lubrication to the track circuit.



44-612 Oval

This system has a carriage pitch of 400mm. It has 18 carriages and is driven by 60-tooth AT20 profile pulleys.

The system includes four carriage locking systems, each locking four carriages. With this combination, the position of every carriage on the straight sections of the track system is controlled.



Ordering Example

DTS+ 44-612X R 8 x 480

Product range: DTS+

System size: 25-351X, 44-468X, 44-612X, 44-612BX or 76-799.

O indicates an Oval system.
R indicates a Rectangular system.

Distance between carriages (mm).

Total number of carriages on system.

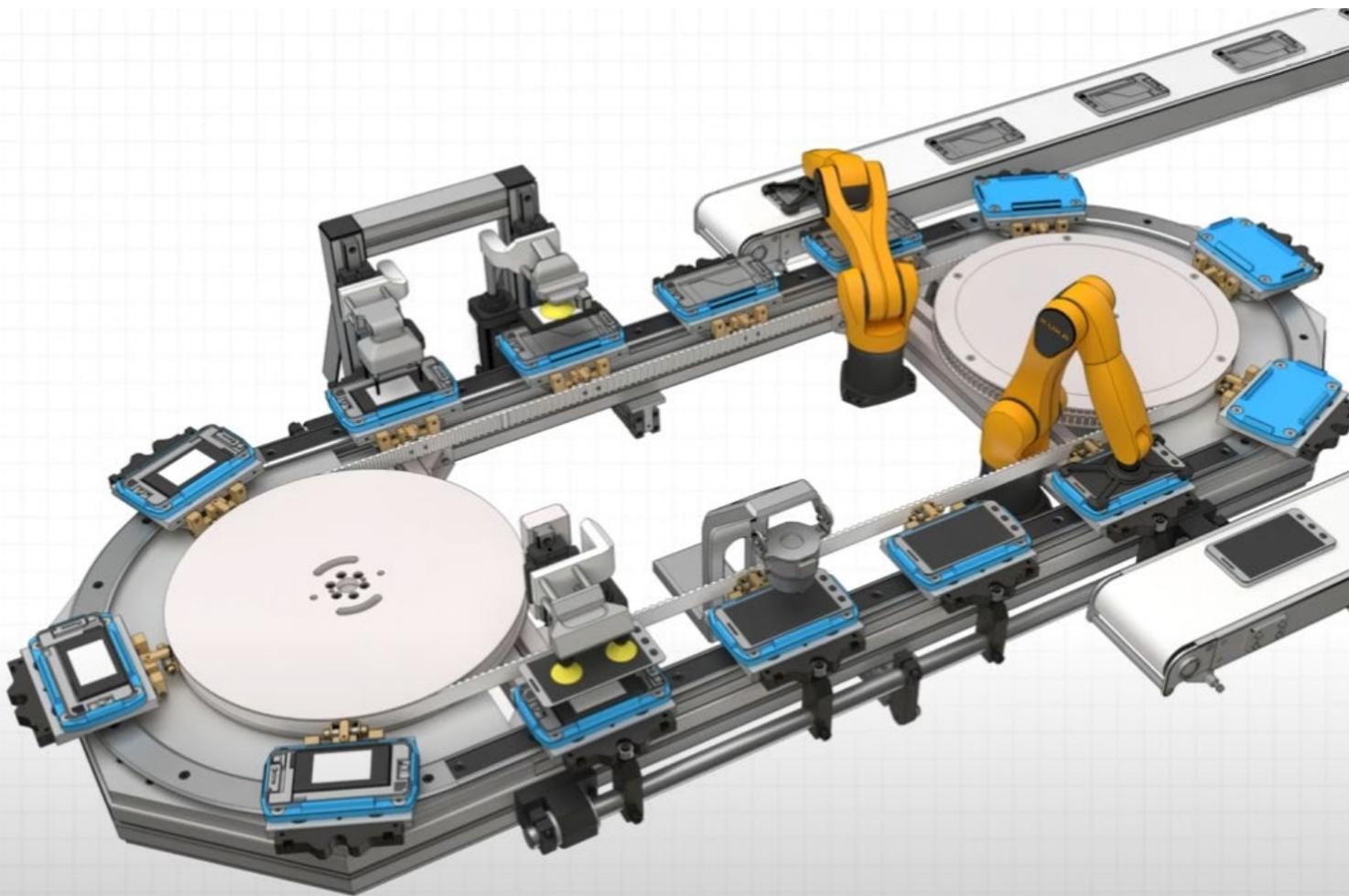
HepcoAutomation®

ADVANCED AUTOMATION SOLUTIONS

HepcoAutomation offer advanced automated solutions to maximise the full potential of Driven Track Systems. Using a variety of high performance control devices and standard integrated software, HepcoAutomation provide reliable control solutions which complement the full range of HepcoMotion DTS products (DTS, DTS+ and DTS2).

Applications from cutting-edge assembly systems to manual operation processes are further enhanced by the integration of robotics and proven automation solutions. The unique features and reliable operation of DTS systems allow ease of integration of robots, safety devices and automation technology, facilitating high-precision motion with varying payloads.

The compact design of DTS systems, in combination with HepcoAutomation's flexible programming options, make them well suited to a variety of applications and industries. The flexibility of the DTS design means systems can be specified according to product handling, operational and environmental requirements.



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