Advanced Design Solution

Driveline Systems for High Mobility Vehicles

ENJOYING DRIVING US FORWARD

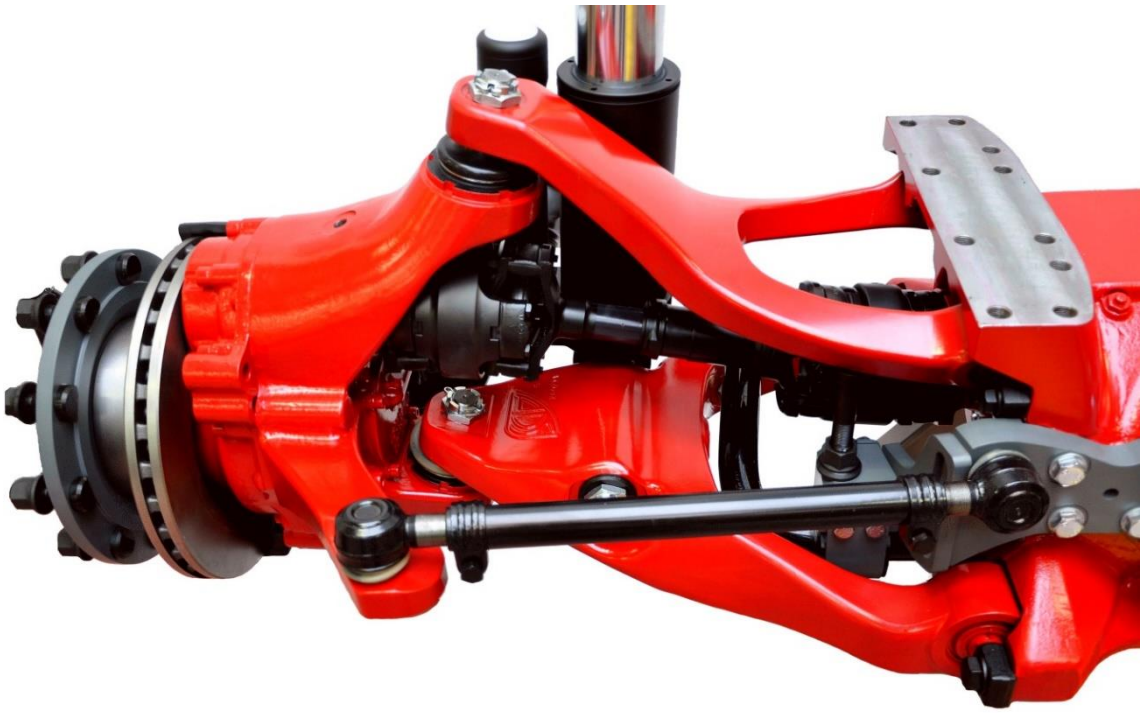
Introduction

Advanced Design Solution is the leading company in the field of driveline systems for high mobility vehicles. The ADS product line is very well known and has been used by many vehicle OEMs throughout the Europe, Asia, and the Middle East.

ADS offers a comprehensive range of products for defence market, bringing proven driveline solutions and best in class performance. ADS gets the advantage of quick turnaround on technical queries, in depth knowledge and in-house manufacturing, an effective and quick decision team, global exposure, long term warranties, and short lead time on standard products.

Customers may select from ADS standard serial products with modular design with many optional features, modified standard products or newly designed projects according to specific requirements.

Advanced Design Solution makes products with sophisticated design, high function parameters, and clean styling.



Independent Suspension Axles Overview

Driveline Systems

Advanced Design Solution offers Driveline Systems with independent suspension axles and various transfer case models for complete range of high mobility vehicles:

From **4x4** to **12x12**

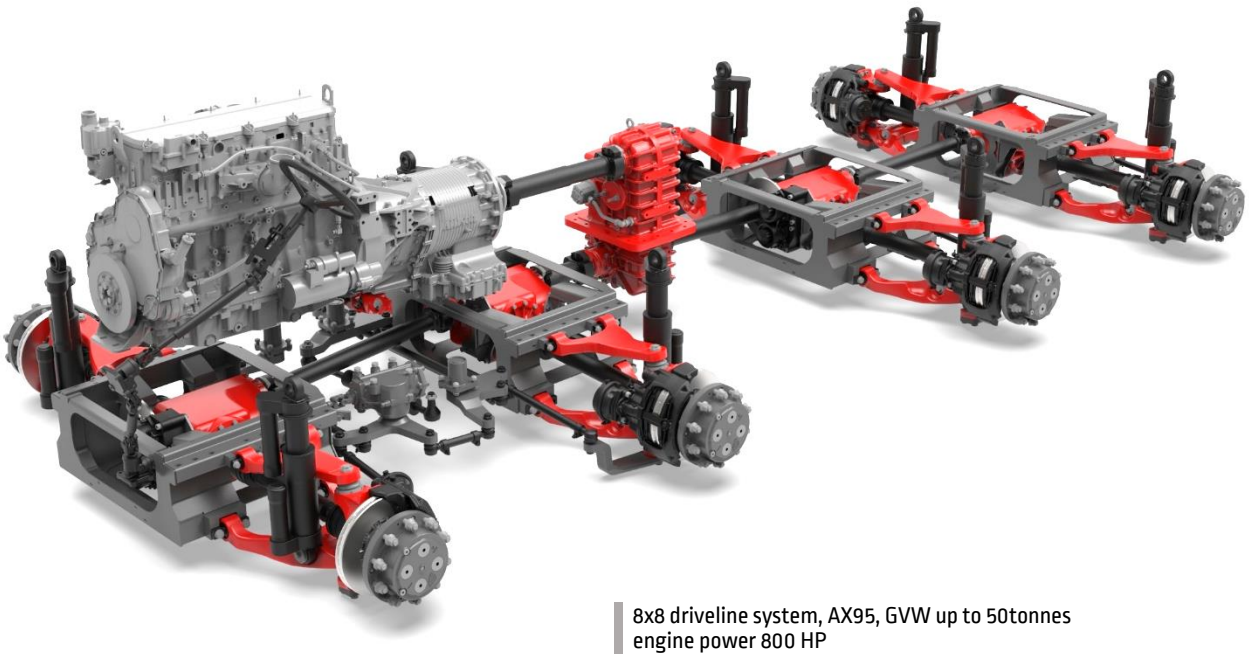
From **2,000 kg/axle** to **13,000 kg/axle**

From **200 HP** to **800 HP**

OEMs can rely on our long-term experience with over 3500 driveline systems in service of worldwide accomplished end users and customers.

ADS engineering team is prepared to design driveline systems for specific vehicles, giving outstanding parameters and unique features, such as low weight, low chassis profile and center of gravity position, high ground clearance, or easy component replacement.

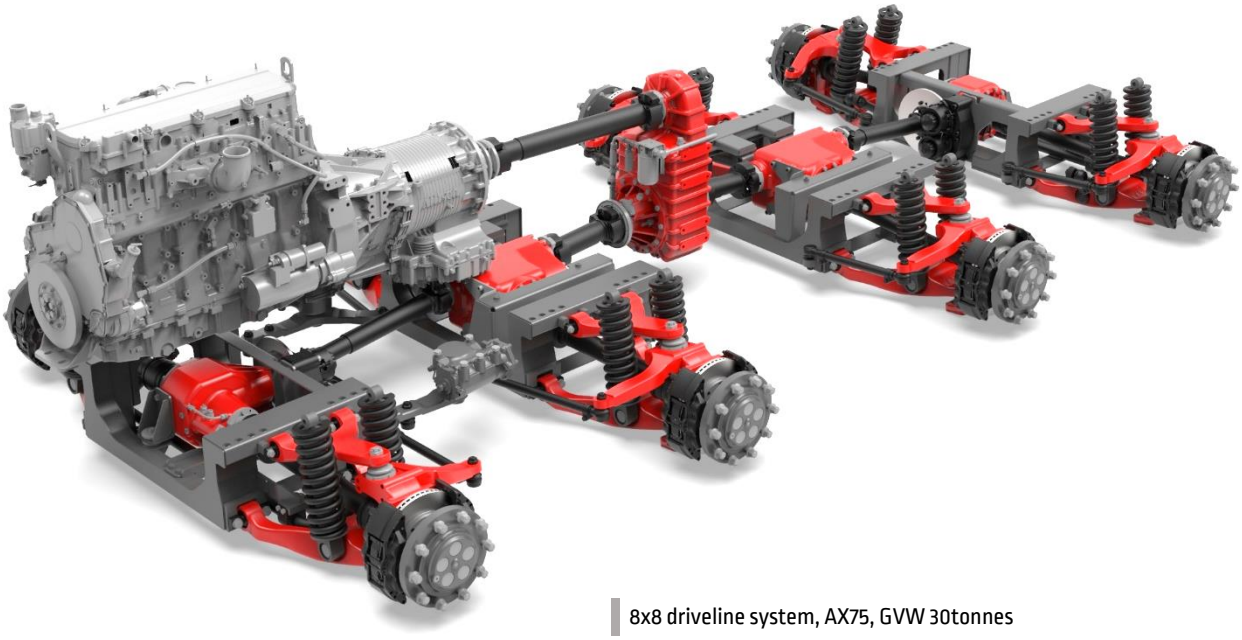
6x6 driveline system, AX60, GVW 18tonnes
engine power 350 HP



8x8 driveline system, AX95, GVW up to 50tonnes
engine power 800 HP

6x6 driveline system, AX80, GVW 28tonnes

4x4 driveline system, AX60LP, GVW 14tonnes



8x8 driveline system, AX75, GVW 30tonnes

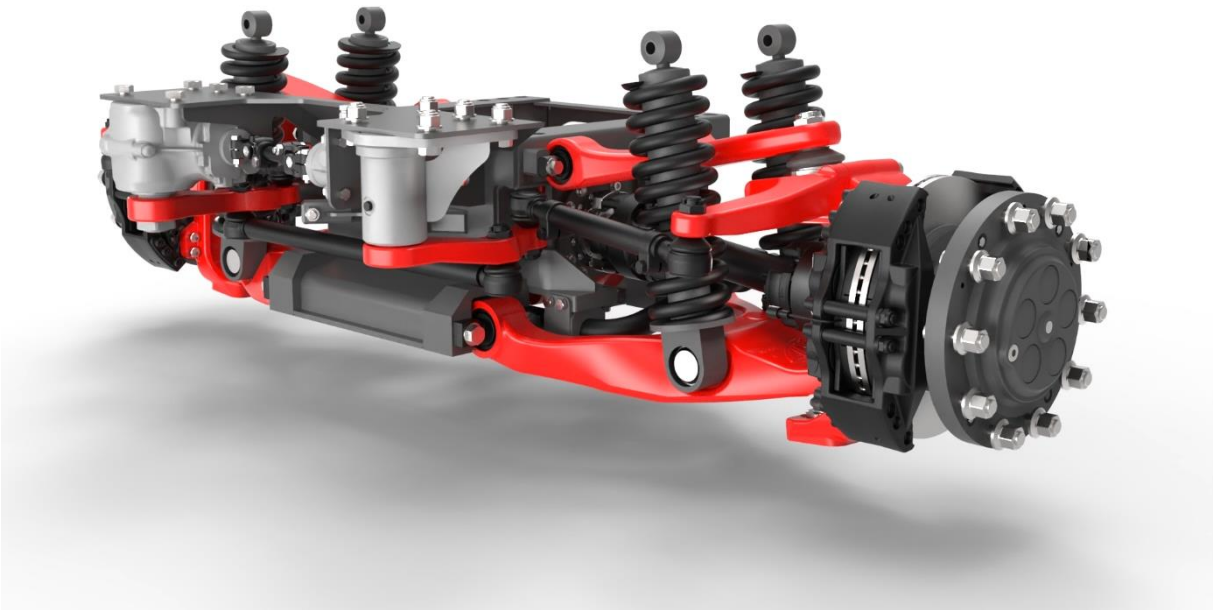
Independent Suspension Axles

Independent Suspension Axle is a principal component of driveline systems for high mobility vehicles. The comprehensive product range is covered by six main product lines AX40, AX60/AX60LP, AX55/AX75, AX96, AX90, and AX95, suitable for full range starting from light rapid vehicles up to heavy APC or MRAP vehicles.

ADS Independent Suspension Axles are known for their clean design, excellent ground clearance, low weight, outstanding heat resistance in warm, desert conditions and high mechanical efficiency. All Independent Suspension Axles have CTIS option a standard, high-capacity axle and interaxle differentials with 100% mechanical lock, Anti-Roll Bar as a standard or an option, and powerful disc brakes with ABS option. The modular design gives OEMs an advantage of easy installation into the vehicle structure with a quick replacement.

The latest innovative Product lines offer increased weight capacity, various steering configurations and low installation height (measured from wheel center to mounting flange) keeping best-in-class ground clearance. We call this Product family LOW PROFILE INDEPENDENT SUSPENSION AXLES. It brings OEMs and customers the best possible combination of ground clearance, performance and protection while maximizing internal space even in a low vehicle profile.

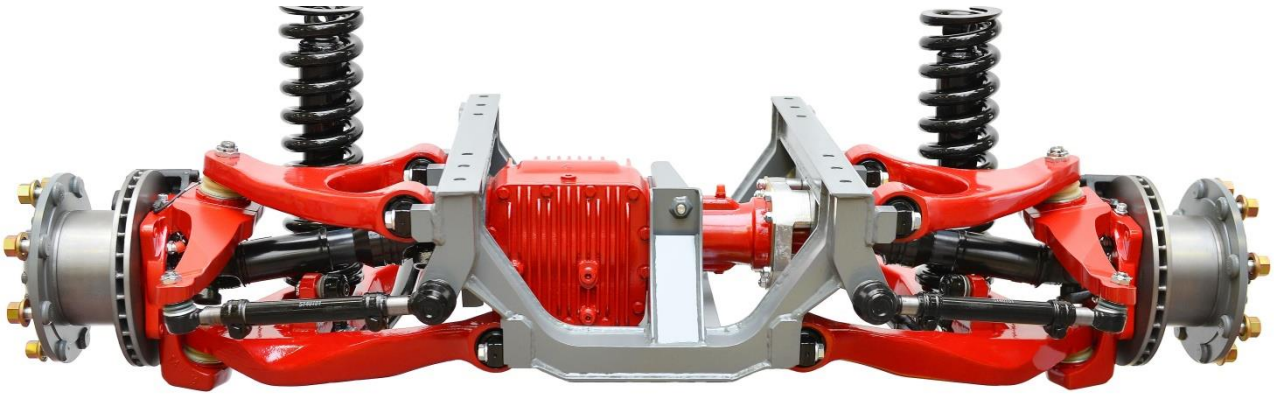
Design Example of AX 75 Low Profile Independent Suspension Axle with integrated steering system, short and compact solution



LOW PROFILE INDEPENDENT AXLES OVERVIEW

Model	AX40	AX60 / AX60LP	AX55 / AX75	AX96	AX90	AX95
Visual						
Weight Capacity	2 000 – 4 000 kg	3 500 – 7 000 kg	3 500 – 6 500 / 8 000 kg	6 000 – 10 000 kg	7 000 – 11 000 kg	7 000 – 13 000 kg
Overall Ratio	1.69	4.87, 3.83	5.52, 6.28 / 6.76	5.07	4.5 - 6.06	6.0 - 7.5
Wheel End	DIRECT DRIVE	PORTAL	PLANETARY	PORTAL	PORTAL	PLANETARY
Wheel Rim	16", 16.5"	20"	20"	20"	20"	20"
Ground Clearance	370 mm (325 / 85 R16)	455 mm (365 / 80 R20)	425 mm (395 / 85 R20)	490 mm (395 / 85 R20)	530 mm (16.00 R20)	485 mm (16.00 R20)
Installation Height	205 mm	240 mm	220 mm	270 mm	335 mm	220 mm
Suspension	MECHANICAL	MECH./ HYDROPNEU.	MECH. / HYDROPNEU.	MECH. / HYDROPNEU.	MECH. / HYDROPNEU.	MECH. / HYDROPNEU.
Disc Brakes	HYDRAULIC	HYDRAULIC	PNEUMATIC / HYDRAULIC	PNEUMATIC / HYDRAULIC	PNEUMATIC / HYDRAULIC	PNEUMATIC / HYDRAULIC
ABS Ready	YES	YES	YES	YES	YES	YES
Differential Locks	OPTION	STANDARD	STANDARD	STANDARD	STANDARD	STANDARD
CTIS	OPTION	STANDARD	STANDARD	STANDARD	STANDARD	STANDARD
Anti - Roll Bar	OPTION	STANDARD	OPTION	OPTION	OPTION	OPTION
Drive Through Diff.	ON REQUEST	AVAILABLE	AVAILABLE	ON REQUEST	ON REQUEST	AVAILABLE
Weight (typical)	390 kg	580 kg (without subframe)	550 / 640 kg (without subf.)	765 kg (without subf.)	850 kg	960 kg

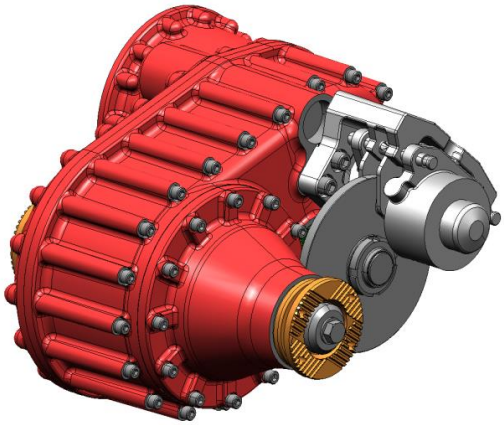
AX40

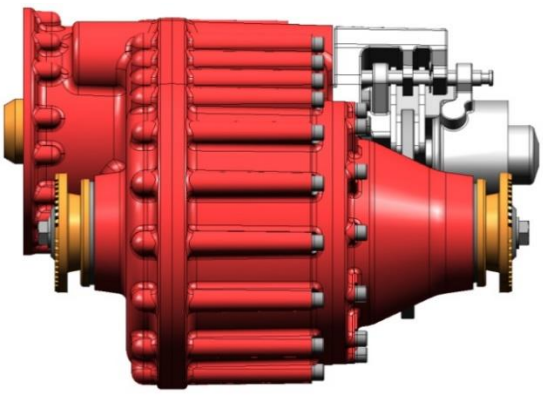


Technical Data

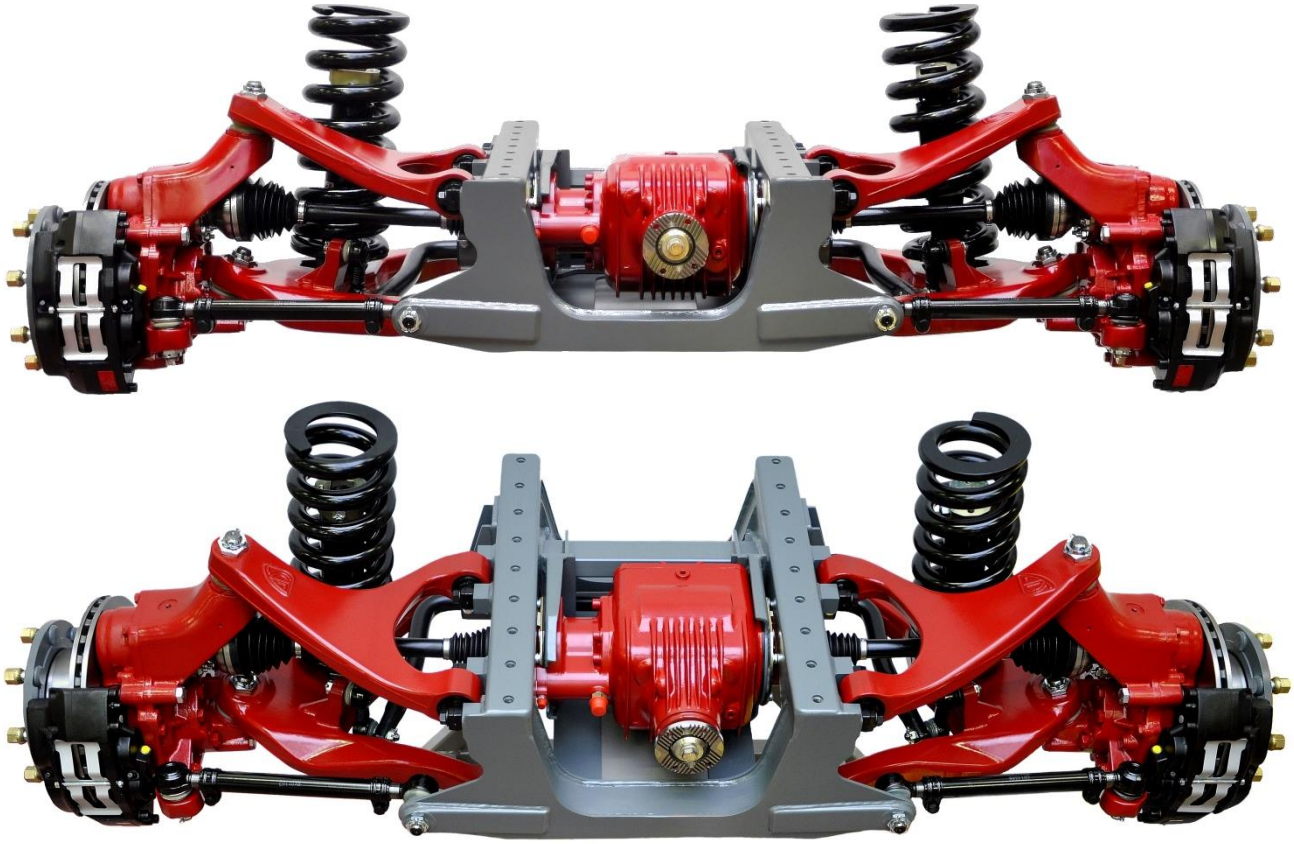
Static Axle Load, Front/Rear	3 500 kg / 4 000 kg
Axle Differential Ratio	1.69
Overall Ratio	1.69
Maximum Input Torque	9 000 Nm
Maximum Input Speed	2 400 RPM
Suspension	Coil Spring
Damping	Hydraulic Damper
Total Wheel Travel	220 mm
Maximum Wheel Angle Inside / Outside	37.0° / 29.5°
Differential Oil Capacity	3.30 l
Wheel Gear Oil Capacity	0.60 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120 °C
Max. Working Temperature of Wheel Gear	100 °C
Brake	Hydraulic Brakes Knott 2x calipers 4x44, Ventilated Disc Ø 325 mm
Tire recommended	325 / 85 R16
Rim size	16'', 16.5''
Wheel mount inches(mm)	Hub piloted 8 Stud – 10.83 BC (275)
Weight, Front/Rear	400 kg / 386 kg

Transfer Case TCP500 suitable for AX40





AX60 / AX60LP (Low Profile)



Technical Data

Static Axle Load, Front/Rear	6 000 kg / 6 500 kg (7 000kg)
Axle Differential Ratio	1.69
Wheel Gear Ratio	2.88 (2.26)
Overall Ratio	4.87 (3.83)
Maximum Input Torque	8 500 Nm
Maximum Input Speed	3 600 RPM
Suspension	Coil Spring
Damping	Hydraulic Damper
Total Wheel Travel	300mm
Maximum Wheel Angle Inside / Outside	37.0° / 29.5°
Differential Oil Capacity	2.80 l
Wheel Gear Oil Capacity	0.95 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120 °C
Max. Working Temperature of Wheel Gear	100 °C
Brake	Hydraulic Brakes Knott 2x calipers 4x60, Ventilated Disc Ø 405 mm
Tire	335 / 80 R20, 365 / 80 R20
Wheel Mount	20" 8-Bolt - Stud Piloted, 275mm (10,83")
Weight Front/Rear	775 kg / 692 kg incl. subframes and steering subframe 610 kg / 582 kg without subframes

Options

Suspension	Hydropneumatic
Differential	Drive through differential with IAD 1:1
AWS	Remote electro-hydraulic steering

AX75

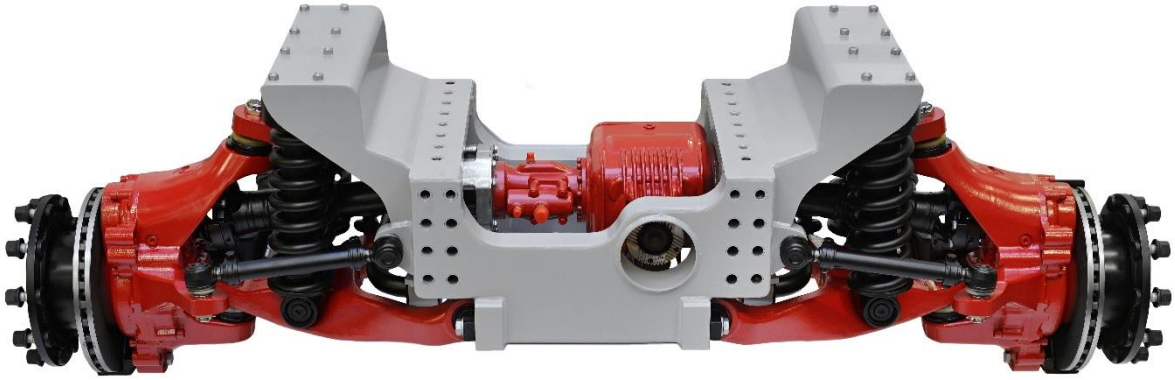
Technical Data

Static Axle Load, Front/Rear	7 500 kg / 8 000 kg
Axle Differential Ratio	1.69
Wheel Gear Ratio	4.0 (3.3)
Overall Ratio	6.76 (5.58)
Maximum Input Torque	8 500 Nm
Maximum Input Speed	3 600 RPM
Suspension	Coil Spring
Damping	Hydraulic Damper
Total Wheel Travel	330mm (400mm)
Maximum Wheel Angle Inside / Outside	37.0° / 29.5°
Differential Oil Capacity	2.80 l
Wheel Gear Oil Capacity	0.65 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120°C
Max. Working Temperature Wheel Hub	100°C
Brake	Disc Brakes Hydraulic / Pneumatic Ventilated Disc ϕ 430
Tire	395 / 85 R20, 365 / 80 R20
Wheel Mount	20" 8-Bolt - Hub Piloted, 275 mm (10,83"), Option: 20" 10-Bolt - Hub Piloted, 335 mm (13,19")
Axle Mounting	From bottom or top side
Weight Front / Rear	740 Kg / 740 Kg including subframe 640 Kg / 640 Kg without subframe

Options

Suspension	Hydropneumatic
Differential	Drive through differential with IAD 1:1
AWS	Remote electro-hydraulic steering

AX96



Technical Data

Static Axle Load, Front/Rear	6 000 – 10 000 kg
Axle Differential Ratio	1.69
Wheel Gear Ratio	3
Overall Ratio	5.07
Maximum Input Torque	8 500 Nm
Maximum Input Speed	3 600 RPM
Suspension	Coil Spring
Damping	Hydraulic Damper
Total Wheel Travel	330mm
Maximum Wheel Angle Inside / Outside	35.0° / 29.5°
Differential Oil Capacity	2.8 l
Wheel Gear Oil Capacity	1.4 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120 °C
Max. Working Temperature Wheel Hub	100 °C
Brake	Disc Brakes Hydraulic / Pneumatic Ventilated Disc Ø 410 mm
Tire	365 / 80 R20 up to 16.00 R20
Wheel Mount	20" 10-Bolt - Hub Piloted, 335 mm (13,19")
Axle Mounting	From bottom or top side
Weight Front / Rear/Middle	765 kg / 775 kg / 837 kg without subframes

Options

Suspension	Hydropneumatic
Differential	Drive through differential with IAD 1:1
Parking brake	Tripstop cylinder on non-steerable axles, capability 14.5t / 60% - 4x4
Steering system option	Front / Rear Side Steering System
Customized subframe	
Different widths on request	

AX90

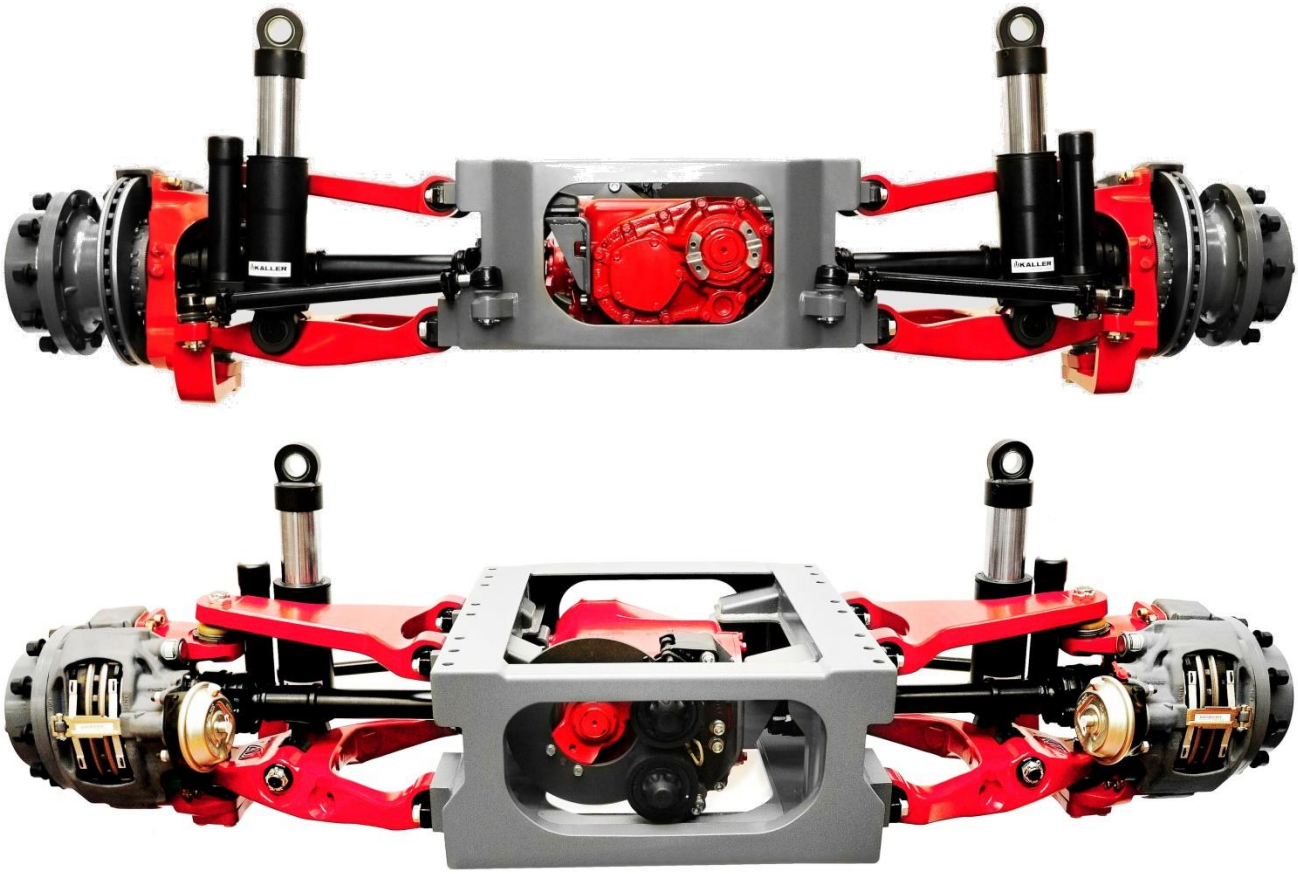
AX90 with Hydropneumatic Suspension

AX90 with Mechanical Suspension

Technical Data

Static Axle Load – Front	up to 10 000 kg
Static Axle Load – Rear	up to 11 500 kg
Axle Differential Ratio	1.75 / 2.36
Wheel Gear Ratio	2.57 / 3.0
Overall Ratio	4.5 / 5.25
Maximum Input Torque	12 000 Nm
Maximum Input Speed	3 000 RPM
Suspension	Coil Spring / Hydropneumatic
Damping	Hydraulic Damper
Total wheel travel	330 / 400 mm
Maximum Wheel Angle Inside / Outside	35° / 29.5°
Differential Oil Capacity	9.0 l
Wheel Gear Oil Capacity	1.4 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120 °C
Max. Working Temperature of Wheel Gear	100 °C
Brake	Disc Brakes Hydraulic / Pneumatic Ventilated Disc Ø 410 mm
Tire	from 365 / 85 R20 to 16.00 R20
Wheel Mount	20" 10-Bolt - Hub Piloted, 335 mm (13,19")
Weight Front / Rear	Front Axle 900 kg, Rear Axle 870 kg, Drive Through Axle 960 kg

AX95



Technical Data

Static Axle Load – Front	up to 12 000 kg
Static Axle Load – Rear	up to 13 000 kg
Axle Differential Ratio	1.75
Wheel Gear Ratio	4.0
Overall Ratio	7.0
Maximum Input Torque	12 000 Nm
Maximum Input Speed	3 000 RPM
Suspension	Hydro-Pneumatic / Mechanical
Total wheel travel	up to 450 mm
Maximum Wheel Angle Inside / Outside	35° / 29.5°
Differential Oil Capacity	9.0 l
Oil Capacity	1.3 l
Oil Specification	SAE 75W-90, Multi-Purpose Gear Oil, API-GL-5 or MIL-L-2105C or CD
Max. Working Differential Temperature	120 °C
Max. Working Temperature of Wheel Gear	100 °C
Brake	Pneumatic Brakes Knorr, Ventilated Disc Ø 432 mm
Tire	16.00 R20
Wheel Mount	20" 10-Bolt - Hub Piloted, 335 mm (13.19")
Weight Front / Rear	Front Axle 950 kg, Rear Axle 920 kg, Drive Through Axle 1010 kg

Transfer Cases and Special Gearboxes

ADS offers a complete product range of transfer cases for maximum input torque ranging from 5 000 Nm to 35 000 Nm. The complete product line contains two main groups:

1. Standard transfer cases: TC820, TCA850, TCA852, TC1600, TC2600 – are mostly in vertical arrangement having modular concept with many options, such as split torque differential, parking brake, PTO, emergency steering pump, direct mount provision for Allison transmissions, and others.

2. Special transfer cases: TCP500, TC1000, TC1012, TC1022, TC 1420, TC2000, TC2001, TC2004 – are designed according to requirements of specific projects, mainly space conditions.

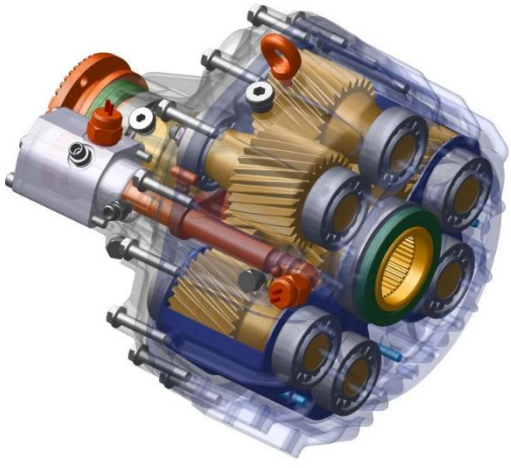
The significant advantages of ADS transfer cases are their compact and low dimensions, high efficiency and low noise level as a product of company engineering knowledge and best gearing technology by Reishauer and Gleason.

Transfer Case TC 1600

Transfer Case	TCP 500		TC 820	TCA 850	TCA 852	TC1012	TC1022	TC 1000
Input Torque Max. [Nm]	5 000		7000	8 000 (10 000)	8 000 (10 000)	10 000		10 000
Input Speed Max. [RPM]	4 000		4 100	4 000	4 000	3 600	4000	4 000
High Gear / Low Gear Ratio	3.15/6.6	3.75/ 7.3	1.24 / 2.80	1.10 / 1.94	1.10 / 1.94	1.1/1.94	1.3/2.5	1.11 / 1.94
Differential	1:1		1:2	1:2	1:2	1:2		1:1 / 1:2
Total Offset Distance [mm]	302.7		350	321.7	321.7	321.7		298.2
Weight [kg]	128		113	124	122	125		162

Transfer Case	TC 1600	TC 1420	TC 2000	TC 2001	TC 2004	TC 2600
Input Torque Max. [Nm]	16 000	20000	20 000	20 000	20 000	35 000
Input Speed Max. [RPM]	3 500	4 350	2 600	2 600	2 900	3250 / 2900
High Gear / Low Gear Ratio	1.30 / 2.27	1.37 / 2.25 (2.27)	0.87 / 1.69	0.87 / 1.69	0.78 / 1.69	1.17 (1.03) / 1.87
Differential	1:2	1:1	without	without	1:1	1:1 / 1:2.5
Total Offset Distance [mm]	422	570	495	510 / 15	147.5 / 228	470
Weight [kg]	290–410	435	305	315	292	405–495

Special Gearboxes	DP 1200	WG 600
Input Torque Max. [Nm]	12 000	5 900
Input Speed Max. [RPM]	3 200	4 500
Gear Ratio	0.893	1.0 / -1.0
Differential	1:1.916	without
Weight [kg]	235	94.5



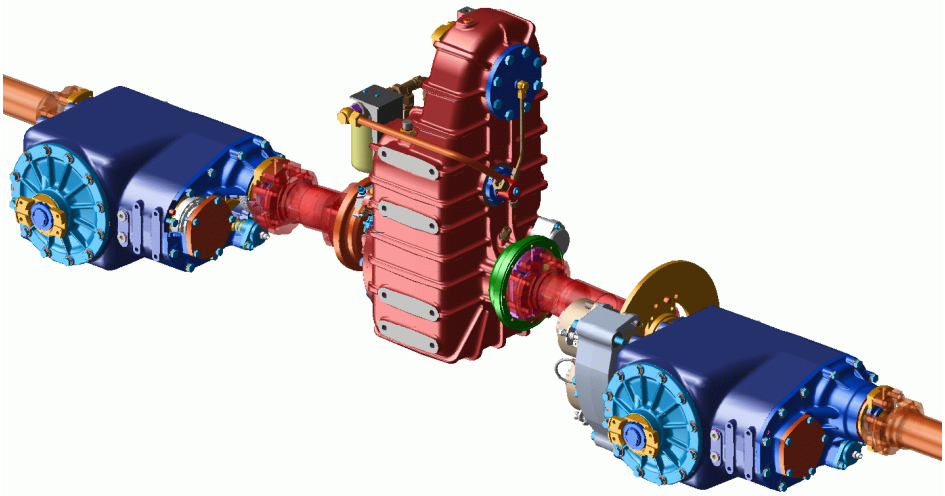
Reversing gearbox WG600, special bus Cobus

Drop box DP1200, Fennek vehicle

Example References

NIMR AUTOMOTIVE, NIMR AJBAAN and HAFEET, DRIVELINE SYSTEM AX60 4x4 / 6x6

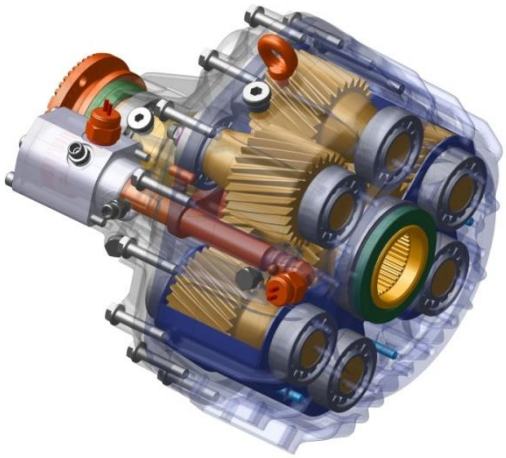
FNSS, PARS 8x8 VEHICLE, DRIVELINE SYSTEM 8x8, CUSTOMIZED



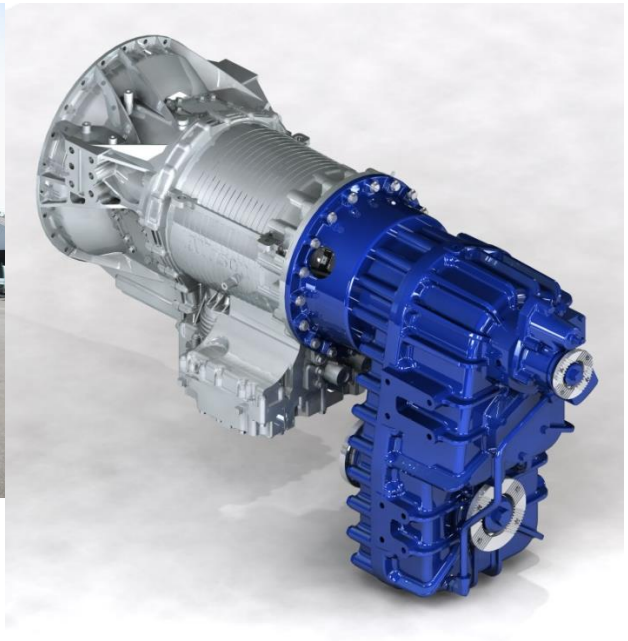
NUROL MAKINA, EJDER YALCIN VEHICLE, DRIVELINE SYSTEM AX80/AX90

KMW, FENNEK VEHICLE, DROP BOX DP1200

COBUS INDUSTRIES, CITY BUS, Reversing Gearbox WG600



KAMAG, Slag Pot Transporter 2700, Transfer Case TC2600



Company Facilities and Key Technologies

Production and Assembly Facilities in Kopřivnice, Czech Republic

CNC milling and turning machines by Mazak

Complete Gear technology by Reishauer and Gleason

Grinding Gear technology by Reishauer and Gleason, CNM and Gear Measurement

Assembly and Testing

Contacts

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Notes:

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