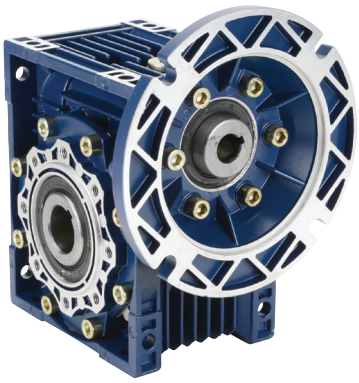
IronHorse® Aluminum Worm Gearboxes

Aluminum Model Overview



IronHorse Aluminum Hollow Bore Worm Gearbox

IronHorse Aluminum Worm Gearbox Accessories

Gearbox Overview

Gearboxes, also known as enclosed gear drives or speed reducers, are mechanical drive components that can control a load at a reduced fixed ratio of the motor speed. The output torque is also increased by the same ratio, while the horsepower remains the same (less efficiency losses.) For example, a 10:1 ratio gearbox outputs approximately the same motor output horsepower, motor speed divided by 10, and motor torque multiplied by 10.

Worm gearboxes contain a worm (gear type) on the input shaft, and a mating gear on the output shaft. Worm gearboxes also change the drive direction by 90°.

IronHorse worm gearboxes are manufactured in an ISO9001 certified plant by one of the leading gearbox manufacturers in the world today. Only the highest quality materials are tested, certified, and used in the manufacturing process. Strict adherence to and compliance with the toughest international and U.S. testing standards and manufacturing procedures assure you the highest quality products.

Aluminum gearboxes feature hollow-bore outputs (hollow all the way through from one side to the other). These gearboxes also utilize C-face mounting interfaces for trouble-free connections to C-face motors. We also offer optional single and double output shafts, output flanges, torque arms, and output covers.

Features

- 10:1 to 100:1 ratios
- Box sizes 30 to 75 mm
- Aluminum alloy housing for lightweight design
- Hardened worm shaft for increased durability
- Two bearings on input and output shafts
- NEMA motor input flanges
- All units filled with Mobil SHC634 synthetic oil
- No vent plug or breather needed; maintenance-free reducer
- Double lip oil seals prevent leakage
- Multiple mounting holes for all angle mounts
- Epoxy paint applied to inside and outside of reducer to protect against corrosion
- Hollow output bores with available plug-in output shafts
- Mountable in any direction, except motor pointing up

Applications

- Use with electric motors for reducing output speed, increasing torque, changing drive direction, or running two loads from one motor.
- Use for conveyors, packaging machines, rotary tables, etc.

IronHorse® Aluminum Worm Gearboxes

Specifications

IronHorse Aluminum Worm Gearboxes – 30, 40, 50, & 63 mm Frames														
Part Number	Price	Ratio	Output RPM @ 1750 RPM Input	Nominal Motor HP [1] @1800 rpm	NEMA Motor Frame	Output Type [2]	Center Distance [3] (mm)	Overhung Load [4] (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 RPM Input — Mechanical [5]			Maximum Input Speed (rpm)
											Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	
WGA-30M-010-H1	$88.00	10:1	175	0.5	56C	H	30	142	80	3	0.54	0.43	150	2,000
WGA-30M-020-H1	$88.00	20:1	88	0.25				179	72		0.30	0.22	150	
WGA-30M-030-H1	$88.00	30:1	58	0.25				205	62		0.25	0.16	177	
WGA-30M-040-H1	$88.00	40:1	44	0.2				225	55		0.19	0.10	150	
WGA-30M-060-H1	$88.00	60:1	29	0.12				259	46		0.12	0.06	142	
WGA-40M-010-H1	$109.00	10:1	175	1			40	279	83	5	1.15	0.95	354	
WGA-40M-020-H1	$109.00	20:1	88	0.5				350	78		0.61	0.48	345	
WGA-40M-030-H1	$109.00	30:1	58	0.5				403	68		0.53	0.36	389	
WGA-40M-040-H1	$109.00	40:1	44	0.33				441	65		0.39	0.25	363	
WGA-40M-060-H1	$109.00	60:1	29	0.25				507	56		0.25	0.14	319	
WGA-40M-080-H1	$109.00	80:1	22	0.12				556	50		0.19	0.10	283	
WGA-40M-100-H1	$109.00	100:1	17.5	0.12				595	47		0.15	0.07	257	
WGA-50M-010-H1	$150.00	10:1	175	2			50	406	84	8	2.06	1.73	628	
WGA-50M-020-H1	$150.00	20:1	88	1				510	78		1.13	0.88	646	
WGA-50M-030-H1	$150.00	30:1	58	0.75				586	70		0.95	0.67	734	
WGA-50M-040-H1	$150.00	40:1	44	0.75				643	65		0.70	0.46	664	
WGA-50M-060-H1	$150.00	60:1	29	0.33				739	57		0.46	0.26	602	
WGA-50M-080-H1	$150.00	80:1	22	0.33				810	50		0.38	0.19	566	
WGA-50M-100-H1	$150.00	100:1	17.5	0.25				866	46		0.28	0.13	487	
WGA-63M-010-H1	$194.00	10:1	175	3	56C		63	510	86	13	3.67	3.16	1141	
WGA-63M-010-H2	$194.00	10:1	175	3	145TC			510	86		3.67	3.16	1141	
WGA-63M-020-H1	$194.00	20:1	88	2	56C			641	80		2.04	1.63	1186	
WGA-63M-020-H2	$194.00	20:1	88	2	145TC			641	80		2.04	1.63	1186	
WGA-63M-030-H1	$194.00	30:1	58	1.5				736	73		1.76	1.28	1416	
WGA-63M-040-H1	$194.00	40:1	44	1				807	70		1.26	0.88	1274	
WGA-63M-060-H1	$194.00	60:1	29	0.75	56C			928	59		0.86	0.51	1141	
WGA-63M-080-H1	$194.00	80:1	22	0.5				1017	53		0.67	0.36	1071	
WGA-63M-100-H1	$194.00	100:1	18	0.5				1088	48		0.57	0.27	1035	

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.

2) Output Type: H = Hollow Bore.

3) The Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.

4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.

5) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.

IronHorse® Aluminum Worm Gearboxes

Specifications (continued)

IronHorse Aluminum Worm Gearboxes – 75 mm Frames

Part Number	Price	Ratio	Output RPM @ 1750 RPM Input	Nominal Motor HP [1] @1800 rpm	NEMA Motor Frame	Output Type [2]	Center Distance [3] (mm)	Overhung Load [4] (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 RPM Input – Mechanical [5]			Maximum Input Speed (rpm)
											Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	
WGA-75M-010-H1	$281.00	10:1	175	5	56C	H	75	604	86	19	5.44	4.68	1717	2,000
WGA-75M-010-H2	$281.00	10:1	175	5	145TC			604	86		5.44	4.68	1717	
WGA-75M-010-H3	$281.00	10:1	175	5	182/4TC			604	86		5.44	4.68	1717	
WGA-75M-020-H1	$281.00	20:1	88	3	56C			759	79		3.14	2.48	1849	
WGA-75M-020-H2	$281.00	20:1	88	3	145TC			759	79		3.14	2.48	1849	
WGA-75M-030-H1	$281.00	30:1	58	2				873	72		2.48	1.79	2026	
WGA-75M-040-H1	$281.00	40:1	44	1.5				957	68		1.88	1.28	1947	
WGA-75M-060-H1	$281.00	60:1	29	1	56C			1099	62		1.26	0.78	1770	
WGA-75M-080-H1	$281.00	80:1	22	0.75				1205	58		0.97	0.56	1672	
WGA-75M-100-H1	$281.00	100:1	18	0.75				1289	52		0.80	0.42	1593	

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.

2) Output Type: H = Hollow Bore.

3) The Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.

4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.

5) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.

Gearbox Selection Factors

Overhung Load K Factors for Various Drive Types	
Chain & Sprocket	1.00
Gear	1.25
V-belt	1.50
Flat Belt	2.50
Variable Pitch Belt	3.50

Divide gearbox OHL ratings by the applicable OHL K factors.

Service Factors for Selecting Gearboxes (when used with electric motors)

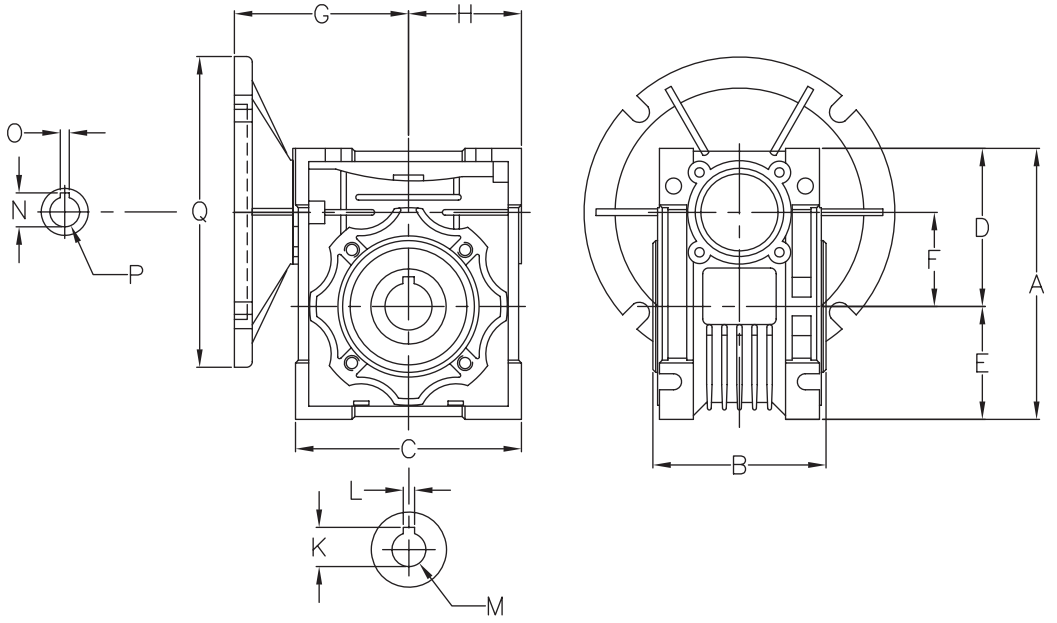
Service Continuity (per day)	Load Characteristics			
	Uniform	Moderate Shock*	Heavy Shock*	Extreme Shock*
Occasional 1/2 hour	1.00	1.00	1.00	1.25
Less than 3 hours	1.00	1.00	1.25	1.50
3-10 hours	1.00	1.25	1.50	1.75
More than 10 hours	1.25	1.50	1.75	2.00

** Shock results from sudden increases in the torque demand of the load, such as: sudden stopping, restarting, and/or reversing; significantly heavy loads dropped onto a moving conveyor; impact loads such as punch press operations.*

Depending upon the load characteristics, divide the gearbox HP, Overhung Load, and Maximum Mechanical Capacity ratings by the applicable service factor.

IronHorse® Aluminum Worm Gearboxes

Gearbox Dimensions – Aluminum Worm Gearboxes



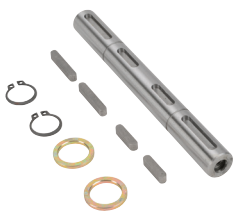
Dimensions (inches) – IronHorse Aluminum Worm Gearboxes

Part Number	NEMA Motor Face	A	B	C	D	E	F	G	H	Output Bore			Input Shaft			ØQ
										K	L	ØM	N	O	ØP	
WGA-30M-xxx-H1	56C	3.82	2.48	3.15	2.24	1.57	1.18	2.89	1.57	0.720	0.187	0.625	0.73	0.19	0.625	6.50
WGA-40M-xxx-H1		4.78	3.07	3.94	2.81	1.97	1.57	3.18	1.97	0.840	0.187	0.750	0.71	0.19	0.625	6.50
WGA-50M-xxx-H1		5.67	3.62	4.72	3.31	2.36	1.97	3.58	2.36	1.110	0.250	1.000	0.71	0.19	0.625	6.50
WGA-63M-xxx-H1		6.87	4.42	5.69	4.00	2.87	2.48	4.06	2.84	1.250	0.250	1.125	0.71	0.19	0.625	6.50
WGA-63M-xxx-H2	145TC	6.87	4.42	5.69	4.00	2.87	2.48	4.06	2.84	1.250	0.250	1.125	0.97	0.19	0.875	6.50
WGA-75M-xxx-H1	56C	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.250	1.250	0.71	0.19	0.625	6.50
WGA-75M-xxx-H2	145TC	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.250	1.250	1.24	0.25	1.125	6.50
WGA-75M-xxx-H3	182/4TC	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.250	1.250	1.24	0.25	1.125	8.97

See our website: www.AutomationDirect.com for complete engineering drawings.

IronHorse® Aluminum Worm Gearboxes

Accessories – Aluminum Worm Gearboxes

IronHorse Aluminum Worm Gearbox Accessories			
Part Number	**Price**	**Description**	**Typical Photo**
WGA-30M-ACC1	$7.75	Output flange, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
WGA-40M-ACC1	$8.75	Output flange, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
WGA-50M-ACC1	$9.75	Output flange, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
WGA-63M-ACC1	$12.50	Output flange, for aluminum WGA-63M series gearboxes. Includes (8) mounting screws.	
WGA-75M-ACC1	$20.25	Output flange, for aluminum WGA-75M series gearboxes. Includes (8) mounting screws.	
WGA-30M-ACC2	$10.50	Torque arm, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
WGA-40M-ACC2	$11.50	Torque arm, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
WGA-50M-ACC2	$12.50	Torque arm, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
WGA-63M-ACC2	$20.75	Torque arm, for aluminum WGA-63M series gearboxes. Includes (8) mounting screws.	
WGA-75M-ACC2	$33.75	Torque arm, for aluminum WGA-75M series gearboxes. Includes (8) mounting screws.	
WGA-30M-ACC3	$10.50	Single output shaft, Ø0.625 in, for aluminum WGA-30M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
WGA-40M-ACC3	$12.00	Single output shaft, Ø0.75 in, for aluminum WGA-40M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
WGA-50M-ACC3	$14.25	Single output shaft, Ø1.0 in, for aluminum WGA-50M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
WGA-63M-ACC3	$19.00	Single output shaft, Ø1.125 in, for aluminum WGA-63M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
WGA-75M-ACC3	$24.50	Single output shaft, Ø1.25 in, for aluminum WGA-75M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
WGA-30M-ACC4	$13.75	Double output shaft, Ø0.625 in, for aluminum WGA-30M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
WGA-40M-ACC4	$16.50	Double output shaft, Ø0.75 in, for aluminum WGA-40M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
WGA-50M-ACC4	$19.00	Double output shaft, Ø1.0 in, for aluminum WGA-50M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
WGA-63M-ACC4	$25.75	Double output shaft, Ø1.125 in, for aluminum WGA-63M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
WGA-75M-ACC4	$31.75	Double output shaft, Ø1.25 in, for aluminum WGA-75M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
WGA-30M-ACC5	$4.50	Output cover, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
WGA-40M-ACC5	$4.50	Output cover, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
WGA-50M-ACC5	$7.75	Output cover, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
WGA-63M-ACC5	$7.75	Output cover, for aluminum WGA-63M series gearboxes. Includes (4) mounting screws.	
WGA-75M-ACC5	$7.75	Output cover, for aluminum WGA-75M series gearboxes. Includes (4) mounting screws.	

IronHorse® Worm Gearboxes

Gearbox Selection

Gearbox Selection Steps

1) Determine the torque and speed required for the load.
2) Determine the overall speed ratio of motor speed to load speed.
3) Determine the gearbox ratio as well as any reduction outside the gearbox (pulleys, gears, etc.).
4) Determine the applicable service factor and overhung load K factor.
5) Determine the gearbox real output torque required, and select a gearbox with a higher Maximum Thermal output Torque rating (for WG cast-iron gearboxes; not applicable for WGA aluminum gearboxes).
6) Determine the gearbox design output torque required (torque with service factor applied), and select a gearbox with a higher Maximum Mechanical Output Torque rating. (Gearbox must also meet requirement #5.)
7) Determine the required sizes of pulleys, gears, etc., and determine the overhung load force. Select a gearbox with a higher Overhung Load rating. (Gearbox must also meet requirements #5 & #6.)
8) Confirm that the selected gearbox meets the applicable system requirements.
9) Select a compatible motor.

Gearbox Selection Example

(Refer to the specifications tables for gearbox specifications, service factors, and K factors.)

A conveyor will run 10 hours/day with moderate shock loading. The conveyor will be driven by a V-belt and needs to be driven at approximately 20 rpm. The motor to be used will have a nominal speed of 1800 rpm (1725 rpm actual speed). The conveyor will require 2700 in·lb of torque.

1) Required **torque** = 2700 in·lb; required **speed** = 20 rpm.
2) Determine the **overall speed ratio** of motor speed to load speed:
   Overall speed ratio = motor speed / load speed = 1725 / 20 = 86.25 [about 86:1]
3) Determine **pulley ratios** at available **gearbox ratios**:
   Gearbox ratio = (overall speed ratio) / (pulley ratio)
   Pulley ratio = (overall speed ratio) / (gearbox ratio)

   For ~~5:1 gearbox~~: pulley ratio = 86.25 / 5 = ~~17.25~~ [17.25" pulley size is prohibitively large]
   For 10:1 gearbox: pulley ratio = 86.25 / 10 = 8.63
   For 15:1 gearbox: pulley ratio = 86.25 / 15 = 5.75
   For 20:1 gearbox: pulley ratio = 86.25 / 20 = 4.31
   For 30:1 gearbox: pulley ratio = 86.25 / 30 = 2.88
   For 40:1 gearbox: pulley ratio = 86.25 / 40 = 2.16
   For 60:1 gearbox: pulley ratio = 86.25 / 60 = 1.44

   Pulley ratio = (conveyor pulley diameter) / (gearbox pulley diameter)
4) Determine **service factor** (**SF**) and **overhung load factor** (**K**) from applicable tables:
   SF = 1.25 due to moderate shock loading and 3-10 hours/day operation
   K = 1.5 due to V-belt
5) Use specifications table to select gearbox with **Maximum Thermal* Torque rating > required real torque**:
   Gearbox required real torque = (final torque) / (pulley ratio)

   For 10:1 gearbox: (2700 in·lb) / 8.63 = 312.86 in·lb; use WG-175-x or larger
   For 15:1 gearbox: (2700 in·lb) / 5.75 = 469.57 in·lb; use WG-175-x or larger
   For 20:1 gearbox: (2700 in·lb) / 4.31 = 626.45 in·lb; use WG-206-x or larger
   For 30:1 gearbox: (2700 in·lb) / 2.88 = 937.50 in·lb; use WGA-63M* or larger
   For ~~40:1 gearbox~~: (2700 in·lb) / 2.16 = 1250.0 in·lb; none applicable
   For ~~60:1 gearbox~~: (2700 in·lb) / 1.44 = 1875.0 in·lb; none applicable

(continued on next page)

IronHorse® Worm Gearboxes

Gearbox Selection Example (continued)

(Refer to the specifications tables for gearbox specifications, service factors, and K factors.)
[Load requirements: Conveyor to run 10 hours/day; moderate shock loading; driven by V-belt @ approx 20 rpm; requires 2700 in·lb of torque. Motor speed 1725 rpm (1800 rpm nominal).]

6) Use specifications table to select gearbox with **Maximum Mechanical Torque rating > required design torque**:
Gearbox required design torque = (real gearbox torque)(service factor)

For 10:1 gearbox:	(312.86 in·lb)(1.25) = 391.08 in·lb;	use WG-175-x or larger
For 15:1 gearbox:	(469.57 in·lb)(1.25) = 586.96 in·lb;	use WG-206-x or larger
For 20:1 gearbox:	(646.45 in·lb)(1.25) = 808.06 in·lb;	use WG-206-x or larger
For 30:1 gearbox:	(937.50 in·lb)(1.25) = 1178.88 in·lb;	use WGA-63M or larger

7) Use the gearbox overhung load ratings from the specifications table to determine the minimum allowable pulley diameters. Select gearbox with **Overhung Load rating > overhung load force**:
Gearbox required OHL rating = (gearbox real torque)(K)(SF)/(gearbox pulley diameter / 2)
Minimum gearbox pulley diameter = (T)(K)(SF)(2)/(OHL rating)
Conveyor pulley diameter = (gearbox pulley diameter)(pulley ratio)

For 10:1, WG-175-010-x gearbox:
Minimum gearbox pulley diameter = (312.86 in·lb)(1.5)(1.25)(2)/(650 lb) = 1.8" [use 2"]
Conveyor pulley diameter = (2")(8.63) = ~~17.26"~~ [17.26" pulley size is prohibitively large]
Determine pulley sizes and OHL for next larger gearbox ratio.

For 15:1, WG-206-015-x gearbox:
Minimum gearbox pulley diameter = (469.57 in·lb)(1.5)(1.25)(2)/(700 lb) = 2.5" [use 2.5"]
Conveyor pulley diameter = (2.5")(5.75) = 14.38" [use 14.4"]
Select **WG-206-015-x gearbox**, **2.5" gearbox pulley**, and **14.4" conveyor pulley**.

For 20:1, WG-206-020-x gearbox:
N/A – larger ratio of same frame size GB is same price, yet provides lower efficiency and power characteristics

For 30:1, WGA-63M-030-H1 gearbox:
Minimum gearbox pulley diameter = (937.50 in·lb)(1.5)(1.25)(2)/(736 lb) = 4.78" [use 5"]
Conveyor pulley diameter = (5")(2.88) = 14.40" [use 14.4"]
N/A – WGA-63M gearbox costs more than WG-206

8) **Check results** against original speed and torque requirements:
a) Conveyor speed = (motor speed) / (gearbox ratio)(pulley ratio) = (1725 rpm) / (15)(14.4"/2.5") = 20 rpm
b) Maximum real torque available at conveyor = (gearbox thermal torque)(pulley ratio) = (673 in·lb)(14.4"/2.5") = 3876 in·lb
c) Maximum design torque available at conveyor = (gearbox mechanical torque)(pulley ratio) / (service factor)
= (1002 in·lb)(14.4"/2.5") / 1.25 = 4617 in·lb
The speed is correct as required, and both maximum torque values are greater than the 2700 in·lb required by the load.

9) **Select** a **motor** and check torque transmitted to the load:
From the gearbox spec tables, WG-206-015-x efficiency = 85%.
maximum thermal input power = 1.40 hp
maximum mechanical input power @ 1.0 SF = 2.09 hp
maximum mechanical input power @ 1.25 SF = (rated max mechanical input power) / (SF) = 2.09 hp / 1.25 = 1.67 hp
maximum allowable motor power = 1.40 hp; select nominal 1hp motor
Select **1hp motor**, and check for adequate torque at the load:
Torque = Power / Speed [**conversion factor: (1hp) = (63,025 in·lb·rpm)**]
$Torque_{load}$ = (63,025 in·lb·rpm / hp)(gearbox input hp)(gearbox efficiency) / (motor rpm / (gearbox ratio)(pulley ratio))
= (63,025)(1)(0.85) / (1725 / (15/1)(14.4/2.5)) = ~~2683 in·lb~~ **[insufficient torque at load]**
This torque value is less than the 2700 in·lb required by the load.
So, select and check the next larger nominal motor size, which is 1-1/2 hp.
Since the 206 frame size 15 ratio gearboxes do not meet the 1-1/2 hp thermal rating, choose the WG-237-015-x gearbox.
Select **1-1/2 hp motor** and **WG-237-015-x gearbox**, and check for adequate torque:
WG-237-015-x gearbox efficiency = 84%
maximum thermal input power = 1.55 hp
maximum mechanical input power @ 1.25 SF = 2.64 hp / 1.25 = 2.11 hp
maximum allowable motor power = 1.55 hp; select nominal 1-1/2 hp motor
gearbox ratio is still 15:1, and OHL rating is increased to 900 lb, so the previous pulley calculations [step 7] remain sufficient [smaller pulleys can be calculated and selected for this gearbox, if desired]
T_{load} = (63,025 in·lb·rpm/hp) (1.5hp) (84%) / (1725 rpm / (15/1)(14.4/2.5)) = 3977 in·lb > 2700 in·lb; sufficient torque at load

Final gearbox and motor selection: 1-1/2 hp motor WG-237-015-x gearbox