



PROFORMANCE MOTORSPORT

Capability Overview



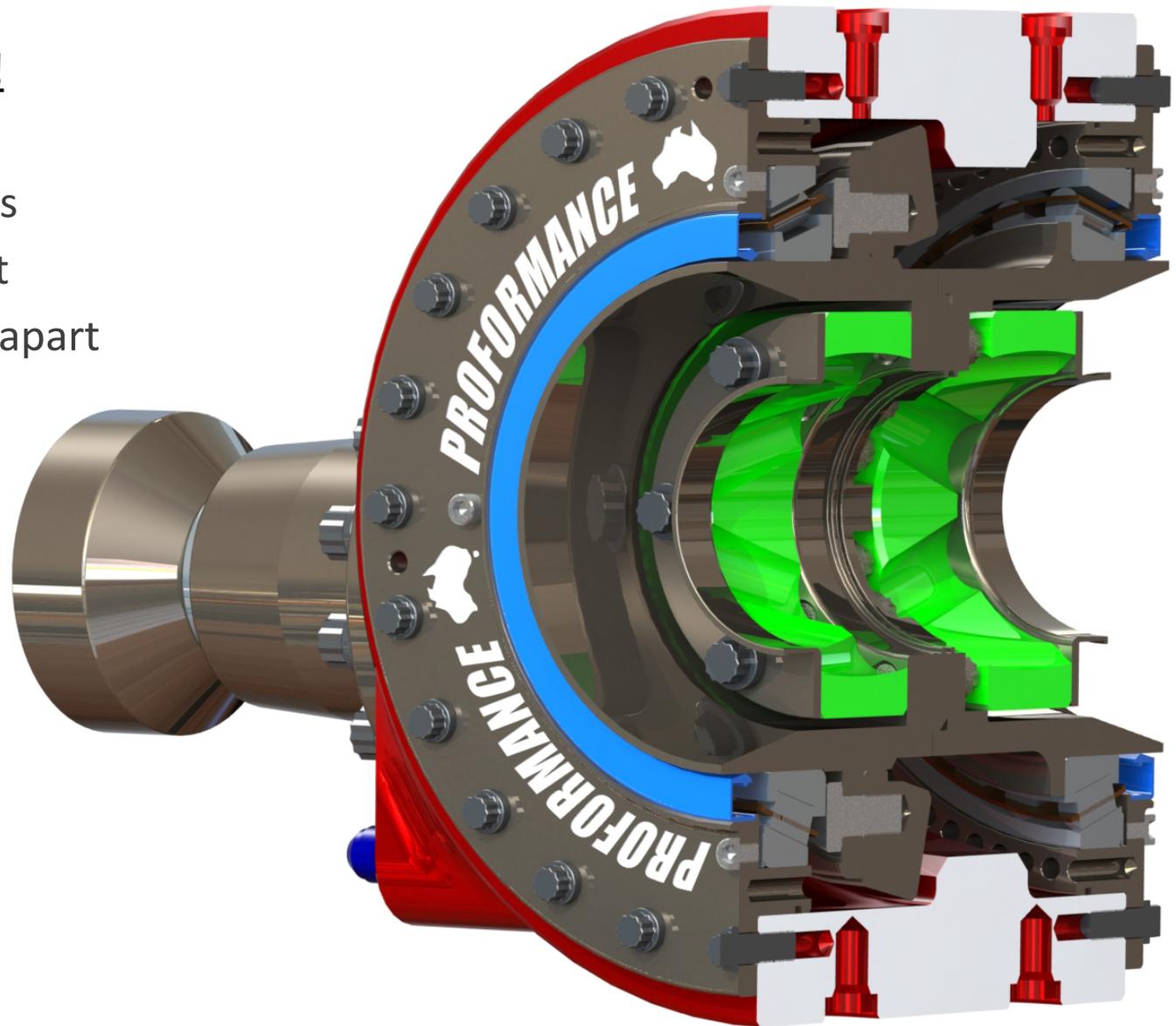
Introduction

- Military and Motorsport Components
- IFS – IRS Specialists
- 25 years Off Road Experience
- Imagineering – Concept Design
- Professional Heat Treatment
- Race Proven Components
- World's Narrowest Differentials
- Consulting + Engineering Services
 - CAD CAM
 - Hydraulics
 - Drivetrain
 - Suspension Geometry

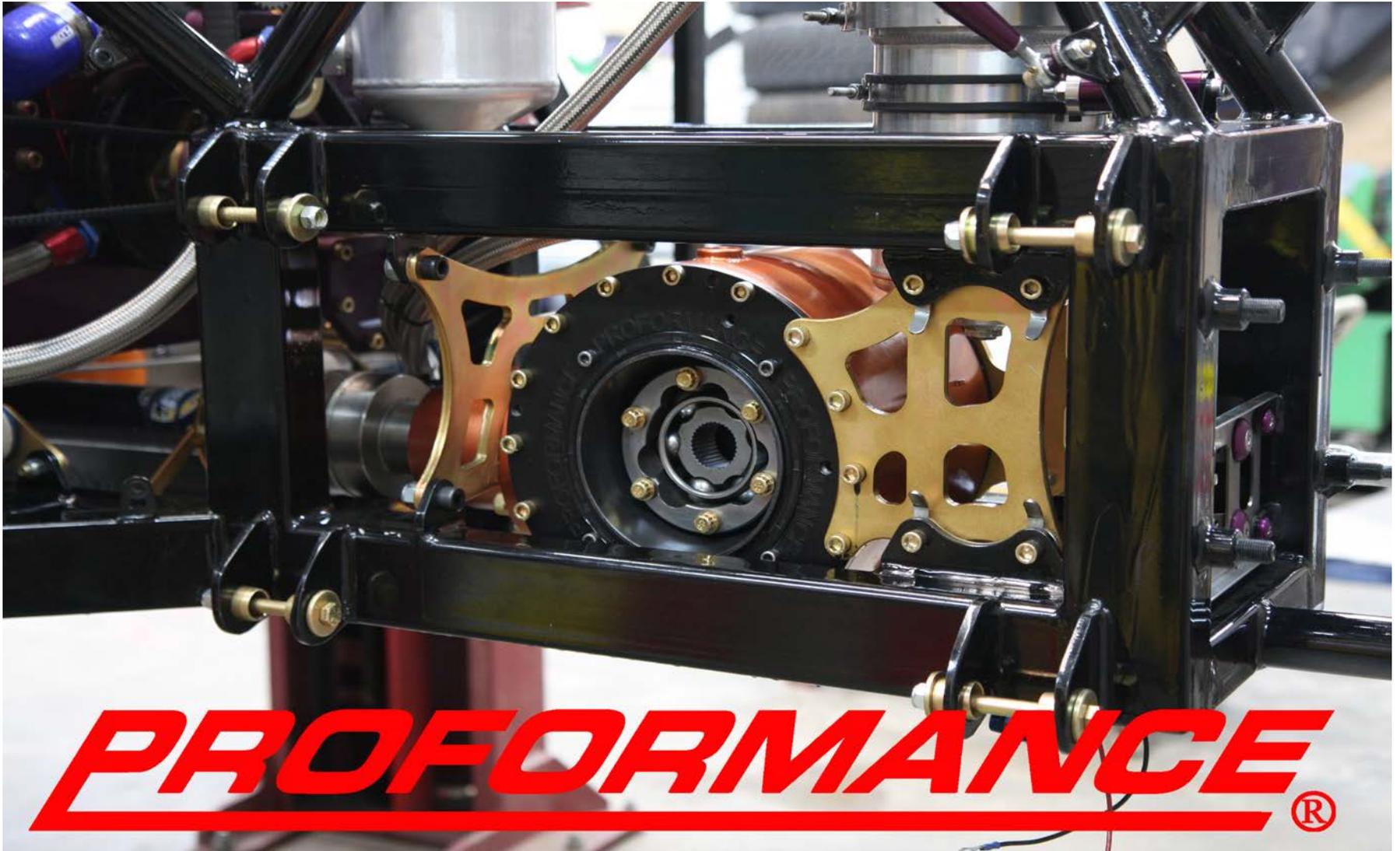


OUR CONCEPT (2006)

- **Game Changer!!**
- Huge bearings
- Internal CV Joints
- Axles 3mm apart
- CV Faces 40mm apart



Internal CV Joints – Longer Axles – More Travel

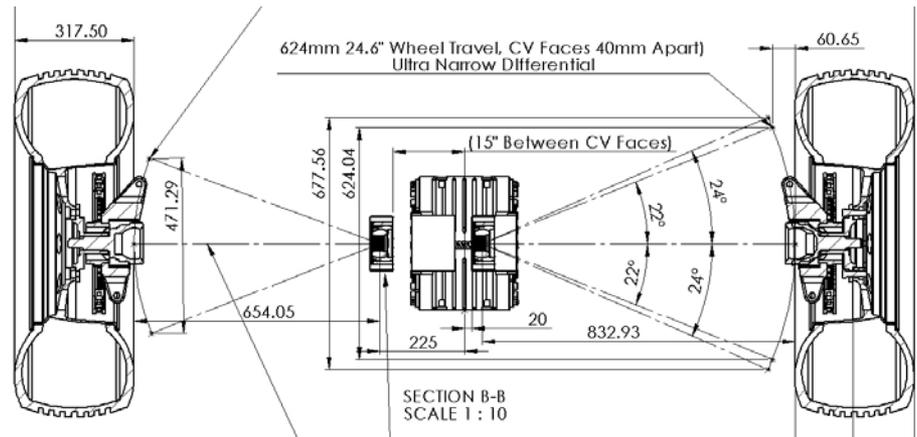
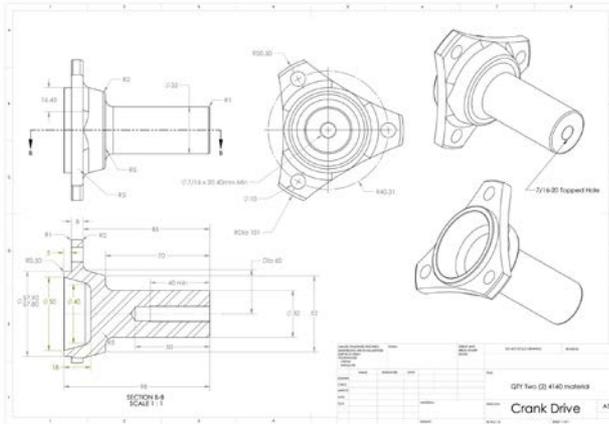


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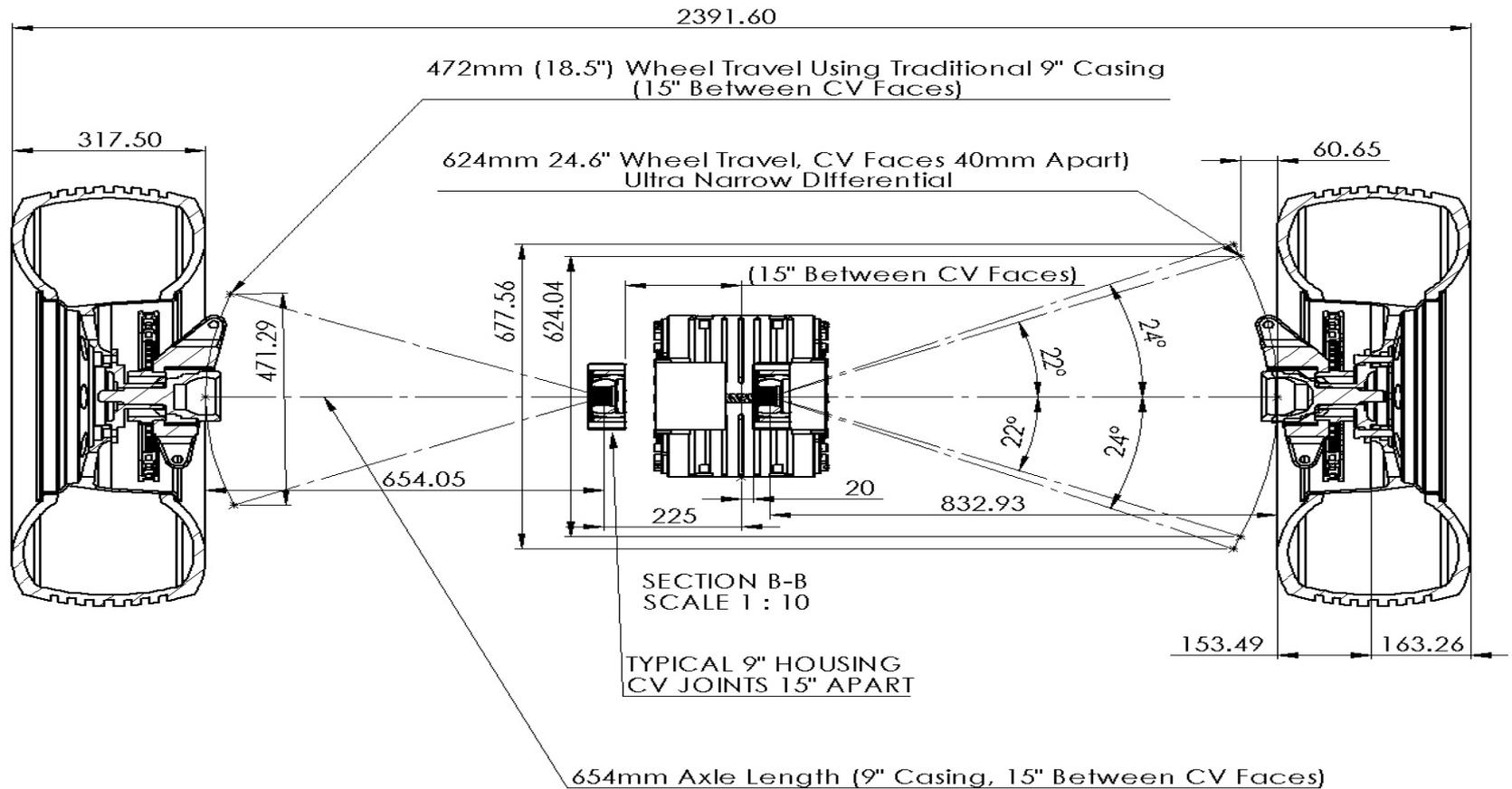
Long Wheel Travel



Vehicle Design and Manufacturing



Engineering & CAD Design Services



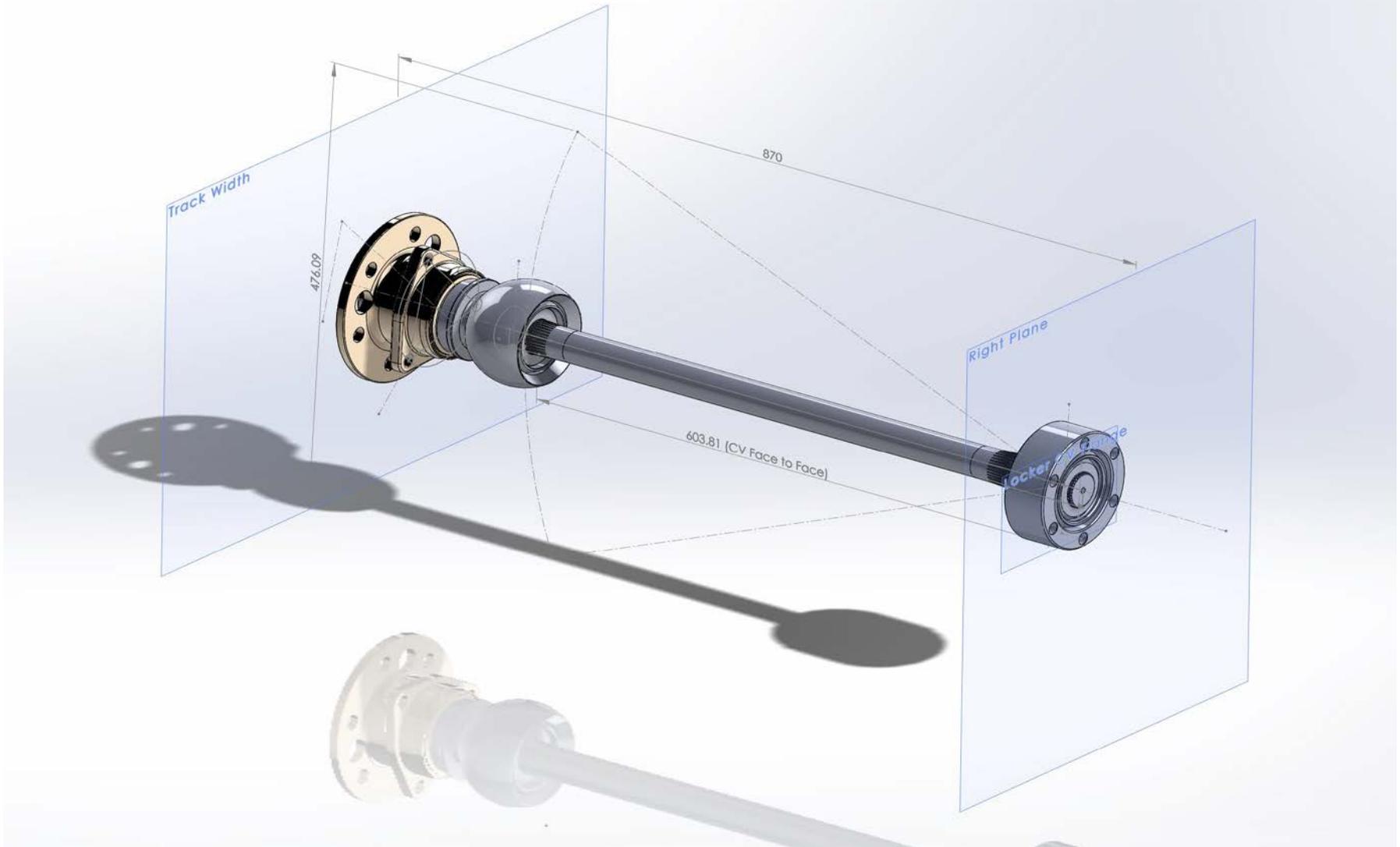
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS			Heat Treatment:	APPLY 0.5 RAD TO ALL TURNED EDGES UNLESS STATED OTHERWISE
SURFACE FINISH:			Finish:	
TOLERANCES: LINEAR: ANGULAR:				
REV	DATE	REASON FOR REVISION	TITLE:	
01				
02				
03				
04				
	DATE	NAME	MATERIAL:	

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Wheel to Wheel Packages

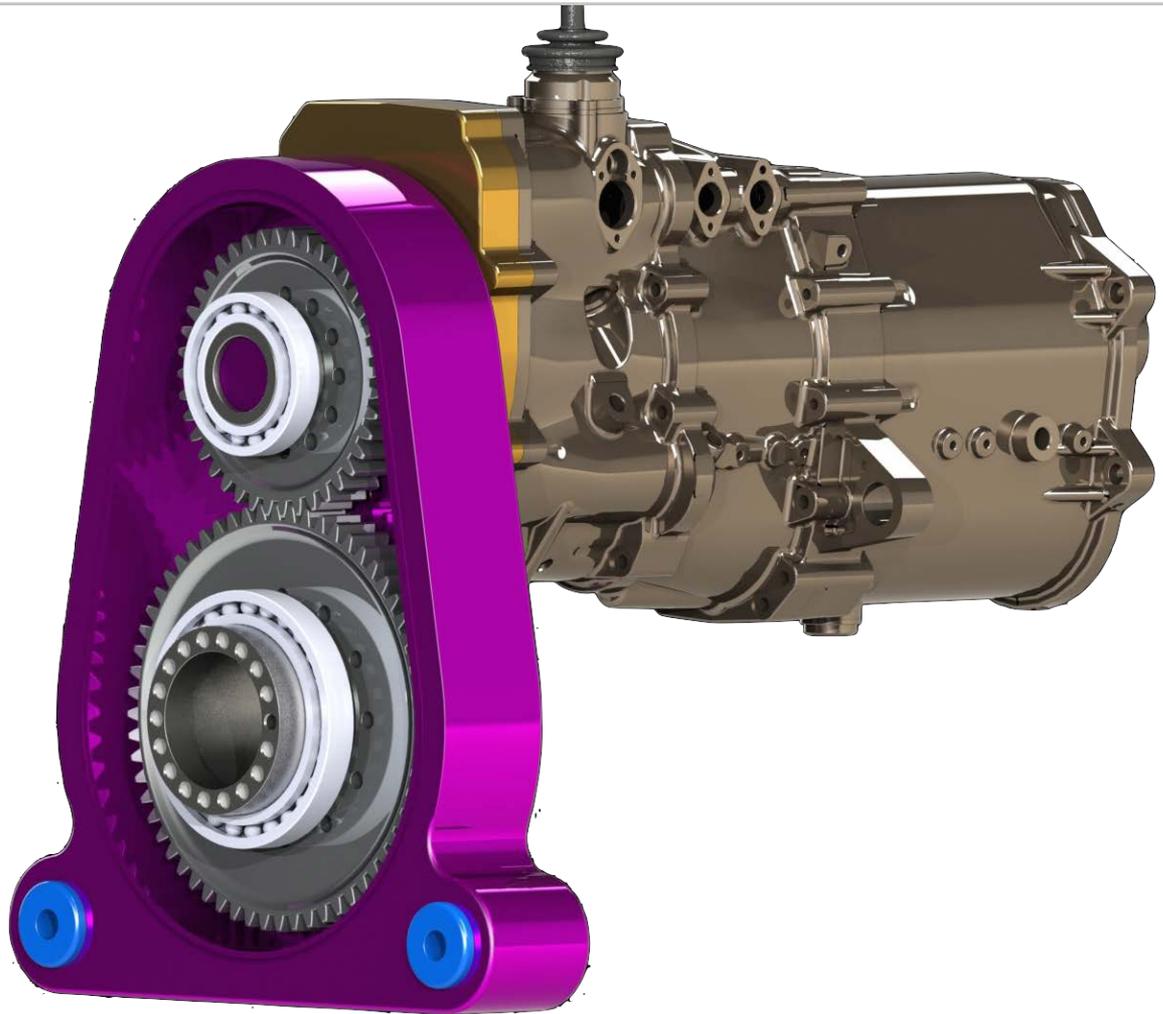


Automated Engineering Drawings



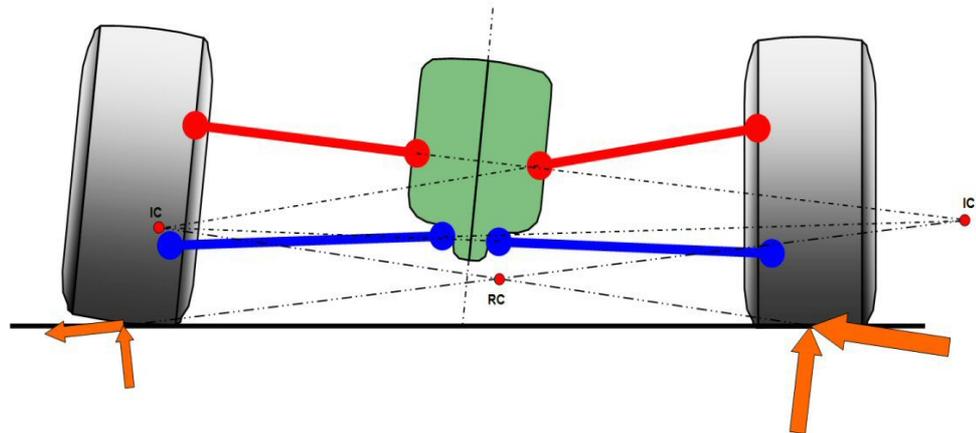
Drivetrain Concept

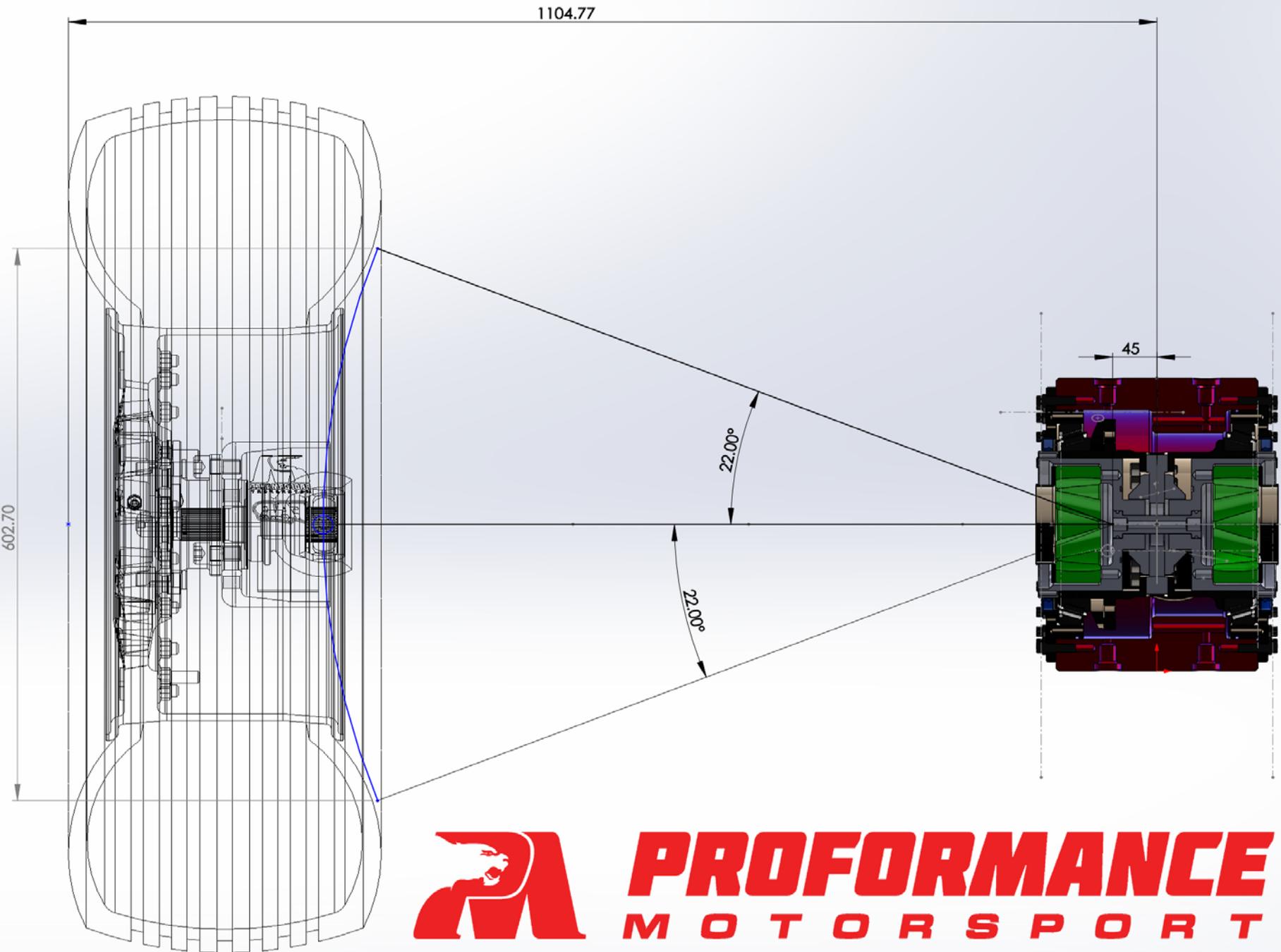
- Mid Mounted
- Front Mounted
- Weight Distribution
- Traction
- Steering
- Placement



Suspension Design - Geometry

- What is Critical?
 - A Arm Design
 - King Pin Inclination
 - Scrub Radius
 - Akerman
 - Caster
 - Camber
 - Bump Induced Camber
 - Anti Squat
- We answer your questions
- We assist with design





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Hydraulic Design

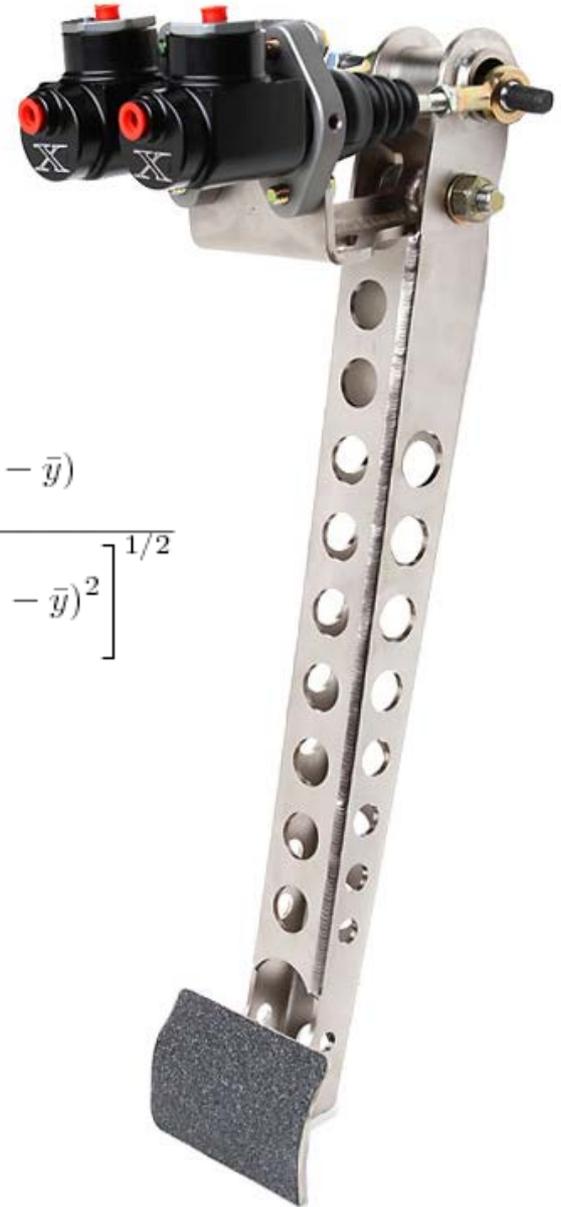
- Moving 37', 40" or even larger tyres left to right at high speed required a lot of horsepower and a well engineered Hydraulic System.
- if your power steering system becomes difficult to operate quickly at low engine RPM, then call us today. A few hours of our time may save you and your team tens of thousands of dollars in pumps, servos and steering components.



Braking System Design

- Mechanical vs Powered Brakes
- Can a Human Foot stop your vehicle?
- 1000 psi Line Pressure
- 3000 psi line pressure
- Brake Temps
- Inboard Brakes
- Brake Design/Size
- Brake Force Calculation
- Pedal and Piston Calculations

$$R = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\left[\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2 \right]^{1/2}}$$

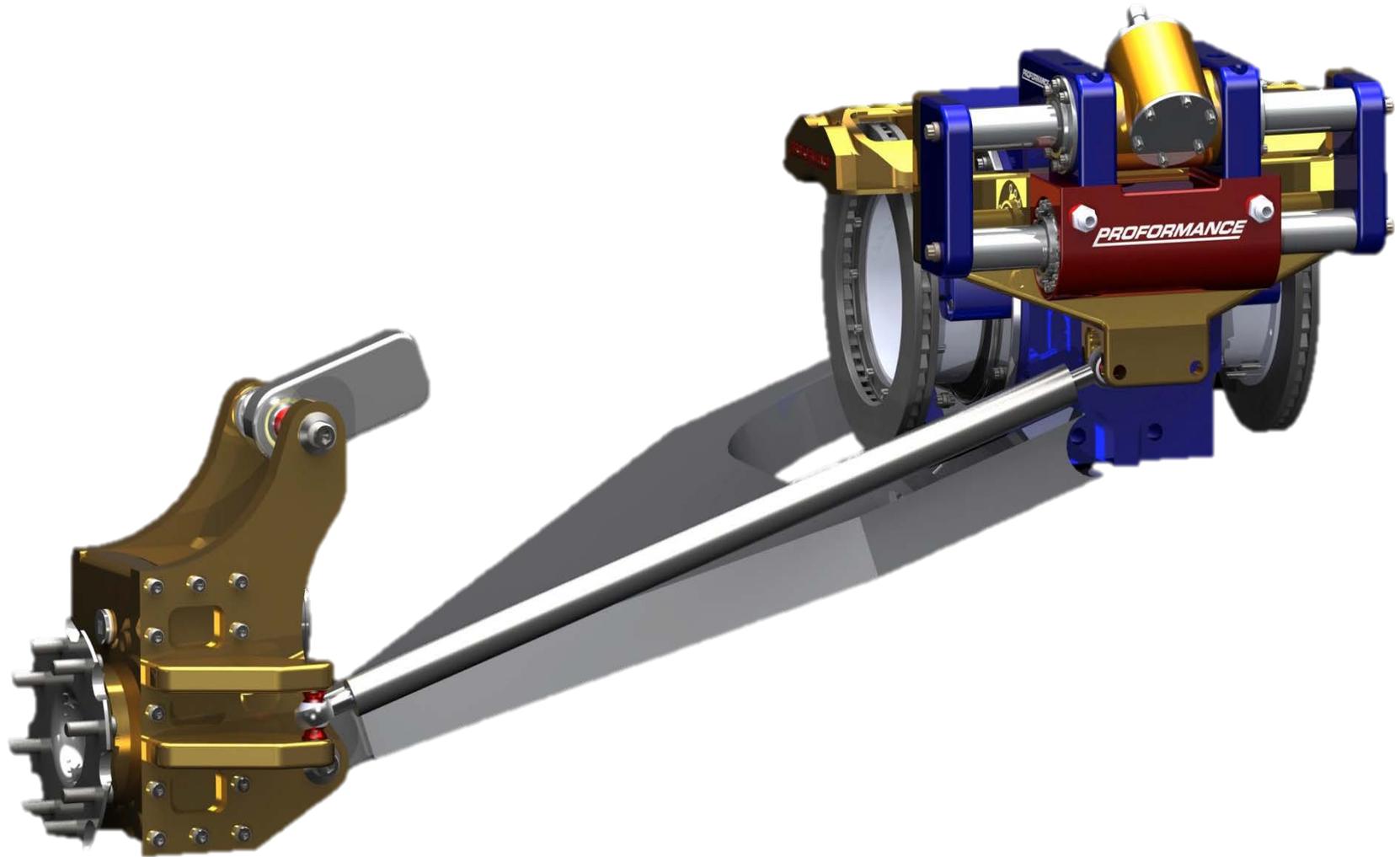


IFS and IRS Spindles and Unit Bearings

- Custom Design
- Indonesian Customers
- Lighter than USA Made
- More Suited to Indonesia
- Customer Logos Applied



COMPLETE MILITARY IFS – IRS PACKAGES



Military Special Vehicles

- IFS and IRS Vehicles
- Suit Chinook Helicopter
- Narrow Vehicle
 - Long Wheel Travel
 - Ultra Narrow Diff
- Locker or Spool
 - Portal Hubs
 - Inboard Brakes



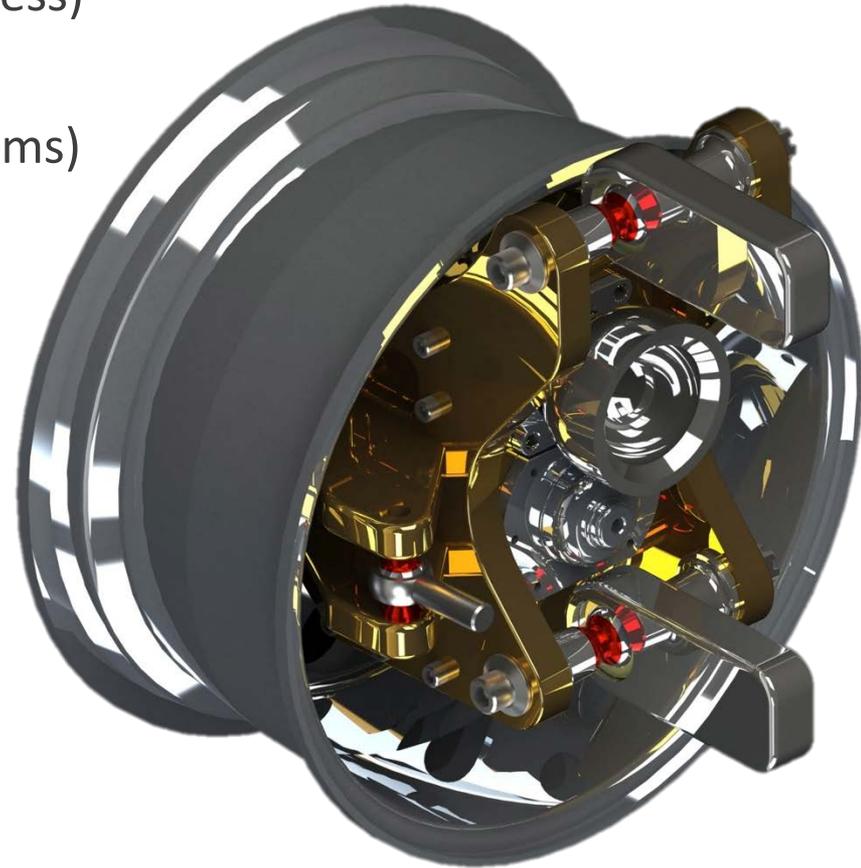
ULTRA NARROW DIFF

- ULTRA NARROW DIFFERENTIAL
 - Axles are 3mm (1/8") Apart
 - CV Faces 40mm (1.5") Apart
- SPOOL or LOCKER
- 6061 Billet Aluminium Case
- 4140 Heat Treated Internals
- 100% Machined in House
- Made in Australia

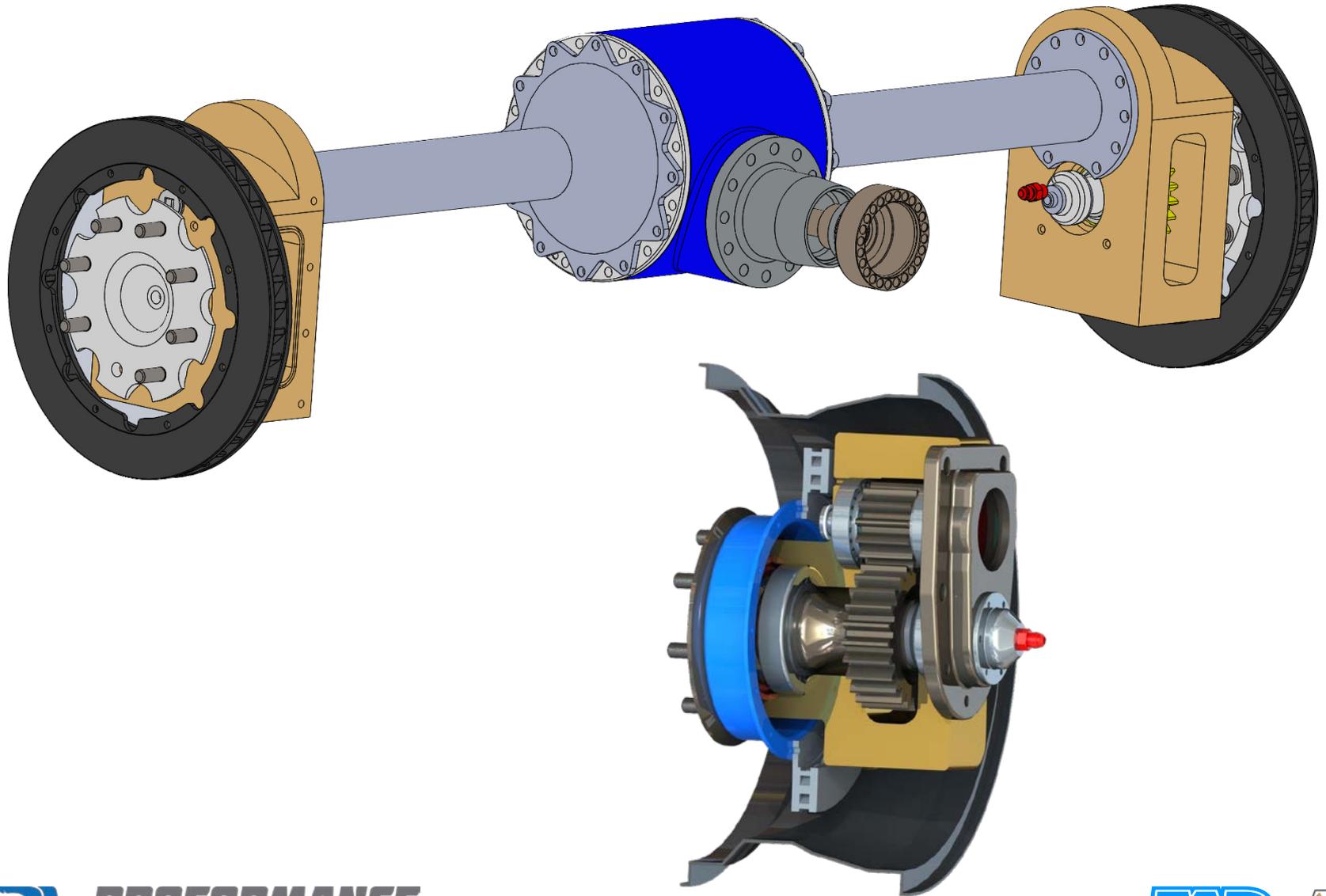


PORTAL – GEARED HUB

- Increased Ground Clearance
- More Power driven to the wheel
- Less Stress on the Diff and Axles (50% Less)
- 200% Axles and CV Joints Strength
- Inbuilt CTIS (Central Tyre Inflation Systems) Lines
- High Misalignment Bearing Pivots
- DOUBLE SHEAR BOLTS
- Massive 35 Spline CV Joint

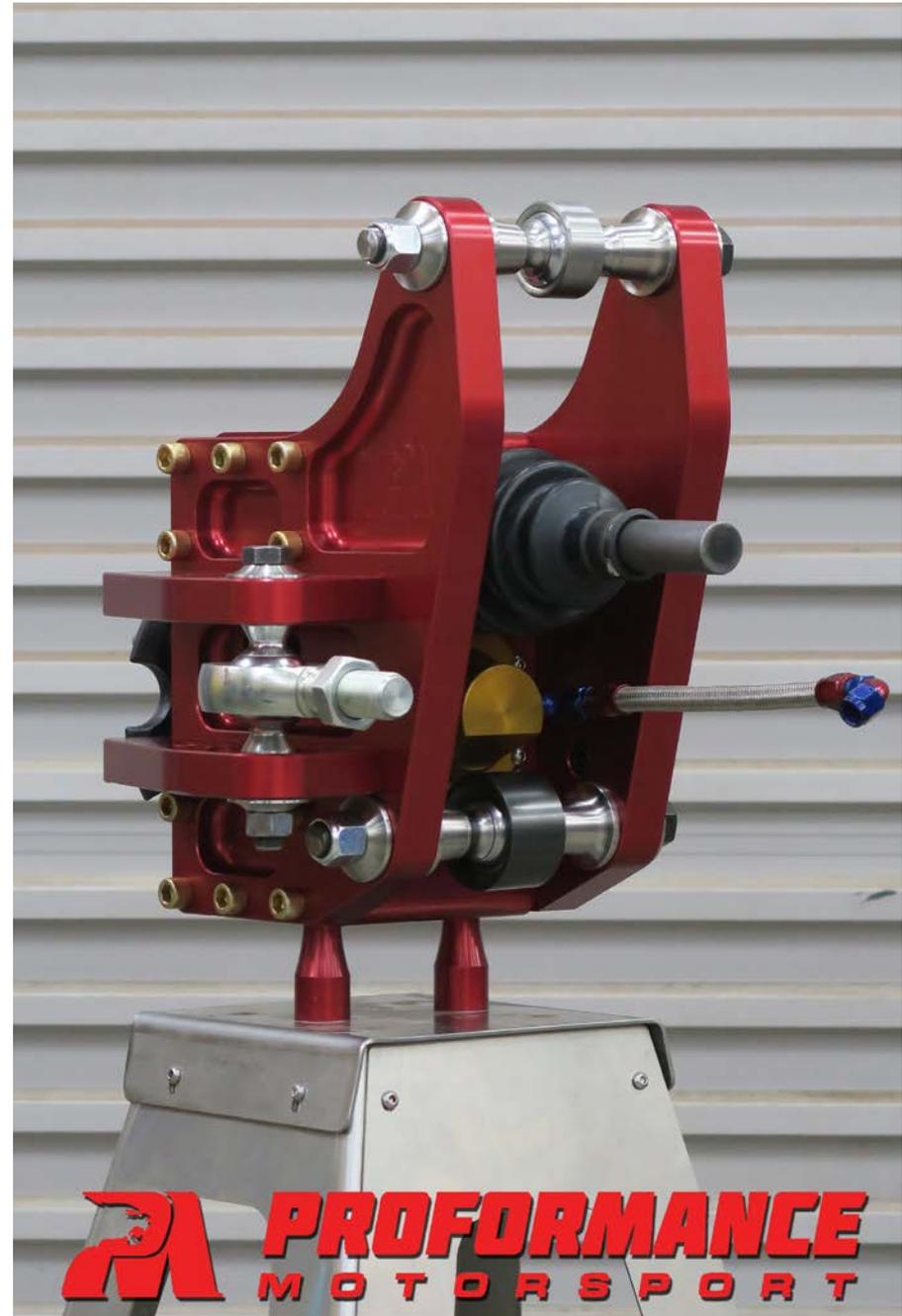


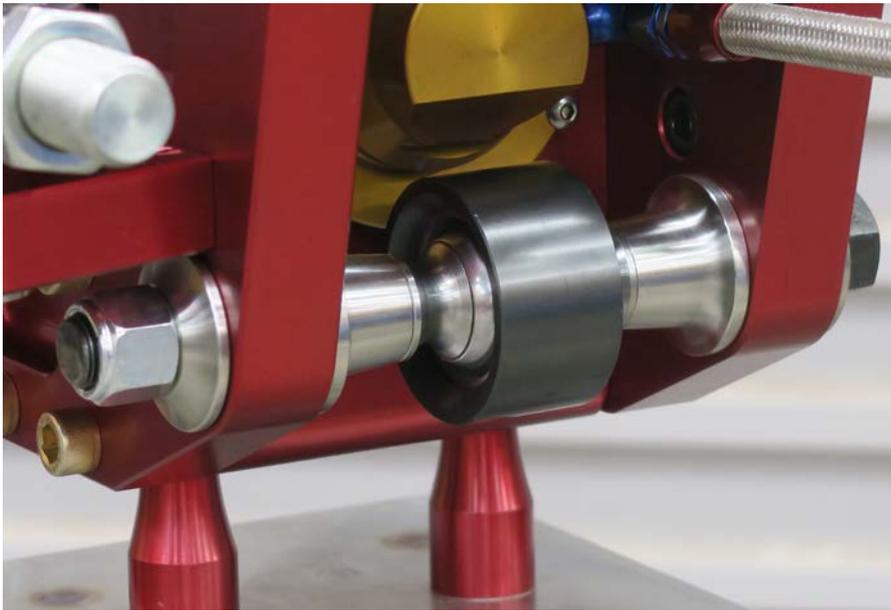
Live Axle Portal Hubs



IFS – IRS PORTAL HUB

- One Component for all 4 corners
- Common Spare Part
- 35 Spline Axles
- 1.0" Heim Joint
- Billet Aluminium
- Aircraft Heim Jonts





 **PERFORMANCE**
MOTORSPORT

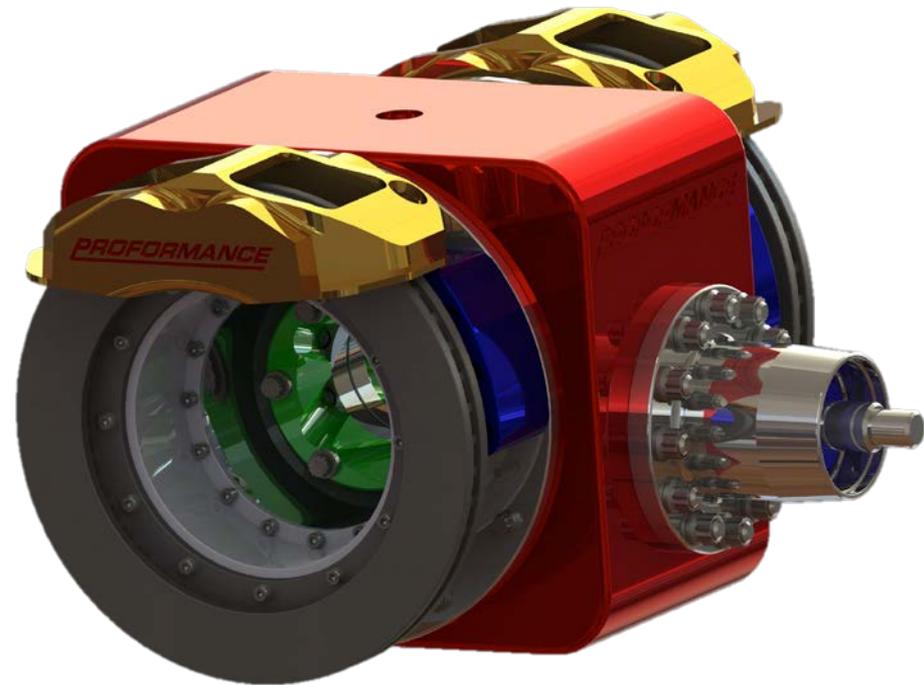
CTIS

- Central Tyre Inflation
- Possible via our Geared Hubs
- Deflate and Inflate whilst driving



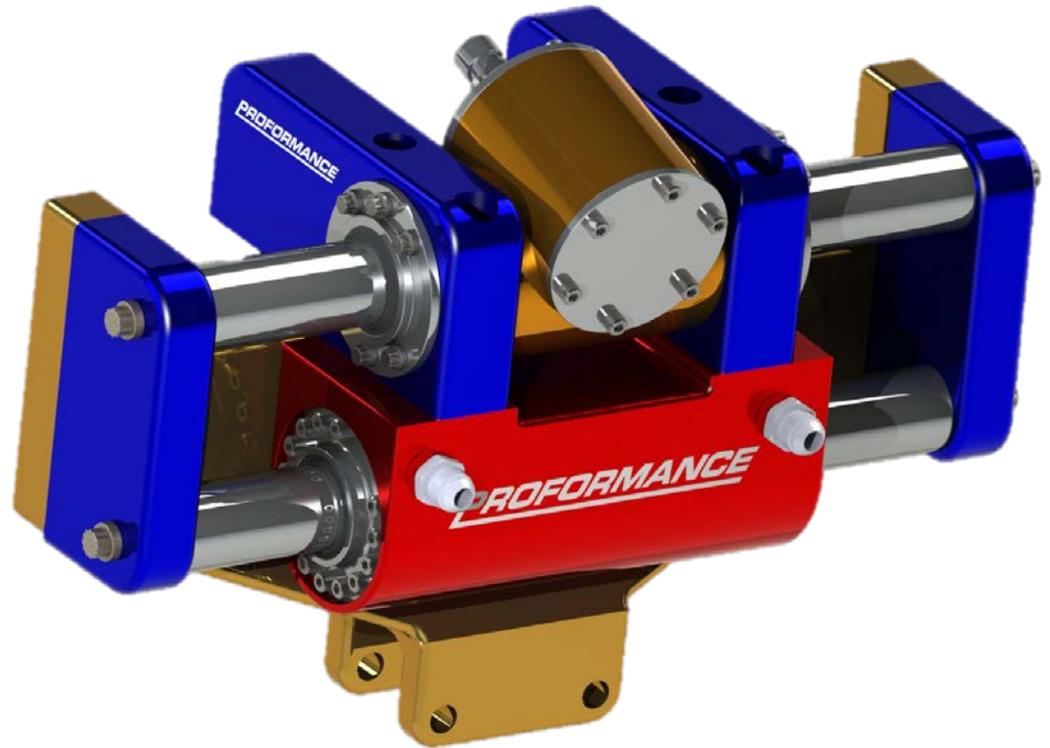
DIFF - INBOARD BRAKES

- Portal Hubs generally require inboard Brakes
- Brake Force is multiplied by 200% at the wheel
- Lower Unsprung Weights
- Brakes are not prone to damage and wear
- Improved weight distribution
- Better Handling
- Faster Speeds
- More Efficient Breaking via the geared hub (200%)



IFS RAPID MOVEMENT STEERING RACK

- NO BUMP STEER
- Fully Sealed
- IP67 Water Proof
- 6061 T6 Components
- Hard Chromed, Hollow "Light Weight" Ram Shafts
- Input Shaft Orientation/Position can be Flipped, Rotated, Angled, from Horizontal to Vertical
- High Flow Hydraulics
- Hard Anodized Bores
- Field Serviceable
- Maximum Ram Travel 180mm
- Easy to replace components
- Suit Long Travel IFS (Independent Front Suspension) vehicles
- 3000 PSI Rated



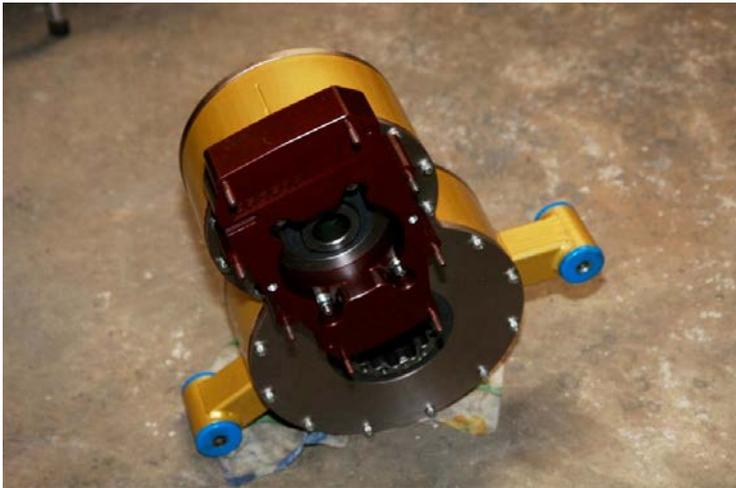
CONFIGURABLE COMPONENTS

- We allow for alternate engine and drivetrain placement, diff positions and other components when designing our components
- Our Steering rack is an example of accommodating flexibility by allowing the user to select the steering column orientation.
- The input shaft and steering column can be flipped, rotated or positioned as required



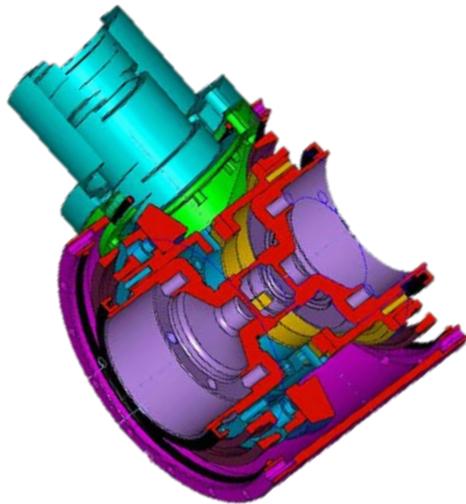
QUICK CHANGE TRANSFER CASE

- Allows rapid ratio changes without the need to service Each Differential.



RACE PROVEN TECHNOLOGY

- We race what we sell
- Thousands of hours of development
- Hundreds of hours of testing
- Unique Vehicles
- World Leader
- Globally Recognised
- Military Contractors



RACE PROVEN TECHNOLOGY



SHOW AND SHINE – ATTENTION TO DETAIL



SHOW AND SHINE – ATTENTION TO DETAIL

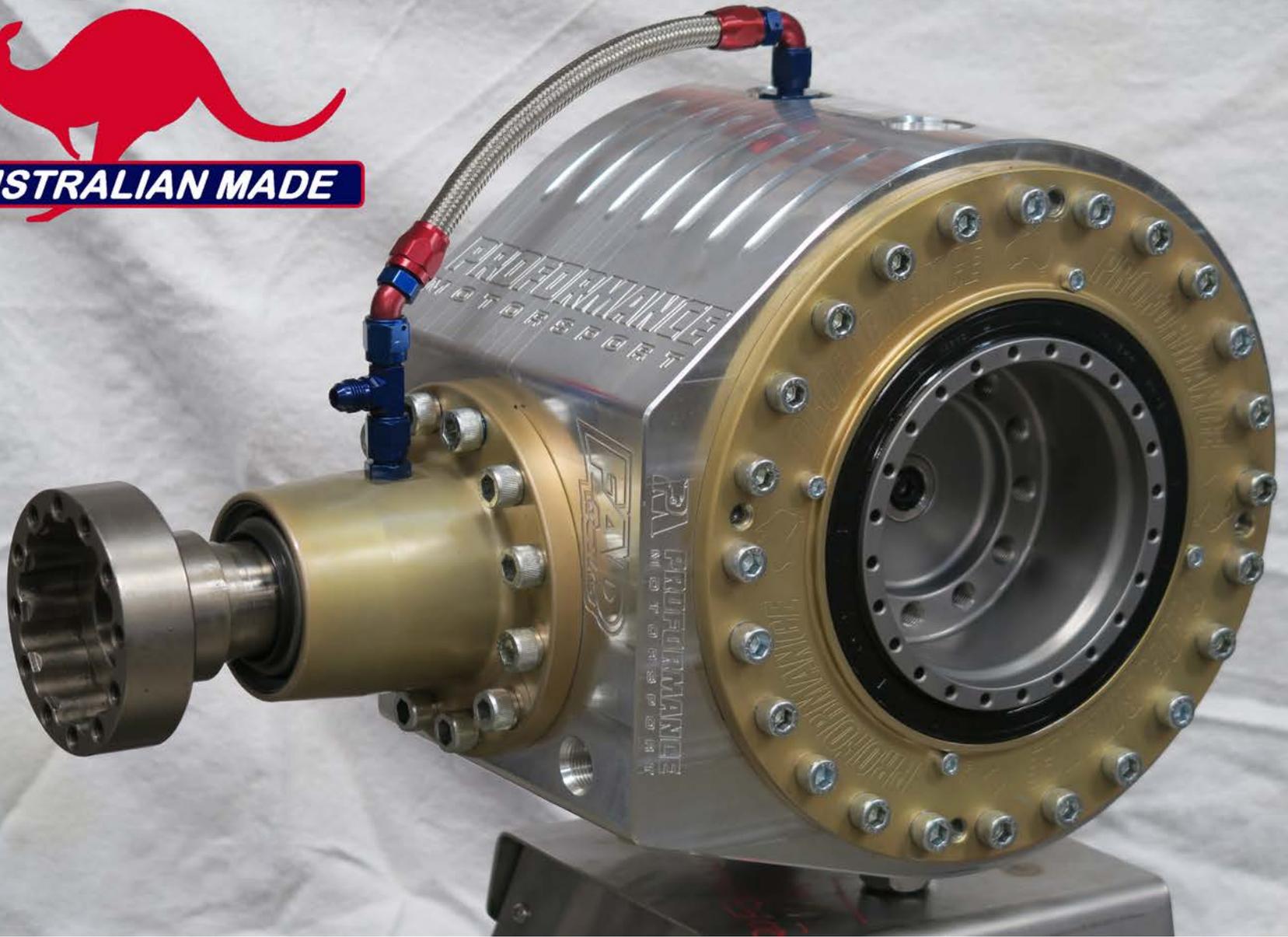


SHOW AND SHINE – ATTENTION TO DETAIL



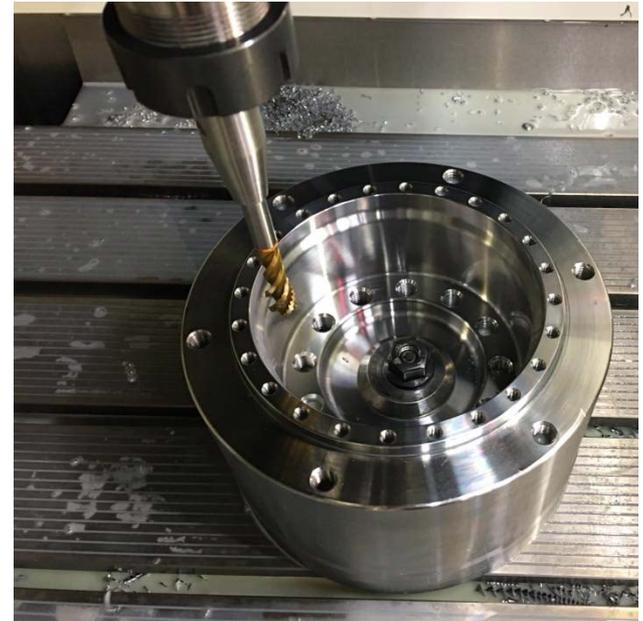


AUSTRALIAN MADE

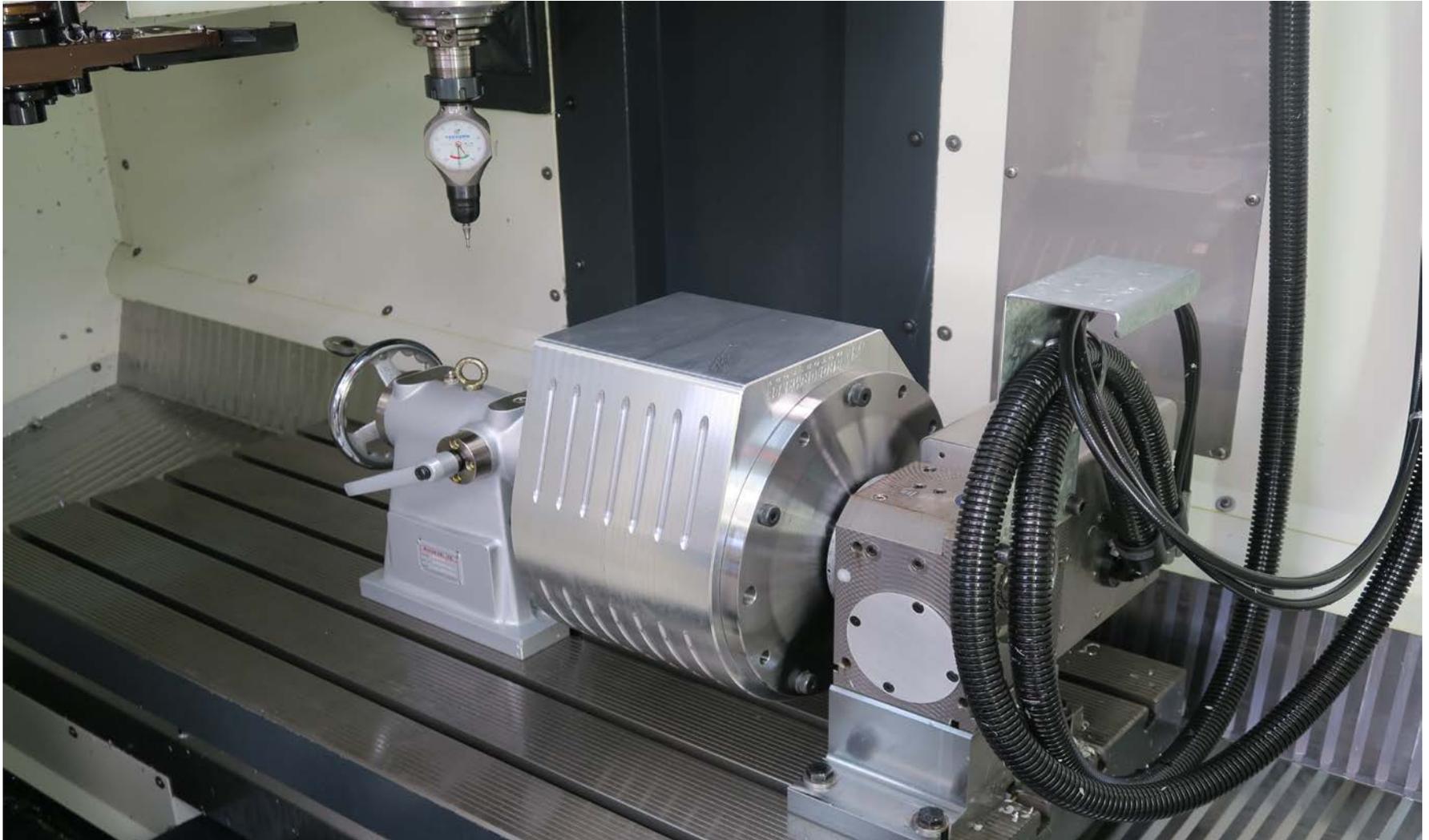


ALL MACHINING IN HOUSE

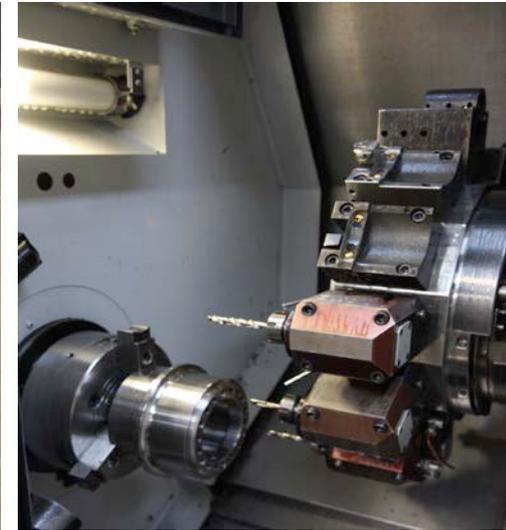
- NOT Made in CHINA
- Quality Controlled
- Tight Tolerances
- Tight Surface Finishes
- Long Component Life



Custom Jigs and Fixtures



German Bohler Uddeholm Chrome Moly Alloys



German Thyssen Krupp Billet T6 6061 Aluminium

- Quality German Thyssen Krupp 6061 T6 Heat Treated Aluminium Billets



ThyssenKrupp

Material Testing – Stress Tests



“Rapid Set Up” Tools

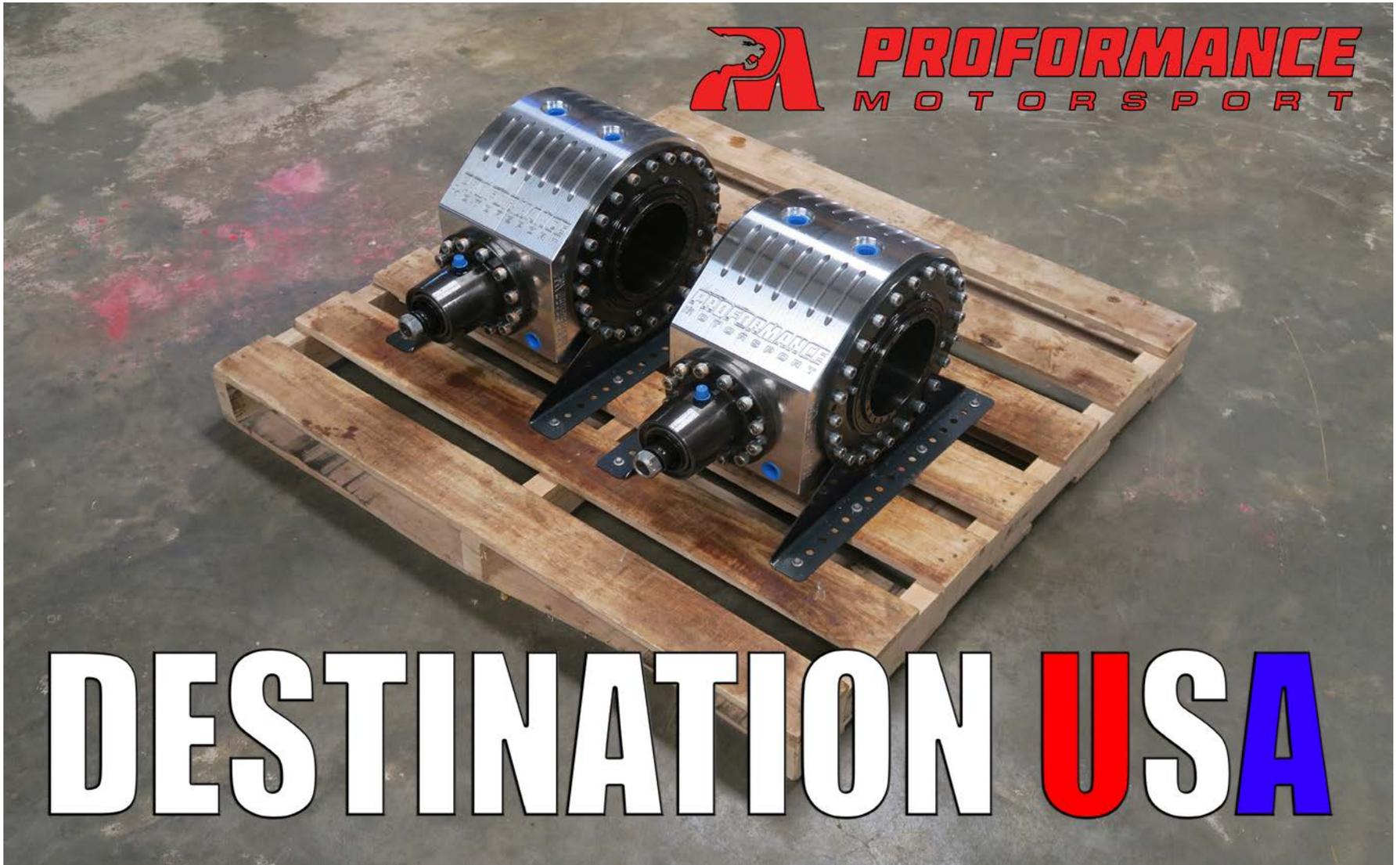
- Pinion Depth Setting Tool (Digital Depth Gauge)
- 60 Second Pinion Depth Setting



Export Packaging



Export – US military



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DESTINATION USA

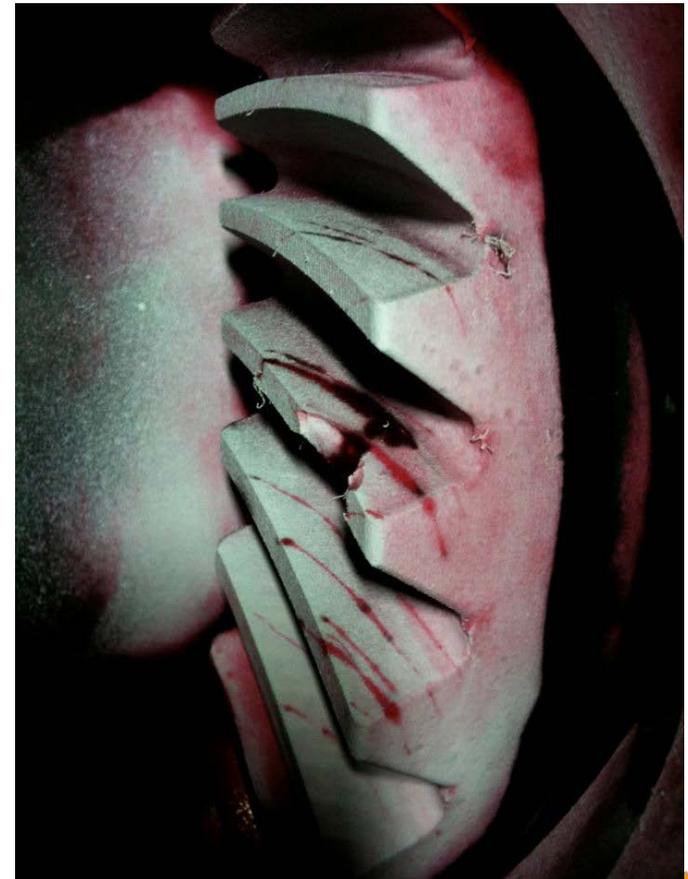
Fasteners – Pivots – Material Selection - Strength

- Stronger Pivots
- Needle Rollers
- Smaller Bolts
- Light Weight
- Long Life



NDT - FAILURE REDUCTION/ANALYSIS

- Non Destructive Testing
- Pre and Post Race
- Historical Tracking of Part Life
- Pre Failure Prediction
- Failure Analysis
- Metal Fatigue Analysis
- Re Design
- Failure Prevention
- Alternate Material Recommendations
- Alternate Treatment/Finish
- Cryogenics
- Polishing
- Surface Treatments



CV Joint Lubricant Analysis



Failure Analysis



ENGINEERING – CONSULTING SERVICE

- Design
- Fault Finding/Analysis
 - Remedies
 - Engineering Re Works
 - (Fixing my competitors)
- Concepts
- Ideas
- IMAGINEERING
- Brainstorming
- Remote Assistance
- Remote Fault Finding
 - Phone
 - Skype
 - Messenger
 -

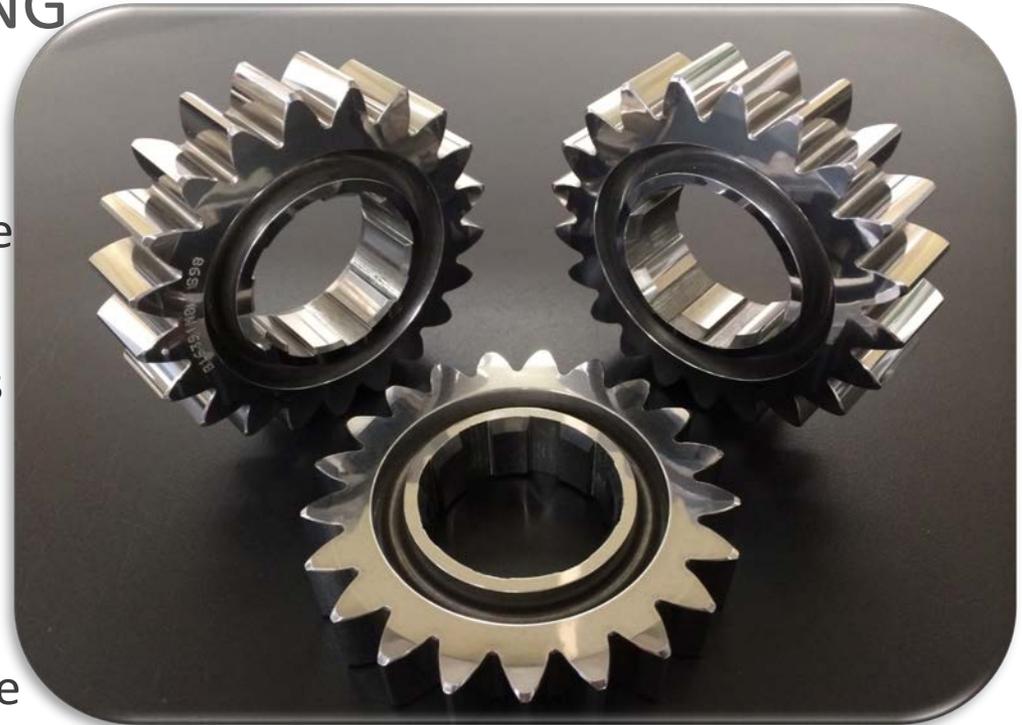
	Brand X	Brand Y	Brand Z
Bore Diameter (cm)	7.10	8.40	8.90
Shaft Diameter (cm)	2.20	7.61	7.61
Bore Area cm sq	39.58	55.41	62.20
Shaft Area cm sq	3.80	45.48	45.48
Piston Area cm sq	35.78	9.93	16.72
Bore Area Square Inches	6.14	8.59	9.64
Shaft Area Square Inches	0.59	7.05	7.05
Piston Area Square Inches	5.55	1.54	2.59
Pump Max (PSI)	1200	1200	2000
Force - Max Pressure (Lbs)	6656	1847	5185
Shaft Stroke cm	16.00	16.00	16.00
Volume (Left to right) cm3	572.54	158.91	267.59
Pump Cubic Inch / Rev	0.75	0.48	0.75
Pump CC/Rev (Calculated)	12.29	7.86	12.29
Number Of Pumps	1.00	1.00	1.00
Total Flow cc/rev	12.29	7.86	12.29
Engine RPM	1750.00	2000.00	2000.00
Drive Ratio	100%	68%	100%
Pump/s Speed RPM	1750	1360	2000
Pump/s Volume cc/min	21498.75	10692.864	24570
Pump/s Volume Gal/Min (3.5US)	6.14	3.06	7.02
Pump/s Volume cc/sec	358	178	410
Time Taken - Left to Right Movement	1.60	0.89	0.65
Revs Per Sec	0.63	1.12	1.53



PROFORMANCE		Wheel Travel Calculator				
		Portal Hub + Narrow Differential (Spool) 300mm (12") Tire Width				
Vehicle Width (In)	94.5	92	90	88	80	
Vehicle Width (mm)	2400	2337	2286	2235	2032	
Axle Length (CV Centres)	837	805	780	755	653	
Total Axle Length	897	865	840	815	713	

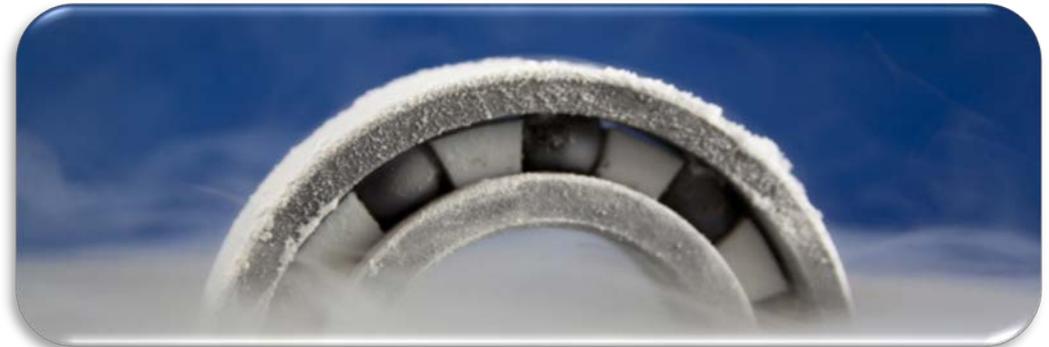
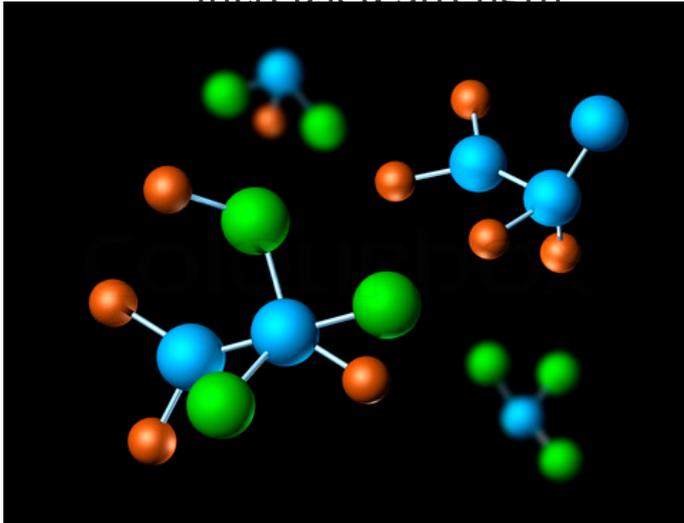
ISOTROPIC FINE FINISHING

- Ultra Fine Finishing
- Triple the Life of your Components
- Removes Stress Raisers
- Lower Operating Temperatures
- More Horsepower
- Less Drag
- No “Break In” required
- No Metal Debris during first use
- Stronger Parts
- Improved Reliability
- Fewer Failures
- FINISH MORE RACES
- SAVE MONEY



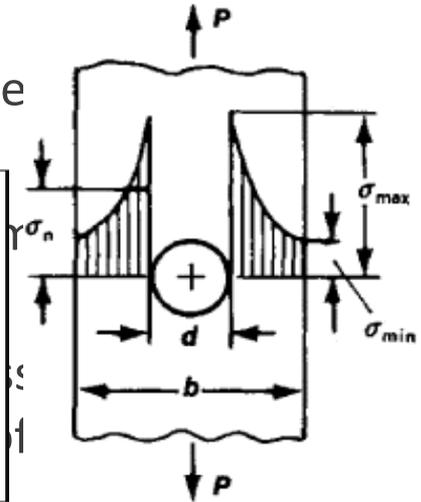
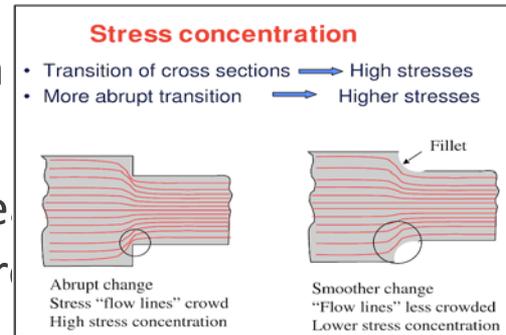
CRYOGENIC COMPONENT TREATMENT

- Used by:
 - AEROSPACE
 - F1
 - NASCAR
 - V8 SUPERCARS
 - LE MANS
- Molecular Realignment
 - Increased Strength



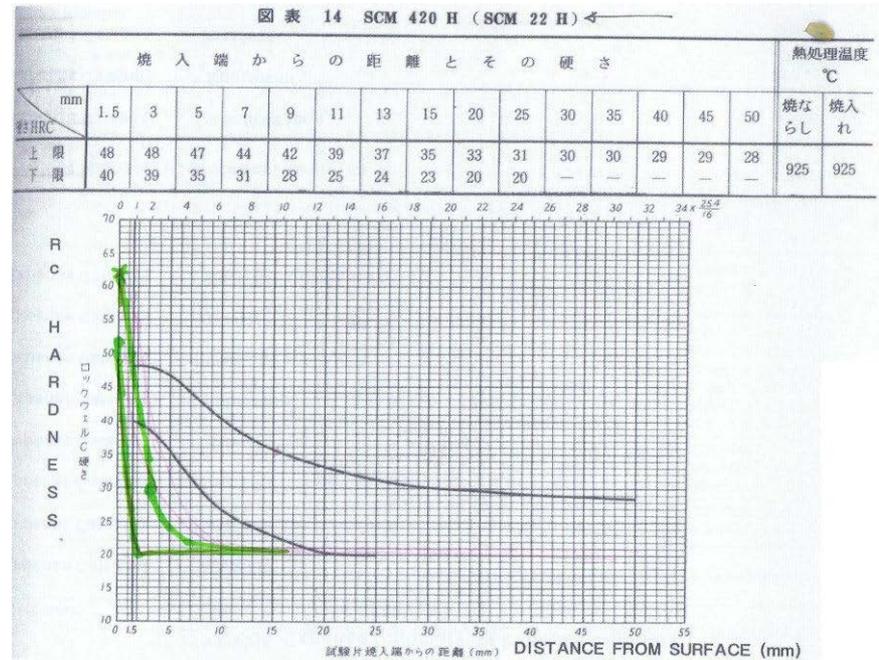
CORRECT ENGINEERING PRACTICES

- We DO NOT drill holes in stressed parts to make them lighter
 - (Like our competition)
- We engineer our components from right first time.
- We apply radius to all edges and be components for maximum fatigue r cycles.
- We remove weight in ways that DO diagrams) into the component/.



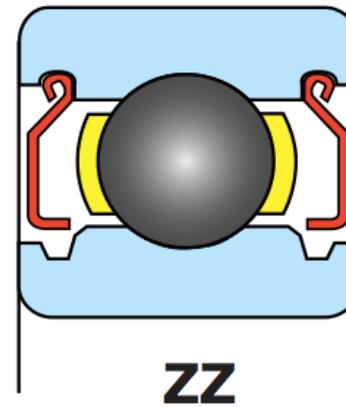
CORRECT HEAT TREATMENT

- We use professional Heat Treatment Facilitators to ensure our parts are as strong as we designed - UNLIKE our competitors
 - (See the graph showing design specs and what we measured, post component failure)
- We are constantly faced with components supplied to us that are in packaging proudly showing made in USA, only to discover after metal analysis (Foundries, Trace Elements etc.) that the components were indeed manufactured and heat treated (*Softened*) in china
- We have analyzed some components that were more than 60 Rockwell on the surface, and only 25-30 Rockwell less than 1mm under the surface – see the graph.

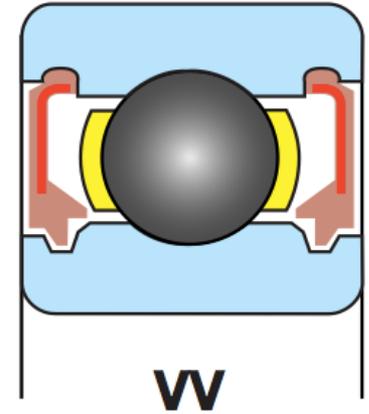


ROLLER BEARING PIVOTS

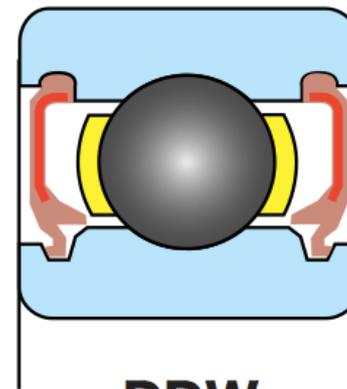
- Bearings used on ALL pivots
 - A Arm Pivots
 - Brake Pedals
 - Accelerator Pedals
 - Steering Columns
 - Full Contact Seal



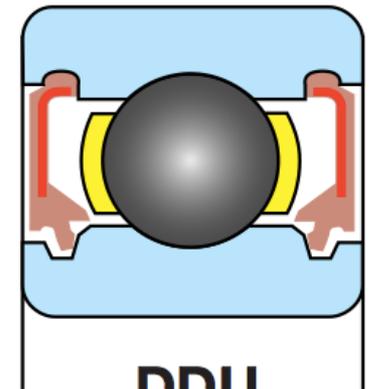
Non-contact shield



Non-contact seal



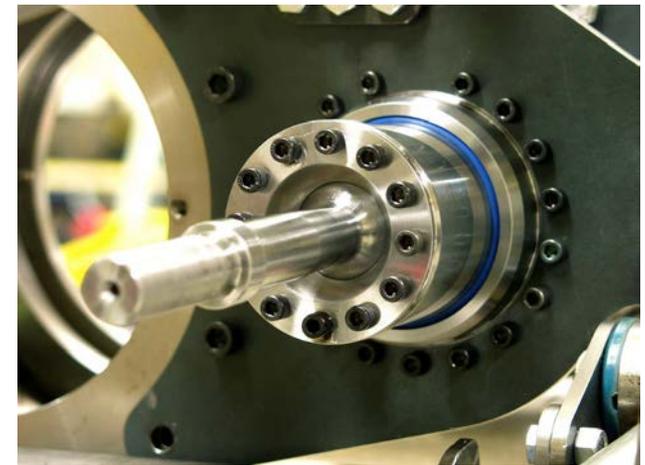
Light-contact seal



Contact seal

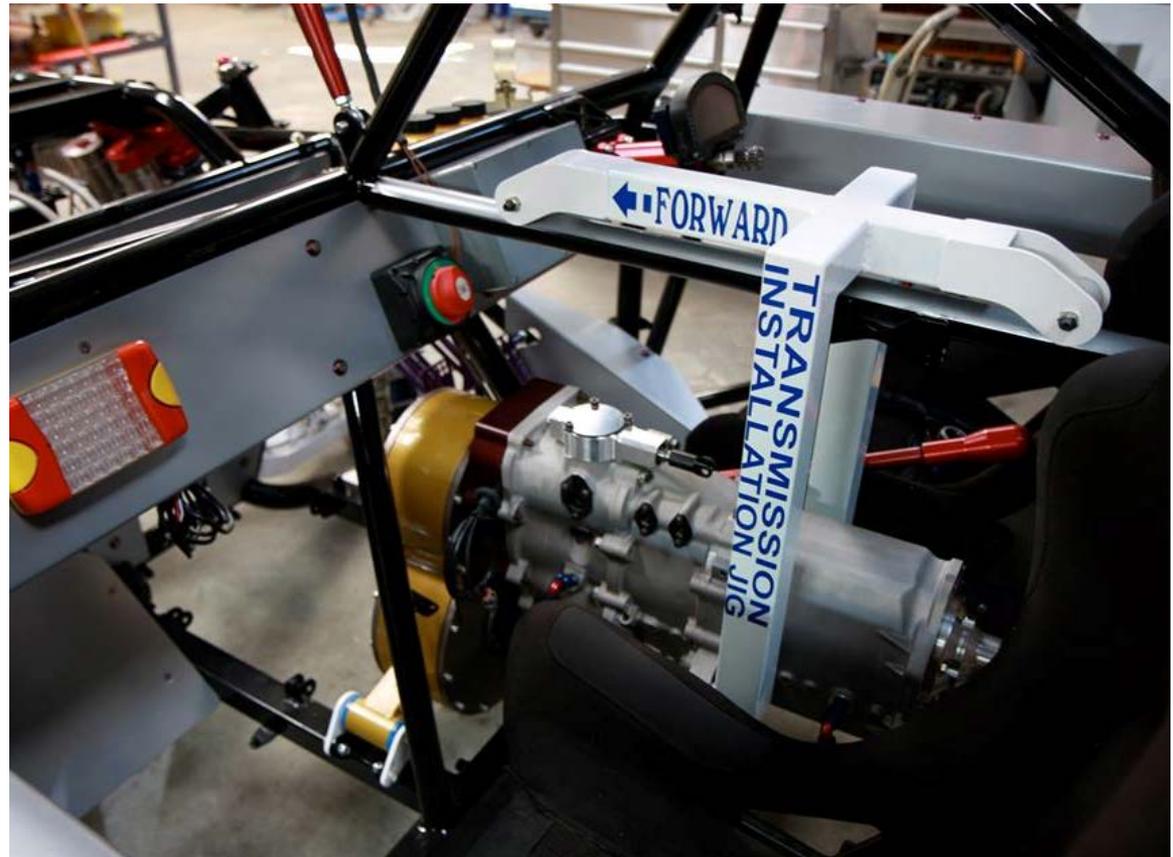
“EARLY” STEERING RAMS

- Manufactures In House
- Internal Ball Joints
- Super Strong 3.00” ram Shafts
- Hollow Rams
- Low Friction Seals
- High Speed racks (1.25 + 1.5 Turns
Lock to Lock 0.25 Seconds)



INTELLIGENT ENGINEERING

- Single Man Assembly/Disassembly
- Field Serviceable
- No Presses or Special Tools
- Hand Fits/Tolerances
- 1,2,3 Assembly Routines
- Jigs and Tools where necessary to allow single person fitment



WE RACE – YOU WIN



CUSTOMER BASE

- POLAND
- BELGIUM
- GERMANY
- USA
- NORWAY
- ICELAND
- RUSSIA
- UK
- AUSTRALIA
- BOLIVIA
- PAKISTAN
- INDONESIA
- NEW ZEALAND
- DUBAI
- UAE
- ISREAL
- CANADA
- COSTA RICA
- OMAN
- FRANCE

SCORE
INTERNATIONAL
OFF-ROAD RACING

Off *Formula*
Road

Mahindra
DEFENCE

THALES

ULTRA4RACING.COM
ULTRA4
Unlimited 4 Wheel Drive Racing



Australian Government
Department of Defence

HERE TO HELP YOU!

- Race Proven Engineering Expertise
- Global Leader in Design and Concepts
- Competitive Pricing
- Engineering and Concept Services
- Indonesian Partners

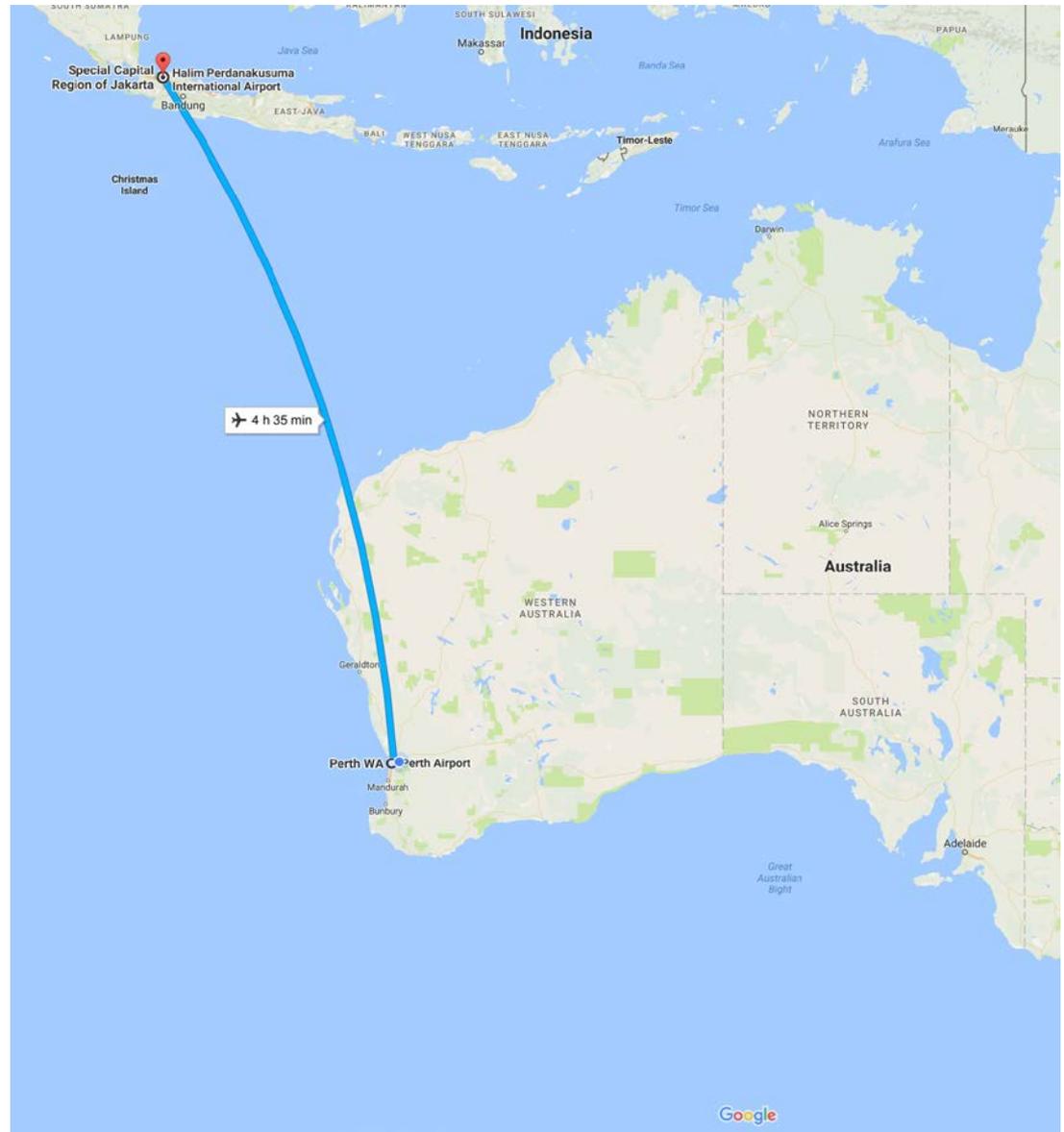


Indonesian Partners



Ongoing Support

- Same Time Zone
- Exceptional Support
- On Site Assistance
- Concept Design
- Real Time
- English Language
- Interpreters Available



CONTACT INFORMATION



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FADWORK PERFORMANCE

??????????

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