Cross + Morse

CROSS+MORSE

Power Transmission Solutions

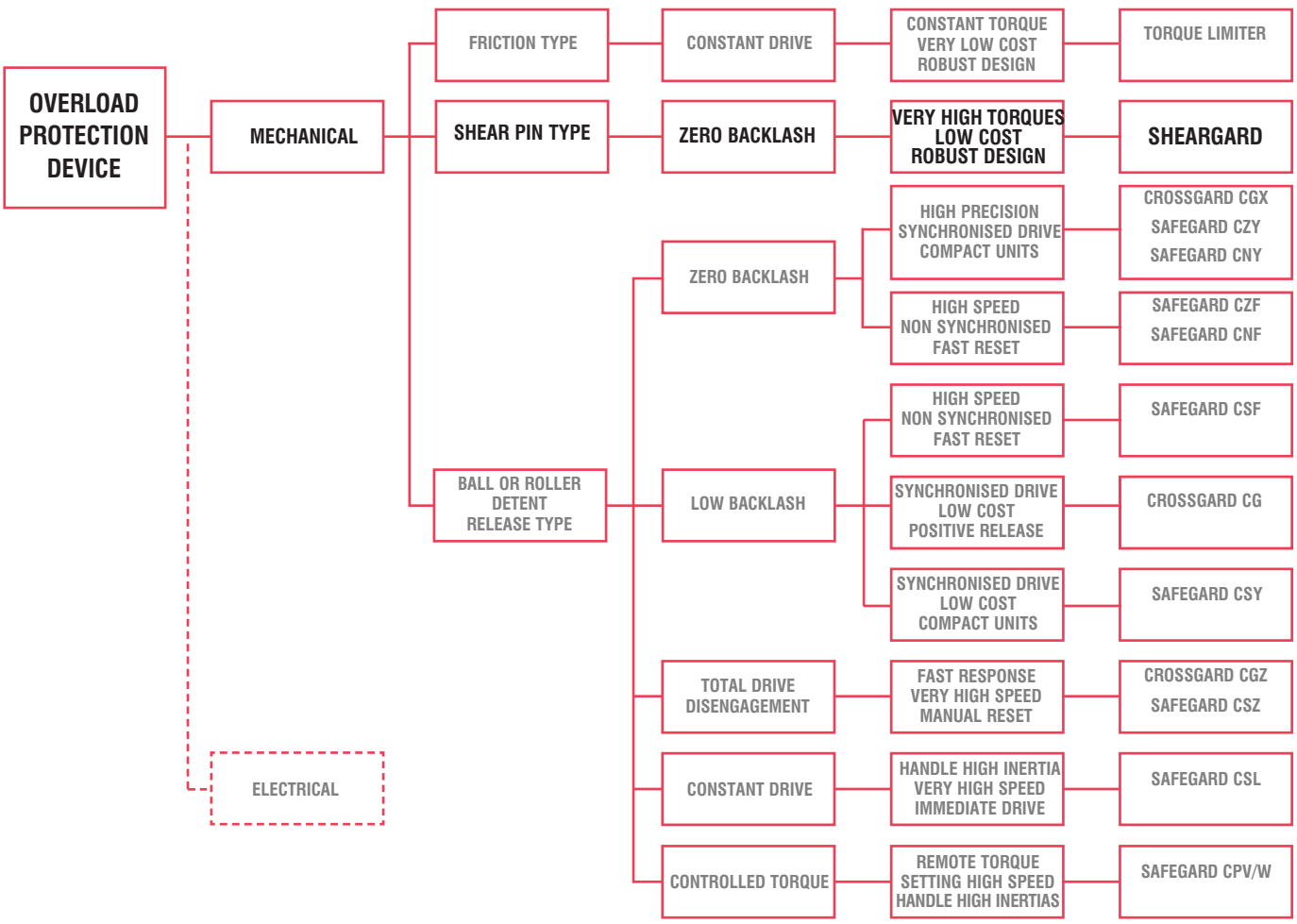
Sheargard

Clutches and Couplings

Sheargard Overload Clutches and Couplings

Cross and Morse's range of Sheargard Overload Protection provides a low-cosst and safe alternative for the following industries:

Oil and Gas
Oil drilling platforms
Petrochemical plants
Oil refineries
Natural gas installations
Ammunition plants
Varnish factories
Sugar refineries
Grain silos
Mining
and many other industries where no-spark equipment is required.



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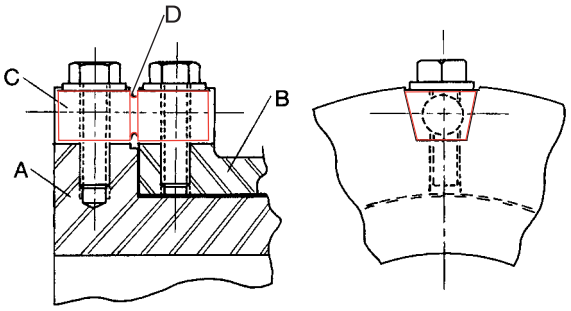
Sheargard Overload Clutches

The Cross Sheargard clutch complements the range of Torque Limiters by providing machinery protection on applications where accurate torque control and shaft synchronisation are necessary; and when in the event of an overload, total disengagement of driving and driven members is required.

The design of the Sheargard Clutches provides for the transmission of high torques (up to 92,195 lb-ft) with a compact, low inertia unit. Standard stock products enables prompt delivery, at low cost of shearpin chain sprockets and flexible shaft couplings. The provision of an optional motor monitor plate enables disconnection of the power supply and / or operation of alarm signals in the event of an overload when used in conjunction with a limit switch or proximity switch.

The basic advantages of the well proven wedge shearpin, have been combined with a clutch designed for economic production, with component parts sized to enable the use of the existing range of torque limiter platewheel and chain flexible coupling to enable supply from stock of complete drive assemblies. For higher speed applications a rubber coupling is available.

In the diagram Hub “A” and Flange “B” have matching tapered slots cut axially in their periphery, into which the wedge-shaped shearpins “C” are inserted and firmly clamped by two self-locking screws. Torque is transmitted by the wedge which has a reduced diameter neck in mid-span “D”’ designed to shear when the pre-determined torque is exceeded, so allowing the sleeve to rotate freely on the hub.



The Cross Sheargard by virtue of its design offers a number of advantages over alternate overload protection systems

1. Simple Design

In a Shearpin the full shear strength is directly available as a frictionless driving force. The use of up to three shearpins provides high torque capacity within a compact unit, keeping both inertias and costs to a minimum. Several ratings of pin for each clutch size provides over 200 stock torque ratings. The Sheargard can be used with chain sprockets, gears, belt drives or shaft couplings. In the event of an overload, the wedge shaped shearpins are easy to locate, and quickly replaced by removal of two self-locking screws and broken halves of shearpin, and replacement with a new wedge pin.

2. Accurate Torque Ratings

Inaccuracy of torque setting in conventional shearpin couplings is caused by non-uniform shear necks, and poor fit of the pin with its mating surfaces. The pins are precision turned to a constant form and can be expected to fracture within ±10% of catalogue rating. The wedge pins are rigidly located in the mating grooves so totally eliminating fretting fatigue failures, and ensuring zero backlash making it ideal for indexing and reversing drives. The clamping of the pin into the wedge angle ensures positive radial and axial location. The design also ensures load sharing is achieved when a number of pins are used for higher torque drives, enabling different rated pins to be used in one clutch.

3. Reliability

The pins are naturally “fail-safe” under all conditions. They are not affected by changes in temperature or humidity and are tolerant of most environment conditions. Sizes 350-950SG standard pins are manufactured from brass to avoid sparking in the event of overload, thus making them suitable in volatile atmospheres. The unconventional shape of the wedge pins prevents the fitment of alien pins ensuring safety and product liability requirements are met at all times. The peripheral location of the wedge pins enables easy inspection, and clear coding of the pins ensures simple checking of torque setting.

4. Availability

Cross Sheargard Clutches and Couplings are carried in stock with minimum pilot bore. Units can be finished bored and keyed to customer’s specifications through a 48 hour rework service. A large stock of standard rated wedge pins, coded according to capacity ensures instant spares availability.

5. Low Cost Protection

The cost of Sheargard Clutches is kept low by volume production techniques, so providing the customer with a low cost synchronised, reliable overload protection device.

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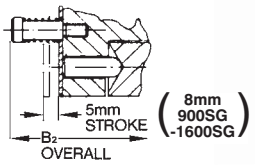
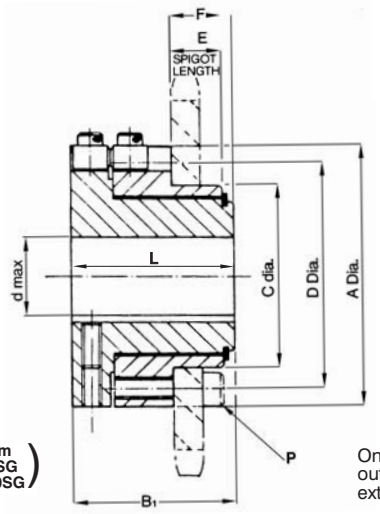
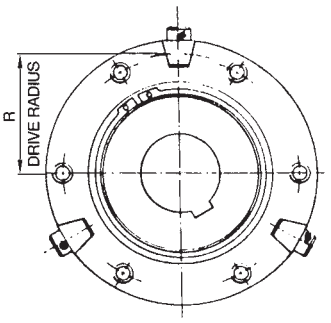
Sheargard Overload Clutches

Power Transmission Solutions

Standard Stock Sheargard Clutches are available in five sizes providing a torque range from 20 to 5,013 lb-ft. Other units with torque ratings to 92,200 lb-ft are available to order, on short lead time. For further details contact Cross & Morse Sales Office.







On sizes 1000SG to 1600SG the outer hub is retained by an end plate which extends beyond bore length.

Dimensions

Clutch Size	edge(4)* Pins	Drive radius R	Torque Rating(1)* Min Nm	Min lb ft	Max Nm	Max lb ft	Bore Dia d Min	Max
250SG	2 x 25	26	27	20	336	248	10	25
350SG	3 x 37	34.5	33	24	1509	1113	19	28
500SG	3 x 37	47	45	33	2028	1496	24	45
700SG	3 x 50	66.5	251	185	5580	4115	28	65
800SG	3 x 50	81	306	225	6798	5013	30	80
950SG	3 x 75	97	830	612	16740	12345	45	100
1000SG	4 x 75	129.5	1108	817	41029	30263	50	120
1200SG	4 x 75	149.5	1279	944	47365	34937	60	150
1400SG	4 x 120	160	12240	9025	100000	73750	70	180
1600SG	4 x 120	200	15300	11285	125000	92200	100	215

Clutch Size	Outside Dia. A	Length Through Bore L	Overall Length B1	Overall Length B2	Spigot Dia. C	Bolt PCD D	Bolts P	Spigot Length E(2)*	Position Back Face F
250SG	63	36	36	-	38.90 / 38.85	50	6 x M5	11.5	15.5
350SG	85	57	57	78	49.25 / 49.20	65	6 x M6	16	21
500SG	105	72	72	93	73.08 / 73.03	92	6 x M8	25	31
700SG	148	92	92	113	104.85 / 104.80	128	6 x M10	35	40
800SG	175	112	112	133	119.86 / 119.80	146	6 x M12	40	50
950SG	215	130	130	156	149.85 / 149.80	185	6 x M14	54	64
1000SG	280	175	175	201	184.85 / 184.80	235	8 x M16	90	103
1200SG	320	210	210	236	224.85 / 224.80	275	8 x M16	125	138
1400SG	350	270	295	321	254.85 / 254.80	300	8 x M24	125*(3)	150*(3)
1600SG	425	300	325	351	304.85 / 304.80	360	12 x M24	148*(3)	173*(3)

*(1)For standard Torque Ratings see table page 12.
*(2)The drive sprocket/pulley can overhang spigot.
*(3)Dimensions E & F can be adjusted to suit sprocket widths.
*(4)W37, W50, & W75 Brass Std, others steel.

Minimum Number of Teeth on Sprockets for Standard Roller Chains

Clutch Size \ Chain Pitch	1/2"1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"
250SG	27	22	18				
350SG	25	27	24	18			
500SG	30	24	21	16	18		
700SG	40	33	28	22	18	19	
800SG		38	34	25	21	23	20
950SG			40	31	25	26	23
1000SG				35	29	28	26
1200SG					36	30	29
1400SG					40	34	25
1600SG						38	29

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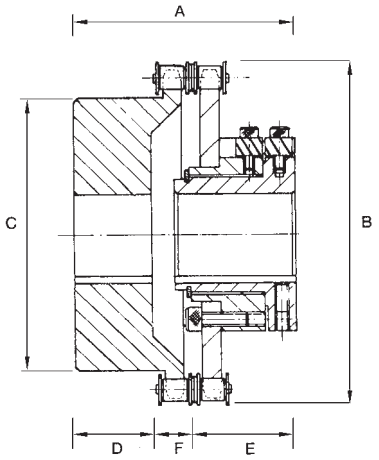
Sheargard Flexible Couplings

Sheargard Chain Couplings

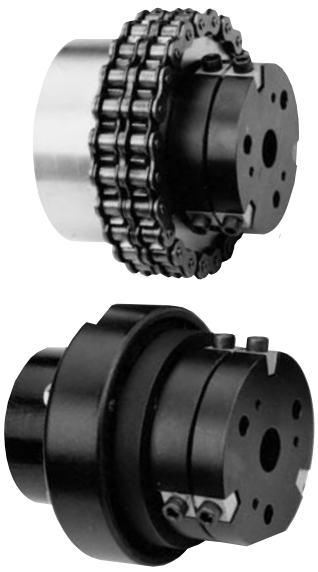
The standard Cross Sheargard unit combines with the Chain Coupling to provide stock overload couplings with minimum backlash and a high reliability. This construction provides a simple, reliable, easy to assemble flexible coupling capable of transmitting high loads and accommodating shaft misalignment with continuous overload protection. Motor monitor assemblies can also be used to switch off power in the event of an overload.

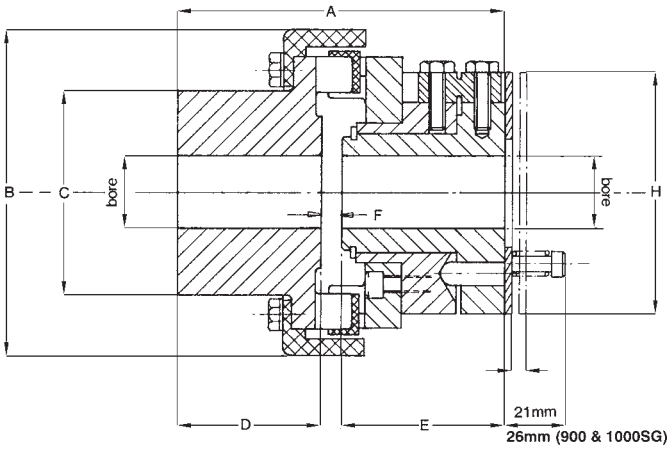
Sheargard ES & KE Couplings

For high speed drives (over 500 rpm) low inertia rubber elastic couplings are offered to enable quiet operation with torsional elasticity to damp vibration and absorb shock loads. The ES Couplings consists of two close grained cast iron jaws with hard rubber drive elements interposed between them, retained by a reinforced thermoplastic cap. The KE Coupling also has close grained cast iron jaws with a Pebax Polyester elastomeric gear ring interspaced to damp vibration and torsional loads. This series can be provided with taper-bore bushes on the coupling end. The KE Coupling provides a lower cost solution.



Chain Coupling





KE & ES Couplings

Chain Coupling Dimensions

Coupling Ref.	Misalignment		Torque Ratings				Sheargard Bore		Coupling Bore		A	B	C	D	E	F
	Parallel	Angular	Min Nm	Max Nm*1	Min lb ft	Max lb ft*1	Min	Max	Min	Max						
350SG-C	0.31	0.5 deg	33	1509	24	1113	19	28	18	70	106	137	104	38	57	11
500SG-C	0.38	0.5 deg	45	2028	33	1496	24	45	22	95	119	187	149	41	72	5
700SG-C	0.51	0.5 deg	251	5580	185	4116	28	65	24	135	162	248	199	67	92	3
800SG-C	0.75	0.5 deg	306	6796	226	5013	30	80	51	120	186	278	175	77	100	9
950SG-C	0.75	0.5 deg	830	16740	612	12347	45	100	51	150	222	326	232	83	130	9
1000SG-C	1.00	0.5 deg	1108	37500	817	27660	45	115	60	200	286	462	320	106	175	5

KE Sheargard Coupling Dimensions

Coupling Ref.	Misalignment		Torque Ratings				Sheargard Bore		Coupling Bore Max	Taper Bush Size	A	B	C	D	E	F
	Parallel	Angular	Min Nm	Max Nm*1	Min lb ft	Max lb ft*1	Min	Max								
350SGKE13	0.4	1.0 deg	33	725	24	535	19	28	55	1610	140	130	90	50	57	33
350SGKE15	0.4	1.0 deg	33	1490	24	1099	19	28	65	2012	151	150	104	58	57	36
500SGKE15	0.4	1.0 deg	45	1490	33	1099	24	45	65	2012	179	150	104	58	72	49
500SGKE18	0.4	1.0 deg	45	2026	33	1494	24	45	75	2517	185	180	120	68	72	45
700SGKE23	0.5	1.0 deg	251	4800	185	3540	28	65	95	3020	241	225	150	85	92	64
800SGKE28	0.5	1.0 deg	306	6796	226	5013	30	80	130	3525	281	275	206	106	100	75

ES Sheargard Coupling Dimensions

Coupling Ref.	Misalignment		Torque Ratings				Sheargard Bore		Coupling Bore Max	A	B	C	D	E	F	H
	Parallel	Angular	Min Nm	Max Nm*1	Min lb ft	Max lb ft*1	Min	Max								
350SGES	0.6	0.7deg	33	300	24	221	19	28	45	114	115	72	48	57	9	85
500SGES	0.7	0.7deg	45	1200	33	885	24	45	60	143	158	96	61	72	10	105
700SGES	0.9	0.8deg	251	3000	185	2213	28	65	75	183	202	120	75	92	16	148
800SGES	1.0	0.8deg	306	4800	226	3540	30	80	80	208	230	130	82	100	26	175
950SGES	1.4	0.8deg	830	12000	612	8851	45	100	100	249	294	160	97	130	22	215

Except as indicated all dimensions in mm
*(1)Running Torque should not exceed 50% of this figure.
*(2)Coupling half manufactured with blind bore.
*(3)Coupling half can be supplied for taper-bush fitted either from hub end (type H) or from coupling end (type F).
*(4)Taper bore versions are shorter.

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Sheargard Torque Ratings

Selection of Wedges for Torque Rating

For each size of Sheargard clutch a selection of Standard wedge pins are available, which can be combined together to provide the desired torque setting. Standard wedges are coded for identification. Sizes 350SG to 900SG use brass pins as standard (steel optional), other clutches use steel as standard pin material.

A representative selection of standard torque settings possible with standard wedges is shown in the table below, all torque ratings being accurate within ±10%. Additional torque settings can be provided with standard or special wedge pins. To avoid unnecessary tripping of the clutch the design torque should be at least 15% above max. starting torque of the drive. To minimise downtime and costs, use selections with minimum number of wedges, for simplicity of maintenance and stock control use selections with wedges one code, as shown in the table. If torque setting is critical, intermediate ratings can be obtained by mixing codes. For drives with shaft speed above 120 rpm, or for improved protection of drive and machinery, use optional monitor plate with a limit switch or proximity sensor to switch off motor on overload.

Torque Ratings - lb ft

Number of Wedges in Clutch												
Orange	Orange /White	Gold	White	White/ Yellow	Yellow	Yellow /Blue	Blue	Blue/ Green	Green	Green /Red	Red	Black
1												
	1											
		1										
2												
			1									
	2											
3												
		2										
				1								
	3											
					1							
			2									
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										3		
											3	
												4

Torque Rating lb.ft. against each Clutch size and Pin Material (Standards in Bold)																		
250	**350**	350	**500**	500	**700**	700	**800**	800	**950**	950	**1000**	1000	**1200**	1200	1400	1600
Steel	**Brass**	Steel	**Brass**	Steel	**Brass**	Steel	**Brass**	Steel	**Brass**	Steel	**Brass**	Steel	**Brass**	Steel	Steel	Steel
	24	34	**33**	46	**85**	118	**103**	148								
	34	46	**46**	63												
	46	63	**62**	85												
	49	68	**66**	91												
20	**63**	88	**86**	125	**185**	254	**226**	310	**612**	841	**817**	1123	**944**	1296		
	68	93	**91**	125												
	73	102	**100**	137												
	91	127	**124**	170												
	92	126	**138**	170	**252**	346	**306**	421	**859**	1180	**1147**	1576	**1324**	1819		
	102	139	**137**	188												
60	**122**	167	**163**	223	**329**	476	**401**	580	**1089**	1495	**1453**	1996	**1678**	2304	9028	11285
40	**127**	176	**171**	249	**370**	509	**451**	620	**1224**	1682	**1635**	2245	**1887**	2592		
	137	190	**186**	254												
	147	201	**197**	271	**481**	661	**586**	805	**1484**	2038	**1981**	2721	**2287**	3141		
	184	252	**276**	339	**503**	692	**612**	842	**1719**	2360	**2294**	3151	**2649**	3638		
79	**190**	260	**254**	350	**661**	907	**805**	1105	**1777**	2441	**2372**	3258	**2739**	3762	13005	16257
60	**190**	263	**257**	374	**555**	763	**677**	929	**1837**	2523	**2452**	3368	**2831**	3888		
	221	303	**297**	415	**825**	1133	**1005**	1380	**2099**	2883	**2803**	3848	**3235**	4443		
121	**243**	333	**326**	447	**658**	952	**801**	1160	**2177**	2990	**2907**	3992	**3356**	4609	18056	22571
100	**273**	375	**367**	503	**1024**	1384	**1247**	1685	**2633**	3617	**3516**	4829	**4058**	5575	14929	18661
	277	378	**414**	509	**755**	1038	**918**	1264	**2578**	3540	**3442**	4727	**3973**	5457		
	294	403	**394**	541	**962**	1322	**1171**	1609	**2968**	4076	**3963**	5442	**4575**	6282		
	330	601	**443**	609	**1274**	1749	**1552**	2130	**3091**	4221	**4126**	5636	**4763**	6506		
181	**365**	500	**489**	670	**987**	1427	**1202**	1739	**3266**	4485	**4360**	5988	**5034**	6913	27085	33856
124	**371**	657	**499**	684	**1317**	1809	**1604**	2203	**3548**	4873	**4737**	6505	**5468**	7510	18434	23043
158	**379**	521	**509**	699	**1322**	1814	**1609**	2210	**3554**	4881	**4744**	6517	**5477**	7523	26011	32513
					1372	1885	**1671**	2295	**4116**	5667	**5495**	7566	**6343**	8734	23119	28899
	440	604	**591**	812	**1443**	1983	**1757**	2414	**4452**	6114	**5944**	8162	**6862**	9423		
	443	606	**593**	829	**1651**	2266	**2011**	2760	**4198**	5765	**5605**	7697	**6471**	8885		
201	**546**	749	**733**	1006	**2048**	2767	**2495**	3371	**5266**	7234	**7031**	9658	**8117**	11150	29858	37323
											5814	7984	**6712**	9217	36113	45141
237	**569**	781	**763**	1049	**1983**	2722	**2414**	3315	**5331**	7322	**7117**	9775	**8216**	11285	39016	48770
	659	1202	**885**	1217	**2548**	3498	**3104**	4260	**6181**	8443	**8252**	11271	**9527**	13012		
	664	909	**890**	1244	**2476**	3399	**3016**	4140	**6298**	8648	**8408**	11545	**9706**	13328		
248	**742**	1314	**997**	1369	**2633**	3617	**3207**	4406	**7096**	9745	**9473**	13010	**10936**	15020	36868	46085
					2744	3769	**3343**	4591	**8232**	11334	**10990**	15131	**12687**	17468	46239	57798
											7925	10883	**9149**	12564		
											9489	13034	**10954**	15047	52021	65027
301	**819**	1124	**1100**	1509	**3071**	4151	**3742**	5056	**7900**	10852	**10547**	14487	**12175**	16725	44787	55984
											11210	15393	**12942**	17771		
	989	1803	**1328**	1826	**3822**	5247	**4656**	6391	**9272**	12664	**12378**	16907	**14290**	19518		
372	**1113**	1972	**1496**	2053	**3950**	5426	**4811**	6610	**10644**	14618	**14210**	19515	**16404**	22529	55302	69128
											14062	19317	**16234**	22300	59716	74645
					4116	5654	**5014**	6886	**12347**	17001	**16484**	22697	**19030**	26202	69358	86698
											16504	22543	**19053**	26024		
											18946	26021	**21872**	30039	73736	92170
											21979	30263	**25374**	34937		

Note:- Torque capacity of size 250SG controlled by unit size, and not wedge capacity. Sizes 1000SG and above are designed to accept up to four wedges, size 250SG only has two wedge slots.

Wedge Replacement following Overload:

To return Sheargard to service after overload, first remove all broken halves of wedges by removing their locking screws. Rotate hub on body until wedge grooves are in line (for drives where synchronisation is essential rotate until alignment marks on body and hub flanges are in line). Ensure wedge grooves are clean. Fit new wedges of same code identification as parts removed and fix firmly into place by tightening locating screws.

Servicing Sheargard Clutches

Sheargard units require minimal servicing. Routine checks that wedge locating screws and monitor plate screws are securely locked down is generally all that is required. If the clutch has suffered a number of overloads, or at major maintenance shutdowns disassembly of the clutch, cleaning with paraffin and light greasing of bearing surfaces will ensure long service life.

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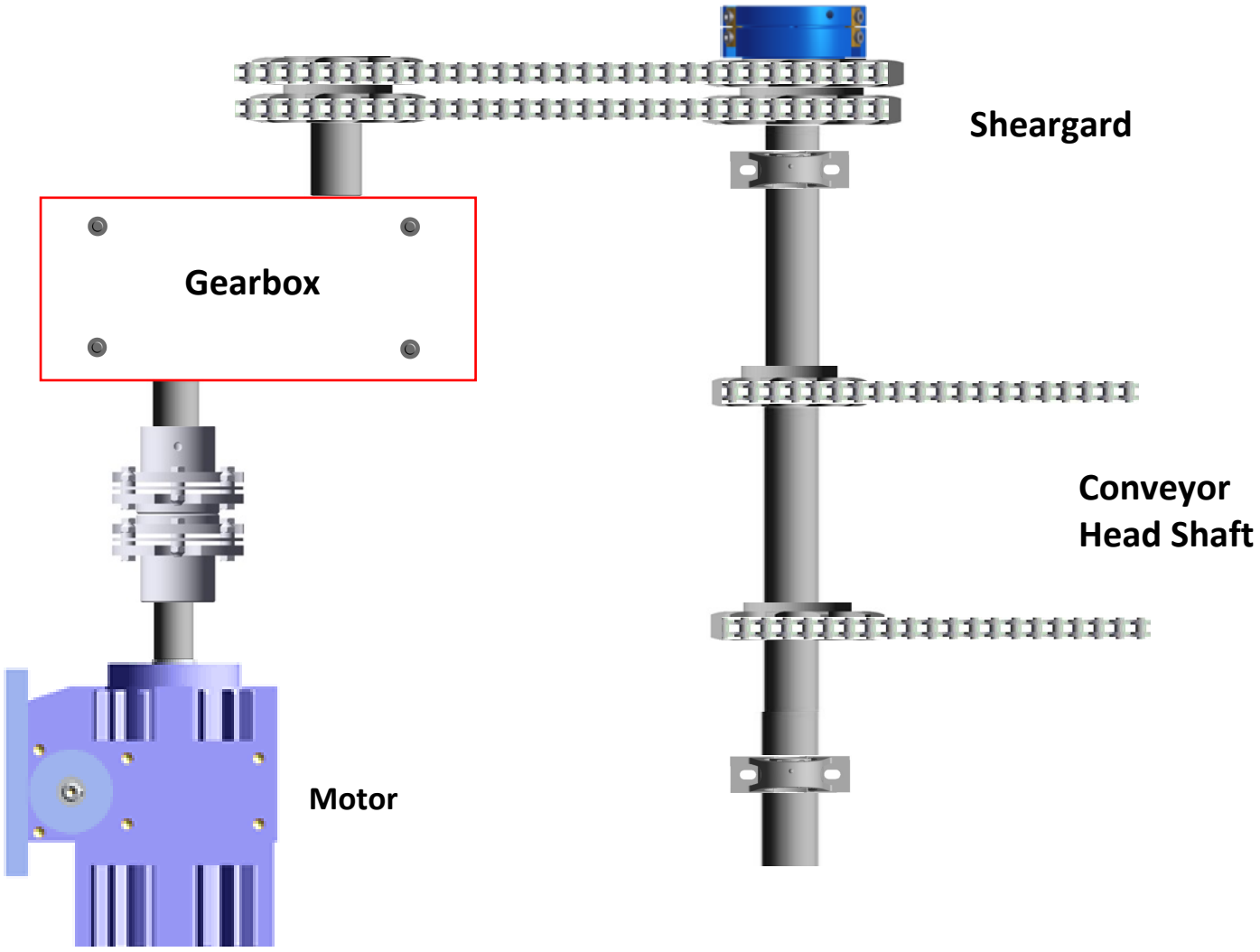
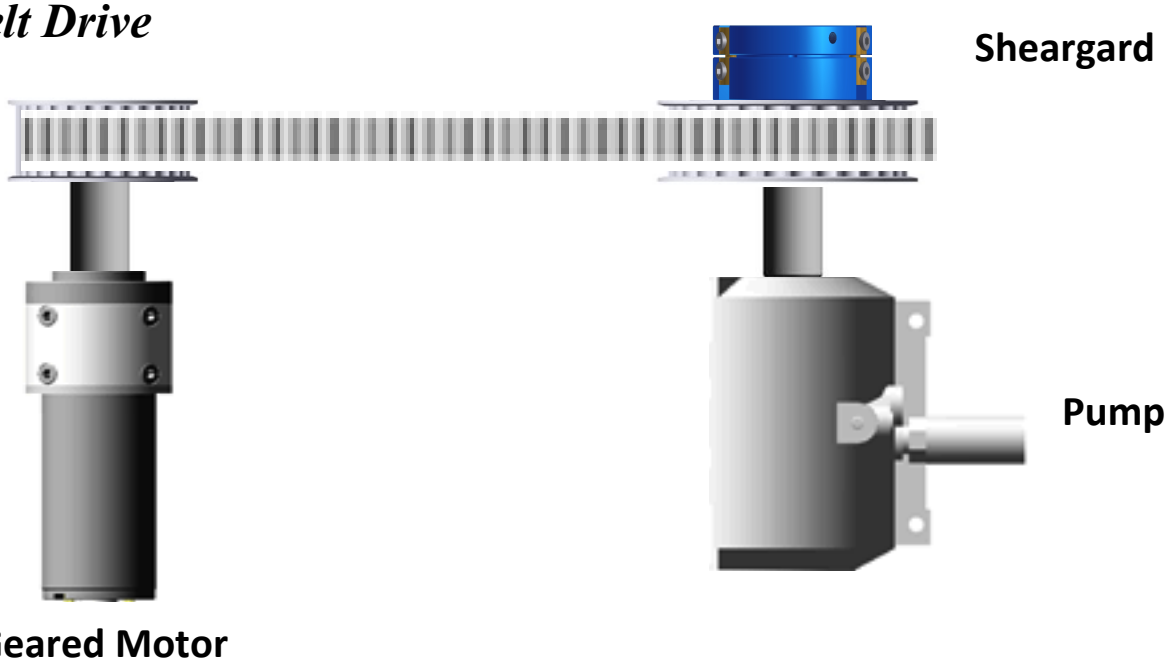
Proposed Application Layouts for Sheargard Clutch

Chain drive



Belt Drive



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Power Transmission Solutions

Power Transmission Products

- Roller Chain Drives
- Timing Belt Drives
- Silent Chain Drives
- Clamping Elements
- Overload Clutches
- Torque Limiters
- Mounted Bearings
- Roller Ramp Freewheels
- Sprag Clutches
- Shaft Couplings
- Tensioners
- Sprockets
- Pulleys
- Gears and Racks

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