Gearbox Selection

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Shaft Mount Gearbox Selection Procedure

Follow the procedure below to select Screw Conveyor Shaft Mount Reducers (SMR) up to 40 horsepower and/or output speeds to 200 RPM, using AGMA recommended application numbers as generally described herein.

How to Select

1) **Determine Class of Service** (See "Classes of Service and Service Factors" on *page 2–2*)
To determine Load Classification for applications under normal conditions, find the type application and duty cycle that most closely matches your specific application. For a detailed list of applications and classifications numbers, see "A.G.M.A. Load Classification Numbers" on *page B–4*.

   Class I: Steady load not exceeding Motor HP rating and light shock loads during 10 hours a day. Moderate shock loads are allowable if operation is intermittent.

   Class II: Steady load not exceeding Motor HP rating for over 10 hours a day. Moderate shock loads are allowable during 10 hours a day.

   Class III: Moderate shock loads for over 10 hours a day. Heavy shock loads are allowable during 10 hours a day.

2) **Determine Reducer Size** (See "Mechanical Ratings" on *page 2–5*)
To choose the correct size SMR gearbox find the Service Class Column that accurately represents the severity of the application, and then finding the correct gearbox output speed will denote the SMR reducer case size and ratio.

3) **Select the corresponding Screw Conveyor Flange and correct Screw Conveyor Shaft Diameter** (See "Accessories Selection" on *page 4–2*)
It is necessary to select a SMR gearbox that not only matches the proper HP and Class of Service, but must also clearly accommodate the CEMA***** trough-end. Select the 3-Hole Screw Conveyor Shaft that's compatible with the schedule pipe diameter of the screw conveyor.
*****_Conveyor Equipment Manufacturer Association_

4) **Select the proper V-belt Drive Arrangement**
All SMR reducers utilizing a Motor Mount require a V-belt and Sheave combination that in conjunction with the Motor (HP & RPM) and gearbox ratio, provide the desired output speed to the driven shaft. In addition to selecting the proper sheave ratio, care must be taken in selecting the correct V-Belt cross-section and number of belts to insure an adequate Service Factor (SF). In many instances, those that specify the V-belt & pulley sizes try to pick a system that prevents nuisance failures, yet still is the Weak Link; as V-belt drives are far less expensive and quicker to replace than damaged gearboxes. If needed, please consult AutomationDirect Tech Support for proper V-belt drive selection.

5) **Select additional Accessories** (See "Accessories Selection" on *page 4–2*)
In the accessories section of the catalog a selection of Motor Mounts, Belt Guards, Bushing Kits, and Backstop clutches can be found. The part numbers are easily selected, as they share nomenclature in common with the corresponding SMR case size. Backstops are a one-way clutch that prevent the driven load of an incline or vertical load from back-driving due to gravity. Always use the same brand of backstop as the manufacturer of the SMR gearbox.

Example of SMR Gearbox Selection Procedure

A 10hp 1750rpm motor is used to drive a uniformly loaded screw conveyor moving sand at 100rpm, operating 8 hours per day. The screw conveyor pipe diameter is 2-$^{7}/_{16}$". Select the required gearbox and accessories.

1) **Determine Class of Service**
   From Table 1 on *page 2–2* locate proper Class of Service; Uniformly loaded load operating less than 10 hours per day is classified as Class I.

2) **Determine Reducer Size**
   From the table on *page 2–5* locate the correct SMR case size and ratio in accordance with Class I Service. The correct SMR selection is a SMR3-15.

3) **Select the appropriate Screw Conveyor Flange and Shaft for this SMR Gearbox**
   From the table on *page 4–2* in the accessories section we would select a Screw Conveyor Flange – Part# SMR3-CF and a 2-$^{7}/_{16}$"; Screw Conveyor Shaft – Part# SMR3-CDS-39

4) **Select correct V-belt Drive Arrangement**
   Using our 10hp, 1750rpm motor we can divide the motor RPM by out output speed of 100 RPM and conclude we require an overall reduction of 17.5:1. Since our gearbox has an actual ratio of 14.87:1 (*page 2–3*) our required V-belt drive is a 1.18:1 ratio. Your V-belt drive should be sized to handle the applied HP, and provide sufficient headroom (Service Factor) to prevent nuisance belt failures.

5) **Select additional Accessories**
   From the table on *page 4–2*, pick the appropriate accessories for a SMR3-15 as indicated.
   For example:
   Motor Mount: SMR3-MM
   Belt Guard: SMR3-BG

A.G.M.A. Load Classification Numbers

Shaft Mount Reducers with Uniform Power Source

A.G.M.A. Class Numbers for Shaft Mount Reducers			
Application	***Service Hours per Day***		
	Up to 3	***3 to 10***	***Over 10***
Agitators (mixers)			
Pure liquids	I	I	II
Liquids and solids	I	II	II
Liquids – variable density	I	II	II
Blowers			
Centrifugal	I	I	II
Lobe	I	II	II
Vane	I	II	II
Brewing and distilling			
Bottling machinery	I	I	II
Brew kettles – continuous duty	II	II	II
Cookers – continuous duty	II	II	II
Mash tubs – continuous duty	II	II	II
Scale hopper – frequent starts	II	II	II
Can filling machines	I	I	II
Car dumpers	I	III	III
Car pullers	I	II	II
Clarifiers	I	I	II
Classifiers	I	II	II
Clay working machinery			
Brick press	II	III	III
Briquette machine	II	III	III
Pug mill	I	II	II
Compactors	III	III	III
Compressors			
Centrifugal	I	I	II
Lobe	I	II	II
Reciprocating, multi-cylinder	II	II	III
Reciprocating, single-cylinder	III	III	III

1) Crane drives are to be selected based on gear tooth bending strength, using the numeric service factors in this table. Service factor in durability shall be a minimum of 1.00.
2) Anti-friction bearings only.
3) A class number of I may be applied at base speed of a super calender operating over-speed range or part range constant horsepower, part range constant torque where the constant horsepower speed range is greater than 1.5 to 1. A class number of II is applicable to super calenders operating over the entire speed range at constant torque or where the constant horsepower speed range is less than 1.5 to 1.

(table continued next page)

A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Cranes 1)			
Dry dock			
Main hoist	2.50	2.50	2.50
Auxiliary hoist	2.50	2.50	3.00
Boom hoist	2.50	2.50	3.00
Slewing drive	2.50	2.50	3.00
Traction drive	3.00	3.00	3.00
Container			
Main hoist	3.00	3.00	3.00
Boom hoist	2.00	2.00	2.00
Trolley drive – Gantry drive	3.00	3.00	3.00
Trolley drive – Traction drive	2.00	2.00	2.00
Mill duty			
Main hoist	3.50	3.50	3.50
Auxiliary	3.50	3.50	3.50
Bridge	2.50	3.00	3.00
Trolley travel	2.50	3.00	3.00
Industrial duty			
Main	2.50	2.50	3.00
Auxiliary	2.50	2.50	3.00
Bridge	2.50	3.00	3.00
Trolley travel	2.50	3.00	3.00
Crushers			
Stone or ore	III	III	III
Dredges			
Cable reels	II	II	II
Conveyors	II	II	II
Cutter head drives	III	III	III
Pumps	III	III	III
Screen drives	III	III	III
Stackers	II	II	II
Winches	II	II	II
Elevators			
Bucket	I	II	II
Centrifugal discharge	I	I	II
Escalators	I	I	II
Freight	I	II	II
Gravity discharge	I	I	II

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3) A class number of I may be applied at base speed of a super calender operating over-speed range or part range constant horsepower, part range constant torque where the constant horsepower speed range is greater than 1.5 to 1. A class number of II is applicable to super calenders operating over the entire speed range at constant torque or where the constant horsepower speed range is less than 1.5 to 1.

(table continued next page)

A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Extruders			
General	II	II	II
Plastics – Variable speed drive	III	III	III
Plastics – Fixed speed drive	III	III	III
Rubber – Continuous screw operation	III	III	III
Rubber – Intermittent screw operation	III	III	III
Fans			
Centrifugal	I	I	II
Cooling towers	III	III	III
Forced draft	II	II	II
Induced draft	II	II	II
Industrial & mine	II	II	II
Feeders			
Apron	I	II	II
Belt	I	II	II
Disc	I	I	II
Reciprocating	II	III	III
Screw	I	II	II
Food industry			
Cereal cooker	I	I	II
Dough mixer	II	II	II
Meat grinders	II	II	II
Slicers	I	II	II
Generators and exciters	II	II	II
Hammer mills	III	III	III
Hoists			
Heavy duty	III	III	III
Medium duty	II	II	II
Skip hoist	II	II	II
Laundry			
Tumblers	II	II	II
Washers	II	II	III

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A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Lumber industry			
Barkers – spindle feed	II	II	II
Main drive	III	III	III
Conveyors – burner			
Main or heavy duty	II	II	II
Main log	III	III	III
Re-saw, merry-go-round	II	II	II
Conveyors			
Slab	III	III	III
Transfer	II	II	II
Chains			
Floor	II	II	II
Green	II	II	III
Cut-off saws			
Chain	II	II	III
Drag	II	II	III
Debarking drums	III	III	III
Feeds			
Edger	II	II	II
Gang	III	III	III
Trimmer	II	II	II
Log deck	III	III	III
Log hauls – incline – well type	III	III	III
Log turning devices	III	III	III
Planer feed	II	II	II
Planer tilting hoists	II	II	II
Rolls – live-off bearing – roll cases	III	III	III
Sorting table	II	II	II
Tipple hoist	II	II	II
Transfers			
Chain	II	II	III
Craneway	II	II	III
Tray drives	II	II	II
Veneer lathe drives	II	II	II

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A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Metal mills			
Draw bench carriage and main drive	II	II	II
Runout table			
Non-reversing – Group drives	II	II	II
Non-reversing – Individual drives	III	III	III
Reversing	III	III	III
Slab pushers	II	II	II
Shears	III	III	III
Wire drawing	II	II	II
Wire winding machine	II	II	II
Metal strip processing machinery			
Bridles	II	II	II
Coilers & uncoilers	I	I	II
Edge trimmers	I	II	II
Flatteners	II	II	II
Loopers (accumulators)	I	I	I
Pinch rolls	II	II	II
Scrap choppers	II	II	II
Shears	III	III	III
Slitters	I	II	II
Mills, rotary type			
Spur ring gear	III	III	III
Helical ring gear	II	II	II
Direct connected	III	III	III
Cement kilns	II	II	II
Dryers & coolers	II	II	II
Mixers			
Concrete	II	II	II

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A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Paper mills			
Agitator (mixer)	II	II	II
Agitator for pure liquors	II	II	II
Barking drums	III	III	III
Barkers – mechanical	III	III	III
Beater	II	II	II
Breaker stack	II	II	II
Calender	II	II	II
Chipper	III	III	III
Chip feeder	II	II	II
Coating rolls	II	II	II
Conveyors			
Chip, bark, chemical	II	II	II
Log (including slab)	III	III	III
Couch rolls	II	II	II
Cutter	III	III	III
Cylinder molds	II	II	II
Dryers 2)			
Paper machine	II	II	II
Conveyor type	II	II	II
Embosser	II	II	II
Extruder	II	II	II
Fourdrinier rolls (includes lump breaker, dandy roll, wire turning, & return rolls)	II	II	II
Jordan	II	II	II
Kiln drive	II	II	II
Mt. Hope roll	II	II	II
Paper rolls	II	II	II
Platter	II	II	II
Presses – felt & suction	II	II	II
Pulper	III	III	III
Pumps – vacuum	II	II	II
Reel (surface type)	II	II	II
Screens			
Chip	II	II	II
Rotary	II	II	II
Vibrating	III	III	III
Size press	II	II	II
Super calender 3)	II	II	II
Thickener (AC motor)	II	II	II
Thickener (DC motor)	II	II	II
Washer (AC motor)	II	II	II
Washer (DC motor)	II	II	II
Wind and unwind stand	I	I	I

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A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Paper mills (continued)			
Winders (surface type)	II	II	II
Yankee dryers 2)	II	II	II
Plastics industry			
Primary processing			
Batch mixers	III	III	III
Continuous mixers	II	II	II
Batch drop mill – 2 smooth rolls	II	II	II
Continuous feed, holding & blend mill	II	II	II
Calenders	II	II	II
Secondary processing			
Blow molders	II	II	II
Coating	II	II	II
Film	II	II	II
Pipe	II	II	II
Pre-plasticizers	II	II	II
Rods	II	II	II
Sheet	II	II	II
Tubing	II	II	II
Pullers – barge haul	II	II	II
Pumps			
Centrifugal	I	I	II
Proportioning	II	II	II
Reciprocating			
Single acting, 3 or more cylinders	II	II	II
Double acting, 2 or more cylinders	II	II	II
Rotary			
Gear type	I	I	II
Lobe	I	I	II
Vane	I	I	II
Rubber industry			
Intensive internal mixers			
Batch mixers	III	III	III
Continuous mixers	II	II	II
Mixing mill – 2 smooth rolls	II	II	II
Mixing mill – 1 or 2 corrugated rolls	III	III	III
Batch drop mill – 2 smooth rolls	II	II	II
Cracker warmer – 2 rolls; 1 corrugated roll	III	III	III
Cracker – 2 corrugated rolls	III	III	III
Holding, feed & blend mill – 2 rolls	II	II	II
Refiner – 2 rolls	II	II	II
Calenders	II	II	II
Sand muller	II	II	II

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A.G.M.A. Class Numbers for Shaft Mount Reducers (table continued from previous page)			
Application	**Service Hours per Day**		
	Up to 3	**3 to 10**	**Over 10**
Sewage disposal equipment			
Bar screens	II	II	II
Chemical feeders	II	II	II
Dewatering screens	II	II	II
Scum breakers	II	II	II
Slow or rapid mixers	II	II	II
Sludge collectors	II	II	II
Thickeners	II	II	II
Vacuum filters	II	II	II
Screens			
Air washing	I	I	II
Rotary – stone or gravel	II	II	II
Traveling water intake	I	I	I
Screw conveyors			
Uniformly loaded or fed	I	I	II
Heavy duty	I	II	II
Sugar industry			
Beet slicer	III	III	III
Cane knives	II	II	II
Crushers	II	II	II
Mills (low speed end)	III	III	III
Textile industry			
Batchers	II	II	II
Calenders	II	II	II
Cards	II	II	II
Dry cans	II	II	II
Dryers	II	II	II
Dyeing machinery	II	II	II
Looms	II	II	II
Mangles	II	II	II
Nappers	II	II	II
Pads	II	II	II
Slashers	II	II	II
Soapers	II	II	II
Spinners	II	II	II
Tenter frames	II	II	II
Washers	II	II	II
Winders	II	II	II

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