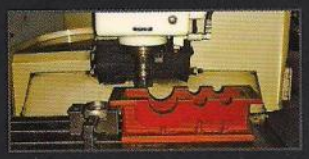
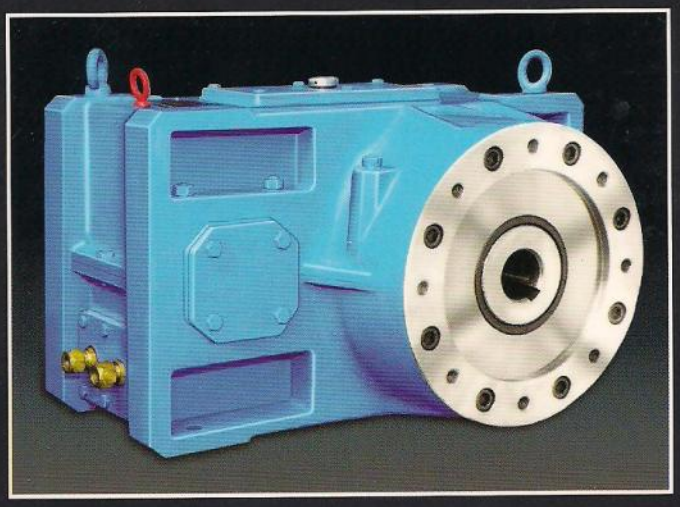
H2 Series Extruder Gear Boxes





CRESCENT

www.gearboxindia.com

CRESCENT

COMPANY PROFILE

Sokhi Heli-Wom Gears specializes in the design, Development, production and marketing of high quality Crescent industrial gears and power transmission products, to the highest specifications, with proven performance in diverse industries across the globe. An accent on quality combined with on going research and development has given us an international reputation for excellence. Consequently, we are today one of the fastest growing company in this industry. Despite this growth, we ensure that our customers receive due attention, with higher quality products and scheduled deliveries.

As a customer focus & technology driven organization offering quality products & services is our forte. By updating technology & infrastructure, we have continued to deliver high value products to our customers. Our gears & gear boxes are widely available under the brand name "CRESCENT". Maintaining the pace with time, we have carved a niche for ourselves within the industry globally.

DESIGN FEATURES

Crescent gear units are a completely new design, advantages are :

- More sizes with a reduced variety of parts.
- Higher operational reliability combined with increased power capacity.
- Predominantly non-contacting wear-resistant labyrinth seals are possible.
- Flanged output shafts to facilitate assembly of gear units in combined spaces (on request).

The basic gear unit can be optimally adapted to customer requirements by fitting different add-on pieces like motor bell housings, gear unit swing bases or backstops.

Crescent gear units have been designed according to a new unit construction principle. Through this, the variety of parts could be reduced. The parts are mainly on stock enabling the Crescent manufacturing plants nationwide deliver at short term.

HOUSINGS

The housings are of cast iron. If required, they may also be of steel. Housings are made in two part. The housing is rigid in design and due to its form has lesser noise and temperature characteristics

GEAR & PINION

The toothed components of the gear unit are case-hardened. The helical gear teeth are ground; depending on their size and transmission ratio. The high quality of the teeth leads to a. significant noise reduction and ensures safe and reliable running. The gear wheels are joined to the shafts by interference fits and parallel keys. These types of joints transmit the torques generated with adequate reliability.

LUBRICATION

Unless otherwise stated in the order documentation, the teeth and bearings are adequately splash-lubricated with oil by the gearwheels. This means that the gear units require very little maintenance.

In non-horizontal positions, with high bearing speeds or peripheral velocities on the teeth, the splash lubrication system may be replaced or supported by a pressure lubrication system.

The oil supply system is permanently attached to the gear unit and consists of a flange pump, a coarse filter, a pressure-monitoring device and pipework.

SHAFT SEAL

Depending on requirements seals are mounted at the shaft exits to prevent oil from leaking from the housing and dirt from entering it.

FAN

The fan is mounted on a high-speed shaft of the gear unit and is protected from accidental contact by a cowl. The fan sucks air through the grid on the cover and blows it along the air ducts on the side of the gear housing. It thereby dissipates a certain amount of heat from the housing.

COOLING

Depending on requirement, the gear unit is fitted with a fan, a cooling coil, a water or air oil-cooling system or a separate oil supply system.

PAINTING

Gear cast finish : Internal and external surfaces are painted with linear epoxy primer. External surfaces are finished with alkyd semigloss blue paint. These paints are resistant to dilute acids and alkalis, oil and solvents, sea water and temperatures up to 140 degree centigrade.

DIRECTION OF ROTATION

The unit may be operated in either direction of rotation as per requirement.

EFFICIENCY

Efficiency of various geaboxes is :
Single stage 99%
Double 98%
Triple stage 97.5%
Quadruple stage 97%

CERTIFICATION

ISO 9001 : 2000

QUALITY CONTROL

All the components of gearboxes undergo a very strict quality control check at different stages of production. Finish product are finally tested to ensure that no scope is left for complaints about noise, oil leakage temperature etc.

SELECTION PROCEDURES & EXAMPLE

SELECTION PROCEDURE

Crescent H2 series extruder gearbox size is to be determined against rated output torque capacity in consideration with necessary service factor.

1. Selection of Reducer

- Required gearbox ratio — Input Speed/Output Speed.
- Select the nearest nominal ratio and corresponding actual ratio from available chart.
- Determine the required torque at output based on consumed load (*) and output rpm.

Required Torque = (9550 X Actual reducer power X Service Factor)/Output speed.

The service factor is to be recommended between 1.5 to 2.0 depending upon the operating duration and loading characteristics. From the mechanical torque-rating table select a suitable size wherein the rated output torque meets to exceeds the required torque under point 1.4 with predetermined ratio.

2. Check for Thermal Rating

- Thermal ratings are listed for following cases-
  A) Gearbox without additional cooling.
  b) Gearbox fitted with cooling water coil.
- Determine the thermal service factor from table.
- Calculate the required thermal power capacity on the basis of absorbed power (*) and thermal service factor correspondence to specified ambient temperature and running hours.
  Required thermal power (kW) = Absorbed power (kW) / thermal service factor.
- Check the type of cooling (with or without cooling coil) by referring to thermal capacity of gearbox taking from table.

Note:- (*) - (In absence of consumed load, take motor power)

RATED EXAMPLE

Driving machine : Three phase A. C. motor.
Motor power = 25 h.p. = 18.650 kW.
Motor speed = n, = 1440 rpm.
Ratio =15:1
Diameter of Motor pulley = 6 inch.
Diameter of gearbox pulley = 16 inch.
Ambient temperature = 30°C.
Service = 1.5

SELECTION

1. Selection of Reducer

- The input speed is given to gearbox from motor through belt and pulley.
  Hence Input Speed at gearbox $= \frac{1440X6}{16}$
  $= 540$ rpm
- Output Speed at gearbox $= 540/15$
  $= 36$ rpm.
- Select the nominal ratio from Table-1.2 as 15.40
- Required output Torque of the gear box :
  $T_{rnqu} = 9550 \text{ X } 18.650 \text{ X } 1.5/36$
  $= 7421.145$ Nm
  $= 7.421$ kNm

From the torque table-1.1 may be found the design H2-1 80 with maximum torque 7.610 KNm at 15.40 ratio.

2. Check for Thermal Rating

- Let's assume that the gearbox is fitted with cooling coil.
- Taking the thermal service factor at 30°C at 100% running time as 0.9.
- The required thermal power capacity :
  Required thermal power (kW) = 18.650/0.9 = 20.72 kW
- From the thermal power table - 2.2 (with cooling coil).
  Maximum thermal power = 135kW
  I.e., Maximum thermal power > Required thermal power.

Where
T_{requ} = Required output torque of gearbox in kNm.
N_1 = Speed of the motor in rpm.

3. Check For thrust Bearing

- The screw diameter, working pressure, screw rpm and thrust bearing life expectancy are to be specified by the extruder manufacturers.
- Calculate the thrust pressure (Fa) of the extruder screw from the following relationship.

$$Fa = \pi \frac{Ds^2}{4X10000} Pa$$

Calculate the thrust bearing capacity (Ca) on the following basis.

$$Ca = Fd \times Fa \times \left(\frac{Lnh \times 60 \times Xns}{10^6}\right)^{\frac{3}{10}}$$

- Check the basic dynamic load rating (C) from thrust bearing table-3.1. The calculated capacity (Ca) must be equal to less than the catalogue rating (C).

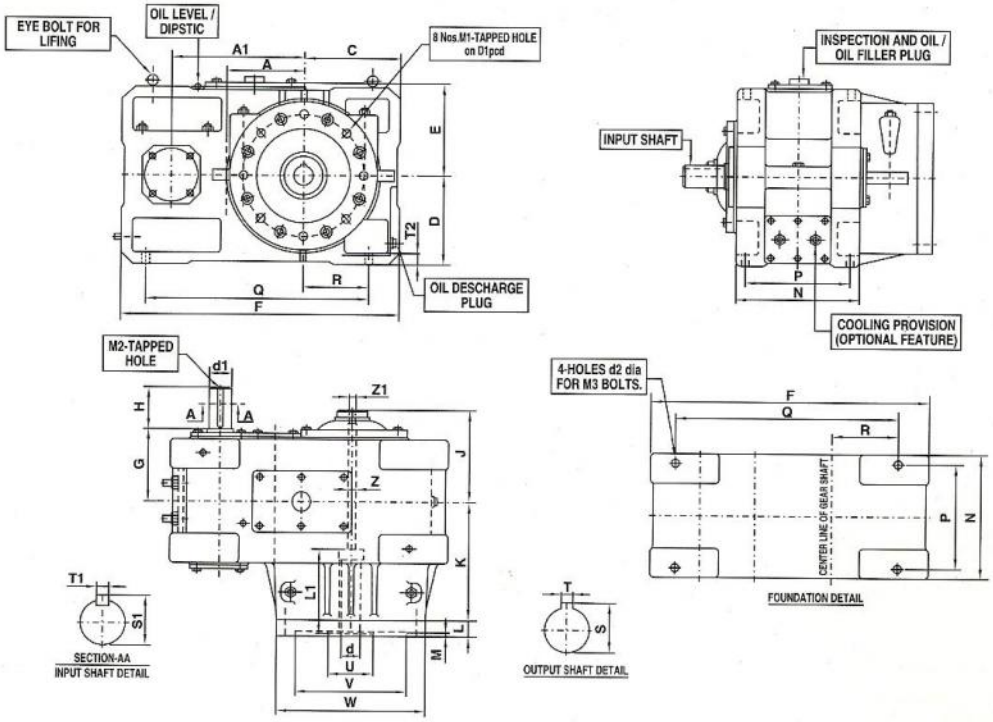
Example

Screwdiameter = Ds = 80mm.
Working pressure = Pa = 500 bar.
Speed of the extruder screw = Ns = 100 rpm.
Thrust bearing life duration = Lnh = 20,000 hrs.

Selection

- Thrust Pressure = $Fa = \pi \frac{80^2}{4X10000} 500 = 251$ kN
- Thrust bearing capacity = $Ca = 1.06 \times 251 \times \left(20000 \times 60 \times \frac{100}{1000000}\right)^{\frac{3}{10}} = 1119$ kN.
- Taking the value of basic dynamic load rating (C) from the table-3.1 (H_2-180 Size)
  C = 1170 kN i.e. C > Ca.
  Hence the selection of bearing is safe. Where
  N_s = Speed of extruder screw in rpm.
  Fd = Factor of sense of rotation (max = 1.06)
  Ds = Extruder screw diameter in mm.
  Pa = Working pressure in bar.
  Fa = Thrust pressure from extruder screw in kN.
  Lnh = Bearing life duration in hours.
  Ca = Required thrust bearing capacity in kN.
  C = Basic dynamic load rating according to the table in kN.

H 2 SERIES HELICAL EXTRUDER GEAR BOX



SIZE	A	A1	C	D	D1	d	d1	d2	E	F	G	H	J	K	L	L1	M	M1
H2-110 EXT	110	190	145	125	160	30.041 30.020	28.015 28.002	14	140	415	112	50	136	160	26	90	7	M12
H2-125 EXT	125	225	160	140	185	40.050 40.025	28.015 28.002	14	154	475	125	60	147	185	30	120	10	M12
H2-140 EXT	140	240	175	160	220	45.050 45.025	32.018 32.002	14	174	515	140	80	145	220	30	135	10	M16
H2-160 EXT	160	272	200	180	280	60.060 60.030	35.018 35.002	18	194	575	160	80	182	240	35	160	10	M16
H2-180 EXT	180	305	210	200	320	75.060 75.030	38.018 38.002	18	214	630	175	80	218	273	40	200	10	M16
H2-200 EXT	200	340	230	225	330	80.060 80.030	38.018 38.002	22	239	690	185	80	221	300	40	225	10	M16
H2-225 EXT	225	385	250	250	370	90.036 90.071	45.018 45.002	22	267	770	205	110	264	335	45	240	10	M20
H2-250 EXT	250	430	285	280	410	100.071 100.036	55.030 55.011	26	298	860	220	110	280	375	45	260	10	M20
H2-280 EXT	280	480	315	315	460	105.071 105.036	65.030 65.011	26	327	950	240	140	300	400	50	280	10	M20
H2-315 EXT	315	540	365	355	540	110.071 110.036	75.030 75.011	33	370	1090	260	140	315	410	50	300	10	M20

SIZE	M2	M3	N	P	Q	R	S	S1	T	T1	T2	U	V	W	Z	Z1
H2-110 EXT	M6	M12	180	144	322	95	33.050 33.020	31.000 30.080	8.018 7.962	8.000 7.964	20	60	130.030 130.000	190	16	M12
H2-125 EXT	M6	M12	200	160	365	105	43.050 43.030	31.000 30.080	12.022 11.978	8.000 7.964	20	70	150.040 150.000	220	20	M16
H2-140 EXT	M8	M12	224	190	415	120	49.000 48.080	35.000 34.080	14.022 13.978	10.000 9.964	20	80	170.040 170.000	270	25	M20
H2-160 EXT	M8	M16	260	225	460	145	64.060 64.040	38.000 37.080	18.022 17.978	10.000 9.964	20	110	230.048 230.000	330	34	M30
H2-180 EXT	M16	M16	290	250	505	147.5	80.010 79.090	41.000 40.080	20.026 19.974	10.000 9.964	25	130	270.052 270.000	370	34	M30
H2-200 EXT	M16	M20	310	265	560	165	85.060 85.040	41.000 40.080	22.026 21.974	10.000 9.964	25	140	280.052 280.000	380	45	M36
H2-225 EXT	M16	M20	340	280	630	185	95.040 48.050	48.050 48.030	25.026 24.974	14.000 13,957	30	160	320.057 320.000	420	45	M36
H2-250 EXT	M24	M24	370	300	710	210	106.060 106.040	59.000 58.080	28.026 27.974	16.000 15.957	30	180	360.057 360.000	460	45	M36
H2-280 EXT	M24	M24	410	335	800	240	111.060 111.040	69.000 68.080	28.026 27.974	18.000 17.948	35	200	410.063 410.000	510	50	M40
H2-315 EXT	M24	M30	450	375	900	270	116.060 116.040	79.053 79.023	28.026 27.974	20.000 19.948	40	240	490.063 490.000	590	50	M40

NOTE : ALL DIMENSION ARE IN MM OTHERWISE SPECIFIED.

RATIO OUTPUT TORQUE (kNm)

TABLE 1.1

NOMINAL RATIO	UNIT SIZE									
	110	125	140	160	180	200	225	250	280	315
5.60	1.56	2.90	2.93	4.41	5.50	7.58	11.04	13.65	24.12	32.25
6.20	1.71	3.03	3.02	4.62	5.84	7.83	11.17	16.57	24.39	32.44
6.86	1.90	3.02	3.34	5.10	6.45	8.63	11.90	17.44	25.81	34.23
7.59	2.09	3.03	3.68	5.20	6.90	9.12	11.96	18.38	26. 00	35.21
8.40	1.88	3.05	3.54	5.21	6.99	9.44	13.18	17.77	26.57	33.18
9.30	2.09	3.04	3.67	5.39	7.01	9.60	13.41	19.16	27.16	35.65
10.30	2.05	3.05	3.53	5.44	7.39	9.88	13.87	19.17	25.77	34.60
11.40	2.11	3.05	3.66	5.30	7.58	9.91	13.53	20.26	29.52	37.55
12.60	2.05	2.42	3.49	5.17	7.40	9.87	13.72	21.19	29.45	37.56
14.00	2.11	3.06	3.59	4.69	7.48	10.00	14.28	21.69	28.74	39.54
15.40	2.11	3.07	3.44	5.03	7.61	8.96	12.17	18.98	25.98	38.53
17.10	2.06	2.43	3.50	5.17	7.42	9.94	13.50	21.06	28.96	43.01
18.90	2.07	2.43	3.45	5.15	7.39	8.54	12.75	17.92	26.22	37.28
20.90	1.38	2.25	3.30	5.29	7.18	8.67	12.18	17.48	24.74	33.65
23.20	1.38	2.25	3.29	4.87	7.19	8.81	11.84	17.06	25.09	34.68
25.60	1.65	2.53	2.83	4.24	6.05	7.99	11.36	15.55	21.51	30.15

EXACT RATIO

TABLE 1.2

NOMINAL RATIO	UNIT SIZE									
	110	125	140	160	180	200	225	250	280	315
5.60	5.689	5.562	5.636	5.648	5.657	5.625	5.670	5.599	5.625	5.648
6.20	6.249	6.281	6.078	6.240	6.214	6.250	6.300	6.245	6.250	6.300
6.86	6.943	6.758	6.814	6.895	6.875	6.905	6.848	6.978	6.875	7.000
7.59	7.667	7.528	7.590	7.693	7.663	7.595	7.565	7.585	7.595	7.609
8.40	8.500	8.611	8.333	8.362	8.427	8.472	8.500	8.680	8.333	8.546
9.30	9.444	9.265	9.342	9.449	9.323	9.319	9.390	9.435	9.206	9.289
10.30	10.389	10.262	10.348	10.489	10.370	10.450	10.434	10.151	10.357	10.272
11.40	11.479	11.272	11.366	11.522	11.474	11.269	11.522	11.711	11.296	11.530
12.60	12.511	12.647	12.505	12.802	12.600	12.664	12.750	12.958	12.667	12.812
14.00	14.081	14.018	14.135	14.167	13.941	14.200	14.167	13.941	14.250	14.167
15.40	15.678	15.160	15.287	15.441	15.260	15.462	15.512	15.500	15.167	15.261
17.10	17.088	17.010	16.818	17.197	17.121	17.337	17.236	16.676	17.062	16.875
18.90	18.638	18.918	18.706	19.003	18.529	19.211	19.111	18.918	18.984	18.958
20.90	20.595	20.475	20.759	20.759	20.250	20.759	20.531	20.912	20.759	20.759
23.20	23.018	23.000	23.319	23.066	22.781	23.003	22.765	23.724	23.098	23.312
25.60	25.757	25.875	25.840	25.757	25.845	25.594	25.575	25.845	25.594	25.575

THERMAL CAPACITIES (kW)
UNITS WITHOUT AUXILARY COOLING

TABLE 2.1

NOMINAL RATIO	UNIT SIZE										
		110	125	140	160	180	200	225	250	280	315
5.60 To 11.4	1500	18	21	29	36	46	82	102	125	160	220
	1000	17	20	27	34	44	82	100	121	156	220
	750	16	19	27	33	43	76	96	115	150	203
12.6 To 25.6	1500	17	20	28	34	44	77	97	120	156	196
	1000	16	19	27	32	42	81	97	115	151	193
	750	15	18	26	31	41	76	82	111	148	185

UNITS WITH AUXILIARY COOLING

TABLE 2.2

NOMINAL RATIO	INPUT SPEED RPM	UNIT SIZE									
		110	125	140	160	180	200	225	250	280	315
5.60 TO 11.4	1500	88	92	130	139	157	170	192	435	490	1040
	1000	87	90	129	139	155	168	188	403	447	940
	750	86	90	127	136	152	165	185	385	422	877
12.6 TO 25.6	1500	81	83	116	123	140	150	177	323	358	701
	1000	80	82	116	122	138	147	174	325	353	647
	750	79	82	113	120	135	145	170	326	354	627

THERMAL SERVICE FACTOR

TABLE 2.3

(Relative to ambient temperature and duration of operation)

Type of cooling	Ambient temperature °C	Running Time in any hour				
		100%	80%	60%	40%	20%
Gearboxes without additional cooling	10	1.12	1.34	1.57	1.79	2.05
	20	1.00	1.20	1.40	1.60	1.80
	30	0.88	1.06	1.23	1.41	1.58
	40	0.75	0.90	1.05	1.20	1.35
	50	0.63	0.76	0.88	1.01	1.13

Type of cooling	Ambient temperature °C	Running Time in any hour				
		100%	80%	60%	40%	20%
Gearboxes with additional cooling	10	1.10	1.32	1.54	1.76	1.98
	20	1.00	1.20	1.40	1.60	1.80
	30	0.90	1.08	1.26	1.44	1.62
	40	0.85	1.02	1.19	1.36	1.53
	50	0.80	0.96	1.12	1.29	1.44

TABLE 3.1

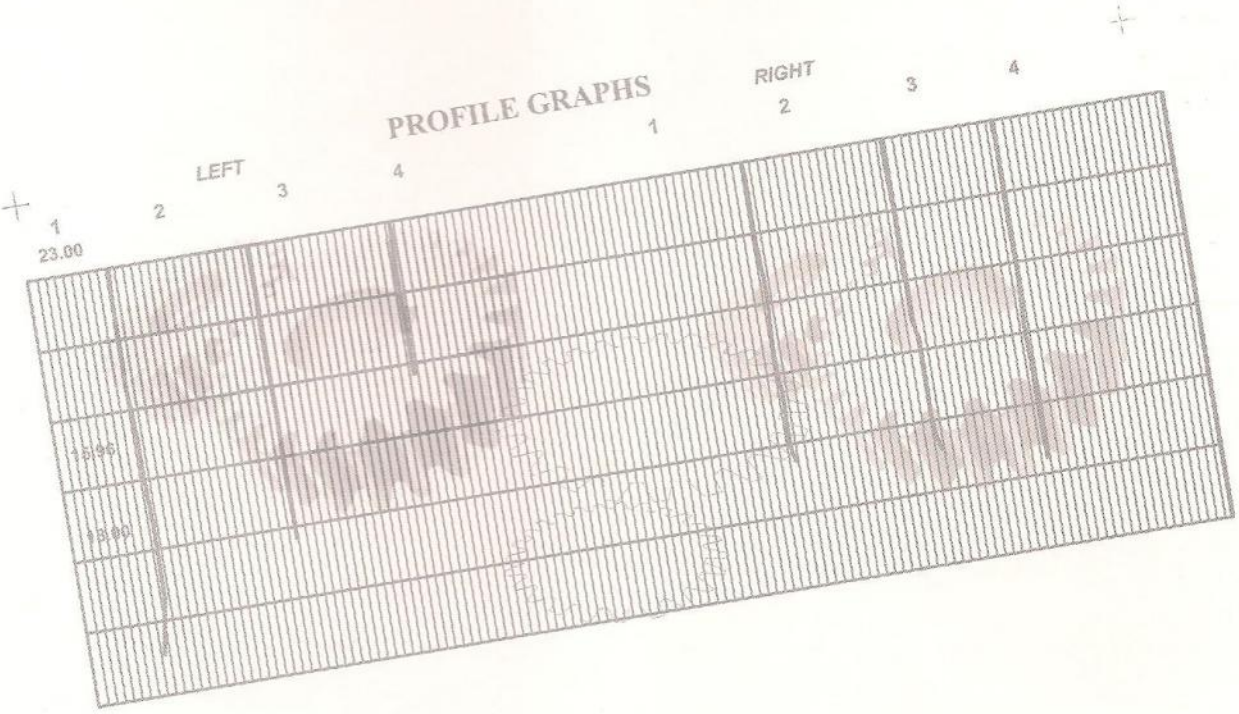
THRUST BEARING DATA				
GEARBOX SIZE	SPHERICAL ROLLER THRUST BEARING (STANDARD SIZE)	BASIC DYNAMIC LOAD RATING C (KN)	OUTPUT SHAFT	
			MAX. POSSIBLE BORE DID HAVING STD. KEYWAY (MM)	STANDARD BORE LENGTH (MM)
H2- 110	2229412	345	30	90
H2 -125	2229414	449	40	120
H2- 140	2229416	575	45	135
H2- 160	2229422	1010	60	160
H2- 180	2229426	1380	75	200
H2 - 200	2229428	1400	80	225
H2 - 225	2229432	1790	90	240
H2 - 250	2229436	2250	100	260
H2 - 280	2229440	2760	105	280
H2 - 315	2229448	2990	110	300

TABLE 3.2

APPROXIMATE WEIGHT AND OIL CAPACITY			
SIZE	NET WEIGHT (KGS)	CROSS WEIGHT (KGS)	OIL QUANTITY (ITS)
H2 - 110	130	140	6
H2 - 125	180	200	7
H2 - 140	250	275	8
H2 - 160	300	330	12
H2 - 180	345	380	16
H2 - 200	395	435	22
H2 - 225	520	570	30
H2 - 250	660	720	38
H2 - 280	725	780	48
H2 - 315	800	860	65

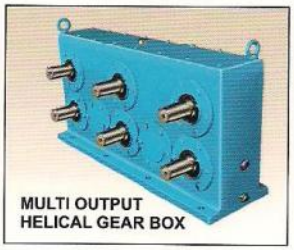
TABLE 3.3

RECOMMENDED LUBRICANT ISO Vg320	
Brand	Grade
Balmer Lawrie	Protomac Sp 320
Bharat Petroleum	Cabol 320 or Amoicam 320
Castrol	Alpha Zn 320
Gulf	Harmony 320
Hindustan Petrolium	Enklo 320
Indian Oil	Servomesh Sp 320
Veedol	Avalon 320



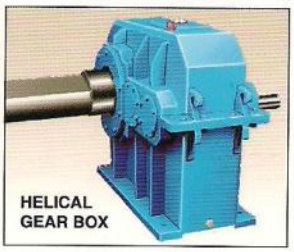

HELICAL GEAR BOX

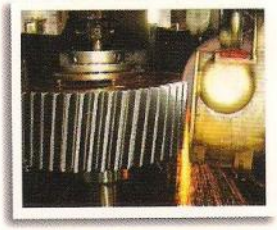

U-TYPE WORM REDUCTION GEAR BOX

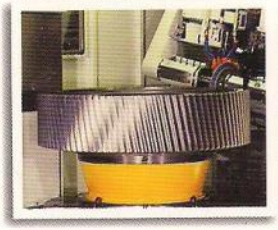

MULTI OUTPUT HELICAL GEAR BOX

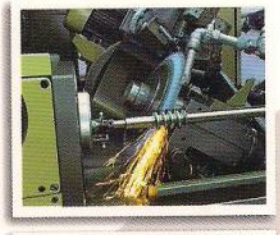

REDUCTION GEAR BOX

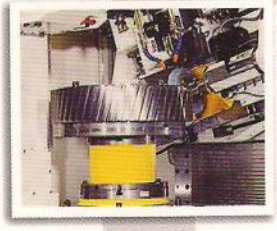

GEAR MOTOR

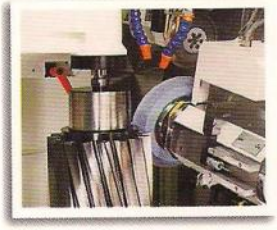

HELICAL GEAR BOX











SOKHI HELI-WOM GEARS PVT. LTD.

61/22-25, SITE-IV, INDUSTRIAL AREA
SAHIBABAD, GHAZIABAD-201010 (U.P)
TEL. : 0120-4344400-09, 2895966, 2896006, 2896214
FAX : 0120-2895967, 4168468
E-mail - sokhi@gearboxindia.com sokhi@del2.vsnl.net.in

Designed and Printed by gdc1598@rediffmail.com