



Differentials Ltd

a brand of **AllMakes4x4**

TRACTION AND DRIVE TRAIN UPGRADES



www.kamdiffs.com

**APPLICATION GUIDE
FOR LAND ROVER VEHICLES**



Welcome to the KAM Differentials Buyers Guide

For almost 22 years KAM Differentials has been supplying highly engineered transmission upgrades and differential locking systems for off-road, commercial and military Land Rover vehicles as well as directly to Iveco, Ford Motorsport and Santana.

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When 4x4 vehicles are heavily laden and used in seriously tough conditions or even a battlefield, getting stuck or suffering transmission failure can have severe consequences. However, these consequences can be dramatically reduced or even eliminated by increasing the strength of the transmission components most at risk of failure. By lowering the strain on the driveline and reducing the final drive gearing and increasing the available traction with a differential locking system.

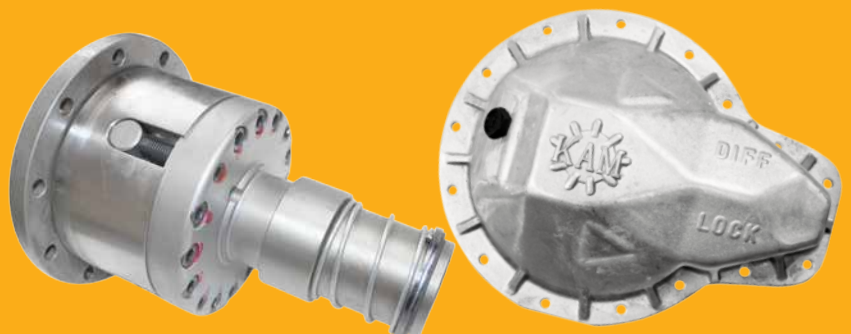
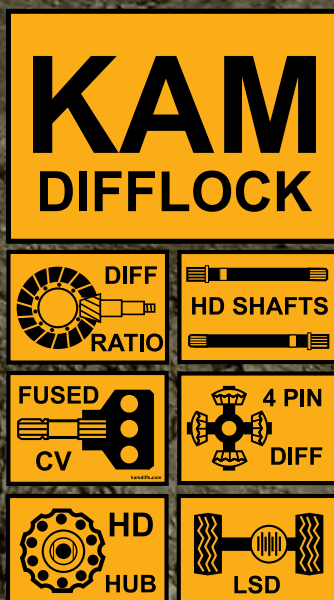
In the very unlikely event of a KAM upgraded transmission failure, use of the unique KAM fused stub shaft in the driveline will protect crucial components and reduce down time to just a few minutes instead of hours.

With KAM traction and heavy duty drive train products fitted to front and rear axles, heavier loads can be carried across tougher terrain with greater safety and reliability. The amount of traction is doubled when a KAM locking differential is engaged, enabling even the worst surfaces and driving conditions to be overcome.

Products include: Differential locking systems, limited slip differentials, 4 Pinion Differentials, Heavy Duty Front & Rear Drive Shafts, CV Joints, Fusible Stub Shafts & Drive Flanges and Alternative Ratio Crown Wheel and Pinions.

This buyers guide is intended to provide all the information necessary to upgrade and modify Land Rover axles. For more detailed information please go to www.kamdiffs.com and www.terrafirma4x4.com.

KAM Differentials products are available from Allmakes 4x4 worldwide distributors.

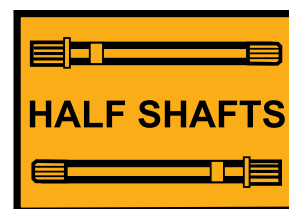


KAM HALF SHAFTS

KAM half shafts are made from Aerospace specification material which is more flexible allowing for a greater degree of twist. Independent tests have proven they are 95% stronger than standard OE shafts. KAM half shafts have been used successfully for over 22 years on recreational off road, competition and military vehicles worldwide.

After machining, the shafts are put through a multiple stage finishing process including heat treatment, shot peening, cryogenic treatment and polishing. KAM produce the strongest and finest quality half shafts available and provide a 5 year no quibble replacement warranty in the extremely unlikely event of failure.*

*Warranty limited upto 35 inch tyres.



- **Aerospace specification material**
- **Independently tested**
- **95% stronger than OE shafts**
- **Over twice the amount of twist**
- **Multiple stage finishing process**
- **Military and competition proven**
- **5 year warranty***

KAM Rear Half Shafts

Part No	Type	Fits wide flange without oil seal
KAM201	Short	90/D1/RRC up to 1994 - 24 spline (703mm)
KAM202	Long	90/D1/RRC up to 1994 - 24 spline (978mm)

Part No	Type	Fits narrow flange with oil seal
KAM203	Short	90/D1/RRC 1994 on, 110/130 2002 on & 2007 on (683mm)
KAM204	Long	90/D1/RRC 1994 on, 110/130 2002 on & 2007 on (953mm)

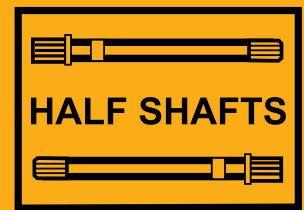
Part No	Type	Without Oil Seal - Salisbury only
KAM205	Short	110/130 upto 1994 Salisbury drum brake axle (660mm)
KAM202	Long	110/130 upto 1994 Salisbury drum brake axle (978mm)

Part No	Type	With Oil Seal - Salisbury only
KAM207	Short	110/130 up to 2002 Salisbury disc brake axle (640mm)
KAM204	Long	110/130 up to 2002 Salisbury disc brake axle (953mm)

Part No	Type	For Series, Lightweight or Santana
KAM221	Short	Series 2A/3 Rear short (643mm)
KAM222	Long	Series 2A/3 Rear short (868mm)
KAM223	Short	Lightweight 2A/3 Rear (630mm)
KAM224	Long	Lightweight 2A/3 Rear (855mm)
KAMR26	Short	Santana PS10 / Massif Rear Long 24-24 Long spline (927mm)
KAMR27	Long	Santana PS10 / Massif Rear Short 24-24 (746mm)

NP: please note - These shafts will only fit 24 spline differential unit.



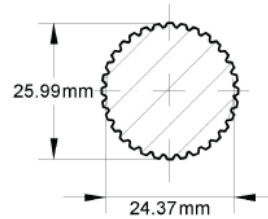


KAM Front Half Shafts

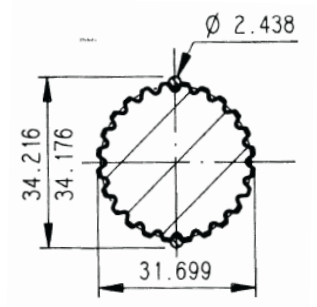
All D1/RRC and 90/110/130 1994 on are fitted with smaller diameter 32 spline (CV end) front half shafts.

Therefore to achieve the strength required with these half shafts, KAM has focused on the larger earlier shaft and CV joint.

In order to upgrade these axles a complete Heavy Duty 23 spline shaft and CV conversion kit is required, combining the larger diameter half shafts and considerably stronger CV joints.



32 spline shaft cross section is 542mm sq.



23 spline shaft cross section is 714mm sq

Part No	Type	Application
KAM209	Short	90/110/130/D1/RRC 23-24 spline (452mm)
KAM209L	Short	Front Short 23-24 Long spline (KAM Old lock system) (452mm)
KAM210	Long	90/110/130/D1/RRC 23-24 spline (837mm)
KAM210L	Long	Front Long 23-24 Long spline (KAM Old lock system) (837mm)
KAM211	Short	Stage1 V8 Front Short 23-24 (398mm)
KAM212	Long	Stage1 V8 Front Long 23-24 (719mm)
KAM360		CV Shim Kit

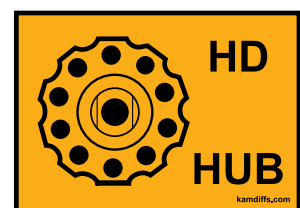
NB: please note 24 spline differential unit only. Shim kit is required if fitting to a KAM CV



KAM Heavy Duty Drive Flanges

KAM HD drive flanges are made from EN36 material. They have 10 bolt holes so they will fit axles originally fitted with either the early wide or later narrow drive flanges which have different bolt hole centres.

These stylish flanges are extremely strong and resistant to wear. In order to replace the wide flange a spacer is required to accommodate the slightly longer half shaft.



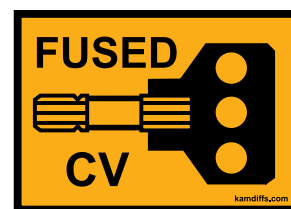
Part No	Type	Application 90/110/130/D1/RRC
KAM101	Narrow (1 UNIT)	FTC859 / RUC105200
KAM102	Spacer	Use this spacer if original drive flange is FRC5806. Converts narrow type to wide.

Registered Designs No: 3025504

KAM CV JOINTS AND CONVERSIONS

KAM CV joints are made from Aerospace specification material and have been independently tested proving they are more than twice as strong as the originals. The stub shafts which are unique to KAM are designed to withstand the strain associated with using tyres up to 35" diameter without breaking. For vehicles with larger than 35" tyres or very high engine horse power it is almost impossible to prevent breakage at some stage.

KAM provides the most effective solution by 'fusing' the stub shaft. This ensures that in the unlikely event of failure the stub shaft can be replaced in less than 5 minutes.



- Aerospace grade material
- Independently tested
- Multiple stage heat treatment
- Over 100% stronger than original CV
- Replaceable 'Fused' stub shafts
- Stub shaft replaced in under 5 minutes
- Clean breakage - No swarf
- Protects the drive train
- 5 year replacement warranty*

KAM Aerospace Specification Shafts & CV Axle Conversion Kits

(including 2 shafts, 2 CV joints, 2 fused stub shafts and shim kits)

Part No	CV Length	Description
KAM301	213 mm	90/110/130/D1/RRC non ABS 1994 on (160mm stub)
KAM302	242 mm	90/110/130/D1/RRC non ABS up to 1994 (185 mm stub) Fitting kit required
KAM303	213 mm	90/110/130/D1/RRC with ABS 1994 on (160mm stub)



KAM CV and Stub Shaft

(inc 1 x CV Joint & 1 x fused stub shaft)

Only works with KAM Conversion Kit

Part No	CV Length	Description
KAM311	213 mm	90/110/130/D1/RRC non ABS 1994 on (160mm stub)
KAM312	242mm	90/110/130/D1/RRC non ABS up to 1994 (185 mm stub) Fitting kit required
KAM313	213 mm	90/110/130/D1/RRC with ABS 1994 on (160mm stub)



KAM CV Only

Part No	Type	Application
KAM330	non ABS	KAM heavy duty CV only (requires stub shaft) 90/110/130/D1/RRC
KAM331	ABS	KAM heavy duty CV only (requires stub shaft) 90/110/130/D1/ RRC



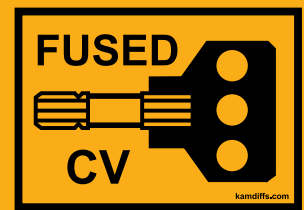
KAM Fused Stub Shafts

Part No	Stub Length	Application
KAM340	185mm	Fusable Stub shaft Long up to 1994
KAM341	160mm	Fusable Stub shaft Short



* Warranty limited upto 35 inch tyre

Recommended to purchase as a spare part



Of the various CV joints that are used in Land Rover axles, we have designed a CV that is interchangeable on all versions. We have produced a Aerospace specification CV with and without ABS. We have also produced two different length stub shafts to fit early and late (1994 on) stub axles.

We recommend that you carry a spare stub shaft in the unlikely event of failure.

OE Land Rover CV joints identification

The fusible stub shaft protects the rest of the drive train. It is imperative to identify the original CV joint and to confirm the overall length. From 1994 onwards CV joints are a direct fitment without the need for a fitting kit and use the shorter fusible stub shaft (160 mm).

All KAM CV joints use the later type roller bearing FTC861, with no modification required to the stub axle. If the original CV joint does not use this roller bearing then you need to purchase a KAM fitting kit which replaces the original bronze bush.

<p>RTC5843 Suffix B RRC - 88-92 D1- 89-92</p> <p>93mm</p> <p>32 spline</p> <p>FROM EA305590 TO JA624754</p> <p>Stub axle bearing</p> <p>KAM Part No: KAM351</p>	<p>606665 Suffix A RRC / 86 -88</p> <p>75mm</p> <p>23 spline</p> <p>UP TO EA305589</p> <p>Stub axle bearing</p> <p>KAM Part No: KAM352</p>
<p>STC3051 & TDJ000010</p> <p>ABS 213mm STC3046 NO ABS</p> <p>32 spline</p> <p>FROM XA159807</p> <p>Stub axle bearing</p> <p>KAM Part No: FTC861</p>	<p>AEU2522 90/110/130 242mm</p> <p>23 spline</p> <p>UP TO KA930455</p> <p>Stub axle bearing</p> <p>KAM Part No: KAM350</p>
<p>RTC6811 Defender RRC/D1 upto 1994</p> <p>ABS 213mm</p> <p>32 spline</p> <p>UP TO HA610293</p> <p>Stub axle bearing</p> <p>KAM Part No: FTC861</p>	<p>RTC6862 242mm</p> <p>32 spline</p> <p>UP TO KA930455</p> <p>Stub axle bearing</p> <p>KAM Part No: KAM350</p>

Pre 1994 Fitting Kit - Sold Separately

Part No	Model	OE Part No	Fitting kit	
KAM350	90/110/130/ D1/RRC upto 1994	RTC6862	32 spline	
		AEU2522	23 spline	
KAM351	Suffix B RRC-88 -92	RTC5843	32 spline	
KAM352	Suffix A RRC/ 86-88	606665	23 spline	

KAM LOCKING DIFFERENTIAL

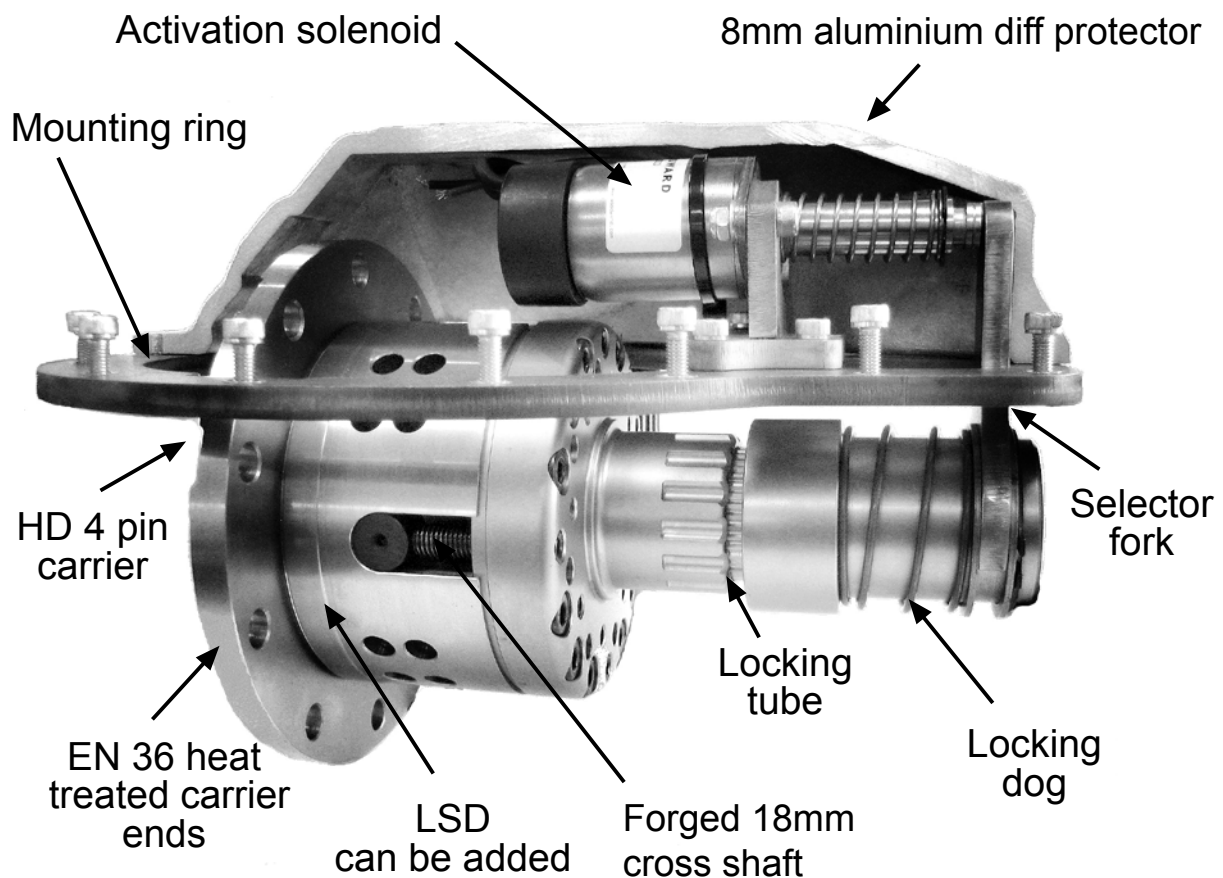
The KAM Locking Differential is solenoid activated (located inside the differential cover). A 45 amp burst of power activates a heavy duty dual coil solenoid located inside the differential cover.

The coil pulls a selector fork, which preloads the engagement spring and forces the sliding dog collar along the locking tube onto the carrier. The differential is now locked. A constant 0.5 amp current holds the coil in the locked state until the switch is deactivated and the locker disengages.

The extremely strong 8mm cast alloy cover significantly increases protection of the ring and pinion.



- Doubles your traction off road
- Heavy duty 4 pin carrier
- Use any 24 spline half shaft
- 8mm aluminium diff cover supplied as standard
- Can be upgraded to Limited Slip Differential (LSD)
- Solenoid activated 12v or 24v



Under “normal” circumstances a standard or “open” differential allows the wheels to rotate at different speeds for cornering. However when driving off-road, where traction can be easily lost, all the drive will be directed to the wheel with least grip - which can result in a loss of forward momentum. The KAM locking differential provides the ideal traction solution by locking the differential manually. When activated, the differential lock engages in 0.4 seconds, providing 100% drive to both wheels, ensuring maximum traction is achieved.

KAM produces a limited slip differential for drivers looking for a system that requires no manual operation. This still offers a considerable increase in traction. KAM LSD units have 7 clutch plates that can be pre-set to suit a variety of applications and will accept upto 450bhp/500ftlbs torque. The more power applied the more lock up is achieved.

For the ultimate locking differential and “best of both worlds” a limited slip differential centre can be installed into the locking differential casing to give both smooth limited slip action combined with an electronically operated locking differential for 100% drive. No additional equipment is required in order to operate a KAM locking differential or LSD.



KAM Locking Differentials

Part No	Type	Application
KAM420	Long Nose	90/110/130/D1/D2/RRC FRONT. 90 upto 1998, D1/D2/RRC REAR.
KAM430	Short Nose	110/130 2002 on REAR, P38 FRONT & REAR*
KAM435	Long Nose	90 1998 on REAR.

KAM Locking Differentials and Limited Slip Differential Combinations

Part No	Type	Application
KAM421	Long Nose	90 upto 1998, D1/D2**/RRC REAR.
KAM422	Long Nose	90/110/130/D1/D2/RRC FRONT.
KAM431	Short Nose	110/130 2002 on, P38/WOLF REAR.
KAM432	Short Nose	P38/WOLF FRONT*
KAM436	Long Nose	90 1998 on REAR.

* P38 will require some modifications to the suspension particularly the panhard rod

** D2 will require a special bolt for the Watts linkage

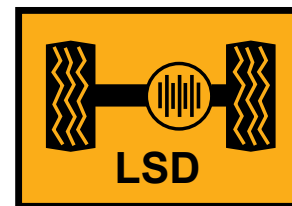


KAM LIMITED SLIP DIFFERENTIAL & 4 PINION CARRIER

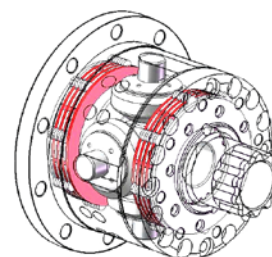
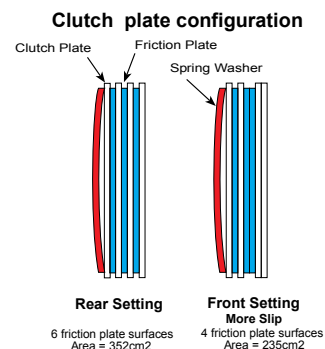
KAM provides a unique traction solution by offering a fully adjustable and upgradeable differential assembly. You can have both a full, manually operated differential locker and Limited Slip Differential in combination. The KAM LSD unit is a clutch type Limited Slip Differential. In simple terms, the more power you apply, the more lock up you get across the half shafts. There are 3 options of clutch plate configuration and the pre-load is fully adjustable.

The ability to set it up gives it a major advantage over other Limited Slip Differentials on the market. The KAM Limited Slip Differentials have been successfully tried and tested in top race vehicles with 450bhp/500 ft/lbs torque.

The KAM clutch plate LSD unit provides smoother power delivery than competitors units. This ensures less stress is applied to the half shafts. Specialist F1 material used in manufacturing ensures longevity of the clutch plates.



- Clutch type LSD
- 4 pinion diff carrier
- LSD & full locker combo
- More power = More lock
- Available front or rear
- Pre load fully adjustable



KAM Heavy Duty 4 Pinion Differential Carrier

Part No	Type	Application
KAM610	Long Nose	90/110/130/D1/D2/RRC FRONT & D2 REAR
KAM620	Short Nose	110/130 REAR 2002 on & P38 FRONT & REAR

Four pin carrier can be upgraded to LSD combination (see upgrade page)

KAM Heavy Duty LSD 4 Pinion Differential Carrier

Part No	Type	Application
KAM630	Long Nose	90/D1/D2 RRC REAR
KAM631	Long Nose	90/110/130/D1/D2/RRC FRONT
KAM640	Short Nose	110/130 REAR 2002 on & P38 REAR
KAM641	Short Nose	P38 FRONT



NB: For clarification all 2002 on Defender 110s have a short nose fitted to the rear and the long nose fitted to the front

KAM CROWN WHEEL & PINIONS

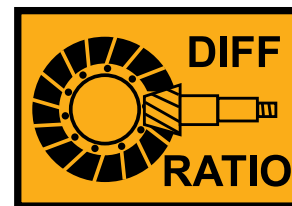
KAM offers a range of alternative ratio crown wheel and pinion gear sets. The optimum final drive ratio can be selected to accommodate increased tyre diameter, up rated engine performance and vehicle application.

The increase in strength is measured by using the standard 3.54 ratio as a baseline, calculating input torque, produced by the engine power and output torque produced by the feedback into the differential from traction obtained.

Up to 25% gearing reduction coupled with up to 70% increase in strength is possible with KAM lower ratio crown wheels and pinions.

3.54:1 is the standard ratio on all Land Rover Defenders, Discovery's and Range Rover Classics. Lower ratios of 3.8, 4.1 and 4.75 are available. The effect of these lower ratios can be seen in the chart. The 2.83 ratio is higher giving 28% increases in overall gearing. It has the effect of either reducing the engine revs or increasing overall road speed. This is generally suited to high-speed roadwork and vehicles that have had engine modifications.

Land Rover fit the same differential assembly to the front and rear axles. As a result the front differential rotates in the opposite direction to the rear with the driving force being applied to the back of the gear teeth. KAM produce ring and pinion sets for the front differential assembly that are 'reverse cut' which ensure the force is applied to the stronger/correct side of the gear teeth.



- 2.83 3.8 4.1 & 4.75 available
- Reverse cut front option
- Up to 70% stronger
- 43% Thicker crown wheel
- 40% Larger tooth profile
- Competition proven

Gearing variations from 3.54 ratio

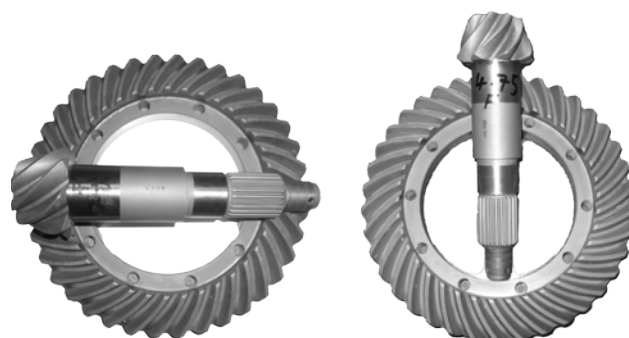
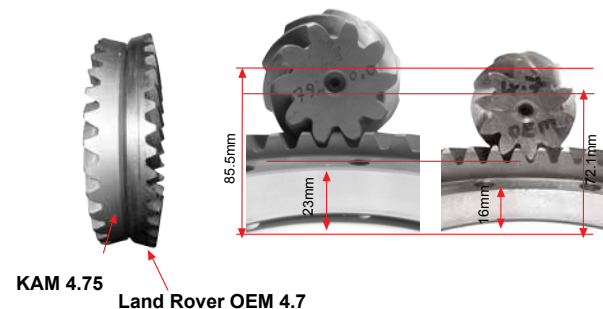
Ratio	Teeth No	Land Rover	Strength Inc %
4.75:1	38/8	-25.47%	50%
4.1:1	41/10	-13.65%	25%
3.8:1	38/10	-7%	70%
2.83:1	51/18	+25.08	28%

KAM Crown Wheel and Pinions

Part No	Ratio	Application for Long Nose Differentials
KAM538	3.8	90/D1/D2/RRC FRONT
KAM539	3.8	90/D1/D2/RRC REAR
KAM541	4.1	90/110/130/D1/D2/RRC FRONT
KAM542	4.1	90/D1/D2/RRC REAR
KAM546	4.75	90/110/130/D1/D2/RRC FRONT
KAM547	4.75	90/D1/D2/RRC REAR
KAM528	2.83	90/D1/D2/RRC FRONT & REAR
Part No	Ratio	Application for Short Nose Differentials
KAM548	4.75	110/130 REAR 2002 ON & P38 F&R
KAM549	4.1	110/130 REAR 2002 ON & P38 F&R

NB: For clarification all 2002 on Defender 110s have a short nose fitted to the rear and the long nose fitted to the front.

Improved Strength KAM 4.75 Land Rover OEM 4.7



Rear Cut

Front Reverse Cut

KAM HEAVY DUTY REPLACEMENT AXLE

KAM Axle Reinforcing Kits

This KAM reinforcing kit comes with full instruction on how to weld it on. The picture shows the reinforced parts in position but not welded on. Simply remove the paint and any rust around the area you will be welding. Tack into position and follow the instructions that come with every kit.

Part No	Type	Description
KAM770	Rear	Long Nose 90/110/130/D1/RRC up to 2002
KAM775	Front	Long Nose 90/110/130/D1/RRC 1984 on



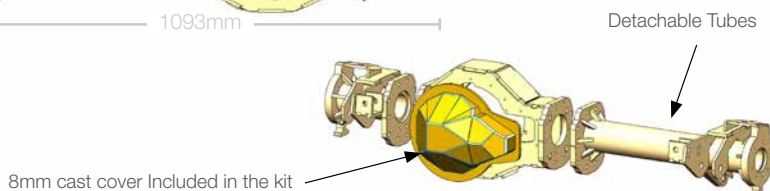
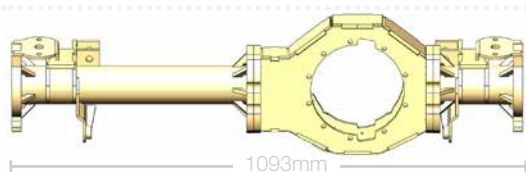
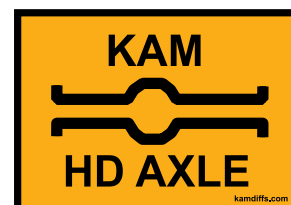
KAM 8mm Aluminium Diff Cover Kit - with weld-on ring

Part No	Type	Description
KAM150	Long Nose	All 90s fronts, 90 rears (upto 1998), 110/130 Fronts, or D1/D2/RRC Front & Rear
KAM151	Short Nose	110 rear 2002 on
KAM152	Long Nose	90 rear 1998 on (shallow cover - to clear the fuel tank)



KAM Heavy Duty Replacement Land Rover Axle Tubes*

Part No	Type	Description
KAM730	Front	Short Nose with KAM - 8mm Diff locker cover fitted P38 (Special Application)
KAM740	Front	Long Nose with KAM - 8mm Diff locker cover fitted 90/110/130/D1/RRC 1994 on
KAM750	Rear	Long Nose with KAM - 8mm Diff locker cover fitted 90/110/130/D1/RRC up to 2002
KAM760	Rear	Short Nose with KAM - 8mm Diff locker cover fitted 90/110/130 2002 on



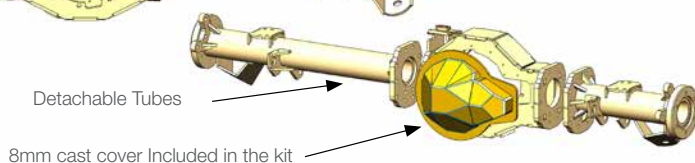
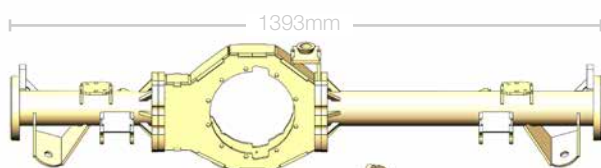
KAM730 KAM740

Specifications

- 9.5mm Tube thickness.
- 40% Thicker than standard.
- Brackets 8mm Steel.
- Accepts standard swivel housing.
- Mounting ring fitted for KAM locker.
- Overall length: 1093mm
- Finish: Black
- Weight: 38.8Kg
- 8mm Cast cover supplied with all kits

Available options

- Castor angle: standard
- Rover Long or P38 Short nose Diff
- Uses 1994 on stub axles and hubs.
- Interchangeable tube options.
- Optional beam lengths.
- Optional diff positions.
- Shaft & CV options:
 - Standard Land Rover Shafts
 - KAM HD Aerospace Shafts: CV



KAM750 KAM760

Specifications

- 9.5mm Tube thickness.
- 40% Thicker than standard.
- Brackets 8mm Steel.
- Accepts standard stub axle & hub.
- Mounting ring fitted for KAM locker.
- Overall length: 1393mm.
- Finish: Black
- Weight: 43.1Kg.

Available options

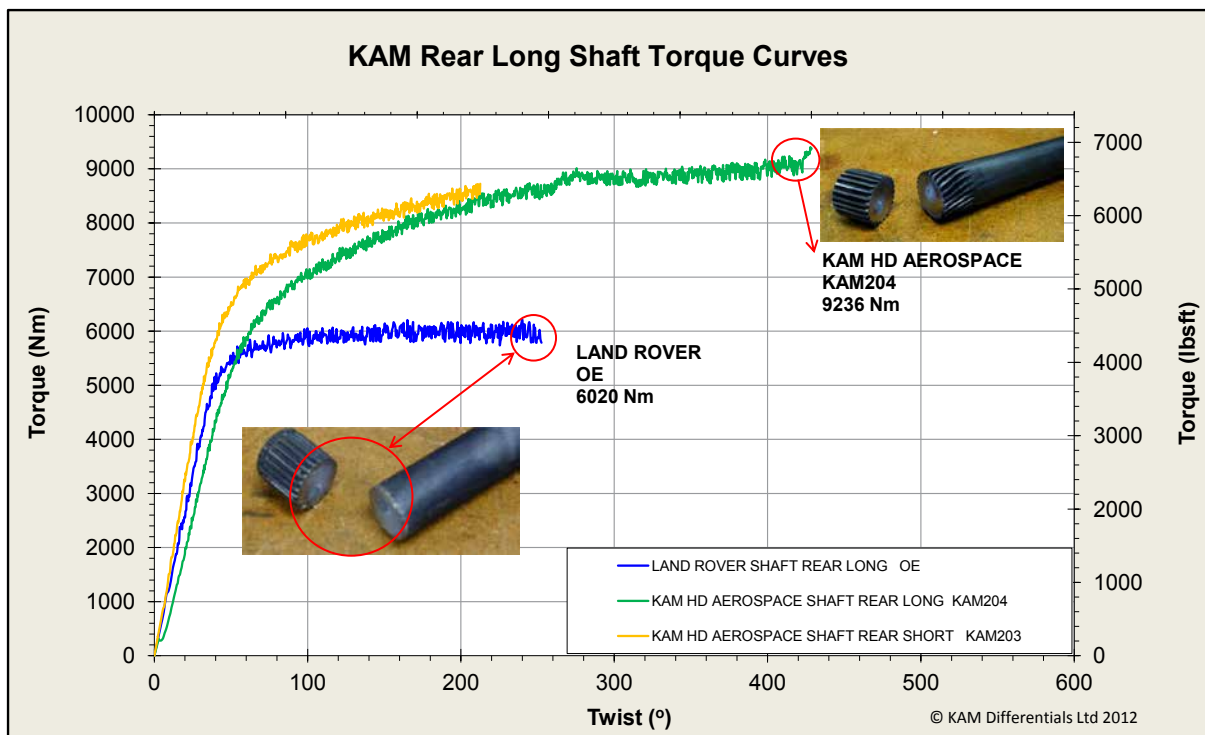
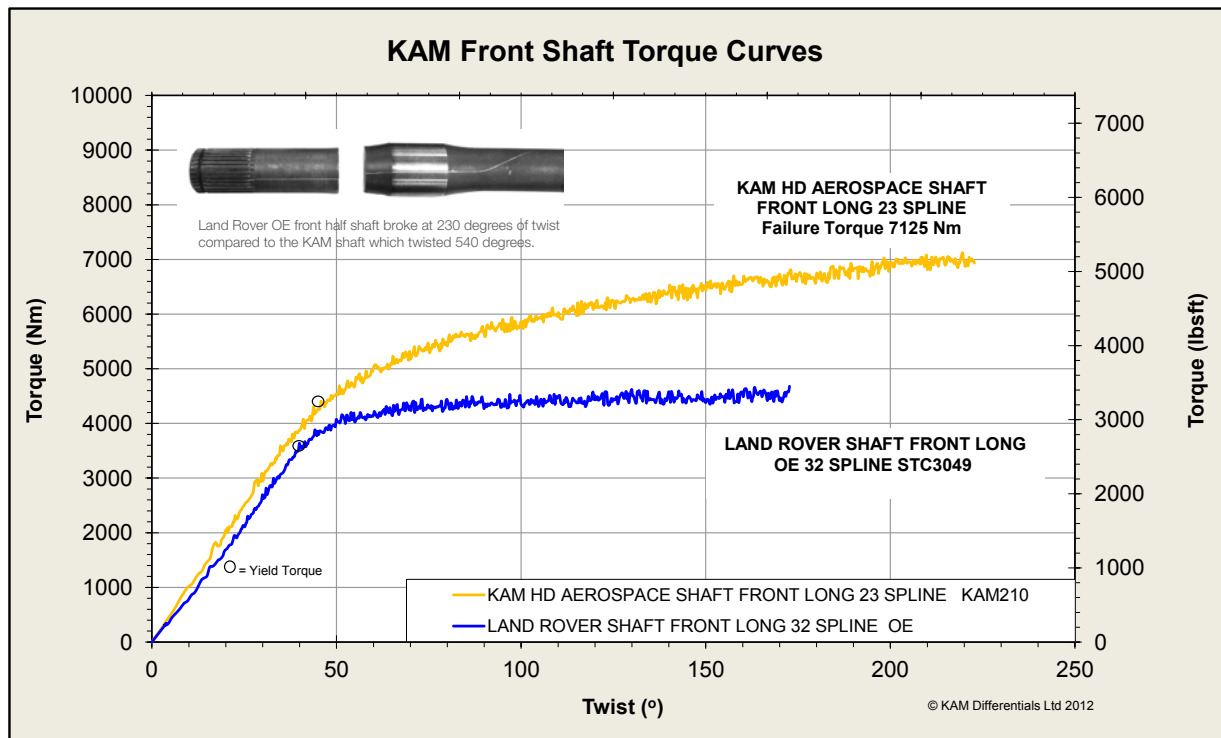
- Rover Long or P38 Short nose Diff.
- Uses 1994 on stub axles and hubs.
- Optional beam lengths
- Optional diff positions.
- Shafts:
 - Standard Land Rover Shafts
 - KAM HD Aerospace Shafts

*Special order only, call KAM directly to discuss your requirements.

TEST DATA OF LAND ROVER VS KAM DRIVE SHAFTS

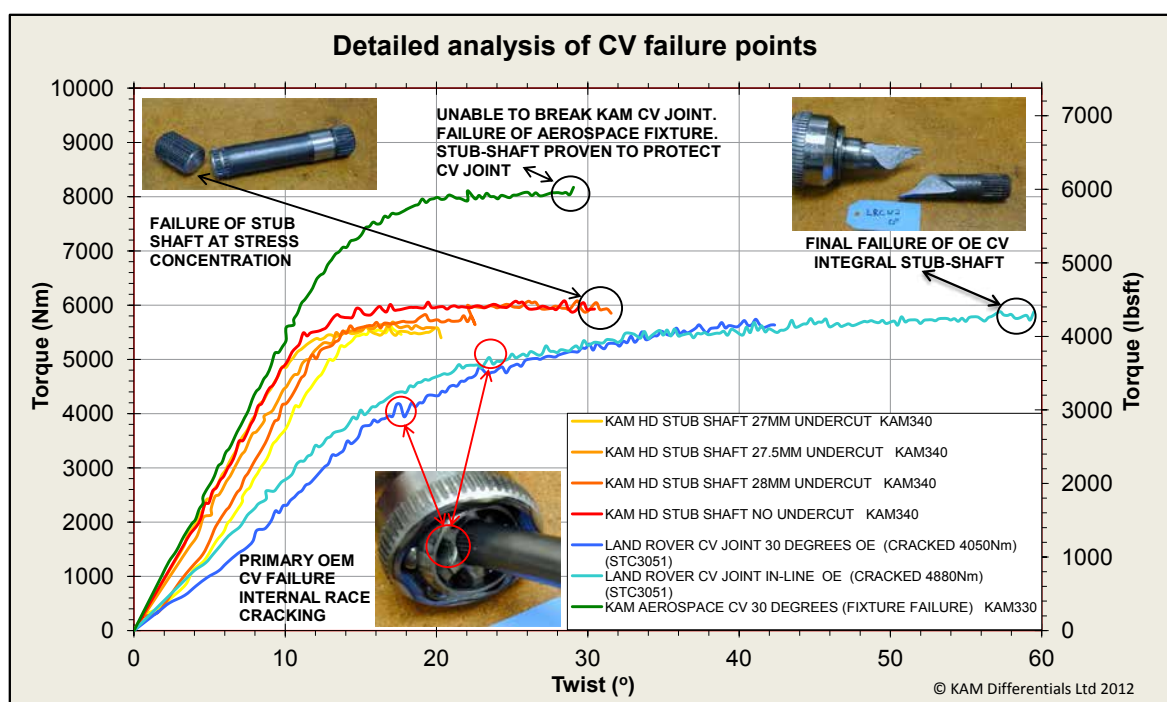
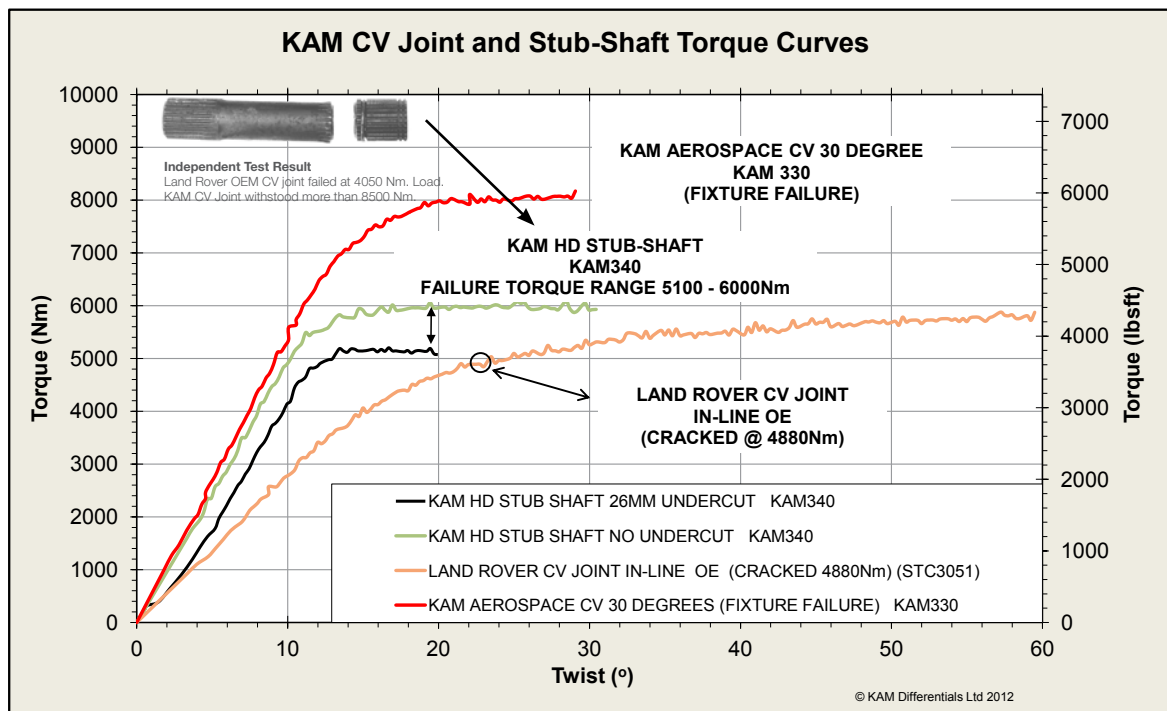
A number of defence contractors requested imperial test data on the KAM heavy duty components. KAM commissioned an independent report on the strength of the KAM parts over the standard Land Rover OEM parts. The full report is available upon request from KAM.

Test data on OEM vs KAM front long shaft



TEST DATA OF LAND ROVER VS KAM CV JOINTS AND STUB SHAFTS

Test data on Land Rover vs KAM CV & fusible stub shaft system



For more information, please visit KAM Differentials Ltd Website

www.kamdiffs.com



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