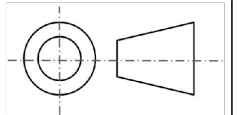
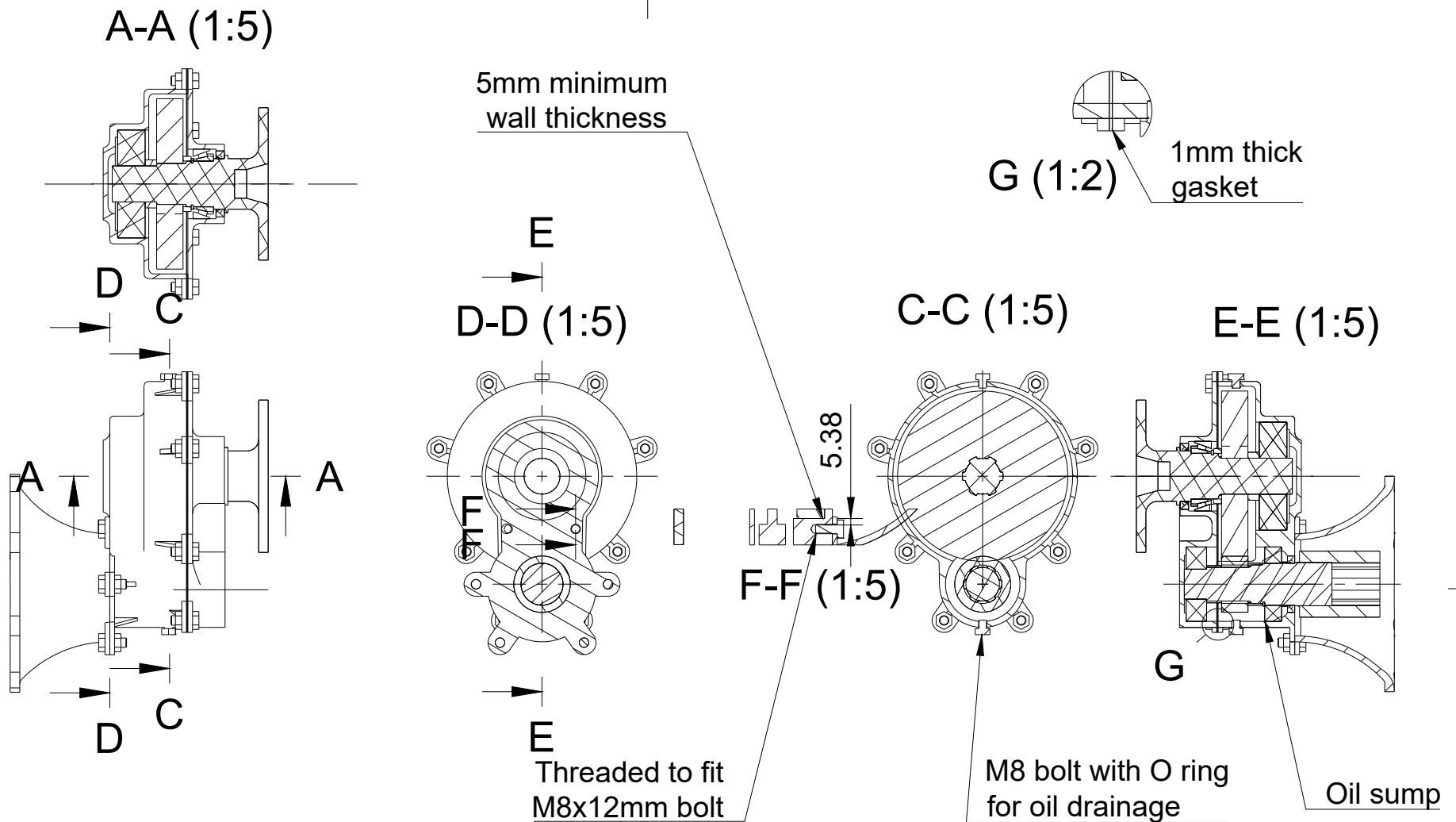
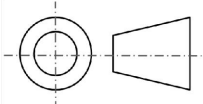
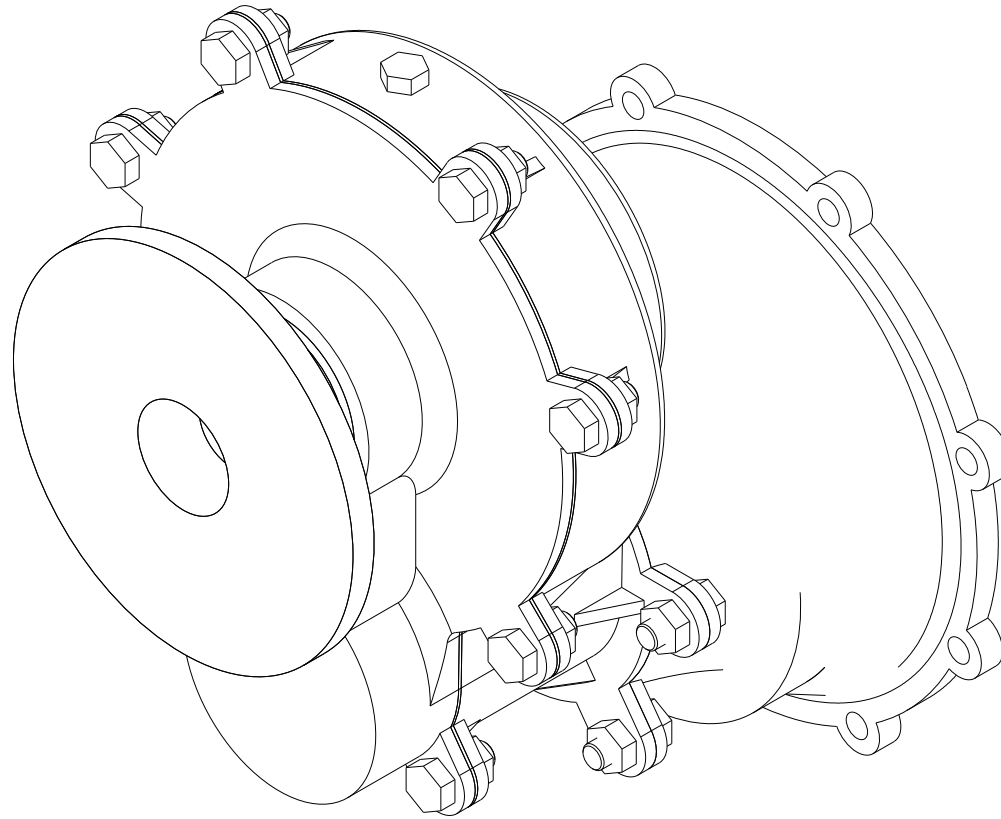


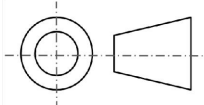
Created by Anthony Fong		10/11/2020		Approved by Beverly Tan, Emma Howard		10/11/2020	
University of Birmingham School of Mechanical Engineering MDB G11 2020 ©		Description General external assembly			Paper size A4	Drawing scale 1:5	All dimensions in mm
		General assembly drawing of Power Take-Off Rear Reduction Unit			Third angle projection		
					Rev.	Drawn in accordance to BS8888 standard	Sheet 1/10





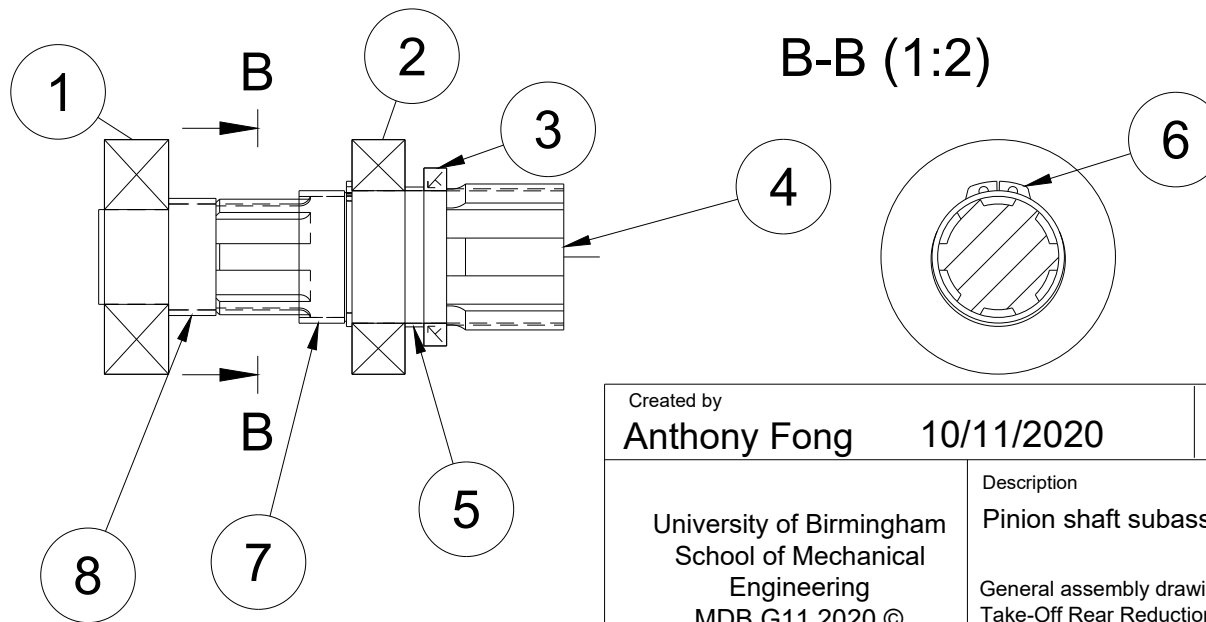
Created by Anthony Fong		10/11/2020		Approved by Beverly Tan, Emma Howard		10/11/2020	
University of Birmingham School of Mechanical Engineering MDB G11 2020 ©		Description General internal assembly			Paper size A4	Drawing scale 1:5	All dimensions in mm
		General assembly drawing of Power Take-Off Rear Reduction Unit			Third angle projection 		
		Rev.	Drawn in accordance to BS8888 standard			Sheet 2/10	



Created by Anthony Fong		10/11/2020		Approved by Beverly Tan, Emma Howard		10/11/2020	
University of Birmingham School of Mechanical Engineering MDB G11 2020 ©		Description Isometric view of transmission assembly			Paper size A4	Drawing scale 1:2	All dimensions in mm
		General assembly drawing of Power Take-Off Rear Reduction Unit			Third angle projection 		
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Parts List

Item	Part Name	Qty	Description	Mass
1	W 6305	1	SKF W6305 deep groove bearing	116.044 g
2	W 6007	1	SKF W6007 deep groove bearing	77.753 g
3	Dynamic seal pinion	1	37X47X4 HM4 R SKF Nitrile rubber radial shaft seal	12.52 g
4	Pinion shaft	1	AISI Steel 1045 705 QT manufactured in house	801.512 g
5	Input spacer	1	Aluminium 6061 39OD, 35ID	1.527 g
6	Retainer ring	1	98541A139 McMaster Carr Carbon Steel for 32mm shaft diameters	3.985 g
7	Pinion R spacer	1	Aluminium 6061 35OD, 32ID	5.115 g
8	Pinion L spacer	1	Aluminium 6061 31OD, 28ID	4.692 g



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Description

Pinion shaft subassembly parts list

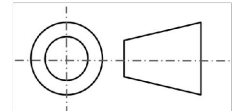
General assembly drawing of Power
Take-Off Rear Reduction Unit

Paper size
A4

Drawing scale
1:5

All dimensions in mm

Third angle projection



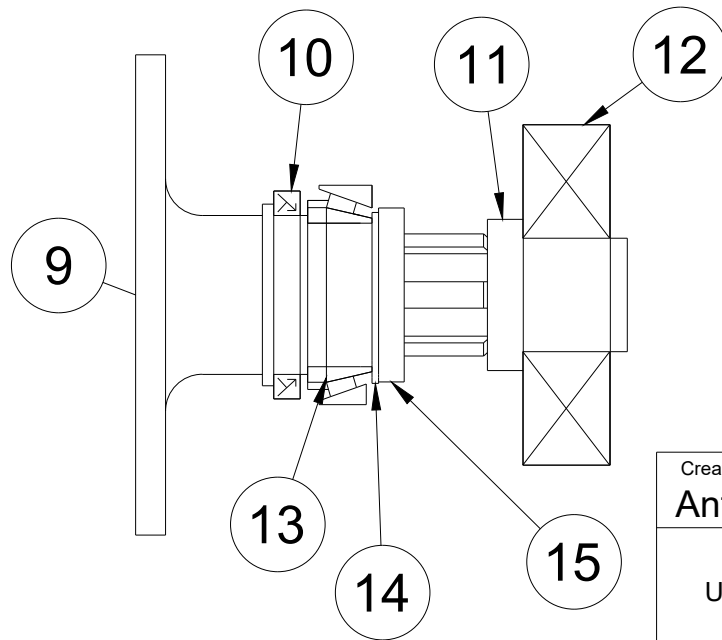
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Parts List

Item	Part Name	Qty	Description	Mass
9	Wheel shaft	1	Steel AISI 1045 705 QT, manufactured in house	570.224 g
10	Wheel dynamic seal	1	42X55X7 HMS5 RG Nitrile rubber SKR radial shaft seal	18.718 g
11	Wheel spacer R	1	Aluminium 6061, 40OD, 30ID	14.102 g
12	6406 bearing	1	SKR 6406 deep groove ball bearing	351.167 g
13	Tapered roller bearing	1	SKR 320 32X Tapered roller bearing 32x58x17mm	18.522 g
14	Retainer ring wheel shaft	1	98541A152 McMaster Carr retainer ring for 38mm shaft	2.208 g
15	Wheel spacer L	1	Aluminium 6061, 46OD, 38ID	9.619 g



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Description

Wheel shaft subassembly parts list

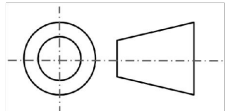
General assembly drawing of Power
Take-Off Rear Reduction Unit

Paper size
A4

Drawing scale
1:2

All dimensions in mm

Third angle projection



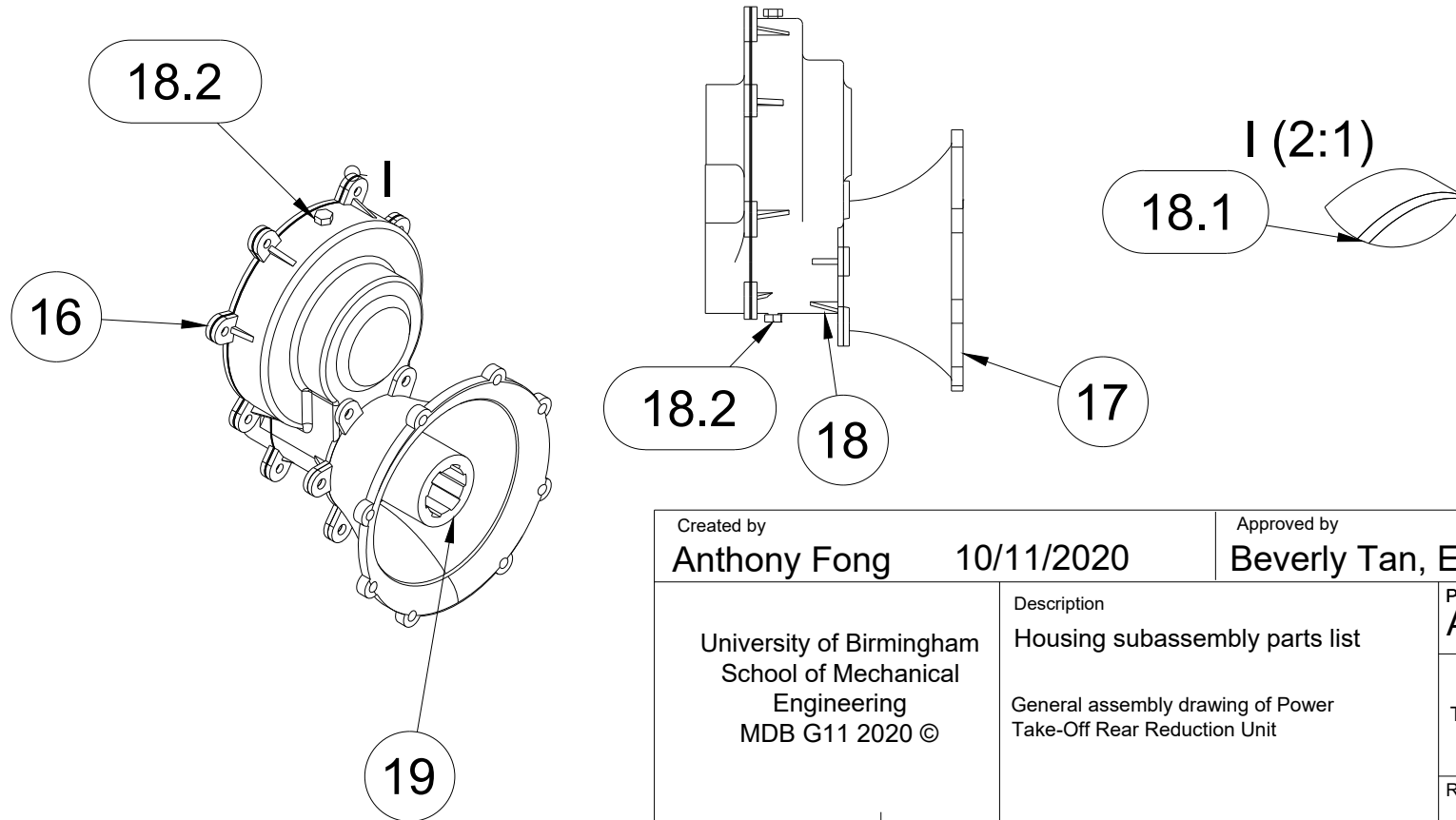
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Parts List

Item	Part Name	Qty	Description	Mass
16	Housing cover v11	1	Aluminium 6061, die cast	414.746 g
17	Transmission mount v61	1	Aluminium 6061, die cast	2510.702 g
18	Transmission housing v21	1	Aluminium 6061, die cast	864.555 g
18.1	Housing gasket	1	1mm thick copper gasket to seal lubrication oil inside the housing	13.614 g
18.2	M8x6 bolt with O ring	2	M8x6 bolt with O ring	2.195 g
19	Spline hub coupler v6	1	Steel AISI 1018 118 QT, manufactured in house	652.004 g



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Description

Housing subassembly parts list

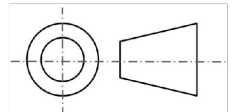
General assembly drawing of Power
Take-Off Rear Reduction Unit

Paper size
A4

Drawing scale
1:5

All dimensions in mm

Third angle projection



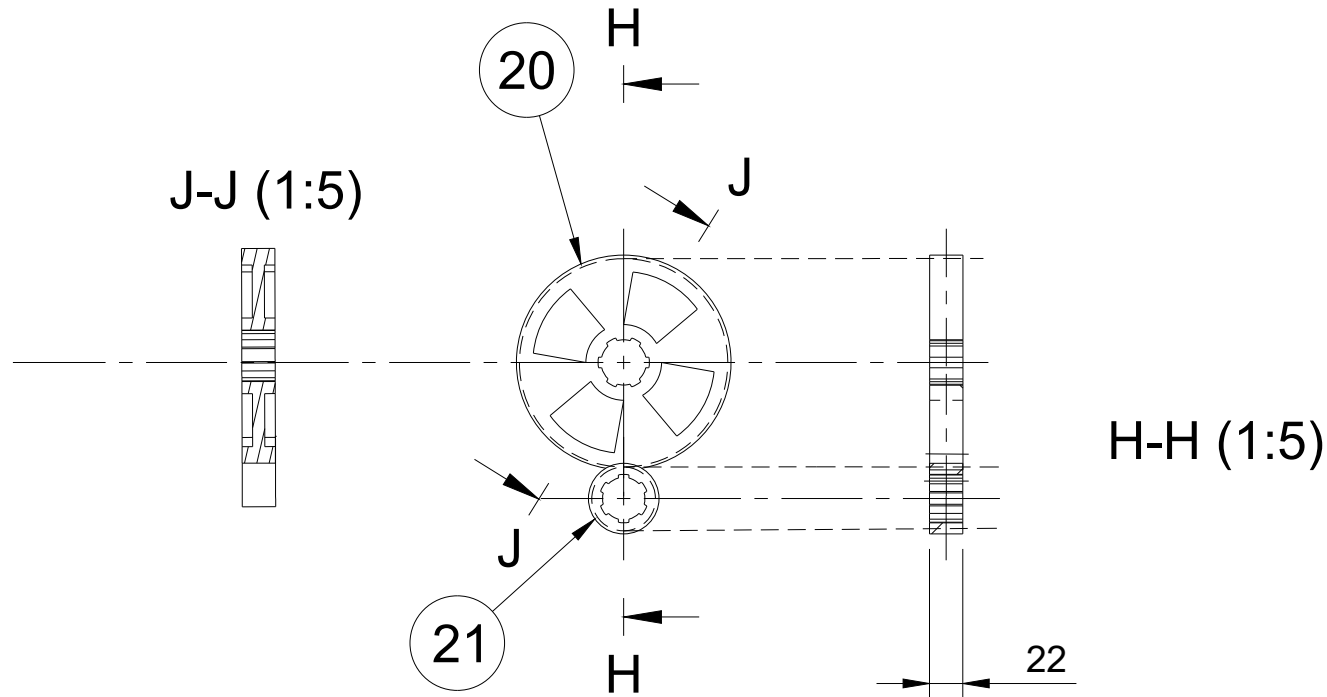
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BS8888 standard

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Parts List

Item	Part Name	Qty	Description	Mass
20	Wheel gear v25	1	KHK SS2-65, EN 36, 65T	2004.309 g
21	Pinion gear v17	1	KHK SS2-20, EN 39, 20T	59.68 g



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Description

Gears subassembly parts list

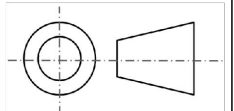
General assembly drawing of Power
Take-Off Rear Reduction Unit

Paper size
A4

Drawing scale
1:5

All dimensions in mm

Third angle projection



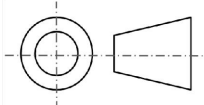
Rev.

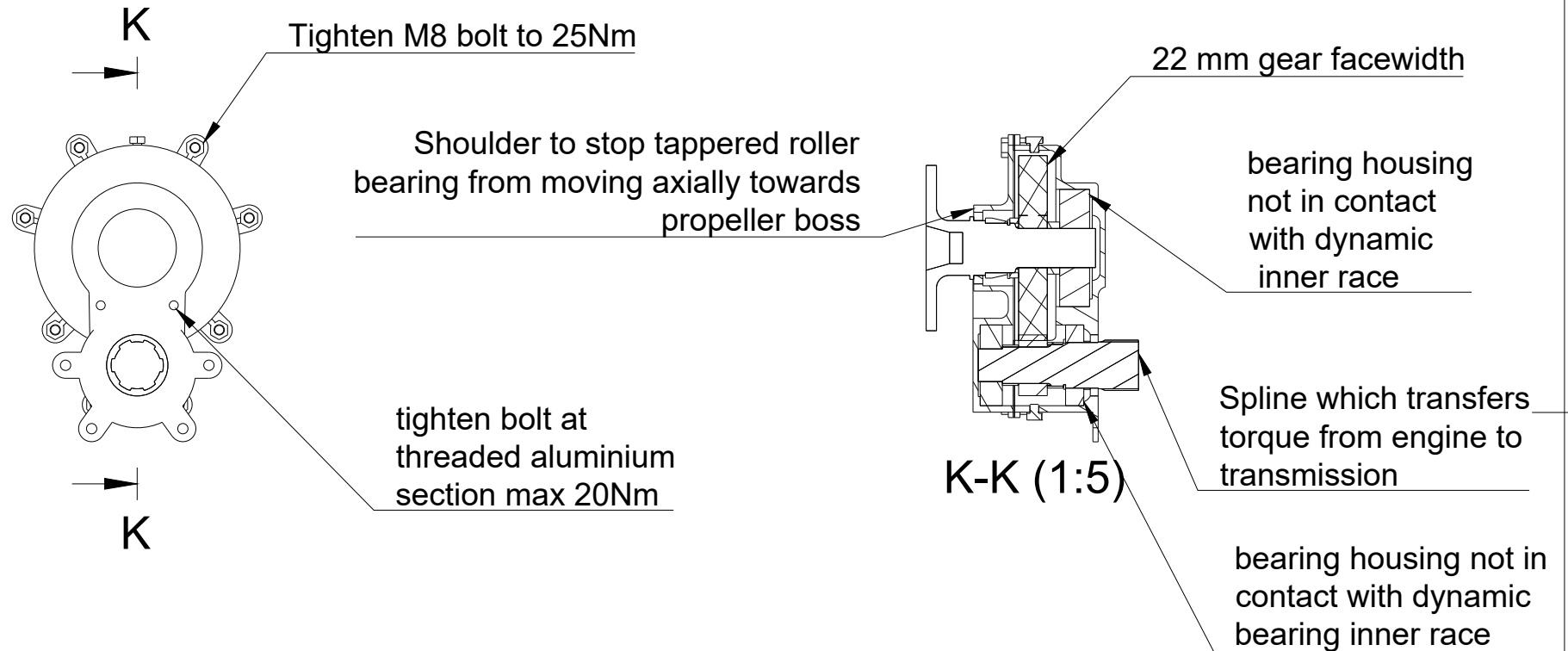
Drawn in accordance to
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Misc parts list

Item	Part name	Qty	Description	Mass
22-33	M8x18 hex bolt	12	Hex bolts to secure transmission to engine	13.7 g per piece
33-35	M8x12 hex bolt	2	Hex bolts to secure transmission to engine	9.7 g per piece
36-47	M8 nut	12	Fastener for bolt	4.7 g per piece

<div>Total mass of transmission</div> <div>8773 g</div>		<div>Created by</div> <div>Anthony Fong 10/11/2020</div>		<div>Approved by</div> <div>Beverly Tan, Emma Howard 10/11/2020</div>	
		<div>University of Birmingham</div> <div>School of Mechanical Engineering</div> <div>MDB G11 2020 ©</div>		<div>Description</div> <div>Misc components parts list and total mass</div> <div>General assembly drawing of Power Take-Off Rear Reduction Unit</div>	
		<div>Paper size</div> <div>A4</div>		<div>Drawing scale</div> <div>1:5 (From parent)</div>	
		<div>Third angle projection</div> <div>  </div>		<div>All dimensions in mm</div>	
		<div>Rev.</div>		<div>Drawn in accordance to</div> <div>BS8888 standard</div>	
				<div>Sheet</div> <div>8/10</div>	



Created by Anthony Fong		10/11/2020		Approved by Beverly Tan, Emma Howard		10/11/2020	
University of Birmingham School of Mechanical Engineering MDB G11 2020 ©		Description Shaft mounting detailed view			Paper size A4	Drawing scale 1:5	All dimensions in mm
		General assembly drawing of Power Take-Off Rear Reduction Unit			Third angle projection		
					Rev.	Drawn in accordance to BS8888 standard	Sheet 9/10

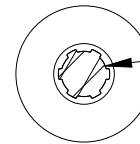
There is clearance between stationary outer race of tapered roller bearing and retainer ring which is moving with the shaft

Chamfered edges to lower stress concentration

Shoulder to stop dynamic seal from sliding

Wheel and pinion shafts have similar spline profiles to decrease tooling costs

M-M (1:5)



L-L (1:5)



Propeller boss, connects to propeller

Both shafts have 2 spacers (L&R) to locate the gears axially. Gears are located radially and circumferentially by splines

Bearing and dynamic seal separated by spacer to avoid static dynamic clash

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Description

Shaft arrangement detailed view

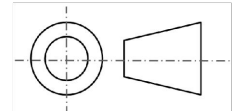
General assembly drawing of Power
Take-Off Rear Reduction Unit

Paper size
A4

Drawing scale
1:5

All dimensions in mm

Third angle projection



Rev.

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