# BJansen - Ultimate 2x72 Belt Grinder

## Metals Listing

You can buy from OnlineMetals - or various other cut to size providers.

<table>
<thead>
<tr>
<th>Part Name/Use</th>
<th>Quantity</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; x 8&quot; x 20&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$38.23</td>
</tr>
<tr>
<td>1/2&quot; x 8&quot; x 8&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$14.58</td>
</tr>
<tr>
<td>1/2&quot; x 8&quot; x 12&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$14.04</td>
</tr>
<tr>
<td>1-1/8&quot; x 4&quot; 6061-T6511 Aluminum round bar rod</td>
<td>1</td>
<td>$1.30</td>
</tr>
<tr>
<td>1/2&quot; x 2-1/2&quot; x 8.5&quot; 6061-T6511 Aluminum flat bar</td>
<td>2</td>
<td>$6.48</td>
</tr>
<tr>
<td>1/2&quot; x 1-1/2&quot; x 12&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$1.94</td>
</tr>
<tr>
<td>1&quot; x 1-1/2&quot; x 8&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$7.00</td>
</tr>
<tr>
<td>3/4&quot; x 1-1/2&quot; x 8&quot; 6061-T6511 Aluminum flat bar</td>
<td>2</td>
<td>$9.00</td>
</tr>
<tr>
<td>3/4&quot; x 1-1/2&quot; x 2&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$1.08</td>
</tr>
<tr>
<td>1&quot; x 2&quot; x 8.5&quot; 6061-T6511 Aluminum flat bar</td>
<td>1</td>
<td>$5.18</td>
</tr>
<tr>
<td>3/4&quot; x 1&quot; x 2&quot; 6061-T6511 Aluminum flat bar</td>
<td>2</td>
<td>$2.00</td>
</tr>
<tr>
<td>Aluminum tube ..26&quot; ID, .50 OD 1-1/8&quot; long</td>
<td>4</td>
<td>$6.00</td>
</tr>
<tr>
<td>3/8&quot; x 2&quot; x 6&quot; 1018 Steel flat bar</td>
<td>2</td>
<td>$26.40</td>
</tr>
<tr>
<td>1-1/2&quot; x 1&quot; x 1/4&quot; 6061 Square Bar - 18' Length (I typically buy a 36&quot; bar and cut a 13-16&quot; piece off to use as the platen tool arm and the longer remaining section to use as the work rest tool arm).</td>
<td>1</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

**Total Metal Cost:** $178.39

## Major Parts

<table>
<thead>
<tr>
<th>Part Name/Use</th>
<th>Quantity</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking wheel (Ebay - Ameribrade is a good choice)</td>
<td>1</td>
<td>$30.00</td>
</tr>
<tr>
<td>Drive wheel (Ameribrade or any other ebay seller)</td>
<td>1</td>
<td>$55.00</td>
</tr>
</tbody>
</table>

**Total Motor Cost:** $150.00

## Notes

*Prices of metal fluctuate significantly. Xometry.com or sometimes Onlinemetals.com is often the cheapest - make sure and search for coupon codes.*

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**Tracking wheel**

**Drive wheel**

Notes: Buy your motor first and then match the drive wheel to the shaft size of your motor. Buy a drive wheel size that is suited for your motor speed. If you are building a general use, variable speed grinder I would suggest a 5" or 6" drive wheel. If you are building a single speed general use grinder (3600 rpm motor) I would suggest getting a 4" drive wheel.

## Motor

Notes: Ideally you will be building a variable speed grinder which requires a VFD and a 3 phase motor. Search ebay for a 3-phase, 208-230v, 1750RPM motor anywhere from 1-3HP. The motor needs to have a c face such as the following types of baldor motors (VM35354 or VEM3554, VM3558 or VEM3558). The frame size needs to ideally be 145TC or 56C. This specific item may take a bit of homework and searching, but you can save a bunch of money on this specific piece rather than buying a brand new motor. I have purchased several Baldor motors on ebay (in new or near new condition) priced between $65 and $200, depending on HP, shipping included. I am certain you can find a good motor for $150.

**Single Phase Motor Notes:**

For a single phase motor, again find a 56C or 145TC frame size and 3450 or 3600 RPM. When using single phase for a general purpose grinder, I typically run a 4" drive wheel on a 3450 or 3600 RPM motor - this combo gives you a belt speed of about 3700 surface feet per minute which is good for general purpose tasks. You can run a 1.5HP motor on a 20 AMP 110V circuit and you can run a 2HP or 3HP single phase motor on a 220V circuit (so make sure you are thinking about your power source when purchasing the motor).
Only needed for a variable speed grinder (for use with your 3 phase motor) KB Electronics KBAC 29D- Variable Frequency Drive - Fwd reverse switch, line switch. The KBAC 29 will run up to a 3HP motor, a KBAC 27 will run up to a 2HP and a KBAC 24D ill run up to a 1HP motor. The last KBAC 29D I purchased was from Texas Process for $345 - shipped. The forward stop reverse switch and line on/off switch will cost you another $50 and can be bought from a number of different sellers.

| VFD | 1 | $400.00 |

Electric supply: cords, wire & liquid tite fittings for VFD to motor (Note: For the VFD to the motor, you will need 14 gauge, 4 strand power supply wire (McMaster Carr has this - so does Home Depot). The Power supply cord will depend on whether you are running 110v or 220v, and these supply cords can be found in any hardware store. Amazon.com has cheap liquid tight fittings.

| Misc. Electrical cords | 1 | $50.00 |

Contact wheel or platen: This is where you can decide how you would like to set up your grinder. If you would like a contact wheel, they can be purchased from many suppliers and bolted to your tool arm. I often buy my contact wheels from AliExpress (specifically a Rams Bralin contact wheel). The quality is decent, and price is very good. They sell all sizes and can install 1/2" bearings, or you can buy them ready for bearings and install your own. Ameribrade also has good contact wheels (which I think are the same Chinese wheels, with better bearings and balanced). If you are looking for a flat platen, they are easy to make your self and also available from many sellers - just do a search, find one you like and bolt it on your tool arm.

| Contact wheel | 1 | $65.00 |

Hardware

<table>
<thead>
<tr>
<th>Gas Spring with Ball-Joint End Fitting, 40 lb. Force, 12.2&quot; Extended Length</th>
<th>McMaster Carr # 4138T54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Shock</td>
<td>1</td>
</tr>
<tr>
<td>Gas Spring mounting bracket McMaster Carr # 9512K95</td>
<td>Gas shock mounting bracket</td>
</tr>
<tr>
<td>10-24 x 3/8” long socket cap screws - McMaster Carr or hardware store</td>
<td>Gas shock bracket mounting screws</td>
</tr>
<tr>
<td>Die Cast Zinc Adjustable Handle, 5/16”-18 Thread x 1-3/16” Long Stud, 2-9/16” Long Handle McMaster Carr # 6271K22</td>
<td>Locking handles</td>
</tr>
<tr>
<td>2.5” Stainless flat cap bolts - 1/4”-20 - 10 pack - McMaster Carr</td>
<td>Assembly bolts</td>
</tr>
<tr>
<td>1 1/4” Stainless flat cap bolts - 1/4”-20 - 25 Pack - McMaster Carr</td>
<td>Assembly bolts</td>
</tr>
<tr>
<td>Shoulder Screw, 3/8” Diameter x 1-3/4” Long Shoulder, 5/16”-18 Thread - McMaster Carr # 91259A630</td>
<td>Shoulder bolt for tracking arm bar</td>
</tr>
<tr>
<td>PTFE Thrust Bearing for 3/8” Shaft Diameter, 3/4” OD, 1/16” Thickness McMaster Carr #2796T12</td>
<td>Bearings for tracking arm</td>
</tr>
<tr>
<td>Lubricant-Filled Nylon Plastic Washer, .322 ID - They come in packs of 5 (you only need 2 individual washers) McMasterCarr # 91545A260</td>
<td>Nylon washer for tracking tab</td>
</tr>
<tr>
<td>18-8 Stainless Steel Shoulder Screw, 5/16” Diameter x 2.5” Long Shoulder, 1/4”-20 Thread McMaster Carr # 91259A109</td>
<td>Shoulder bolt for tracking tab</td>
</tr>
<tr>
<td>18-8 Stainless Steel Shim, .020” Thick, 1/4” ID, 3/8” OD, packs of 10 - McMaster Carr #98126A568 (you will need exactly 12 shims)</td>
<td>Shim washers (to properly space tool bar openings)</td>
</tr>
<tr>
<td>4” 1/2-13 thread bolt, nut - McMaster Carr or local hardware store</td>
<td>Tracking wheel bolt</td>
</tr>
<tr>
<td>Iron Knob with 5/16”-18 Thread 3” Long Stud McMaster Carr # 6042K88</td>
<td>Tracking adjustment screw</td>
</tr>
<tr>
<td>3/8” 5S bolts, 1” long and washers McMaster Carr or local hardware store</td>
<td>Motor mount bolts</td>
</tr>
<tr>
<td>Steel Thrd-Locking Slotted Thick Wall Insert, 5/16”-18 Int Thread, 31/64” Length (McMaster Carr # 90248A027 )</td>
<td>Steel threaded inserts for tool bar locking handles</td>
</tr>
<tr>
<td>Shipping</td>
<td>$15.00</td>
</tr>
<tr>
<td>Total Accessory/Hardware costs</td>
<td>$867</td>
</tr>
</tbody>
</table>

All in grinder cost $1,045

Approx build time: about 10-15 hours
The "ULTIMATE" ZxZ Grinder

[This PAGE DRAWN TO SIZE]

Scanov on
Legal letter size paper
8.5" x 14"

1.125" ROUND ROD
(Handle)

TAPPED 1/4" X 20

5/16" through HOLE

3/4" x 1.5" x 2"
(Tracking Tab)

TAPPED 1/2" X 13

1/2" x 13

5/16" through Hole

SIDE VIEW

1/4" x 1.5" x 8.15"
(Track &ib Arm)

1/4" through Hole

Countersunk

TAPPED 1/4" x 15 threaded insert

3/16" through Hole

3/16" through Hole

1/4" x 1.5" x 20

Tapped Holes

(All measurements drawn to centroid of hole)
$\bigcirc = \frac{1}{4}''$ through hole
counter sunk

$\bigcirc = \frac{1}{2}'' \times 13$ tapped hole for a threaded insert

$\frac{1}{2}'' \times 8'' \times 8''$
(left side plate)
3" x 1.5" x 8"
(bottom spacer)

1.5" x 20 tapped holes

17/64" through hole
To provide relief for the C face motor, consider simply cutting the center shaft motor hole with a 4.5" hole saw. This will provide the relief needed such that the motor can bolt flat to the aluminum plate.
If you need help or have questions, I can generally be reached at 618-579-9689 on weeknights between 8PM and 9PM CST.
BJANSEN'S ULTIMATE BELT GRINDER 2019 =

BASE PLATE

1:2

1/2 X 8 X 14 Aluminum

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NOTE: Dimensions given for most unthreaded holes are for associated hardware, not clearance hole sizes

These PDF drawings were graciously provided by my buddy Fittzhugh

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NOTE: Transfer holes from LEFT SIDE PLATE to account for toolbar clearance, as set by temporary tape shims - see instructions.
MIDDLE SPACERS (2 REQ)
1:1
3/4 X 1.5 X 8 Aluminum

TRACKING SUPPORT SPACERS (4 REQ)
1:1
0.26 ID 0.5 OD X 1.125 Aluminum Tube

NOTE: Transfer holes from LEFT SIDE PLATE to account for toolbar clearance, as set by temporary tape shims - see instructions.
TOP SPACERS
1:1
1 X 1.5 X 8 Aluminum
Page 4 of 12
SIDE PLATE, RIGHT
1:2
1/2 X 8 X 20 Aluminum
Page 5 of 12

SECTION A-A
SCALE 1:2
SIDE PLATE, LEFT
1:2
1/2 X 8 X 8 Aluminum
Page 6 of 12
TENSION & TRACKING SUPPORT, RIGHT

1:1

1/2 X 2.5 X 8.5 Aluminum

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RELIEVE AS NEEDED FOR MOTOR CLEARANCE

4X Ø.25

Ø5/16-18
TENSION & TRACKING SUPPORT, LEFT

1:1
1/2 X 2.5 X 8.5 Aluminum
Page 8 of 12

RELIEVE AS NEEDED FOR MOTOR CLEARANCE

4X Ø.25
82° Ø.56

Ø.375

.5

1.125

7.75

1.25

8.5
TENSION & TRACKING ARM
1:1
1 X 2 X 8.5 Aluminum
Page 9 of 12
TRACKING PIVOTS

FRONT PIVOT
3/4 X 1 X 2 Aluminum

REAR PIVOT
3/4 X 1 X 2 Aluminum

[SEE NOTE]

NOTE: Assemble TRACKING PIVOTS, TRACKING TAB, washers with shoulder bolt, then transfer hole locations from TENSION ARM to account for washer thickness.
TRACKING WHEEL TAB
1:1
3/4 X 1.5 X 2 Aluminum
Page 11 of 12
LEFT SIDE AND SPACERS
Front View
1:1
Transfer holes from side plate to spacers, using tool bar with temporary tape shims to ensure clearance for tool bar movement. See instructions for details.