INSTALLATION, OPERATION, SPARE PARTS, AND MAINTENANCE MANUAL

MMD 625 SERIES (625MM CENTRES) TWIN SHAFT SIZER

S625-0053, Standard Height, Short Length Case, 4-Tooth x 5-Ring

CUSTOMER:

OMYA SOUTHERN PTY LTD
VIA MMD (AUSTRALIA) PTY LTD

Machine Serial Number :	**S625-0053***
Date Of Manufacture :	**December 1998**
Case Designation :	**Standard Height / Length**
Shafts Designation:	**4-Tooth x 5-Ring**
Gearbox Assembly :	**MMD R200, 30:1 Ratio**
Fluid Coupling Type :	**Fluidrive STC500**
Wheel Carriage Assembly :	**Transom Type (Transverse)**
Centralised Greasing :	
Underspeed Sensing :	**Electromatic, 110V A.C**

* Please quote in all correspondence. This number can be found on the identification plate, and welded onto the machine side plate

THE MMD GROUP OF COMPANIES

MMD Mining Machinery Developments Limited
Cotes Park Lane, Cotes Park Industrial Estate,
Somercotes, Derbyshire. DE55 4NJ. England.
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E-Mail: manuals@mmduk.demon.co.uk

Last Updated: 22nd January 1999

MMD 625 SERIES, 625MM SHAFT CENTRES TWIN-SHAFT MINERAL SIZER

CUSTOMER

OMYA SOUTHERN PTY LTD
VIA MMD (AUSTRALIA) PTY LTD

MMD JOB NUMBER	**13916**
MACHINE SERIAL NUMBER	**S625-0053**
GEARBOX SERIAL NUMBER	**S7070381-016**
G.A. DRAWING NUMBER	**6250335**

PREPARED BY :- C.J.HAMBLETON

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POSITION :- CAD /MANUAL DEP'T.

DATE COMPLETED :- 22 - 1 - 99

MMD 625 SERIES TWIN-SHAFT MINERAL SIZER

LOW PROFILE, SHORT LENGTH CASE ASSEMBLY
4 TOOTH RING x 5 RINGS PER BREAKER SHAFT, MMD R200, 30:1 RATIO GEARBOX, WITH FLUIDRIVE STC500 FLUID COUPLING AND HOUSING

SIZER SERIAL #:	G.A. DRAWING #:	MMD JOB #:
S625-0053	**6250335**	**13916**

CUSTOMER	**OMYA SOUTHERN**
LOCATION	**AUSTRALIA**
MANUFACTURED	**DECEMBER 1998**

MACHINE CASE ASSEMBLY

TYPE	**LOW PROFILE, SHORT LENGTH CASE**
PART NUMBER	**346250335**

BREAKER SHAFT ASSEMBLIES

TYPE	**4 TOOTH x 5 RING**
PART NUMBER (LEFT)	**246250321**
PART NUMBER (RIGHT)	**246250322**

GEARBOX ASSEMBLY

TYPE	**MMD R200, 30:1 RATIO**
PART NUMBER	**247070381**
SERIAL NUMBER	**S7070381-016**

FLUID COUPLING ASSEMBLY

TYPE	**FLUIDRIVE STC500**
PART NUMBER	**141562659**

MMD 625 SERIES TWIN-SHAFT MINERAL SIZER

LOW PROFILE, SHORT LENGTH CASE ASSEMBLY
4 TOOTH RING x 5 RINGS PER BREAKER SHAFT, MMD R200, 30:1 RATIO GEARBOX, WITH FLUIDRIVE STC500 FLUID COUPLING AND HOUSING

WHEEL CARRIAGE ASSEMBLY

TYPE	**TRANSVERSE TRANSOM STYLE**
PART NUMBER	**145040129**

UNDERSPEED SENSING ASSEMBLY

TYPE	**ELECTROMATIC 110V**
PART NUMBER	**143210000**

PLEASE NOTE:- ALL FIXINGS LISTED IN THIS MANUAL ARE TO BS EN24014 GRADE 8.8 (UNLESS OTHERWISE STATED)

CONTENTS

MMD MINING MACHINERY DEVELOPMENTS LIMITED

MMD 625 SERIES TWIN SHAFT MINERAL SIZER GENERAL ARRANGEMENT

DRAWING NUMBER - 6250335

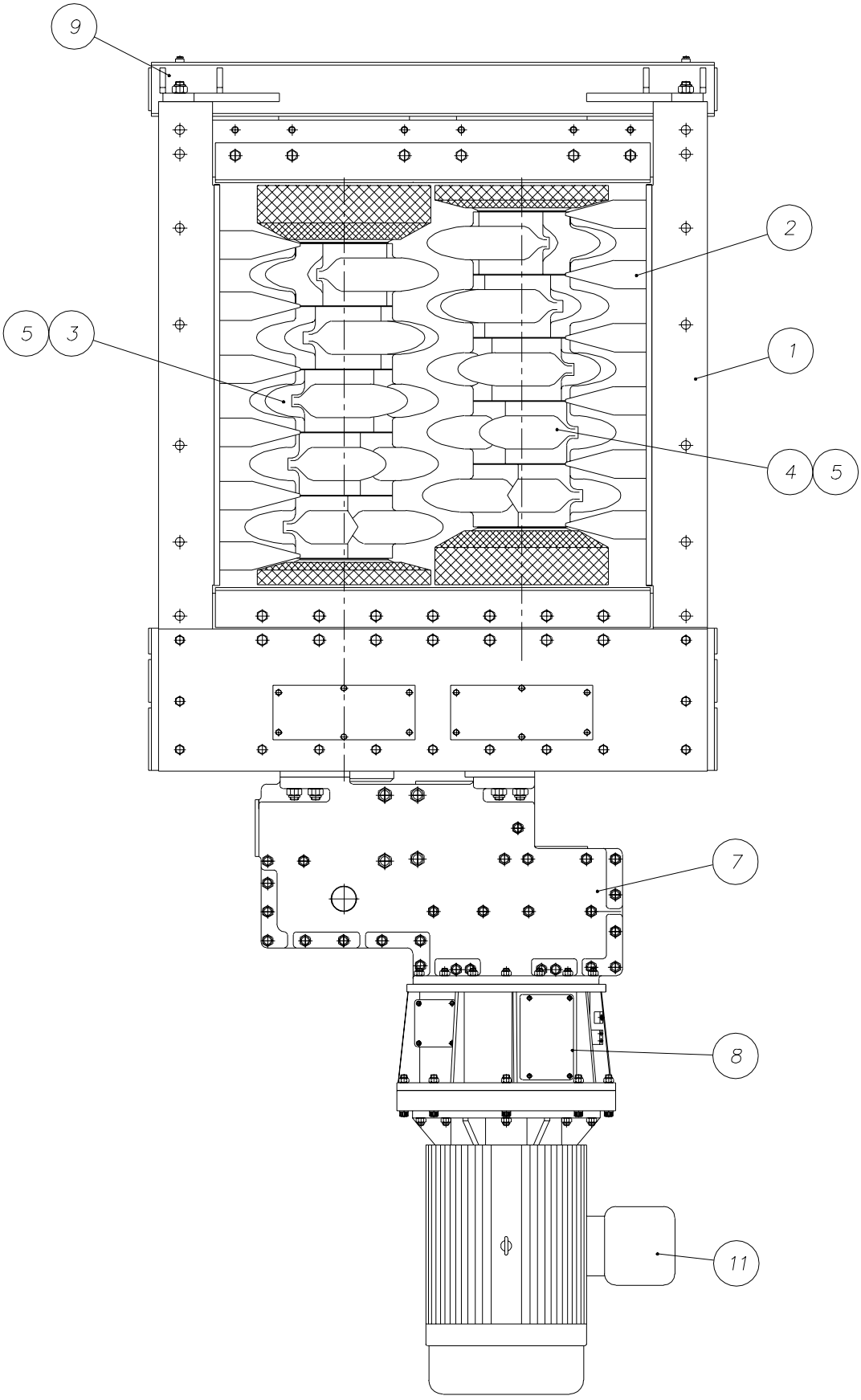
MMD MINING MACHINERY DEVELOPMENTS LIMITED

SIZER ASSEMBLY

SERIAL NUMBER - S625-0053

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	25-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Sizer Assembly - Serial Number : S625-0053



MMD MINING MACHINERY DEVELOPMENTS LIMITED
Sizer Assembly - Serial Number : S625-0053

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	346250335	625 Centres Standard Height, Standard Length Case Assembly	3,954	1
2	146251527	Side Wear Plate Assembly	326	1
3	246250321	4 Tooth x 8 Ring Breaker Shaft Assembly (Left-Hand / Drive)	2,166	1
4	246250322	4 Tooth x 8 Ring Breaker Shaft Assembly (Right-Hand / Driven)	2,170	1
5	145060064	Medium-Duty Tooth Cap And Tooth Cap Fixings Assembly (Material: MMD 505)	24	40
6	111701004	Gear Coupling Assembly	109	1
7	247070381	MMD R200 30:1 Ratio Gearbox Assembly (With Splined Input Pinion)	1,613	1
8	141562659	Fluidrive Engineering Company Limited STC500 Fluid Coupling Assembly	438	1
9	145040110	Transverse Transom Style Wheel Carriage Assembly	550	1
10	143210000	Electromatic Underspeed Sensing Assembly, 110V A.C, 60Hz	0.6	1
11	—	Teco Electric Company Limited 150kW, 415 Volt, 50Hz, 1480rpm Electric Motor (Customer Supplied)	1,200	1
		TOTAL MASS:-	**13,486 kg**	

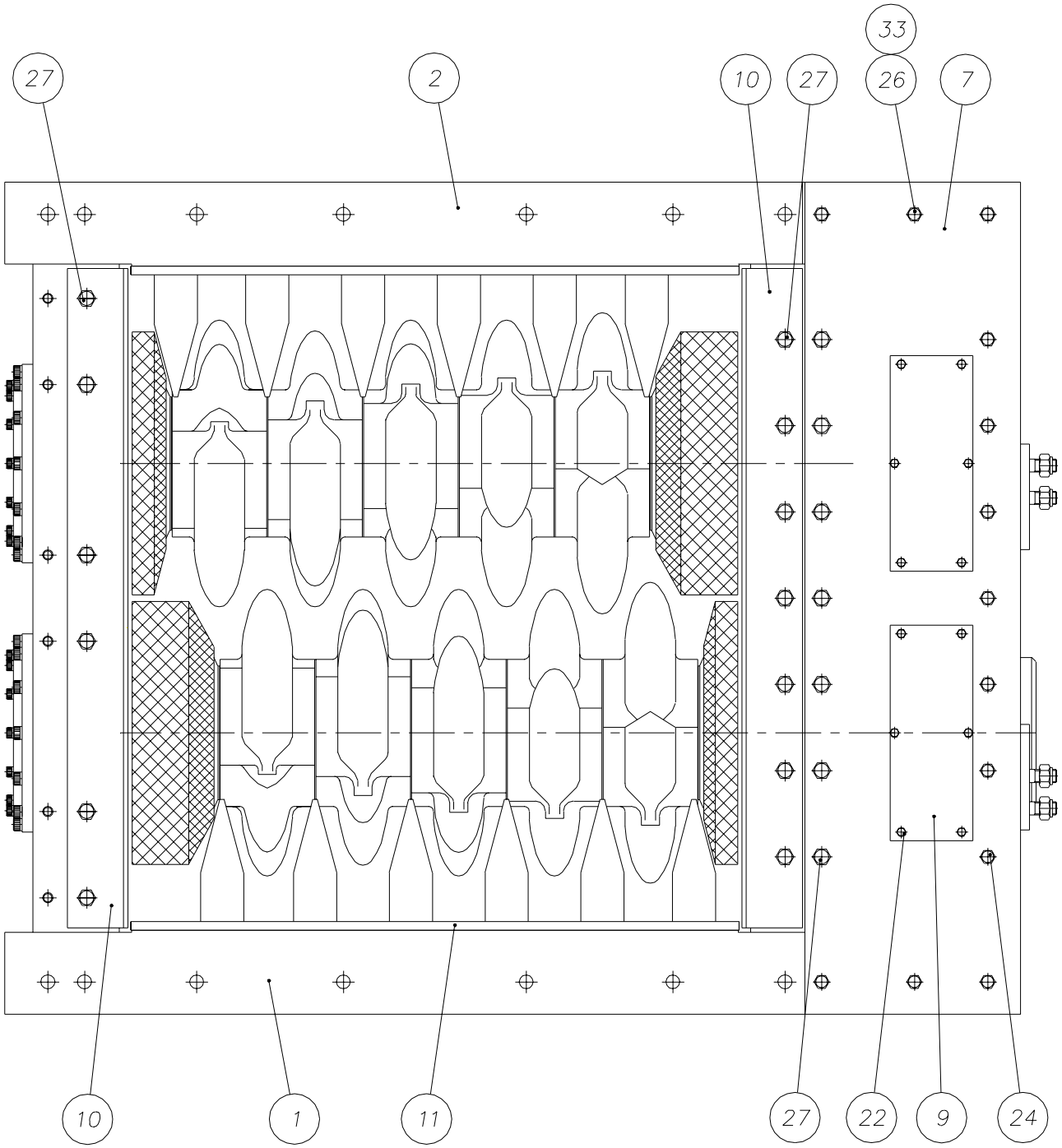
MMD MINING MACHINERY DEVELOPMENTS LIMITED

CASE ASSEMBLY

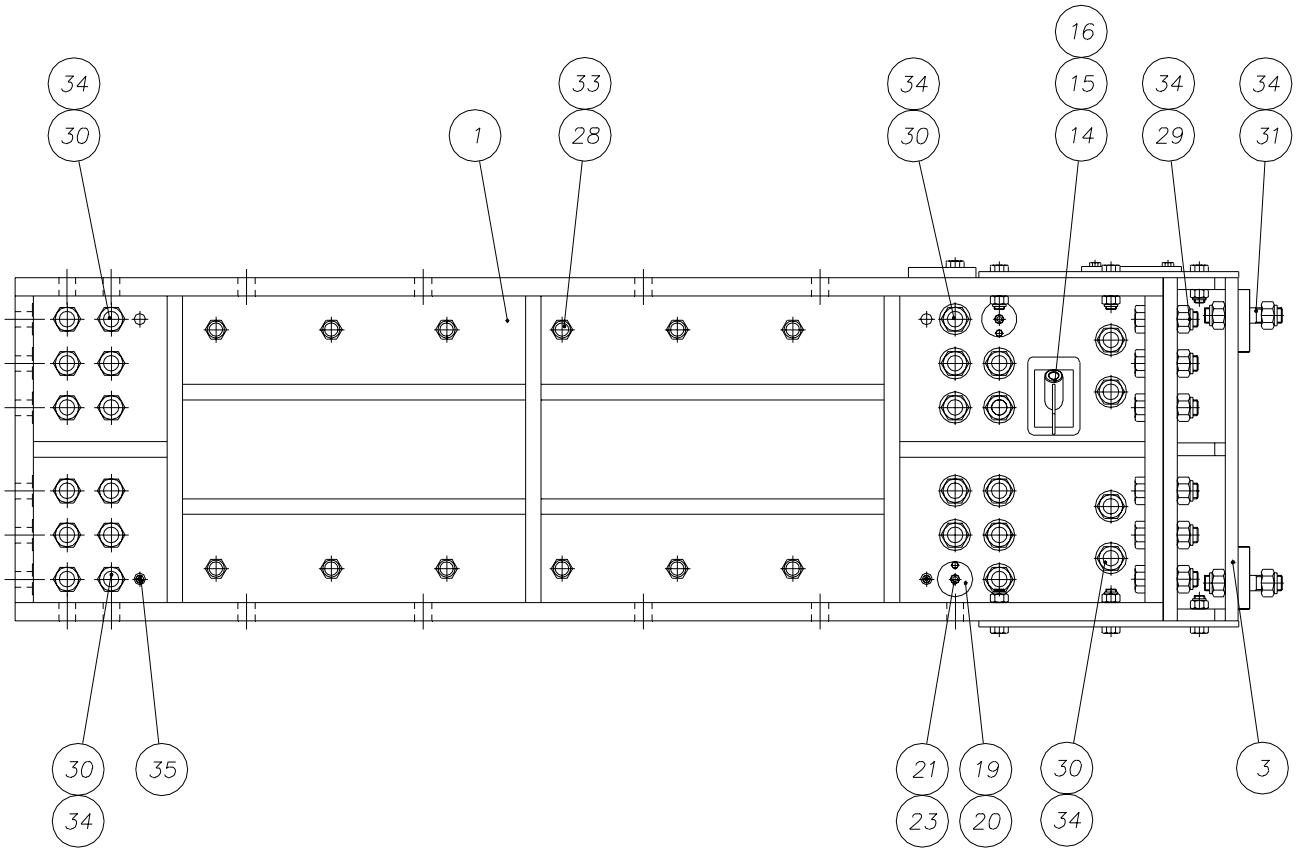
PART NUMBER - 346250335

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

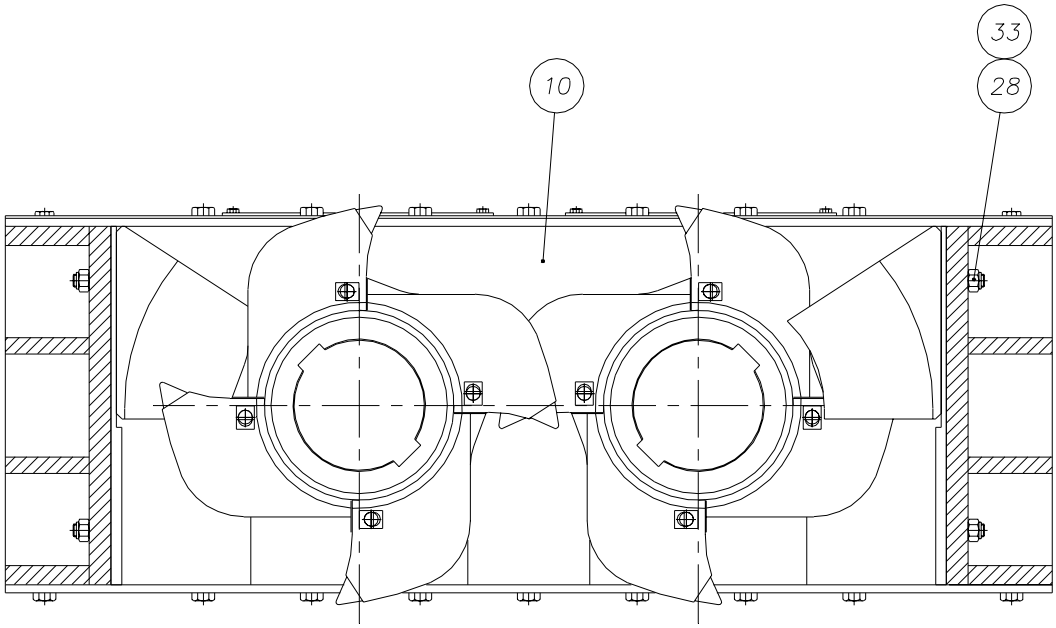
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250335

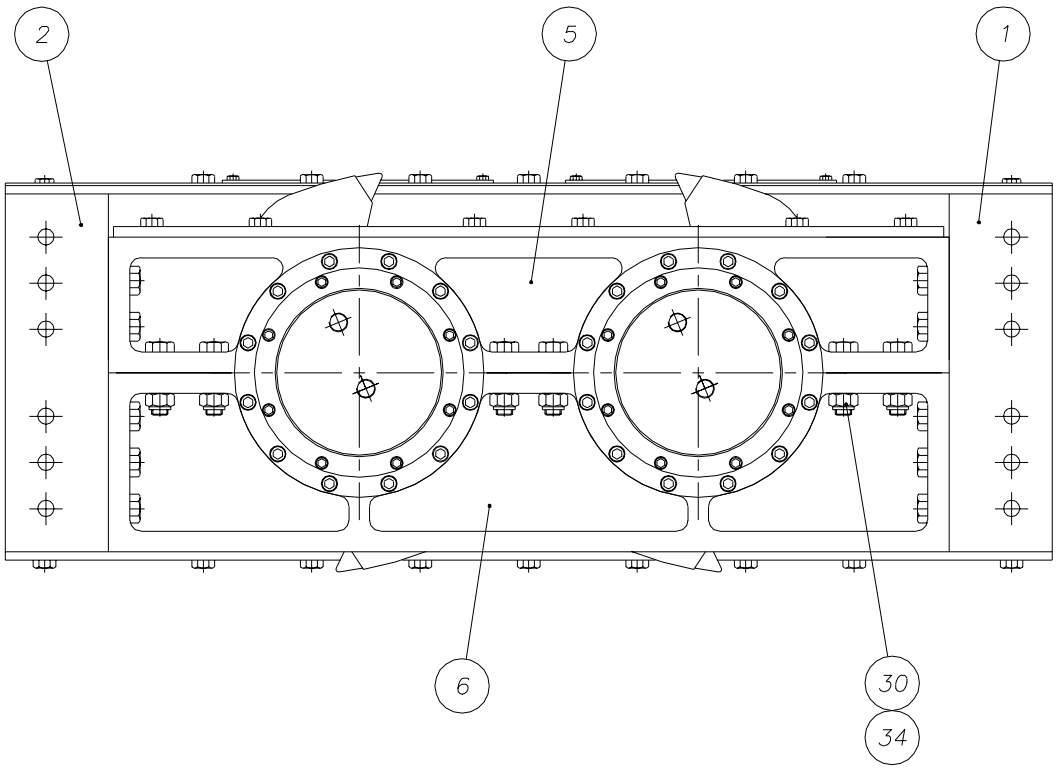


MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250335



MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250335





MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250335

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251519-85	Side Plate	855	1
2	6251520-85	Side Plate	855	1
3	6251521-85	Gearbox Mounting Plate	405	1
4	6251365-06	Top Bearing Housing	335	1
5	6251524-06	Top Bearing Housing With Reject Facility	285	1
6	6251366-06	Bottom Bearing Housing	330	2
7	6251536-85	Top Cover Plate	70	1
8	6251532-85	Bottom Cover Plate	80	1
9	6250232-84	Inspection Cover Plate	7	2
10	6251523-84	End Wear Plate	90	1
11	6251525-84	Side Wear Plate	115	1
12	6251462-01	Key Block (Gearbox Mounting)	12	1
13	0062856-01	Oil Level Dip-Stick	2	1
14	0062857-01	Dip-Stick Holder	1.8	1
15	0062875-01	Dip-Stick Holder Blanking Plate	1	1
16	023301601	Filler/Breather (UCAB 1380-10)	0.1	1
17	6250213-85	Lifting Lug *	16	2
18	6250214-85	Lifting Lug *	16	2
19	6250193-01	Dowel	0.5	2
20	6250194-01	Dowel Retaining Plate	0.25	2
21	031308020	M8 x 20 H.T. Hex. Set Screw	0.01	4
22	031312025	M12 x 25 H.T. Hex. Set Screw	0.04	12
23	030512030	M12 x 30 Socket Head Cap Screw (Grade 12.9)	0.04	4
24	031320050	M20 x 50 H.T. Hex. Set Screw	0.17	14
25	031320060	M20 x 60 H.T. Hex. Set Screw	0.19	4
26	030320070	M20 x 70 H.T. Hex. Bolt	0.22	8
27	031324050	M24 x 50 H.T. Hex. Set Screw	0.27	27
28	031824070	M24 x 70 Countersunk Socket Screw	0.25	24
29	030330100	M30 x 100 H.T. Hex. Bolt	0.7	12
30	030330110	M30 x 110 H.T. Hex. Bolt	0.8	64
31	6251034-01	M30 Gearbox Mounting Stud	1	8
32	031420000	M20 Nyloc Nut	0.06	12
		TOTAL MASS:-	**See Over**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250335

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
33	031424000	M24 Nyloc Nut	0.11	24
34	031430000	M30 Nyloc Nut	0.23	76
35	036000604	¼” BSP Grease Nipple	0.01	4
		ITEMS MARKED THUS * ARE FOR LIFTING PURPOSES ONLY, AND SHOULD BE REMOVED AND STORED IN A SAFE PLACE WHILE THE MACHINE IS IN USE		

TOTAL MASS:-	**3,954 kg**

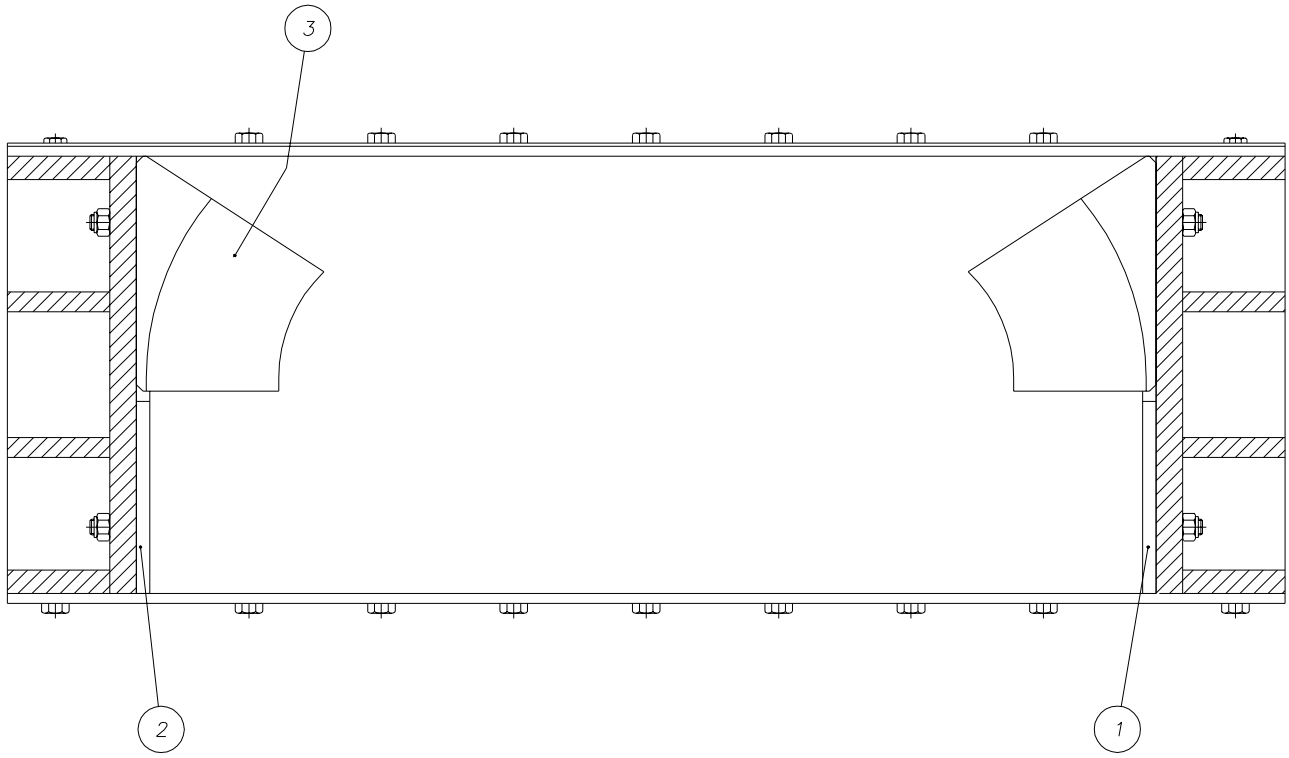
MMD MINING MACHINERY DEVELOPMENTS LIMITED

SIDE WEAR PLATE ASSEMBLY

PART NUMBER - 146251527

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Side Wear Plate Assembly - Part Number : 146251527



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251526-91	Side Wear Plate (Vida Plate)	85	1
2	6251527-84	Side Wear Plate	85	1
3	6251070-01	Pyramid (Material - MMD101)	26	6
		TOTAL MASS:-	**326 kg**	

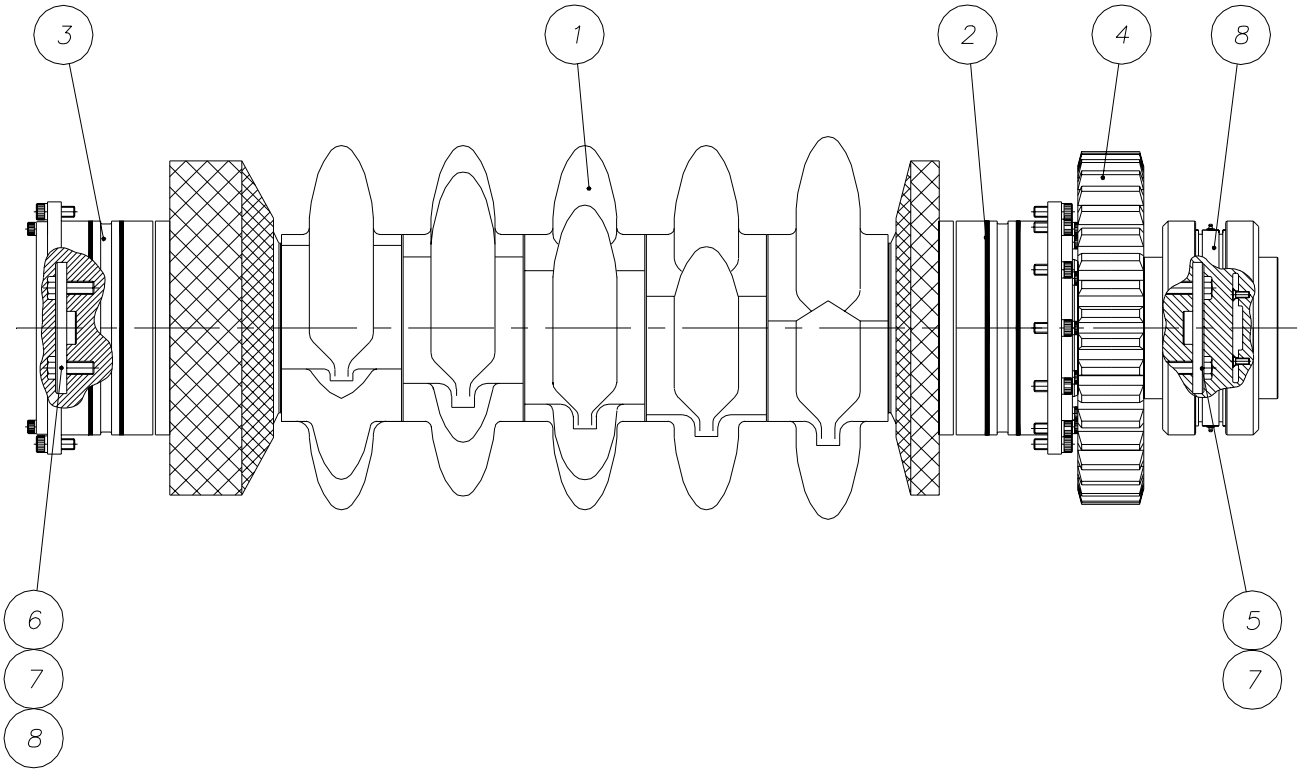
MMD MINING MACHINERY DEVELOPMENTS LIMITED

4 TOOTH x 5 RING LEFT-HAND (DRIVE) SHAFT ASSEMBLY

PART NUMBER - 146250321

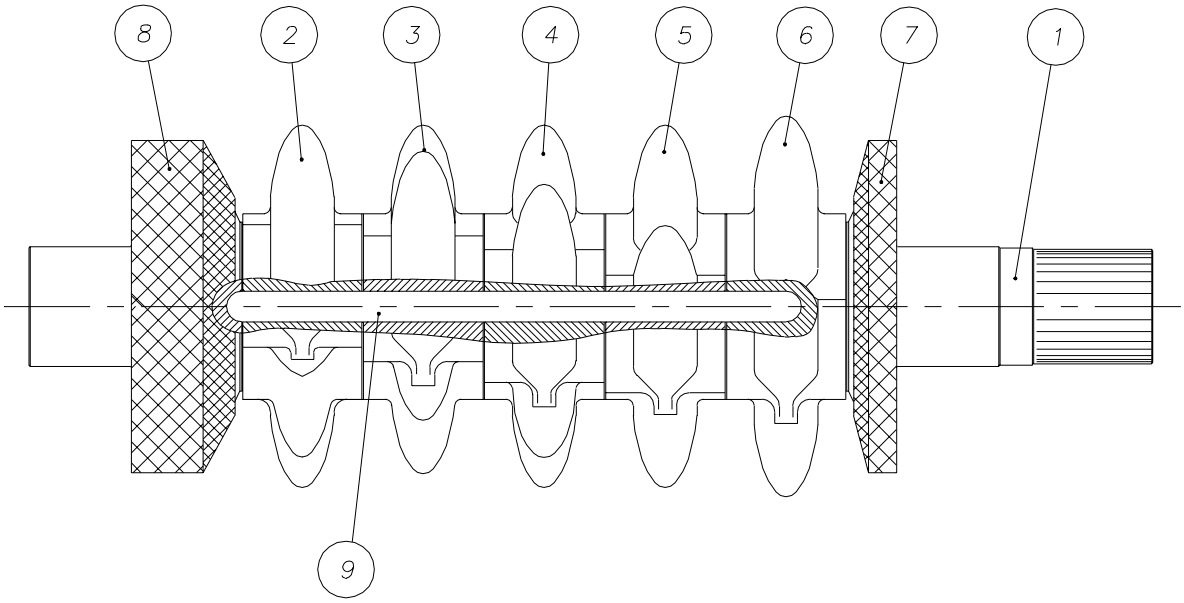
REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

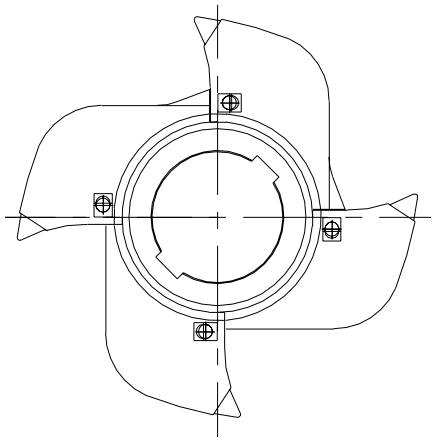
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Drive Shaft Assembly - Part Number : 246250321



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	146250321	Breaker Shaft Assembly (Drive)	1,627	1
2	146251429	Fixed Bearing Assembly	135	1
3	146251426	Floating Bearing Assembly	126	1
4	6250255-01	Spur Gear	260	1
5	6251359-01	End Cap	7	2
6	031320020	M20 x 20 H.T. Hex. Set Screw (Pulse Stud)	0.1	1
7	031324050	M24 x 50 H.T. Hex. Set Screw	0.27	16
8	111701033	Gear Coupling Assembly (See Section 7)	–	1
		TOTAL MASS:-	**2,166 kg**	

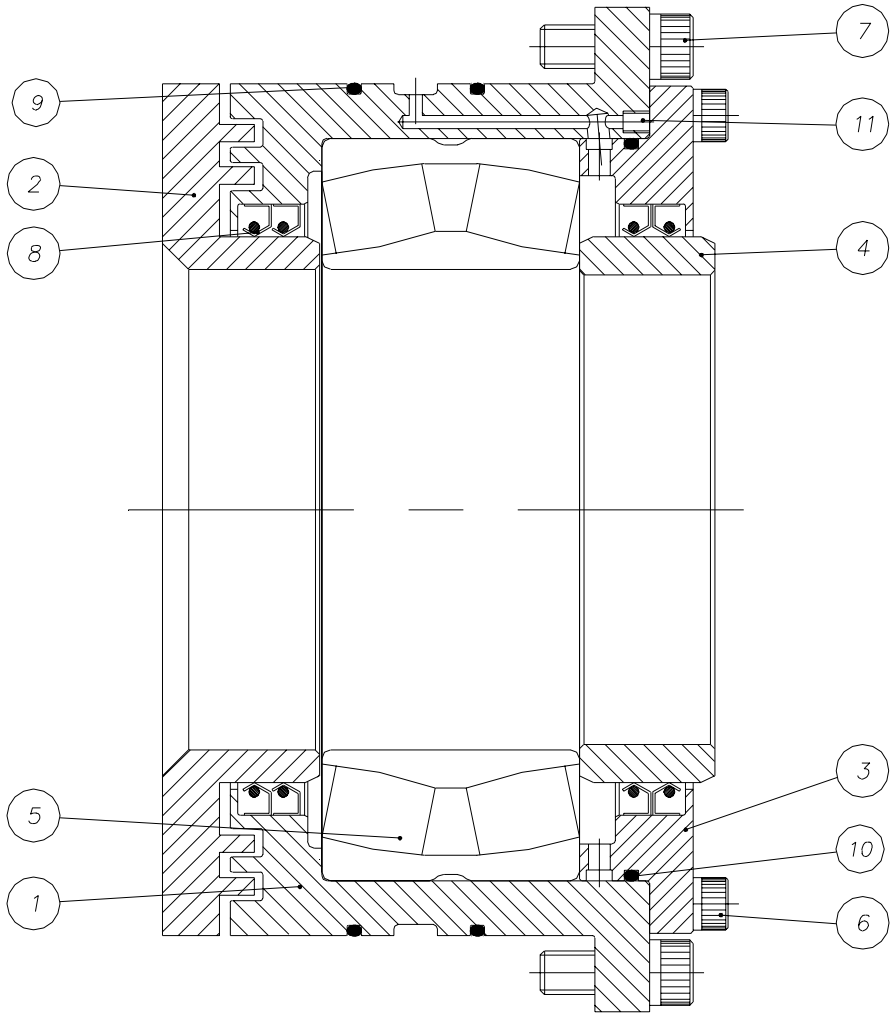
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Drive Shaft Assembly - Part Number : 146250321





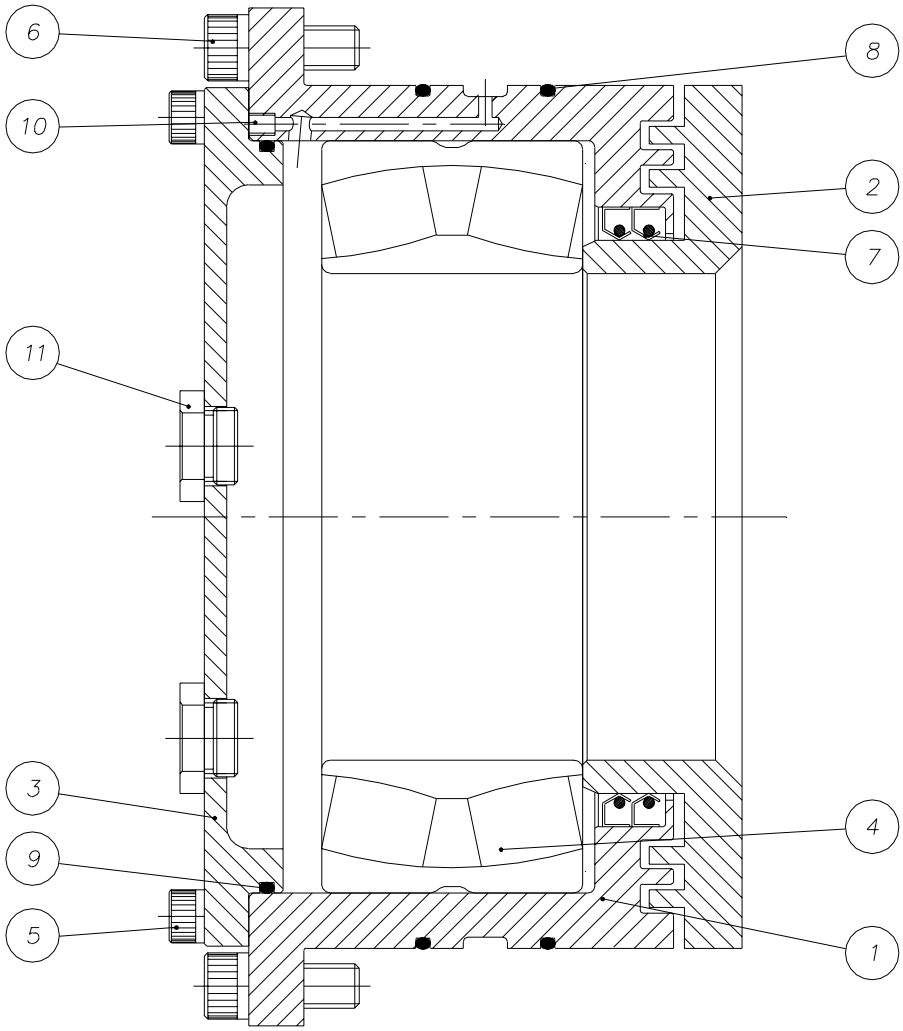
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5010192-06	Breaker Shaft	695	1
2	5050057-06	4 Tooth Ring (0^o Keyway)	130	1
3	5050058-06	4 Tooth Ring (15^o Keyway)	130	1
4	5050059-06	4 Tooth Ring (30^o Keyway)	130	1
5	5050060-06	4 Tooth Ring (45^o Keyway)	130	1
6	5050061-06	4 Tooth Ring (60^o Keyway)	130	1
7	6251450-84	Right-Hand Screwed Collar	125	1
8	6251451-84	Left-Hand Screwed Collar	143	1
9	5090122-01	Key (56 x 32 x 999 Long)	14	1
		TOTAL MASS:-	**1,627 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fixed Bearing Assembly - Part Number : 146251429



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251430-06	Bearing Capsule	54.8	1
2	6251428-01	Labyrinth	22	1
3	6251369-01	Seal Plate	16	1
4	6251358-01	Spacer	7	1
5	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
6	030516050	M16 x 50 Socket Head Cap Screw (Grade 12.9)	0.11	12
7	030520050	M20 x 50 Socket Head Cap Screw (Grade 12.9)	0.18	12
8	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
9	032000546	'O' Ring (RM 3393-57)	0.01	2
10	032000604	'O' Ring (RM 3193-57)	0.01	1
11	036000001	1/8" BSP Grub Screw	0.1	1
		TOTAL MASS:-	**135 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Floating Bearing Assembly - Part Number : 146251426



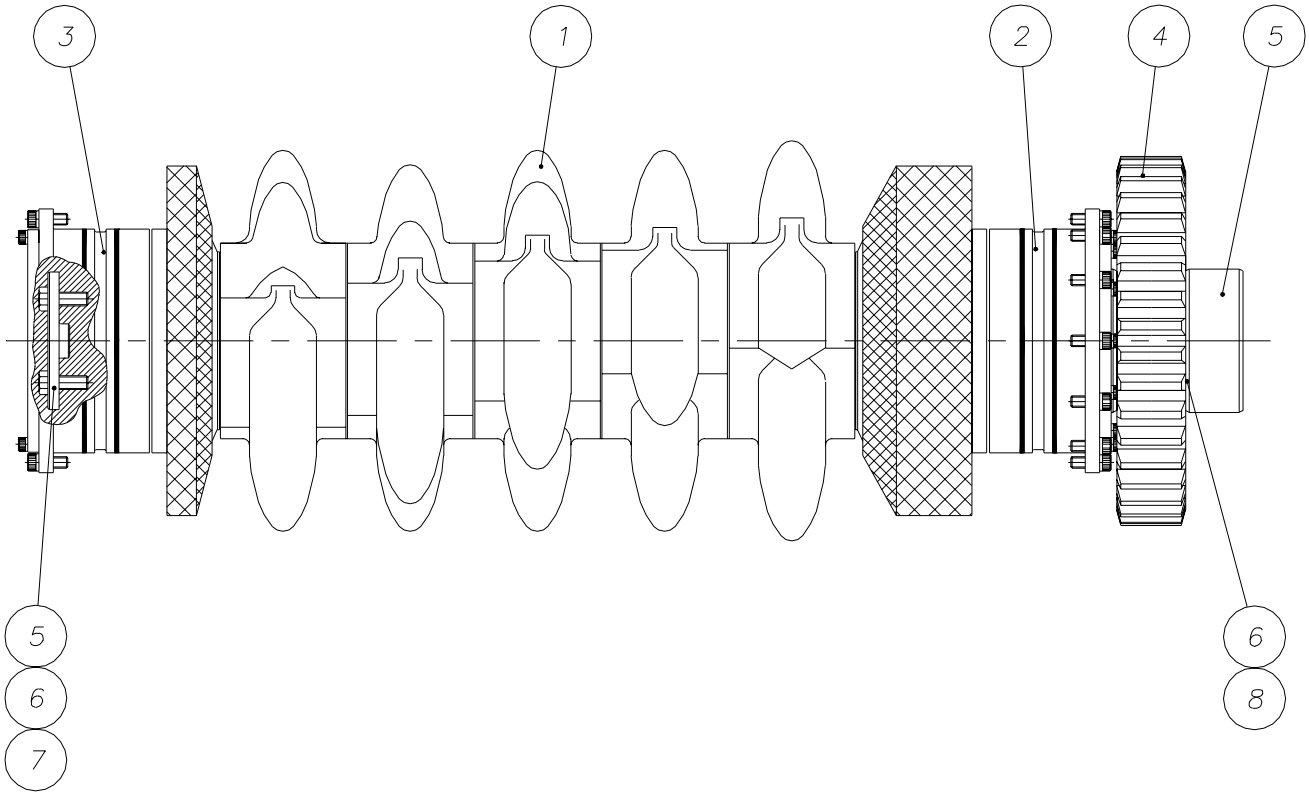
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251431-06	Bearing Capsule	54.7	1
2	6251428-01	Labyrinth	22	1
3	6251417-01	Seal Plate	15	1
4	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
5	030516050	M16 x 50 Socket Head Cap Screw (Grade 12.9)	0.11	8
6	030520050	M20 x 50 Socket Head Cap Screw (Grade 12.9)	0.18	12
7	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	2
8	032000546	'O' Ring (RM 3393-57)	0.01	2
9	032000604	'O' Ring (RM 3193-57)	0.01	1
10	036000001	1/8" BSPT Plug	0.1	1
11	1548575-01	Blanking Plug For Underspeed Sensing	0.1	2
		TOTAL MASS:-	**126 kg**	

4 TOOTH x 5 RING LEFT-HAND (DRIVEN) SHAFT ASSEMBLY

PART NUMBER - 246250322

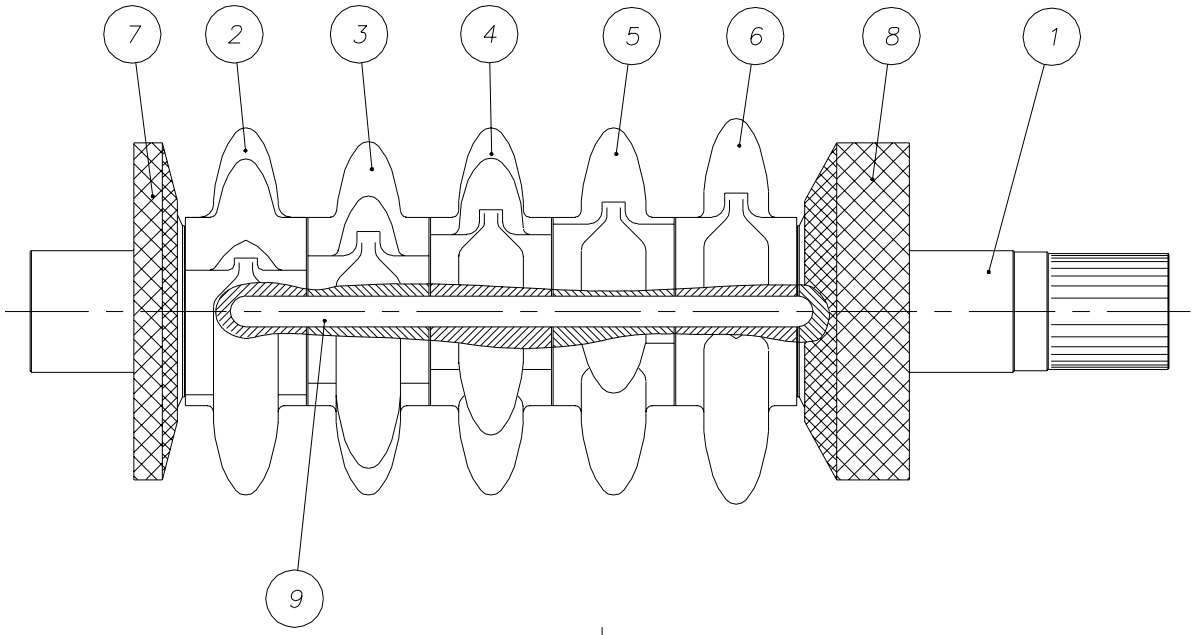
REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	12-1-99

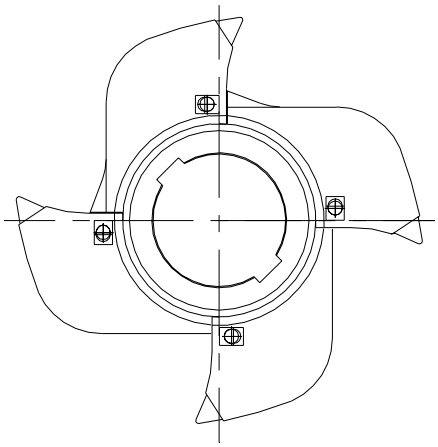
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Driven Shaft Assembly - Part Number : 246250322



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	146250322	Right Hand Breaker Shaft Assembly (Driven)	1,627	1
2	146251429	Fixed Bearing Assembly	135	1
3	146251426	Floating Bearing Assembly	126	1
4	6250255-01	Spur Gear	260	1
5	6250281-01	Spacer	4	1
6	6251359-01	End Cap	7	2
7	031320020	M20 x 20 H.T. Hex. Set Screw (Pulse Stud)	0.1	1
8	031324050	M24 x 50 H.T. Hex. Set Screw	0.27	16
		TOTAL MASS:-	**2,170 kg**	

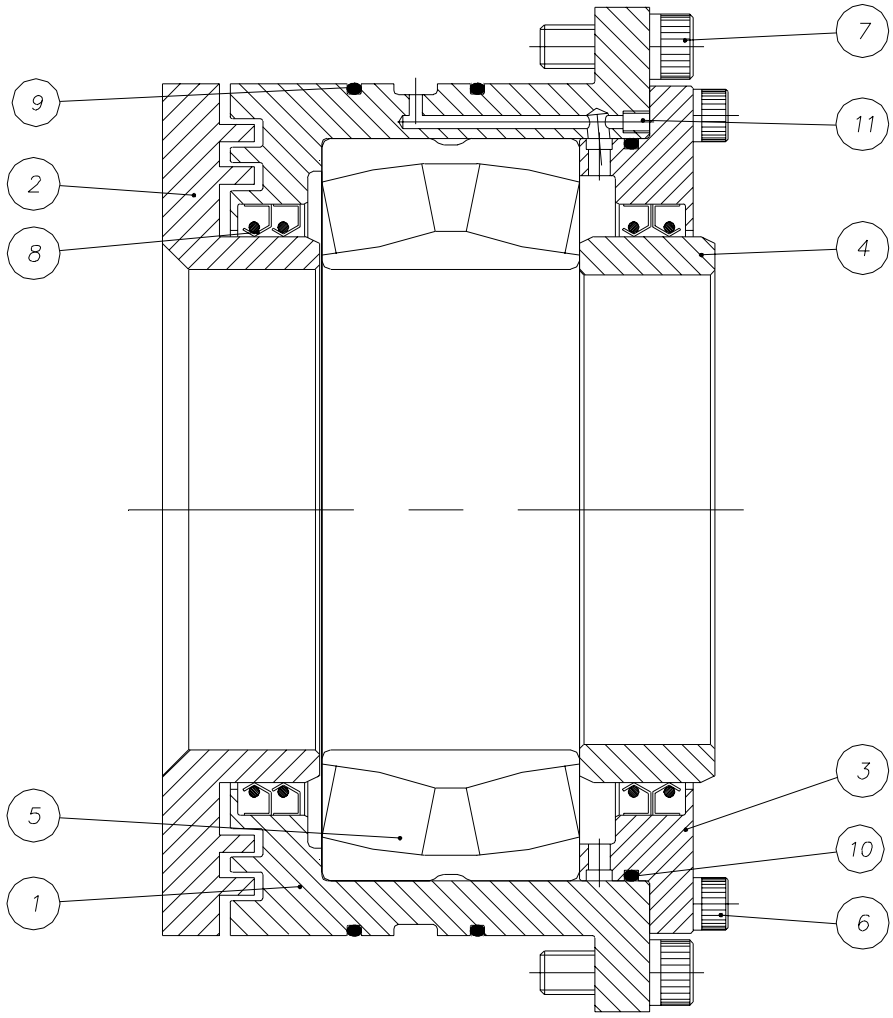
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Driven Shaft Assembly - Part Number : 146250322





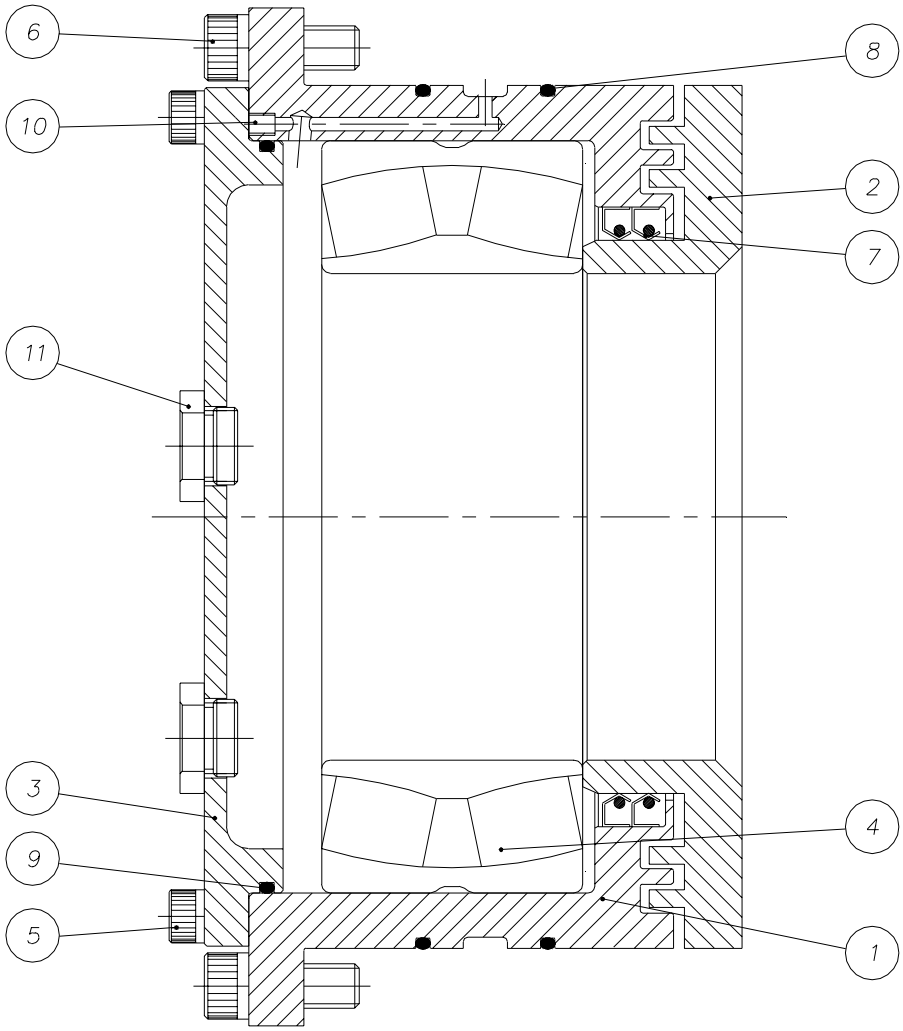
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5010193-06	Breaker Shaft	695	1
2	5050057-06	4 Tooth Ring (0^o Keyway)	130	1
3	5050058-06	4 Tooth Ring (15^o Keyway)	130	1
4	5050059-06	4 Tooth Ring (30^o Keyway)	130	1
5	5050060-06	4 Tooth Ring (45^o Keyway)	130	1
6	5050061-06	4 Tooth Ring (60^o Keyway)	130	1
7	6251450-84	Right-Hand Screwed Collar	125	1
8	6251451-84	Left-Hand Screwed Collar	143	1
9	5090122-01	Key (56 x 32 x 999 Long)	14	1
		TOTAL MASS:-	**1,627 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fixed Bearing Assembly - Part Number : 146251429



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251430-06	Bearing Capsule	54.8	1
2	6251428-01	Labyrinth	22	1
3	6251369-01	Seal Plate	16	1
4	6251358-01	Spacer	7	1
5	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
6	030516050	M16 x 50 Socket Head Cap Screw (Grade 12.9)	0.11	12
7	030520050	M20 x 50 Socket Head Cap Screw (Grade 12.9)	0.18	12
8	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
9	032000546	'O' Ring (RM 3393-57)	0.01	2
10	032000604	'O' Ring (RM 3193-57)	0.01	1
11	036000001	1/8" BSP Grub Screw	0.1	1
		TOTAL MASS:-	**135 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Floating Bearing Assembly - Part Number : 146251426



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251431-06	Bearing Capsule	54.7	1
2	6251428-01	Labyrinth	22	1
3	6251417-01	Seal Plate	15	1
4	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
5	030516050	M16 x 50 Socket Head Cap Screw (Grade 12.9)	0.11	8
6	030520050	M20 x 50 Socket Head Cap Screw (Grade 12.9)	0.18	12
7	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	2
8	032000546	'O' Ring (RM 3393-57)	0.01	2
9	032000604	'O' Ring (RM 3193-57)	0.01	1
10	036000001	1/8" BSPT Plug	0.1	1
11	1548575-01	Blanking Plug For Underspeed Sensing	0.1	2
		TOTAL MASS:-	**126 kg**	

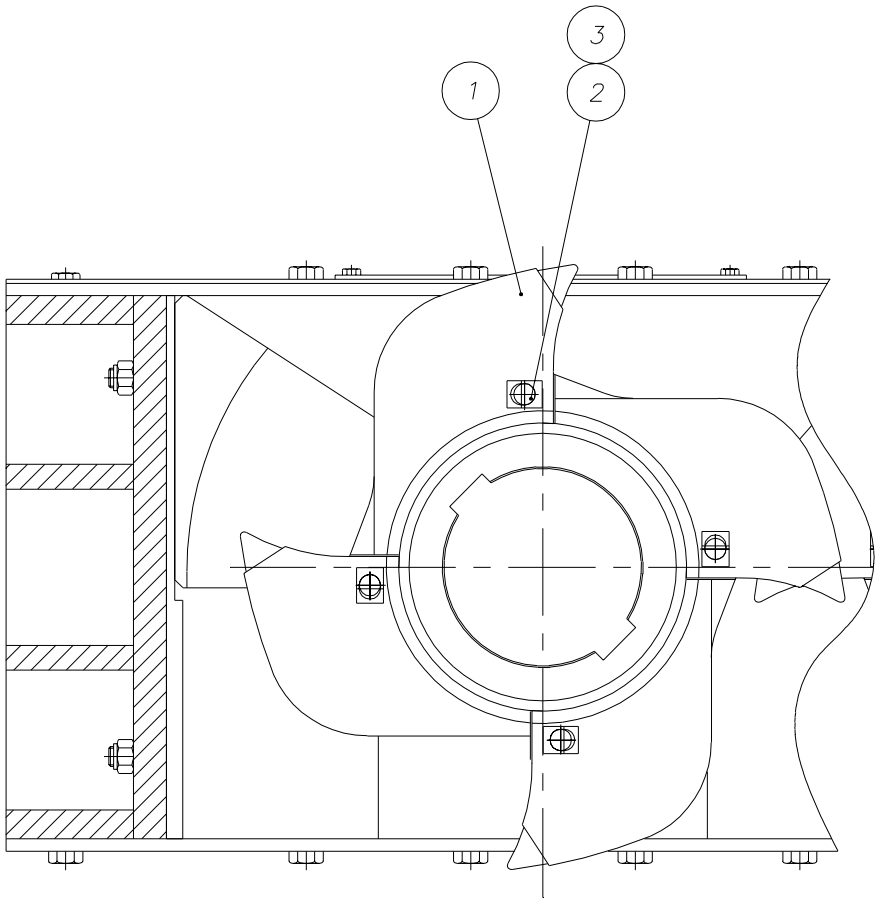
MMD MINING MACHINERY DEVELOPMENTS LIMITED

TOOTH CAP AND TOOTH CAP FIXINGS ASSEMBLY

PART NUMBER - 145060064

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Tooth Cap & Fixings Assembly - Part Number : 145060064



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5060064-01	Glove Type Tooth Cap (Material:- MMD505)	21.5	1
2	5110005-01	M24 x 103 Tooth Cap Bolt (Grade 12.9)	2.5	1
3	031424000	M24 Nyloc Nut	0.11	1
		TOTAL MASS:-	**24 kg**	

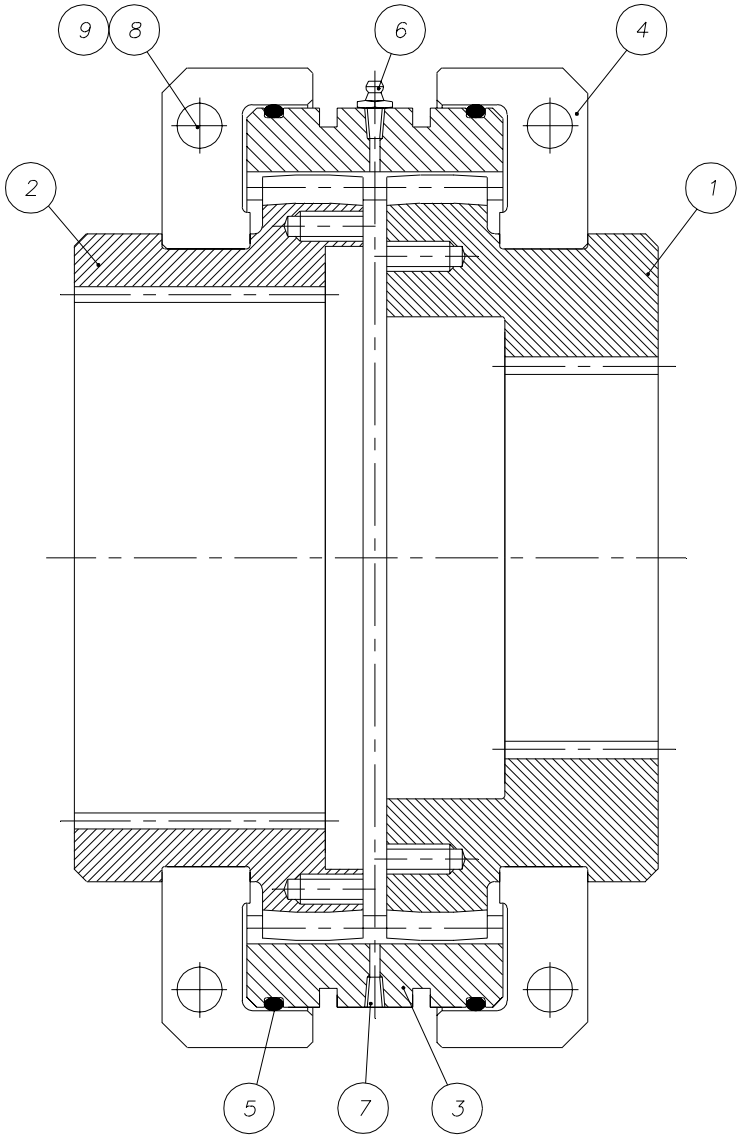
MMD MINING MACHINERY DEVELOPMENTS LIMITED

GEAR COUPLING ASSEMBLY

PART NUMBER - 111701004

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	12-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Gear Coupling Assembly - Part Number : 111701004



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	1701005-01	Hub	28	1
2	1701006-01	Hub	17.6	1
3	1701007-01	Sleeve	22	1
4	1701008-01	Split Clamp	20	2
5	032000784	'O' Ring (RM 3493-57)	0.01	2
6	036000609	¼" BSPT Grease Nipple	0.01	1
7	036000002	¼" BSPT Pressure Plug	0.01	1
8	030516090	M16 x 90 Socket Head Cap Screw (Grade 12.9)	0.2	4
9	031416000	M16 Nyloc Nut	0.03	4
		TOTAL MASS:-	**109 kg**	

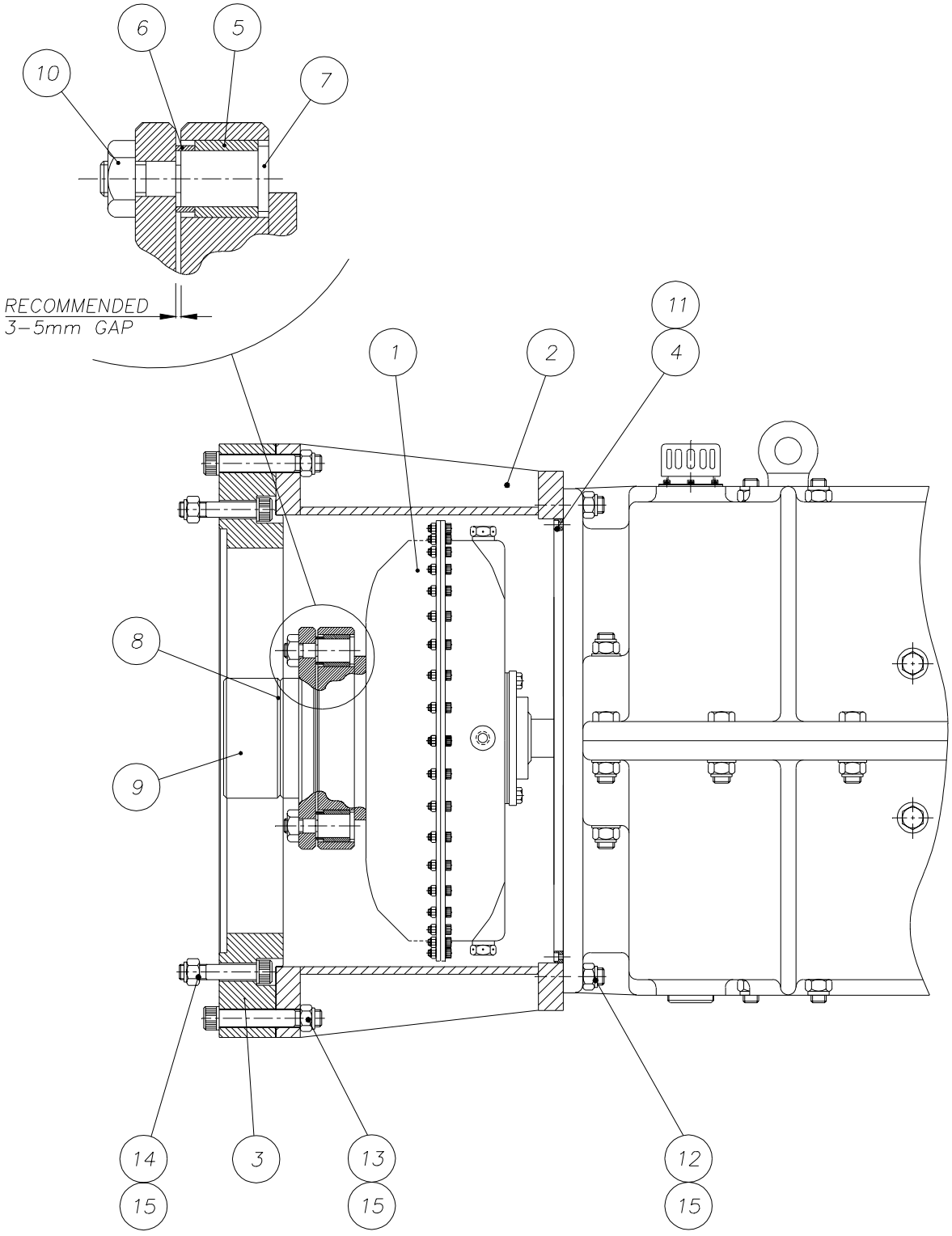
MMD MINING MACHINERY DEVELOPMENTS LIMITED

FLUIDRIVE FLUID COUPLING ASSEMBLY

PART NUMBER - 141562659

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fluid Coupling Assembly - Part Number : 141562659



MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fluid Coupling Assembly - Part Number : 141562659

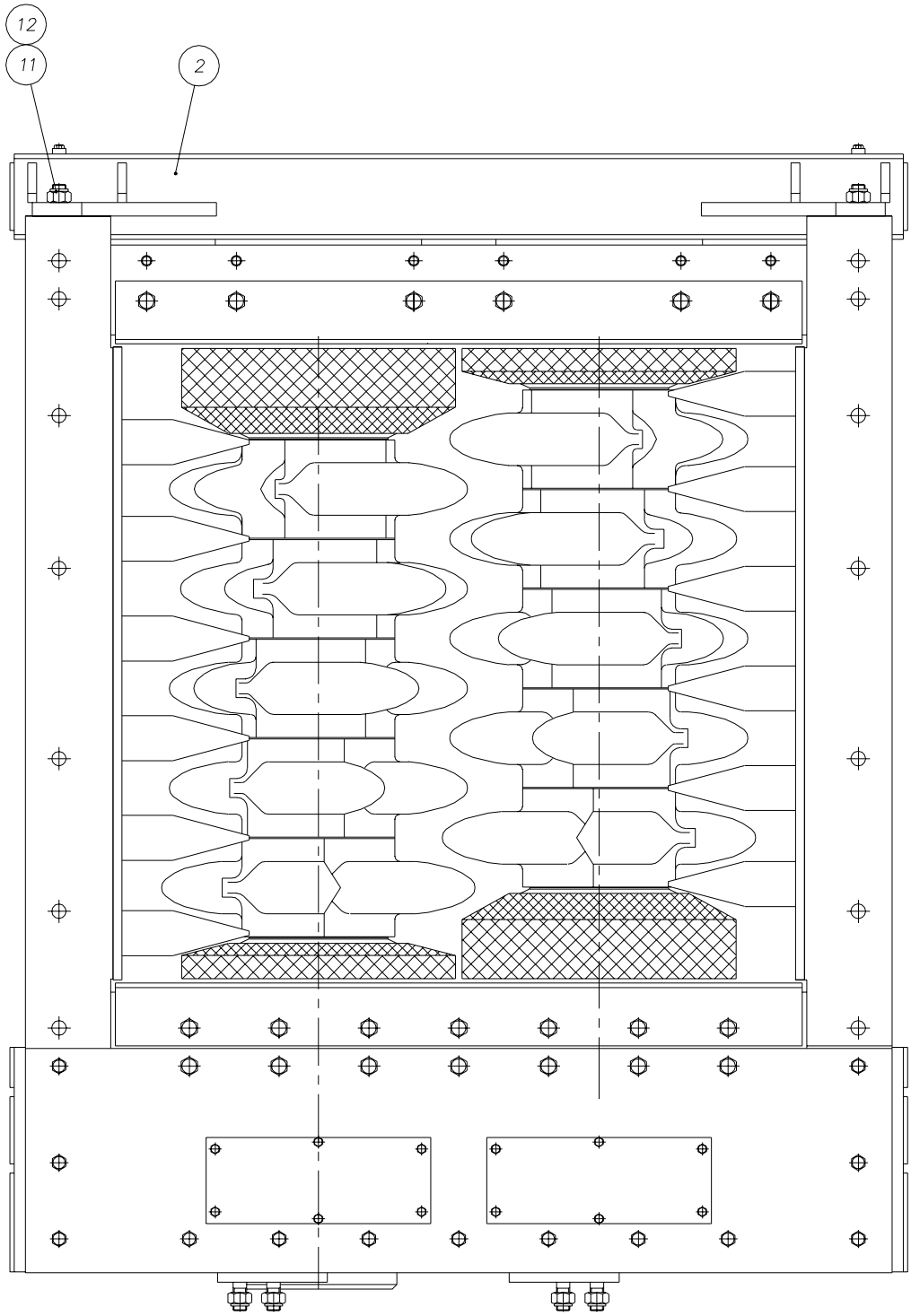
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	023150030	Fluidrive STC500 Fluid Coupling (Oil Filled)	100	1
2	1544420-01	Fluid Coupling Housing	143	1
3	4008310-01	Motor Adaptor Plate	150	1
4	1561828-01	Spigot Ring	3	1
5	2060360-01	Bush (51159/A)	0.05	8
6	2060370-01	Washer (51160/A)	0.01	8
7	2060380-01	Coupling Pin	0.4	8
8	2060440-01	Drive Boss	26.5	1
9	2060450-01	Spacer	2.6	1
10	035822000	7/8” BSW Drive Pin Hex. Nut	0.1	8
11	030506015	M6 x 15 Socket Head Cap Screw (Grade 12.9)	0.01	2
12	1561687-01	M20 Stud	0.1	12
13	030520130	M20 x 130 Socket Head Cap Screw (Grade 12.9)	0.37	8
14	030520100	M20 x 100 Socket Head Cap Screw (Grade 12.9)	0.3	8
15	031420000	M20 Nyloc Nut	0.06	28
		THE FOLLOWING SPARE PART IS AVAILABLE, BUT IS NOT SUPPLIED WITH THIS ASSEMBLY		
	023150072	Fluidrive Fusible Plug, Inc. Washer (26711/A)	–	–
		TOTAL MASS:-	**438 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED

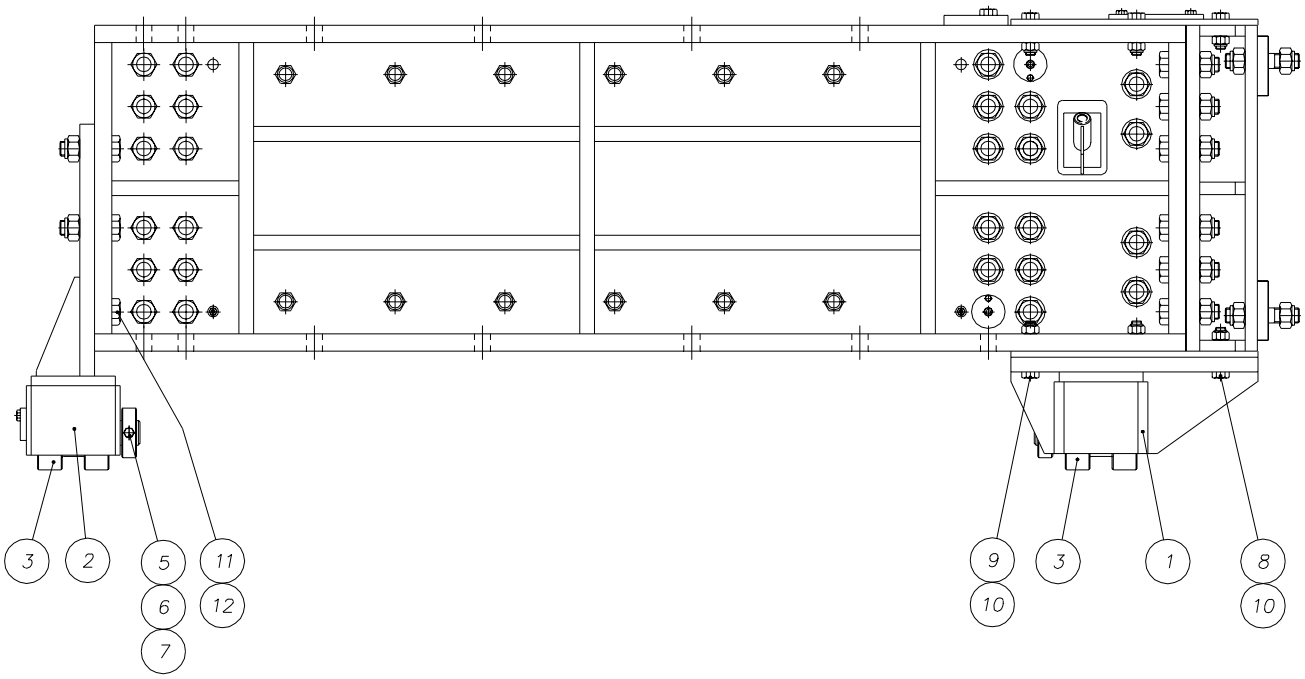
TRANSOM WHEEL CARRIAGE ASSEMBLY

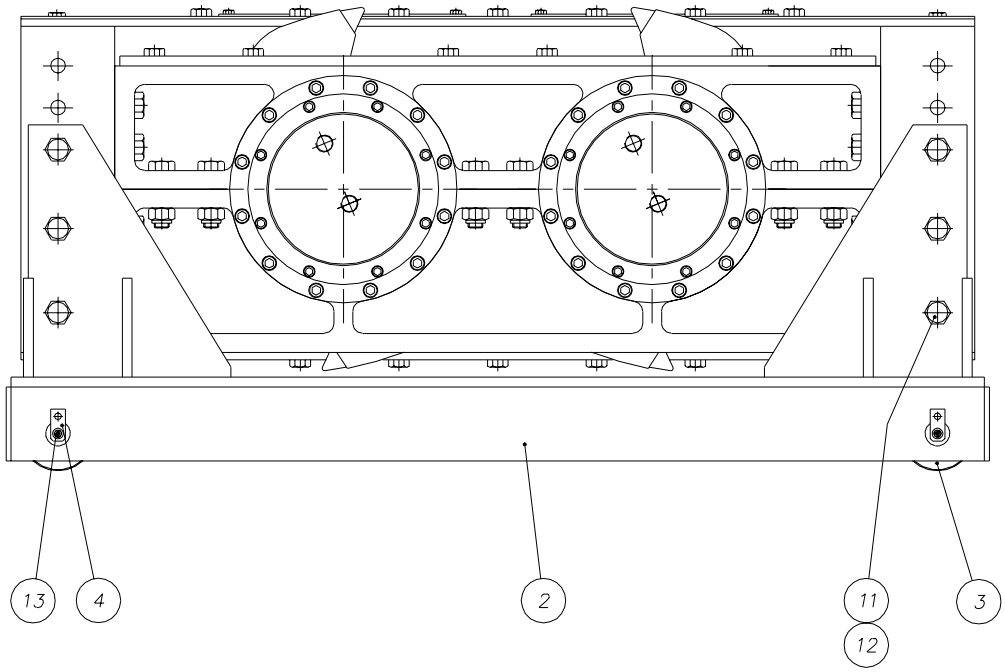
PART NUMBER - 145010129

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	25-1-99


12
11
2

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Wheel Carriage Assembly - Part Number : 145040129





ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5040129-84	Wheel Carriage Unit (Drive End)	235	1
2	5040130-84	Wheel Carriage Unit (Non-Drive End)	230	1
3	5040123-01	Flanged Wheel, Complete With Bushes	14	4
4	4006684-01	Wheel Pin	3.6	4
5	4006685-01	Collar	1.5	4
6	030312120	M12 x 120 H.T. Hex. Bolt	0.11	4
7	031412000	M12 Nyloc Nut	0.02	4
8	030320090	M20 x 90 H.T. Hex. Bolt	0.28	2
9	030320100	M20 x 100 H.T. Hex. Bolt	0.3	2
10	031420000	M20 Nyloc Nut	0.06	4
11	030330110	M30 x 110 H.T. Hex. Bolt	0.8	6
12	031430000	M30 Nyloc Nut	0.21	6
13	036000604	¼” BSP Grease Nipple	0.01	4
		TOTAL MASS:-	**550 kg**	

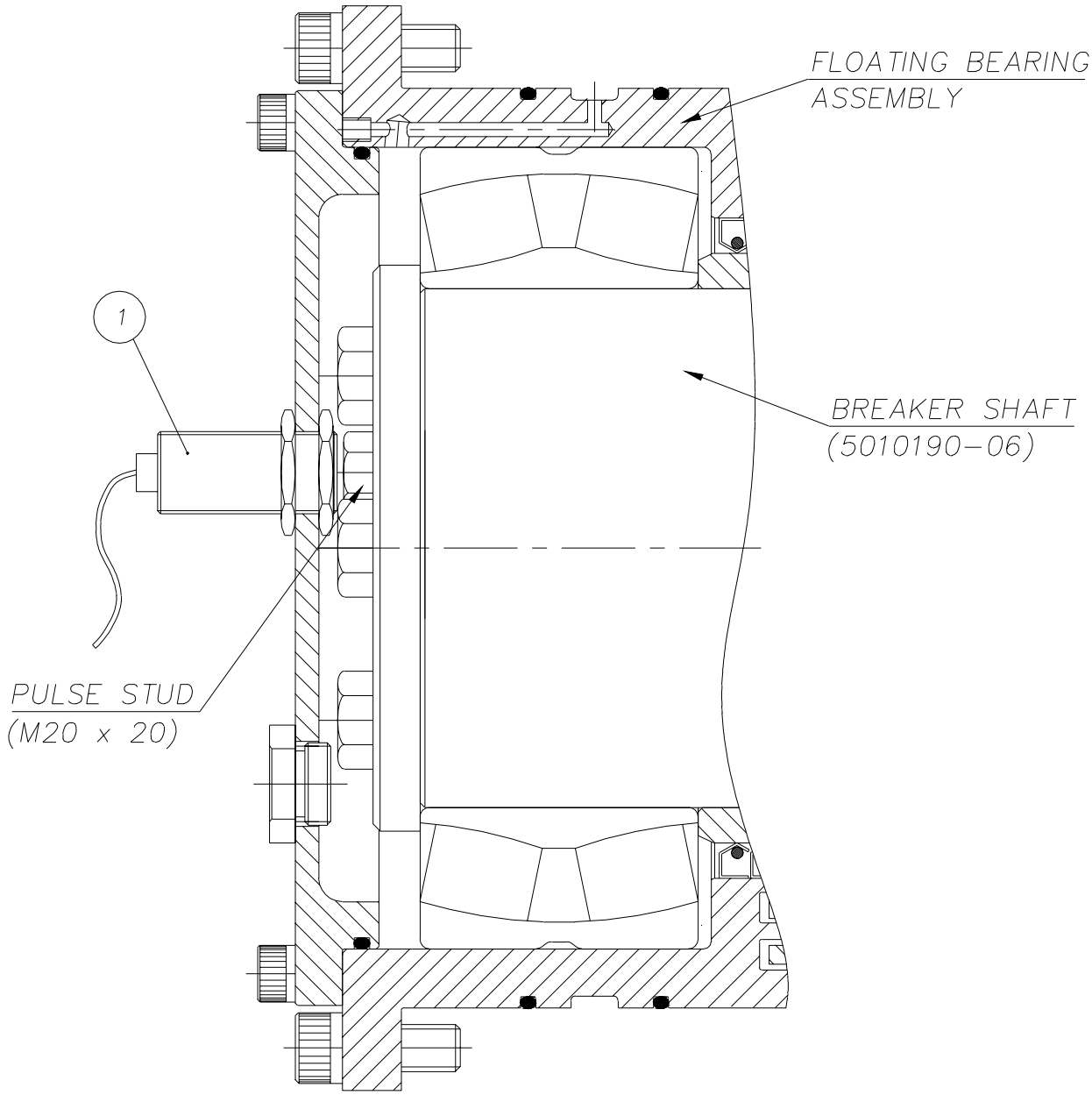
MMD MINING MACHINERY DEVELOPMENTS LIMITED

ELECTROMATIC UNDERSPEED SENSING ASSEMBLY (110V, A.C)

PART NUMBER - 143210000

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Underspeed Sensing Assembly - Part Number : 143210000



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	**143210000**	**Underspeed Sensing Assembly. 110V, A.C**	**–**	**1**
		Comprising:-		
	023210001	Proximity Switch Inductive (DJ10G)	0.35	1
	023210002	Pulse Continuity Realy (S114156 110V, A.C)	0.19	1
	023210004	Relay Base (S411)	0.06	2
		TOTAL MASS:-	**0.6 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED

MMD 625 SERIES TWIN SHAFT MINERAL SIZER

PRINCIPLES OF OPERATION & MAINTENACE SCHEDULE

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	22-1-99

MMD 625 SERIES TWIN SHAFT MINERAL SIZER

Principles Of Operation

The MMD Mineral Sizer accepts the product in through the top of the Sizer, delivery being from any angle. The two rotating shafts have attached the appropriate sizing teeth which pass the total product, undersize and oversize, down through the Sizer.

The undersized product is passed through the rotating teeth without further degradation, whilst the oversized product is presented to the teeth in such a manner that the weakness of the material in tension is exploited to the advantage. The size of the broken product can be controlled in all three planes, giving an accurately sized product, which is then passed to the underside of the sizer.

The sizer is made of extremely robust construction and of adequate strength to withstand continuous heavy duty operation. The sizer is designed to contain the breaking forces within its own framework, and transfers none of these forces to the supporting structure.

The machined sideframes are of ribbed construction fabricated from structural steel with easily replaceable steel wearplates covering all the inside area of the sizing chamber. Suitable drillings readily accept the fitting of hopper and chute work.

The main shafts are machined from high strength alloy steel bar which are supported by self aligning double row spherical roller bearings which are housed in ribbed steel castings. The bearings are lubricated by grease at both ends of the sizer and are protected by heavy duty lip seals which are further protected by a grease filled double labyrinth to prevent the ingress of water, dirt, etc.

The actual sizing elements are manufactured to MMD's own specification, which is an alloy carbon steel which also incorporates manganese, and thus work hardens during operation.

Due to the robust manufacture of the MMD Sizer, there is little or no vibration apparent when the machine is sizing. Maintenance is kept to a minimum due to the fact that there is a maximum of three oil levels on the machine for gear lubrication and greasing points for each gear coupling, bearing labyrinth, and, where fitted, the wheel carriage units. Also, if specified, the bearing greasing points can be served by a automatic centralised greasing unit.

Safe Operating Procedure

BEFORE ANY WORK IS CARRIED OUT ON THE MACHINE, ISOLATE THE POWER SUPPLY, AND REMOVE THE CABLE FROM THE MOTOR. UNLESS THE ABOVE OPERATION IS CARRIED OUT, NO PERSON OR PERSONS SHALL STAND ON THE MACHINE.

- Installation of safety guards and fences shall be the responsibility of the customer at the time of commissioning.
- During operation of the machine, no person or persons should violate the safety guards and fences in its vicinity.
- Unless otherwise stated, MMD will not be responsible for the safe siting of the machine, and/or any requirements appertaining to operating codes of practice.
- MMD will not be responsible for the use or operation of the machine for any purpose other that the specified / accepted operation requirement in the official order.
- It is understood any maintenance carried out in accordance with this manual shall be by a person or persons qualified to carry out such practice in compliance with the safety requirements of the operating company.

FAILURE TO COMPLY WITH ANY OF THE ABOVE PROCEDURES IS DONE SO AT THE OPERATOR'S OWN RISK.

Pre-start Check List

- Ensure visually that the machine is fully engaged in the working position.
- Check thoroughly to ensure that no person or persons can be injured when the machine starts.
- Check drive components for signs of wear or obvious damage, leaks, etc.
- Check for excess spillage in and around the sizer operating area.

Sizer Start-Up Procedure

- Carry out the specified pre-start checks.
- Select the desired function on the control switch, either forward or reverse.
- The Machine will now start, and the shafts rotate in the direction selected. If the motor starts, but the

shafts do not rotate, then the machine is either stalled, or a fusible plug has blown in one or both of the fluid couplings.

- Refer to the *Stall Procedure*.

Initial Commissioning Procedure

- The fluid coupling and the gearbox lubricant levels must be checked, and if necessary adjusted by either filling or draining.

- All bearings, and the gear couplings should be greased by the recommended amount prior to the commissioning of the machine.

- For the recommended lubricant specifications/quantities, see the *Maintenance Schedule*

Commissioning Procedure

If the Sizer is removed from the normal (working) position for major overhauls or modifications, it will be necessary to re-commission the machine prior to starting up again.

- Cary out a full check of all items against manual parts list and drawings to ensure that everything is installed as per the contract. This is a visual check only.

- Turn the machine breaker shafts to check for obstructions or fouling on the cleaning combs and rotating teeth. Trim as required to achieve a free running fit.

- Run the machine under zero-load conditions for four (4) hours. Check for excessive noise, heat or vibration. Refer to the *Trouble Shooting* guide if any adverse effects are noted. Rectify as necessary.

- Run the machine under full-load conditions for eight (8) hours. Again check for any excessive noise, heat etc.

Overload Safety Systems (Mechanical)

Mechanical overload is taken up by use of fluid coupling(s), mounted to the input shaft of the electric motor(s).

A fusible plug is screwed into the fluid coupling. The purpose of the fusible plug, is to provide an additional safeguard to the motor, and prevent overheating in the event of a prolonged stall, or failure of the motor overload trip.

The fusible plug contains a fusible alloy, which melts at a set temperature, and thus alloys the fluid in the fluid coupling to escape, thus removing the load from the motor and allowing it to run free.

After a fusible plug failure, the fault must be corrected, a new fusible plug fitted, and the fluid coupling refilled with clean fluid in accordance with the fluid coupling manual.

Overload Safety Systems (Electrical)

Where specified, fitted at the non drive end of the Sizer, is an underspeed sensing device. The purpose of the underspeed sensing device, is to notify the operator that the breaker shafts have stopped rotating (i.e. stalled). This is achieved by a pick up on the breaker shafts passing through the magnetic field of a close proximity sensor, therefore inducing an electrical impulse to the monitoring system.

Should the breaker shafts stop rotating, the monitoring system will instantly trip the electric motor(s).

The Power supply to the electric motor(s) must be isolated, and a manual inspection can be carried out to identify the fault.

Sizer Stall Test

After every operating stall, and after any major overhaul, the fluid coupling must be reset to give maximum torque. This is achieved by carrying out the following;

- Isolate the machine, by removing the cable from the electric motor.
- Position the fluid coupling in the fluid coupling housing so that the filling plug is accessible in the access flap. Or if mounted in a motor mounting frame, it may be necessary to remove one or more access cover plates.
- Remove the filler plug.
- Position the filling hole as indicated in the fluid coupling manual, and fill until the coupling will accept no more fluid in the position.
- Replace the filler plug.
- Place a large metallic object, such as a piece of heavy column or beam between the sizer shafts.
- Re-connect the power cable to the electric motor.
- The next operation requires two people and a tachometer, and is carried out as follows.

    i Select the start position on the control switch, and run the motor until a steady reading is obtained on the tachometer

    ii Stop the motor.

    iii See the fluid coupling manual with regard to the typical torque output/speed characteristics.

- If the tachometer reading is below the specified motor rpm, allowing for voltage drop, release fluid from the fluid coupling. If it is more than the specified motor rpm, add fluid to the fluid coupling. Repeat this process until a steady reading is achieved for the motor manufacturers recommended rpm for maximum torque.
- Remove the obstruction from between the sizer shafts.

Underspeed Protection

Where specified, underspeed protection is provided by a 'Electromatic' inductive proximity switch and relay. This speed sensing device monitors the sizing shaft speed at the non-driven end of the sizer. In the event of the Sizer going into a stall situation, and the shafts stopping, the underspeed sensing device will trip the electric motor driving the sizer.

If there is an obstruction in the Sizer, this can be r moved by reversing the sizer shafts. Once the obstruction has been cleared or removed, the Sizer can be restarted.

Replacing The Underspeed Sensor

Should the underspeed sensor become inoperative, it will be necessary to replace it. To do this, the machine must be in the maintenance position. The machine must also be isolated electrically, so that the machine cannot be started accidentally whilst work is being carried out.

i Disconnect electric leads.

ii Loosen the locknut, and unscrew the detector head.

iii Refitting is the reverse of the above procedure. However, care must be taken to ensure that the sensor head is within 7mm of the stud in the end of the breaker shaft, which provides a pulse every revolution.

Setting Underspeed Relays

The time delay relay should be set in accordance in the local electrical supply to allow the electric motor to run up to full speed before energising the tachometer relay. This relay can be checked by turning the dial to zero, and trying to start the machine. The electric motor will start and stop again almost immediately.

The tachometer relay should be set to five (5) seconds on the front dial. This means that if the relay does not count a pulse for five (5) seconds, it will stop the electric motor.

Trouble Shooting Guide

In any of the following cases, advice may be obtained direct from MMD if in doubt.

It is recommended that a daily check be made for any excessive noise, vibration, lubricant leaks, or obvious damage. The following hints should help in determining the source of any unusual feature;

NOISE – When an unusual noise is heard, it is important to determine quickly what is causing the noise, so that action can be taken. There are basically two speeds to consider.

i High speed end (Electric Motor)
ii Low speed ends (Breaker Shafts)

The first step is to determine the speed of the noise. It will be a regular noise in either the machine aperture or the drive train. If it is a slow rhythmic noise, it is likely to come from the shafts. This could indicate that there is a broken or loose bolt. Fully check the machine, the machine aperture, (with no material passing through), to determine the cause.

If the noise is high pitched, or a rapid knock or whine, it is coming from the drive train. Starting from the motor, work along the transmission to determine the cause of the noise. The obvious causes would be; faulty bearings in the motor, fluid coupling, or gearbox; damaged gears; lack of lubricant or ingress of dust into rotating parts.

VIBRATION – A similar check list is used as when tracking down an unusual noise, however, most excessive vibration is caused either by faulty main shaft bearings or faulty gearbox bearings. These items should be checked first by checking the temperature on the frame of the machine adjacent to the shaft bearings and on the casing of the gearbox.

LUBRICANT LEAKS – It is essential that all lubricants are fully checked and replenished in accordance with the service manual recommendations. If any leak is found, action must be taken immediately to correct it, i.e find the source of the leak, determine the cause of the leak by reference to the spare parts manual, and identify the parts required to rectify the leak. When this has been done, the machine must be stopped at the first opportunity so that the work may be carried out.

OBVIOUS DAMAGE – 99% of the obvious damage occurring on MMD machines inside the machine aperture is caused by tramp iron. Broken or cracked caps/segments and bolts are the most common form of obvious damage. A visual inspection will determine the cause.

Wear Plates - Replacing

The MMD Sizer has wear plates on the inside of the machine aperture to protect the side plates and bearing housings. These wear plates must be replaced when a hole is worn through, but should be replaced when 15mm of wear has been detected. Clearance of rotating teeth on the side wear plates should be a minimum of 10mm. This clearance should be checked when side wear plates have been replaced before starting the machine.

To remove wearplates, the following procedures must be followed;

Side Wear Plates:

- Weld two temporary lifting lugs to each wear plate (on smaller machines this procedure may not be necessary).
- Attach lifting equipment to the temporary lifting lugs.
- Remove the countersunk bolts retaining the side wear plates and discard them.
- Remove the wear plate.
- Thoroughly clean the inside of the machine where the new wear plate is to be fitted to ensure correct seating of the new wear plate.
- Weld temporary lifting lugs to the new side wear plate.
- Lift the new wear plate into position, and line up with fixing holes.
- Bolt the wear plate into position, and line up with the fixing holes.
- Bolt the new wear plate into position, using new countersunk bolts. (Under no circumstances do we recommend the re-use of existing bolts).
- Tighten the bolts to the torque specified on MMD procedure T056.
- Remove the temporary lifting lugs and discard them.

  Check the clearance between tooth caps/segments and wear plates. Clearance should be a minimum of 10mm

End Wear Plates

- Thoroughly clean the top of the machine to expose fixing bolts and tapped holes for the lifting eye bolts.
- Remove the hexagonal set screws from the end wear plates, which attach the wear plate to the bearing housing. These set screws are fitted into drilled and tapped holes, and should be removed using a socket wrench. Under no circumstances should any other method be used to remove these set screws.
- Fit lifting eye bolts into the top of the wear plates, and lift out.
- Thoroughly clean all faces to which the new wear plates fit, to ensure correct seating of the new wear plate. Protect tapped fixing holes before cleaning.
- Attach lifting eye bolts to the new wear plate, and lift it into position.
- Bolt the wear plate into position using the existing set screws.
- Remove the lifting eyes.
- Tighten the bolts to the torque rating specified in MMD procedure T056. (Included at the back of this manual).

Warning Regarding VITON® Fluoroelastomer Seals

When the recommended handling procedures are followed, VITON® fuoroelastomer polymers present no known health hazards. As with many polymers, minute quantities of potentially irritating or harmful gases may diffuse from uncured VITON® even at room temperature, therefore, it should only be used in well ventilated areas.

In case of eye contact, immediately flush the eyes for a least 15 minutes with clean water. Always wash contacted skin with soap and water after handling VITON®

Intentional burning of VITON® is not recommended, except in an approved incineration process, because of the possible formation of toxic and corrosive combustion products. However in the event of accidental fire involving VITON®, firefighters should be made aware of the possibility of toxic and corrosive vapours.

To dispose of scrap or waste VITON®, landfill is preferred. The disposal method must conform to local regulations. As mentioned above, burning of VITON® is not recommended under any circumstances.

Main Shaft Bearings Flange Mounted Type

These bearings are rated to last for five (5) years under specified conditions (in compliance with the Maintenance Schedule). However, there could be bearing failures for such reasons as worn or damaged seals, insufficient lubrication etc.

To replace a worn or damaged bearing, the following procedure must be followed:

- Follow the procedure for removing the shafts until the shafts are fully exposed, see shaft removal.
- Using an MMD bearing puller or similar device, plus a hydraulic jack, the complete bearing assembly must be pulled from the end of the shaft, after first removing the end plate.
- This will leave the old labyrinth still attached to the shaft. It must be checked visually and dimensionally against the drawing to check for excess wear. See *Things To Check*.
- The damaged bearing assembly may now be dismantled as follows:
  - **i** Remove the retaining plate complete with the two outer seals.
  - **ii** Remove the damaged bearing from the capsule, this now exposes the inner seals for removal.

Main Shaft Bearings Re-Assembly (Flange Type)

Should every item need replacing, the following procedure should be followed;

- Remove old labyrinth from the breaker shaft using oxy-acetylene cutting equipment to heat the labyrinth, and then knock off. Care must be taken to ensure that no damage is done to the shaft.
- Assembly all the parts required in the following order:-
  - **i** Labyrinth
  - **ii** Capsule
  - **iii** Seals
  - **iv** Bearing
  - **v** Seal Plate
  - **vi** Spacer
  - **vii** ‘O’ Rings
- Warm the labyrinth in an oil bath or similar to 100^{o}C. Remove from the oil bath and push onto the shaft immediately. The labyrinth will stop at the raised shoulder and will not travel any further.
- Fit the inner seals into the bearing capsule. These are a tap in fit and the lips must both be faced towards the labyrinth.
- Coat the inside of the capsule sparingly with a suitable anti-seizing agent.

- Fit the bearing into the capsule. This is a gentle tap in fit and a soft drift must be used. The bearing must seat fully home in the capsule.

- Warm the bearing and capsule in an oil bath or similar to 100^{o}C. Remove from the oil bath and immediately push onto the shaft. Care must be taken as the seals engage the labyrinth spacer and the assembly must be 'felt' into position. The assembly will seat fully home once engaged onto the seal surface of the labyrinth spacer as the furthest extremity of the labyrinth locates firmly against the inner race of the bearing.

- Fit the two outer seals into the seal retaining plate ensuring that the seals are 'back to back'.

- Push the seal retaining plate onto the shaft up to the bearing capsule and bolt together.

- Warm the spacer in an oil bath and heat to 100^{o}C. When up to temperature remove and immediately push onto the shaft.

- Test grease the bearing housing from the side of the machine to check for a free flow of grease through the casting.

- Re-assemble the machine in reverse sequence.

Things To Check

- LABYRINTH - Check for scoring on the seal surface. Also, check for any wear on the labyrinth shoulders. If any dimension has been reduced by 30%, or there is any scoring on the seal surface, then the labyrinth must be replaced.

- SEALS - Check the condition of all lip seals. If there is any sign of damage, the seals must be replaced. As company policy MMD recommend that all seals be replaced if they are removed for any reason.

- SEAL SPACER - If there is any scoring of the face of this spacer, it must be replaced.

- BEARING CAPSULE - If there is any obvious damage or any sign that the bearing has been turning in the capsule, then it must be replaced. The tolerance between the bearing and capsule is very fine (precision fit) and any damage inside this capsule is unacceptable.

Main Shaft Bearings Dowel Located Type

These bearings are rated to last for five (5) years under specified conditions (in compliance with the Maintenance Schedule). However, there could be bearing failures for such reasons as worn or damaged seals, insufficient lubrication etc.

To replace a worn or damaged bearing, the following procedure must be followed:

- Follow the procedure for removing the shafts until the shafts are fully exposed, see shaft removal.

- Use a wire sling on an overhead crane to raise the shaft at the end with the damaged bearing assembly such that the bearing capsule is clear of the bottom bearing housing.

- Using an MMD bearing puller or similar device, plus a hydraulic jack, the complete bearing assembly must be pulled from the end of the shaft, after first removing the end plate.

- This will leave the old labyrinth still attached to the shaft. It must be checked visually and dimensionally against the drawing to check for excess wear. See *Things To Check*.

- The damaged bearing assembly may now be dismantled as follows:
  - **i** Remove the retaining plate. This automatically removes the two outer seals, and the seal spacer.
  - **ii** Place four M16 x 120 hexagon head bolts in the end of the bearing capsule.
  - **iii** Stand the assembly on the floor, using the bolts as feet.
  - **iv** Apply heat to the bearing capsule/
  - **v** The damaged bearing should fall out of the capsule.

Main Shaft Bearings Re-Assembly (Dowel Type)

Should every item need replacing, the following procedure should be followed;

- Remove old labyrinth from the breaker shaft using oxy-acetylene cutting equipment to heat the labyrinth, and then knock off. Care must be taken to ensure that no damage is done to the shaft.

- Assemble all the parts required in the following order:-
  - **i** Labyrinth
  - **ii** Capsule
  - **iii** Seals
  - **iv** Bearing
  - **v** Dowel & Seal
  - **vi** Seal Retaining Plt
  - **vii** Spacer
- Warm the labyrinth in an oil bath to 100^{o}C. Remove from the oil bath and push onto the shaft immediately. The labyrinth will stop at the raised shoulder and will not travel any further.

- Fit the inner seals into the bearing capsule. These are a tap in fit and the lips must both be faced towards the labyrinth.
- Coat the inside of the capsule sparingly with a suitable anti-seizing agent.
- Fit the bearing into the capsule. This is a gentle tap in fit and a soft drift must be used. The bearing must seat fully home in the capsule.
- Warm the bearing and capsule in an oil bath or similar to 100^{o}C. Remove from the oil bath and immediately push onto the shaft. Care must be taken as the seals engage the labyrinth spacer and the assembly must be 'felt' into position. The assembly will seat fully home once engaged onto the seal surface of the labyrinth spacer as the furthest extremity of the labyrinth locates firmly against the inner race of the bearing.
- Fit the two outer seals into the seal retaining plate ensuring that the seals are 'back to back'.
- Push the seal retaining plate onto the shaft up to the bearing capsule and bolt together.
- Warm the spacer in an oil bath and heat to 100^{o}C. When up to temperature remove and immediately push onto the shaft.
- Test grease the bearing housing from the side of the machine to check for a free flow of grease through the casting.
- Re-assemble the machine in reverse sequence.

Things To Check

- LABYRINTH - Check for scoring on the seal surface. Also, check for any wear on the labyrinth shoulders. If any dimension has been reduced by 30%, or there is any scoring on the seal surface, then the labyrinth must be replaced.
- SEALS - Check the condition of all lip seals. If there is any sign of damage, the seals must be replaced. As company policy MMD recommend that all seals be replaced if they are removed for any reason.
- SEAL SPACER - If there is any scoring of the face of this spacer, it must be replaced.
- BEARING CAPSULE - If there is any obvious damage or any sign that the bearing has been turning in the capsule, then it must be replaced. The tolerance between the bearing and capsule is very fine (precision fit) and any damage inside this capsule is unacceptable.
- DOWEL - Check for any signs of damage on the vertical sides of the dowel. If the capsule has been trying to turn, there will be indentations approximately half way up its length. If these are evident, then the dowel must be replaced.

Breaker Shafts

In the event that a breaker shaft becomes damaged, it will be necessary to remove it from the machine and replace it with a new one. The procedure used to accomplish this is as follows:-

- Move the sizer into the maintenance position.
- Thoroughly clean the sizer of all extraneous material, grease, oil, etc.
- Remove the end wearplates from both ends of the machine.
- Remove the top cover plate from the machine. This is bolted to the machine side plates. All bolts must be removed using a socket. Under no circumstances should any other method be used to remove the set screws.
- Remove the clamping rings from the gear couplings and slide back the sleeve towards the gearbox. This action disconnects the drive train from the breaker shafts.
- Remove the gearbox complete with the motor and fluid coupling assembly.
- Remove the bolts from the top bearing housing on each end of the machine.
- Using two M24 eye bolts, lift out the top bearing housings. The shaft assemblies are now exposed.
- The damaged shaft can now be lifted out by means of nylon webs slung at either end.
- Once the shaft is removed, the bearing assemblies, labyrinth seals, teeth and rings must be removed by using a hydraulic press.
- Replacement is a reversal of the above procedure.

Breaker Bar Adjustment

Adjustment of the breaker bar should be as follows;

- Remove the bolts securing the breaker bar to the machine.
- Using the jacking screws, raise the breaker bar to the machine.
- To raise the breaker bar, insert breaker bar packers, and to lower, remove these packers.
- When the height is satisfactory, refit the bolts, and tighten in accordance with MMD procedure T056.

Cleaning Comb Adjustment

Where specified, on larger machines, there are adjustable cleaning combs fitted to minimise build-up of material between the tooth rings, and to prevent recirculation of any product attached to the shafts. These cleaning combs will need periodic adjustment to compensate for wear. This is achieved by removing packers as follows;

- Check the actual cleaning comb clearance.
- Remove the cleaning combs. Each cleaning comb is secured to the side plate by two bolts. Remove these bolts and withdraw the cleaning comb from the side plate.
- Remove necessary packers to give specified cleaning comb clearance. Thickness of packers to be removed is the difference between actual cleaning comb clearance and the specified cleaning comb clearance.
- Refit the cleaning combs into the side plates and bolt into position using existing bolts. These bolts must then be re-torqued.

Motor Mounting (Motor Frame Type) - Installation:

The electric motor cradle is designed such that foot mounting can be utilised, but still allowing the motor to oscillate with the machine. Thus the problem which would be encountered with mounting to a separate base would be avoided. The flange spigot is used to assist in gaining accurate concentricity and squareness.

The motor should initially be sat on jacking screws, in the tapped holes through the cradle foot packs. Adjust until the motor spigot is in alignment with the cradle spigot and the motor face flange is parallel to the corresponding face into the cradle. When satisfactory alignment is achieved, the packer height required under each foot must be measured individually. Packer sets must then be made up or machined. Fit the packers under the correct feet, fit bolts into the motor flange, pull in motor spigot with these bolts. These bolts should then be tightened.

The foot bolts should then be added, and should be tightened to the amount specified in MMD procedure T056.

Removal:

The motor can be removed on the cradle to allow fluid coupling removal. This prevents disturbance of the motor alignment.

Should the motor need removing completely, the following procedure should be followed;

- Disconnect all electrical connections from the motor.
- Remove the top and bottom cover plates from the motor mounting frame. These are secured with M12 bolts.
- Remove the bolts connecting the motor flange and bolts connecting the motor feet to the mounting bracket.
- The motor can now be removed. Carefully slide the motor out of the motor mounting bracket, until the coupling on the motor shaft is clear of the motor mounting bracket. The motor can now be safely lifted out of position.
- Remove the coupling half and spacer from the motor shaft.
- Remove the shims from the foot mountings.

Gearbox Replacement

Removal:

- Remove the motor (See Heading 'Motor Mounting')
- Remove the Voith fluid coupling.
- Note, that if fitted Oil cooler modules must be removed prior to removing the gearbox.
- Remove the motor mounting bracket from the gearbox. The motor mounting bracket is bolted to the gearbox. Take the strain of the motor mounting bracket with suitable lifting equipment before removing the bolts. This is not necessary on machines with only a coupling housing.
- Remove the top cover plate to expose the gear coupling. All bolts must be removed using a socket, under no circumstances should any other method be used to remove these set screws.
- Split the two clamping rings from the gear coupling, taking care not to damage the 'O' ring.
- Slide the coupling sleeve towards the gearbox.
- Attach lifting equipment to the gearbox lifting eyes.
- Remove the studs/bolts connecting the gearbox to the gearbox mounting plate.
- Slide the gearbox away from the mounting plate, until the gear coupling is clear of the mounting plate. The gearbox can now be lifted out of position.
- The drive half of the gear coupling can now be removed, if required for a replacement gearbox.
- Remove the end cap from the shaft. This is bolted in position by socket cap screws. These cap screws must be removed using a suitable Allen key. Under no circumstances should any other method be used.
- Slide the coupling half off the shaft, taking care not to damage any teeth or the splined bore of the coupling and splines.

Fitting Gearboxes:

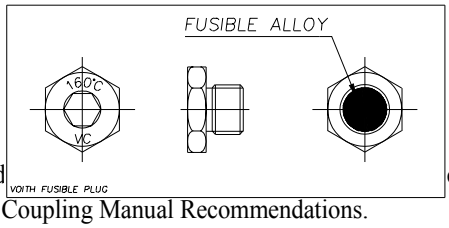
- Clean the output shaft of the gearbox and the gear coupling.
- Slide the driven half of the coupling onto the shaft.
- Fit the end cap onto the shaft, and tighten.
- Lift the gearbox into position, ensuring that the spigot on the gearbox mates with the recess on the gearbox mounting plate. Fit the studs/bolts connecting the gearbox to the gearbox mounting plate, and torque. up.
- Align the teeth on the coupling half, with the teeth on the coupling sleeve, and slide the coupling sleeve into position.
- Ensure 'O' rings are correctly seated on the coupling sleeve, and fit the two split clamping rings around the coupling using two M20 socket cap screws. Tighten bolts in accordance with MMD procedure T056.
- Thoroughly clean the top cover plate and mating face of the machine.
- Lift the cover plate into position, and bolt in place using existing bolts and set screws.
- Tighten these bolts in accordance with MMD procedure T056.
- Fit the fluid coupling.
- Lift the motor mounting plate into position, ensuring that the recess in the motor mounting plate lines up with the spigot on the gearbox. Fit the bolts connecting the motor mounting plate to the gearbox. These bolts should then be tightened in accordance with MMD T056.
- Fit the electric motor (See Heading 'Motor Mounting').
- Connect all electrical supplies to the motor.
- Fill the gearbox with the correct lubricant to the designated level.

Fluid Coupling: Voith Turbo

Where a Voith coupling is fitted, it has a keyed female bore which mounts directly on to the input shaft of the gearbox with no alignment necessary. The input side has a driving hub which is driven by a separate boss mounted directly onto the keyed motor shaft.

The fluid coupling is a fail safe device which ensures that no mechanical damage can occur to the machine. The working chamber of the coupling houses a runner and an impellor with no mechanical connection other than the viscosity of the mineral oil.

In the event of an operating stall, the shafts would stop turning. This stopped motion would be transferred through the gearbox to the driven side of the fluid coupling. However, the driving side of the coupling would continue to rotate. This action generates heat inside the coupling to a point where the fusible plug safety device will blow and release the fluid.



The Fluid ce with the Fluid Coupling Manual Recommendations.

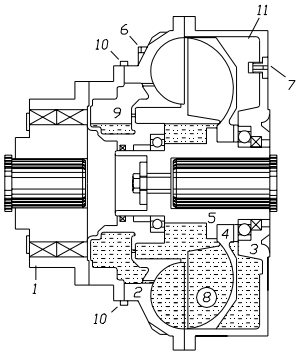
Voith fluid couplings have a delayed filling chamber, which permits torque reduction on start-up, optimal motor load protection, smooth acceleration of heavy masses, and effective torque reduction during acceleration.

VOITH DESIGN TYPE: TVSC			
1	Flexible Connecting Cplg	**6**	Filler Plug
2	Outer Wheel	**7**	Fusible Plug
3	Coupling Shell	**8**	Operating Fluid
4	Inner Wheel	**9**	Delayed Filling Chamber
5	Coupling Hub	**11**	'SC' Chamber

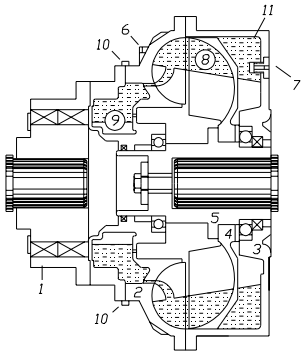
VOITH DESIGN TYPE: TVF, TVG, TUV			
1	Flexible Connecting Cplg	**6**	Filler Plug
2	Outer Wheel	**7**	Fusible Plug
3	Coupling Shell	**8**	Operating Fluid
4	Inner Wheel	**9**	Delayed Filling Chamber
5	Coupling Hub	**10**	Delay Nozzle

Voith Fluid Coupling Operation Design Type: TVSC

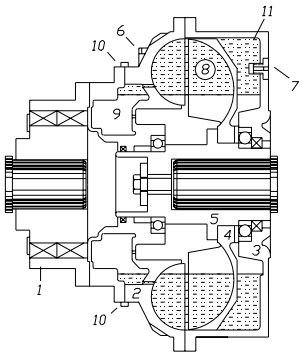
Coupling At **Stand-Still**



Coupling At **Start-Up**

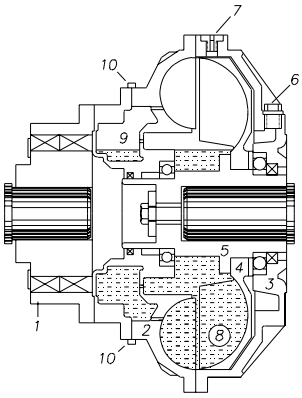


Coupling **Running**

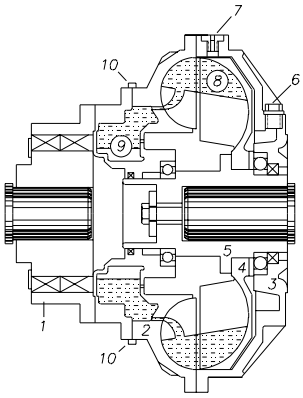


Voith Fluid Coupling Operation Design Type: TVF, TVG, TUV

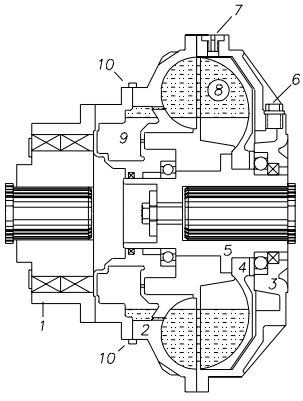
Coupling At **Stand-Still**



Coupling At **Start-Up**



Coupling **Running**

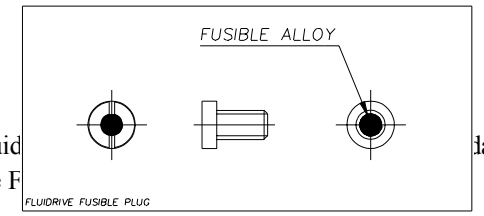


Fluid Coupling: Fluidrive Engineering Limited

Where a Fluidrive coupling is fitted, it has a splined female bore which mounts directly on to the input shaft of the gearbox with no alignment necessary. The input side has a driving hub which is driven by a separate boss mounted directly onto the keyed motor shaft. The boss drives the coupling via pins shrouded with a heavy-duty neoprene bush.

The fluid coupling is a fail safe device which ensures that no mechanical damage can occur to the machine. The working chamber of the coupling houses a runner and an impellor with no mechanical connection other than the viscosity of the mineral oil.

In the event of an operating stall, the shafts would stop turning. This stopped motion would be transferred through the gearbox to the driven side of the fluid coupling. However, the driving side of the coupling would continue to rotate. This action generates heat inside the coupling to a point where the fusible plug safety device will blow and release the fluid.



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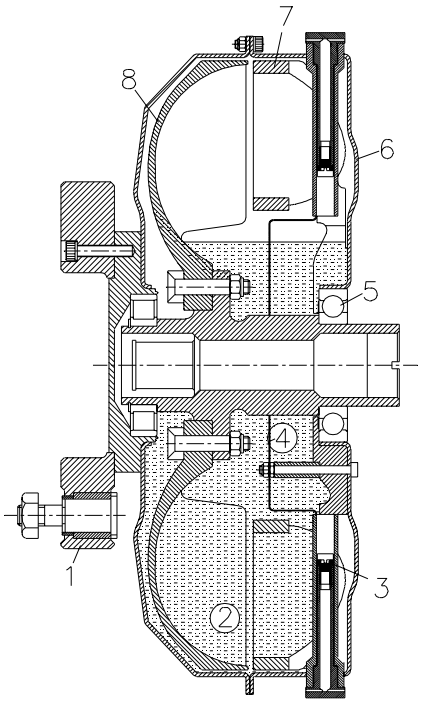
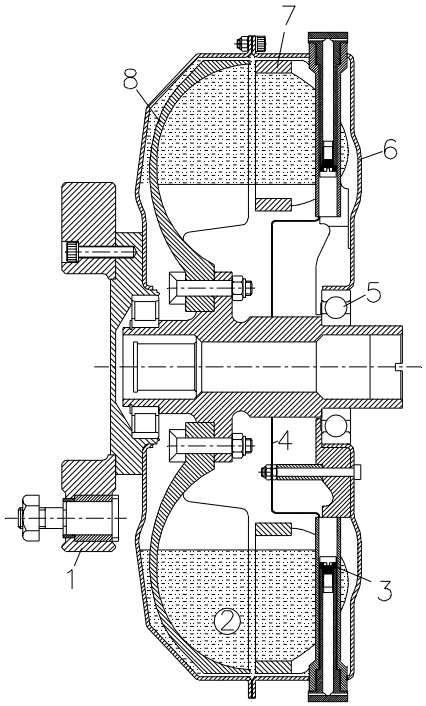
FLUIDRIVE DESIGN TYPE: STC			
1	Adaptor	**5**	Ball-Bearing
2	Operating Fluid	**6**	Impellor Casing
3	Fusible Plug	**7**	Impellor
4	Ante-Chamber	**8**	Runner

Fluidrive Fluid Coupling Operation Design Type: STC

Coupling At **Stand-Still**



Coupling **Running**



Maintenance Schedule

Maintenance of the Sizer and its ancillaries is most important, and must be carried out in accordance with this manual. Failure to do so could result in a reduction of operational efficiency, or even a machine breakdown.

NOTE: BEFORE ANY WORK IS CARRIED OUT ON THIS MACHINE, ISOLATE THE POWER SUPPLY, AND REMOVE THE CABLE FROM THE ELECTRIC MOTOR.

WHERE THE MACHINE IS FITTED WITH BREAKER SEGMENTS, AFTER THE FIRST 24 HOURS OF CONTINUAL OPERATION, CHECK THE SEGMENT FIXING BOLTS, AND/OR RE-TORQUE TO 608lbf / 84kgM / 824NM. THEN AFTER 7 DAYS OPERATION, CHECK THE SEGMENT FIXING BOLTS AGAIN, AND RE-TORQUE TO THE AMOUNT STATED.

GENERAL INFORMATION;

Due to the harsh working conditions, it is necessary to apply regular amounts of grease to the breaker shaft bearings and labyrinth seals. Therefore, **MMD recommend 41cm³ of grease to each bearing per day, regardless of the number of hours worked**. **Where a automatic centralised greasing unit is fitted, it should be regulated to provide this quantity as a minimum**. To check that the labyrinth seals are clear, and that the greasing system is functioning normally, grease will be visible between the end wear plate, and the breaker shaft.

NOTE: WHERE FITTED, THE AUTOMATIC CENTRALISED GREASING SYSTEM MUST BE RUN AT ALL TIMES, WHILST THE MACHINE IS RUNNING. IT IS ALSO RECOMMENDED TO RUN THE GREASE FEED FOR 2 HOURS AFTER EACH RUNNING PERIOD.

LIGHT LOAD RUNNING;

When it is expected that the sizer will not have any feed of material for a period in excess of 15 minutes, the sizer motors should be shut down. The reason for this, is that the transmissions are designed to carry high loads, and when loads are removed, the possibility of roller slip in the bearings exists, which could result in long term damage.

DAILY MAINTENANCE;

Visual and audible examination for excessive vibration or noise.

Grease the four main breaker shaft bearings until grease is visible from the labyrinth seals on the ends of the breakers shafts. The grease specifications are as follows;

Normal Use: Lithium Complex EP NLGI No.2 Extreme Pressure Grease (Where Ambient Temperatures Cannot fall below $0^{o}C$)
Example : Shell Calithia EPT2

Cold Weather: Lithium Complex EP NLGI No.1 Extreme Pressure Grease (Where Ambient Temperature Can Fall To Below $-10^{o}C$)
Example : Shell Sterak 1

Extreme Low Temperatures: If There Is Potential For The Ambient Temperature To Fall Below $-30^{o}C$, Special Synthetic Products May Be Required. Consult The MMD Technical Department If In Doubt

Check gearbox, and spur gear oil levels, and top up as required, with the correct specification lubricant. Refer to the gearbox preventative maintenance sections for further information and lubricant specifications. The spur gear lubricant is as follows;

Lubrication: Heavy Duty Gear Oil (Sulphur Phosphorous ISO VG 320 Viscosity Index 85, i.e. 320 Centistokes Viscosity @ $40^{o}C$).

WEEKLY MAINTENANCE;

Where fitted, check the automatic centralised greasing unit reservoir for grease, and top-up if required with the recommended lubricant.

MONTHLY MAINTENANCE;

Grease the gear coupling at the ¼" BSP grease nipple. Specification as per breaker shaft bearings.

ANNUAL MAINTENANCE;

All bolts must be checked for tightness, and re-torqued to the amount specified in the procedure overleaf (MMD Procedure T056) if necessary.

Where fitted, grease the wheel carriage units at their respective grease points (grease nipples), dependent upon usage.