# HepcoMotion®
ADVANCED LINEAR SOLUTIONS
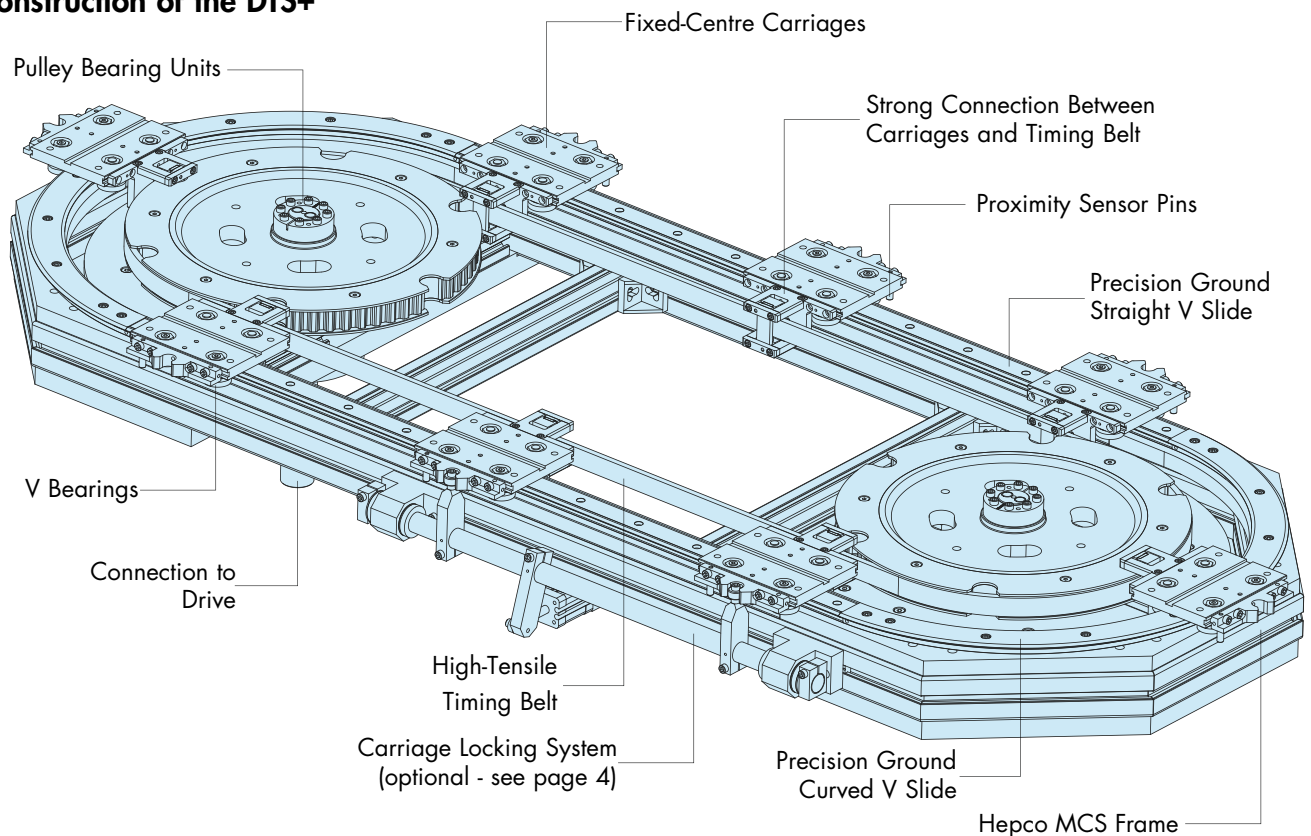
DTS+ Driven Track System

The HepcoMotion DTS+ system design has been improved and updated whilst retaining the strong connection between carriages and drive belt. The new design incorporates a belt connection which sits below the top face of the carriage plate, freeing up space 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.
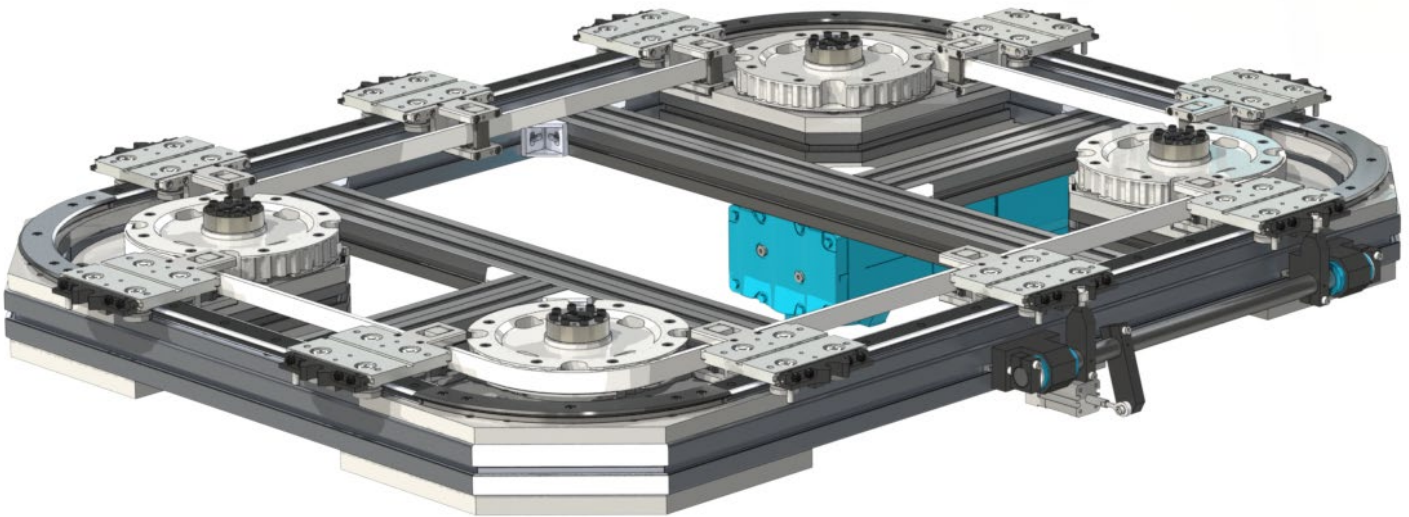
The DTS+ system incorporates key features of Hepco's PRT track system and original DTS, combining them with a high load capacity connection between carriages and the drive belt. The carriages will not disengage from the belt, allowing transmission of higher forces compared to the original DTS system.

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+

Pulley Bearing Units

Fixed-Centre Carriages

Strong Connection Between Carriages and Timing Belt

Proximity Sensor Pins

Precision Ground Straight V Slide

V Bearings

Connection to Drive

High-Tensile Timing Belt

Carriage Locking System (optional - see page 4)

Precision Ground Curved V Slide

Hepco MCS Frame

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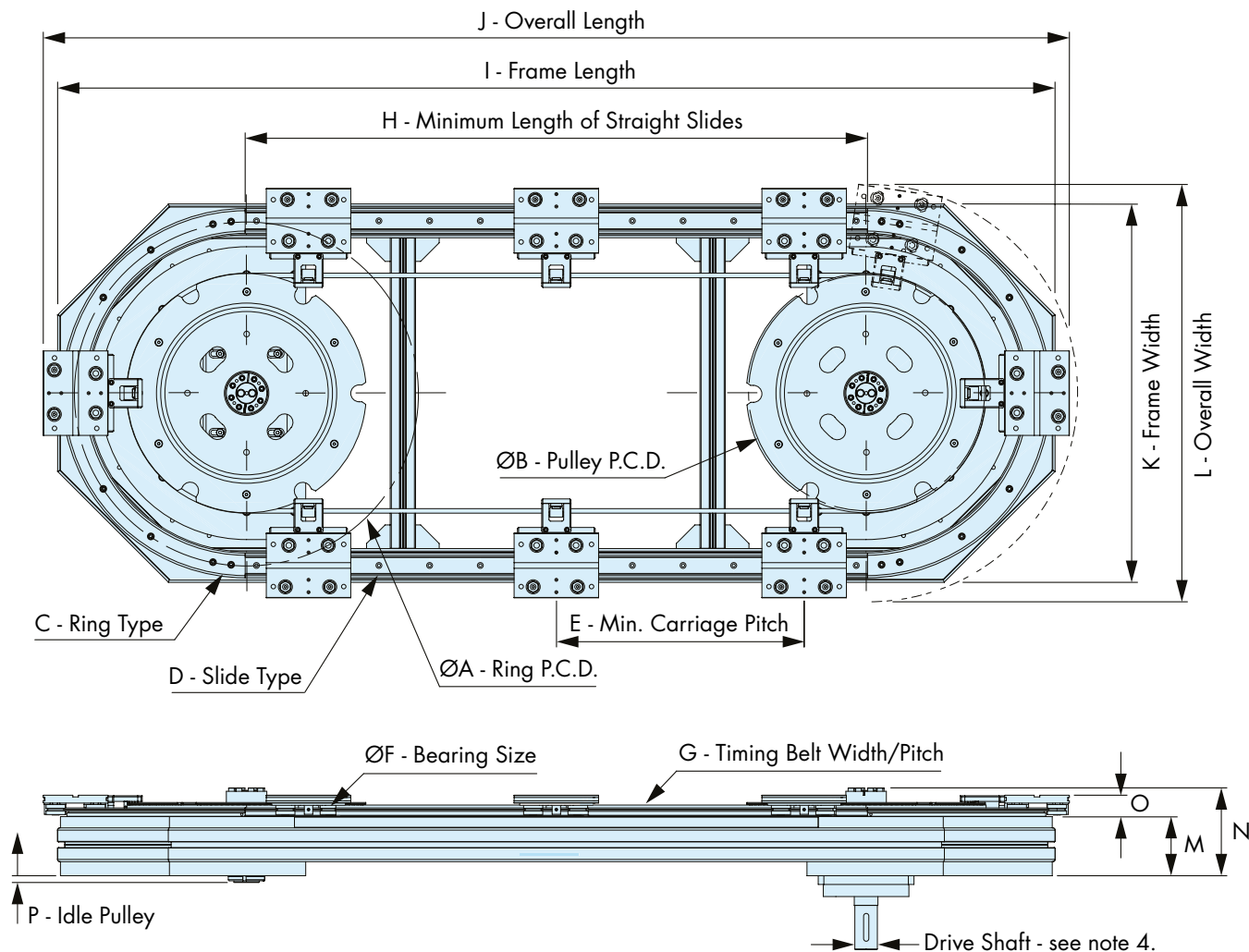
A system with 180° ring segments in an oval circuit is shown above. Rectangular systems with 90° segments are also available.

System Size	ØA (Ring PCD)	ØB*1 (Pulley PCD Options)			C	D	E	ØF	G	H
25-351	351	190.99	200.54	210.08	TR25-351	TNS25	110	25	25/AT10	370
44-468	468	254.65			TR44-468	TNM44	160	34	25/AT20	420
44-612	612	381.97	420.17	445.63	TR44-612	TNM44	200	34	25/AT20	610
44-612B		381.97	420.17					40	25/AT20	
76-799-32	799	458.36	496.56	509.29	TR76-799	TNL76	240	54	32/AT20	820
76-799-50									50/AT20	

System Size	I	J*2	K*3	L*2,3	M	N	O	P
25-351	H + 407	H + 422	411	441	110	152	29	12
44-468	H + 527	H + 578	528	596	105	156	38	12
44-612	H + 671	H + 722	672	737	105	156	38	12
44-612B		H + 737		759			44	
76-799-32	H + 884	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.
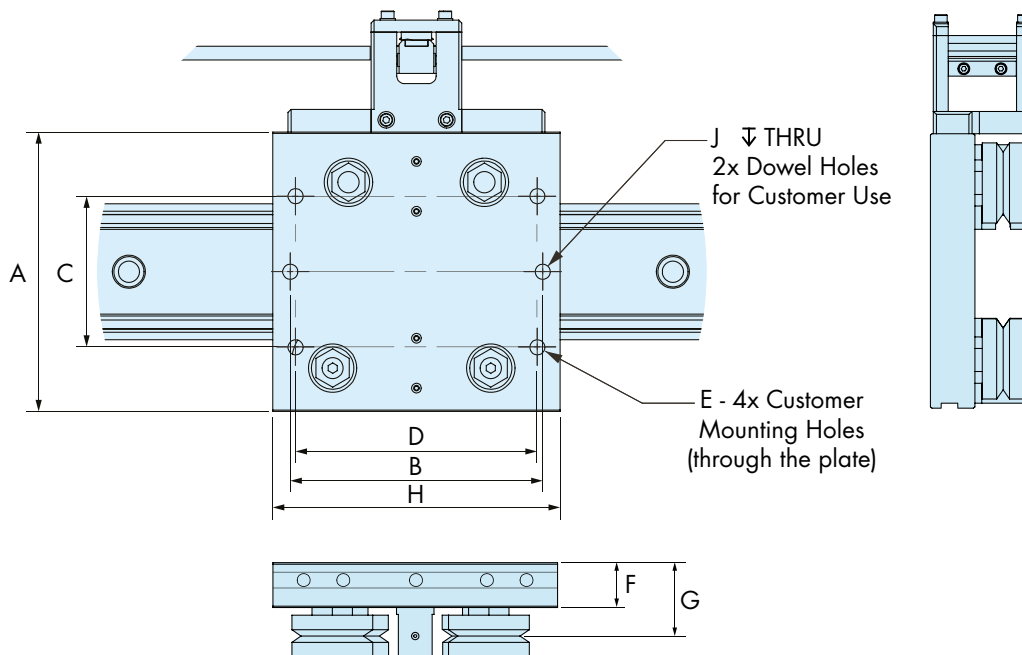
DTS+ Carriage Assembly Dimensions

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 and 44-612 systems:

E - 4x Customer
Mounting Holes
(through the plate)
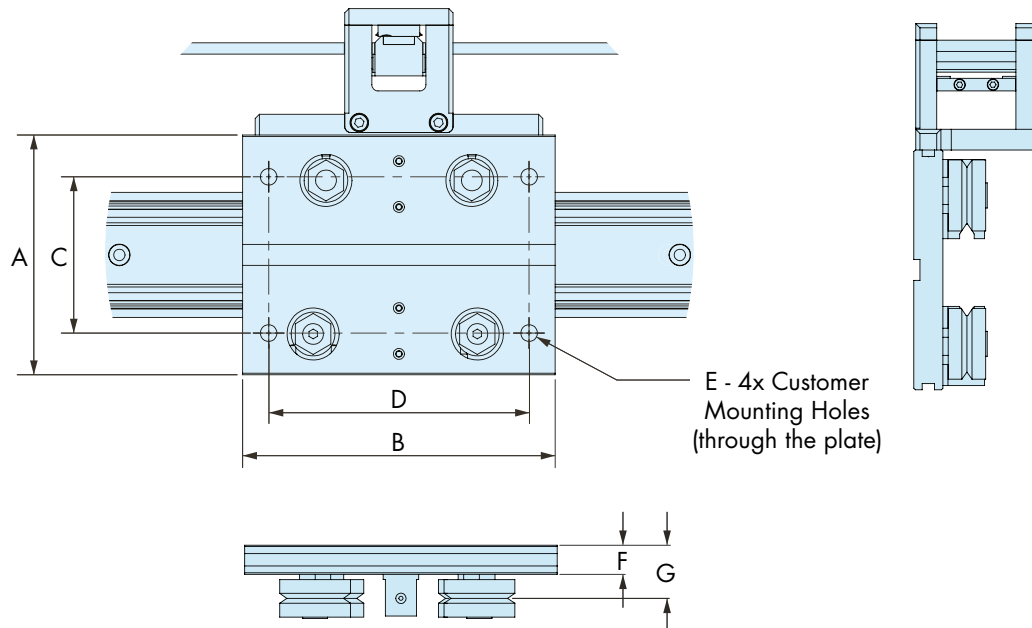
44-612B systems with Ø40mm AS Bearings and 76-799 systems:

J ⇩ THRU
2x Dowel Holes
for Customer Use

E - 4x Customer
Mounting Holes
(through the plate)

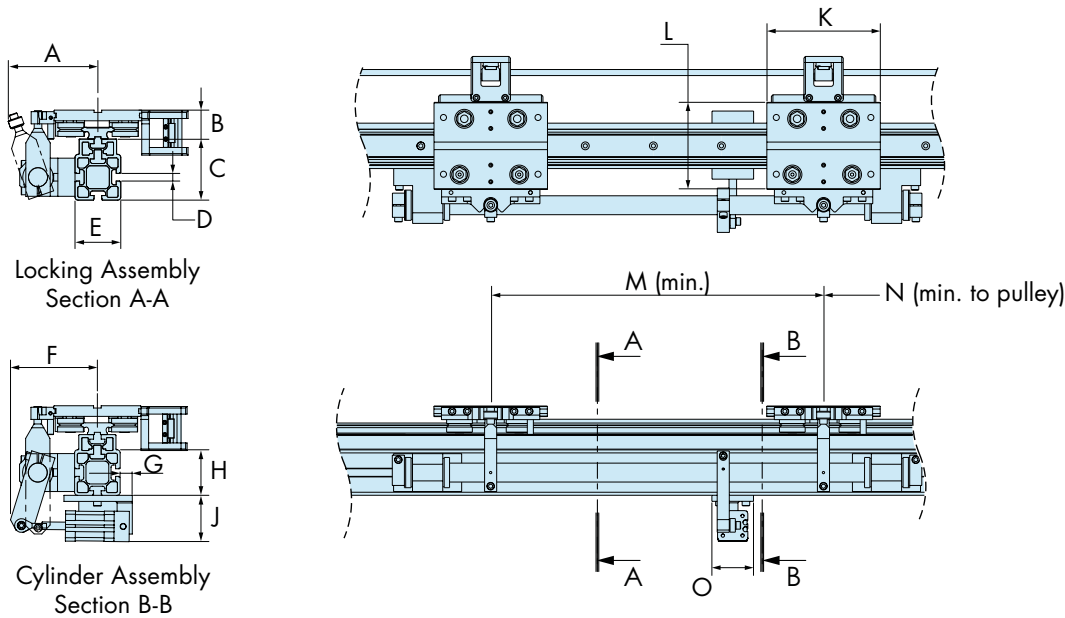| System Size	A	B	C x D	E	F	G	H	J
25-351	80	105	50 x 85	M6 x 1 - 6H	10	19	N/A	N/A
44-468	115	145	75 x 120	M8 x 1.25 - 6H	14	25.5	N/A	N/A
44-612	115	150	75 x 125	M8 x 1.25 - 6H	14	25.5	N/A	N/A
44-612B	135	160	110 x 140	M8 x 1.25 - 6H	20	31.5	140	Ø8 H7
76-799	185	190	100 x 160	M10 x 1.5 - 6H	30	49	165	Ø10 H7

Note: The table above lists the standard dimensions for each system size. Whilst some dimensions of the belt connection 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.

Locking Cam — Locking Pocket

Locked Position

Unlocked Position

Pivot Arm

Locking Cylinder

Carriage Locking System Dimensions

Locking Assembly
Section A-A

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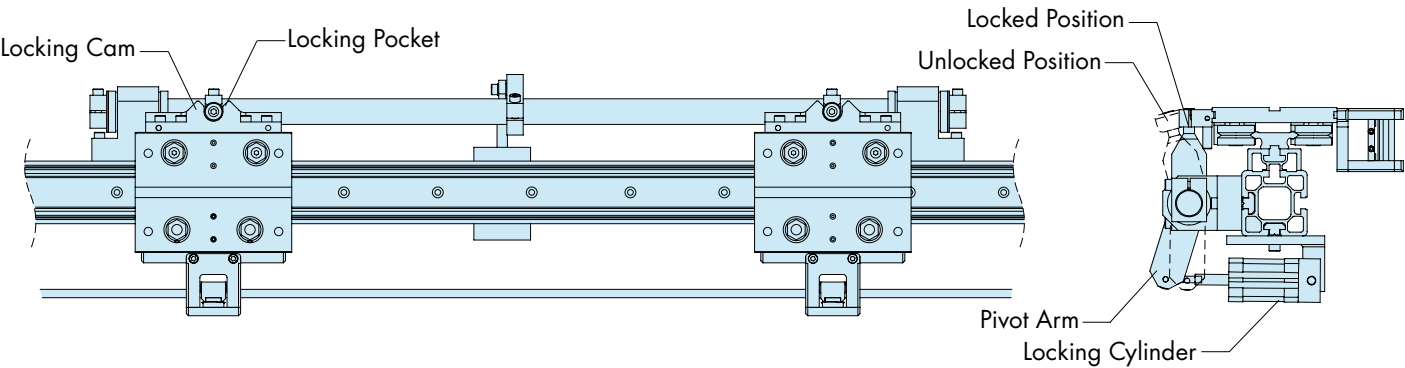
System Size	A	B	C	D	E	F	G
25-351	95	29	80	10	60	100	24
44-468	114	38	80	10	60	118	6
44-612	114	38	80	10	60	118	6
44-612B	124	44	80	10	60	128	24
76-799	199	68.5	110	10	90	172	-

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

DTS+ Carriage Pitch Intervals & Compatible System Sizes

The construction of the DTS+ means pulley size is determined by the pitch between carriages on the system. A series of pockets in the pulleys house the belt connection as carriages travel around the curve. The number of pockets in the pulley is dictated by the pulley circumference and carriage pitch. Consequently, the carriage pitch intervals that can be achieved are finite. A list of possible carriage pitches is given below, up to 1500mm. For carriage pitches above 1500mm, or those not shown in the list below, please contact our Technical Sales team to discuss your application requirements.

Pitch	25-351	44-468	44-612	44-612B	76-799	Pitch	25-351	44-468	44-612	44-612B	76-799
110	✓					750	✓				
120	✓					770	✓				
140	✓					780					✓
150	✓					800	✓	✓	✓	✓	✓
160		✓				810	✓				
180	✓					840	✓		✓	✓	✓
200	✓	✓	✓	✓		880	✓	✓	✓	✓	
210	✓					900	✓	✓	✓	✓	✓
220	✓		✓	✓		910	✓				
240	✓	✓	✓	✓	✓	960	✓	✓	✓	✓	✓
260					✓	980	✓		✓		
270	✓					990	✓				
280	✓		✓			1000	✓	✓	✓	✓	✓
300	✓	✓	✓	✓		1040		✓			✓
320		✓			✓	1050	✓				
330	✓					1080	✓		✓	✓	✓
350	✓					1100	✓	✓	✓	✓	
360	✓		✓	✓	✓	1120	✓	✓	✓		✓
400	✓	✓	✓	✓	✓	1170	✓				
420	✓		✓			1190	✓				
440	✓		✓	✓		1200	✓	✓	✓	✓	✓
450	✓					1210	✓				
480	✓	✓	✓	✓	✓	1260	✓		✓		✓
490	✓					1280		✓			✓
500	✓	✓	✓	✓		1300	✓	✓	✓	✓	✓
520					✓	1320	✓		✓	✓	✓
540	✓				✓	1330	✓				
550	✓					1350	✓				
560	✓	✓	✓			1360		✓			
600	✓	✓	✓	✓	✓	1380					
630	✓					1400	✓	✓	✓	✓	✓
640		✓			✓	1430	✓				
660	✓		✓	✓		1440	✓	✓	✓	✓	✓
700	✓	✓	✓	✓		1470	✓				
720	✓	✓	✓	✓	✓	1500	✓	✓	✓	✓	
						Please consult our Technical Sales team for carriage pitches above 1500mm.					

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, Mv and Ms. 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(max.)	L_2(max.)	M_S(max.)	M_V(max.)	M(max.)	L_1(max.)	L_2(max.)	M_S(max.)	M_V(max.)	M(max.)
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm
25-351	1280	1200	14	24	27	1600	3000	18	63	33
44-468	3200	2800	64	95	110	3600	6000	73	210	120
44-612	3200	2800	64	100	115	3600	6000	73	220	130
44-612B	N/A					4800	4600	97	184	192
76-799	N/A					10000	10000	360	470	470

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

$$L_F = \frac{L_1}{L_{1(max.)}} + \frac{L_2}{L_{2(max.)}} + \frac{M_S}{M_{S(max.)}} + \frac{M_V}{M_{V(max.)}} + \frac{M}{M_{(max.)}}$$

For DTS+ 25-351, 44-468, 44-612 and 76-799 systems: $L_F \leq 1$

For DTS+ 44-612B systems: $L_F \leq 0.5$
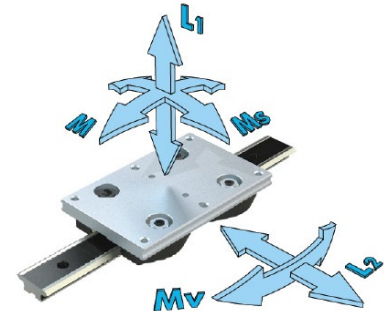
With L_F determined, the life in km can be calculated using the equation below. Basic life should be taken from the table to the right in respect of bearing size and type (twin or double-row).

DTS+ System Size	Bearing Size	Basic Life (km)	
		Twin Bearings	DR Bearings
25-351	...J25...	40	45
44-468	...J34...	70	160
44-612	...J34...	70	160
44-612B	...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 Vee system slide technology; The load capacities and calculations above have been carefully developed as a result of years of extensive system testing and application experience. Many competitors' systems use industry standard, theoretically derived 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_{0R} & C_{0A}) 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 Hepco 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_{0R}	C_{0A}		C_R	C_A	C_{0R}	C_{0A}
…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 the 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 the DTS+ means carriages will not disengage from the drive belt. As such, it is recommended to have a mechanical or software torque limiter in the drive system 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 250N for a size 25 system or 500N for a size 44. For 76-799 systems the peak load on each belt connection should not exceed 650N for systems with 32mm wide belts, or 1000N for systems with a 50mm wide drive belt.

The graph below can be used as a quick guide to DTS+ performance in terms of linear speed and carriage mass. 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.

DTS+ Payload vs. Linear Speed
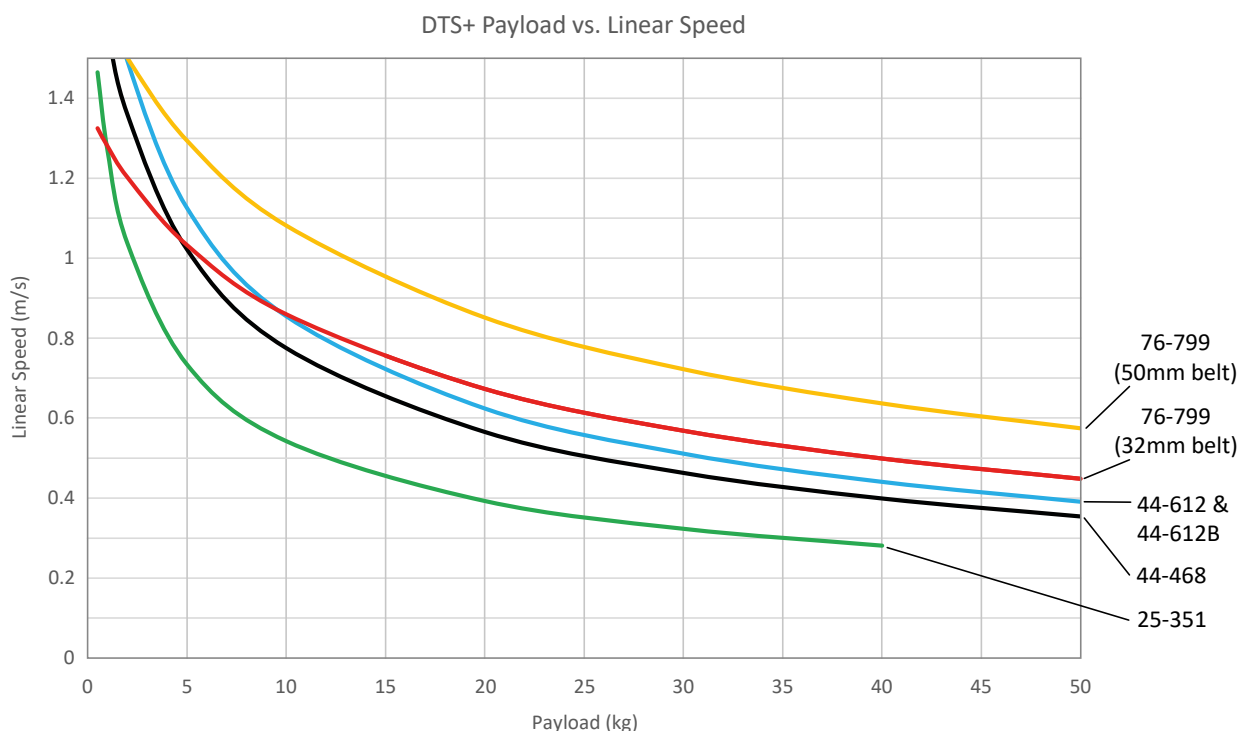
To confirm system specification and suitability, please speak with one of our Technical Sales team, who will discuss the requirements and parameters of your application to determine the most suitable system specification.

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.
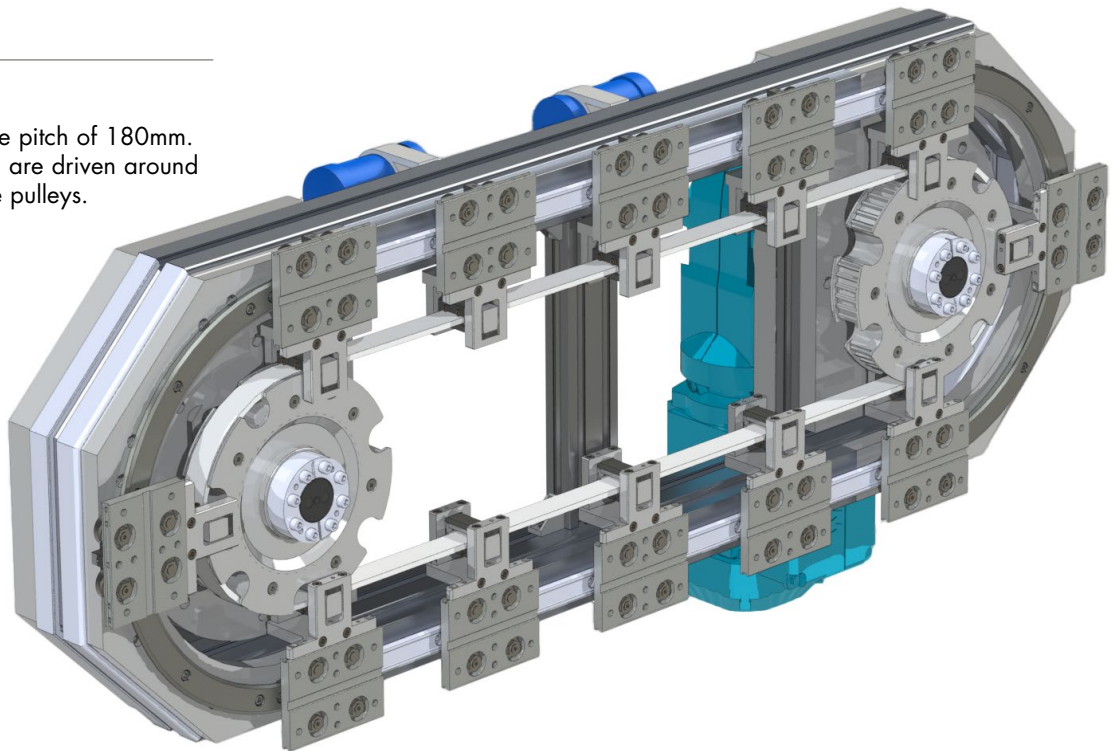
44-468 Oval

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.
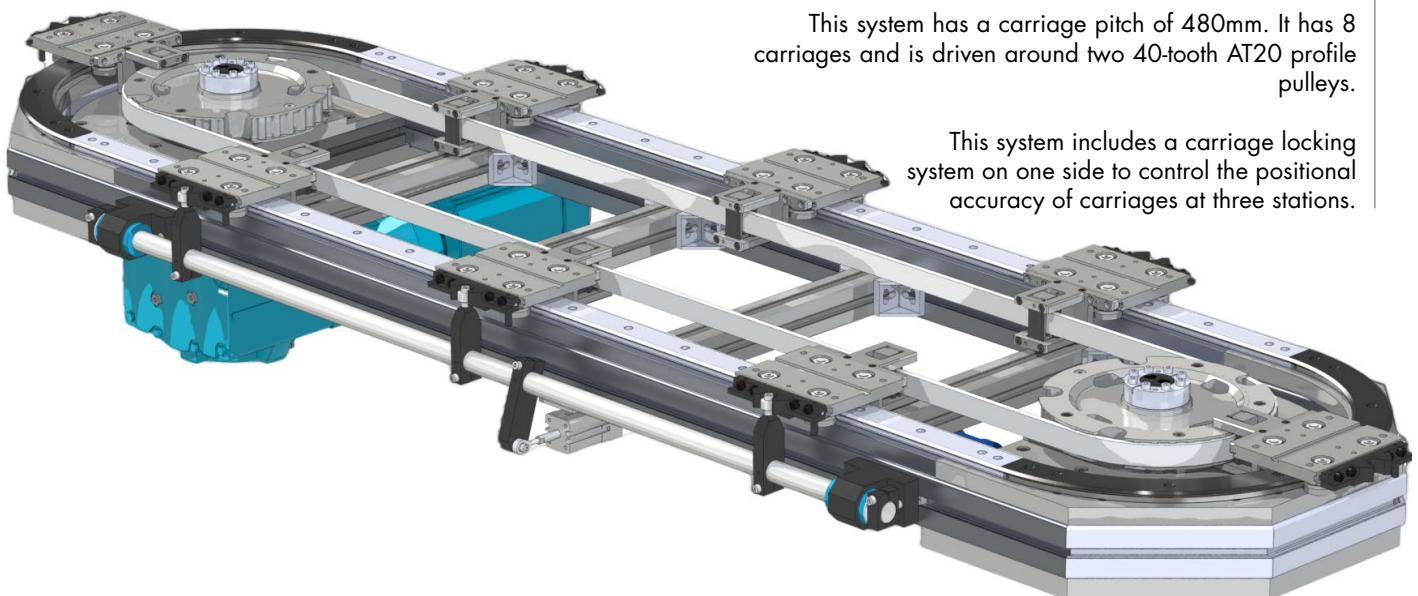
44-612 Rectangle

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 sufficient lubrication to the complete 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.
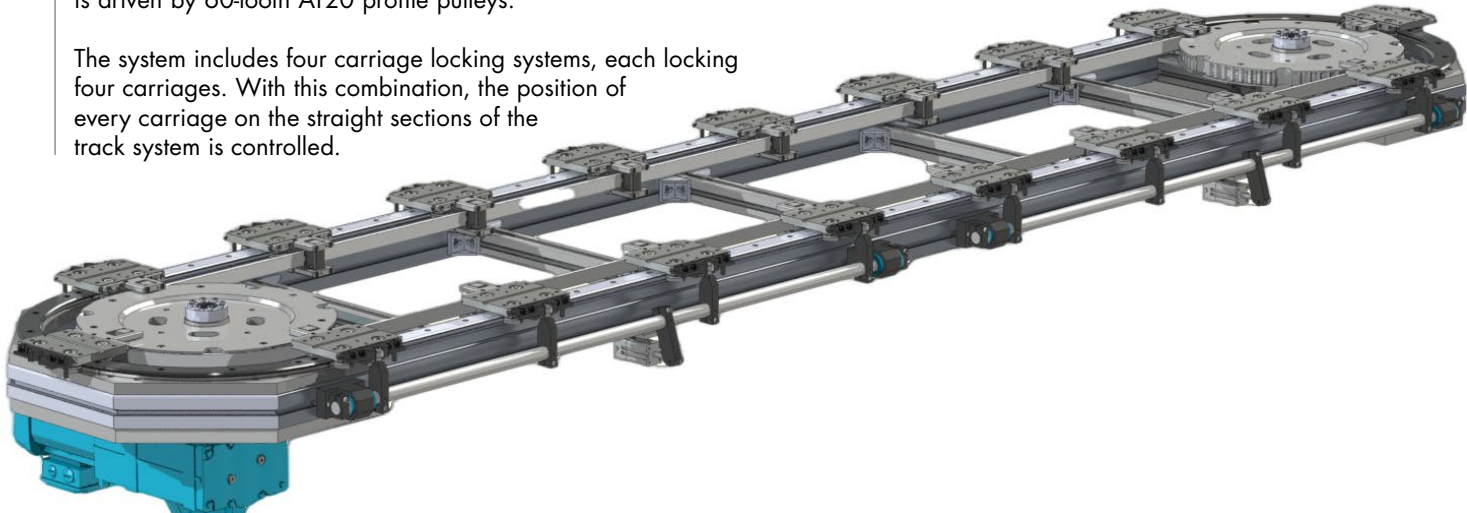
Ordering Example

DTS+ 44-612 R 8 x 480

Product range: DTS+

System size: **25-351**, **44-468**, **44-612**, **44-612B** or **76-799**.

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

Distance between carriages (mm).

Total number of carriages on system.

HepcoAutomation®

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.
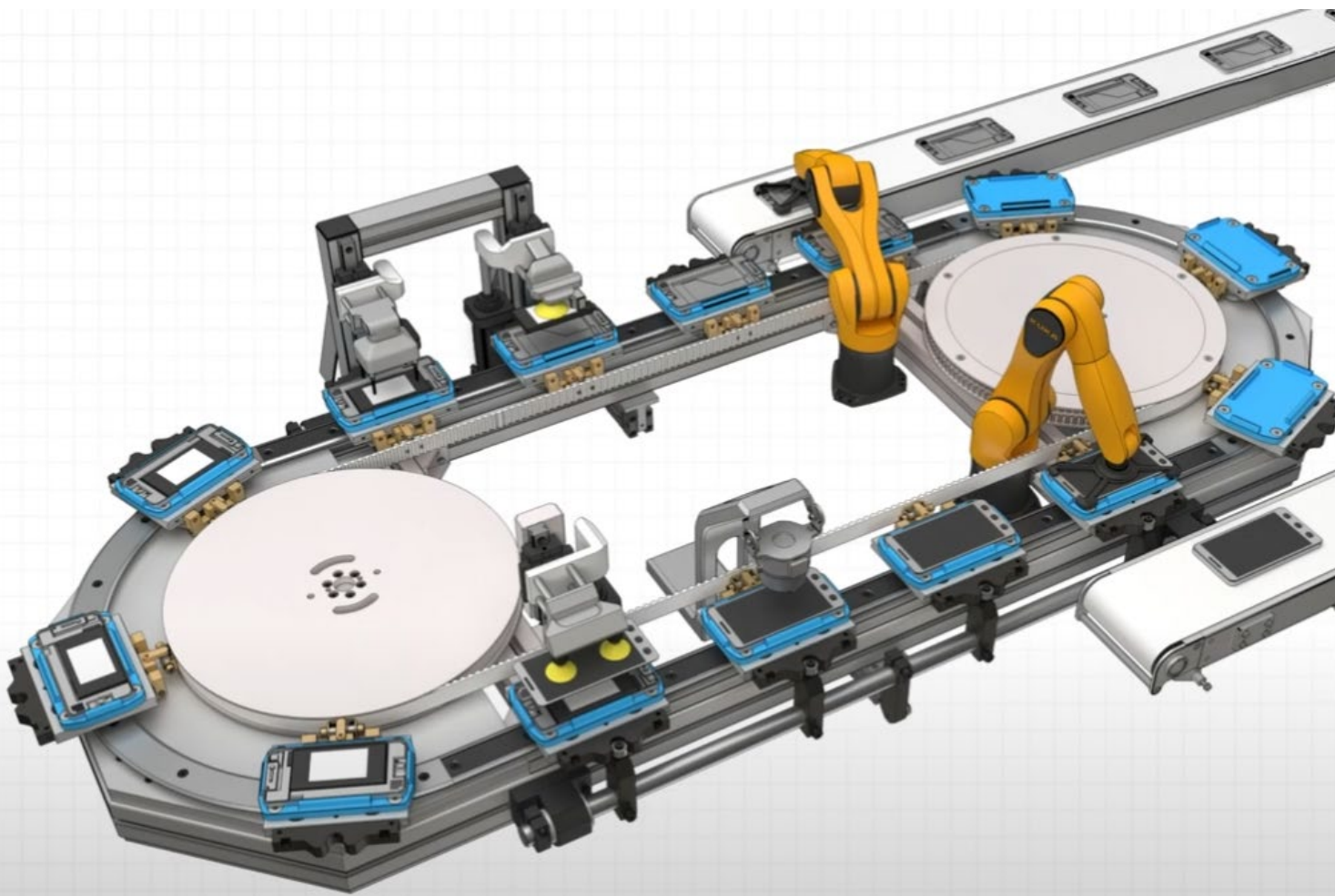
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