DYNAMIC DIFFERENTIAL

The Adjustable-While-Running Precision Timing Mechanism

CANDY CONTROLS
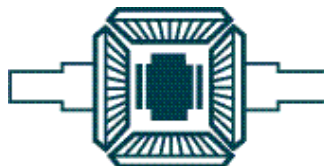
– **Manual or motorized controlled correction for shaft positioning.**

– **Infinitely adjustable even while running for registration control.**

– **Low backlash and transmission error for speed trimming and timing.**

FEATURES

- **Pin-Point accuracy**
- **Advance or retard timing**
- **Adjustable while running**
- **Infinitely adjustable**
- **Manual or motor control**
- **Most compact design**
- **Ball bearing construction**
- **Precision hardened gears**
- **Oil bath lubrication**
- **1:1 Ratio**
- **Counter rotation**
- **Input-either shaft**
- **Positive drive-can't slip**
- **Dependable, rugged design**

Control Knob

Spider Gear

Input Shaft

Output Shaft

Worm Gear
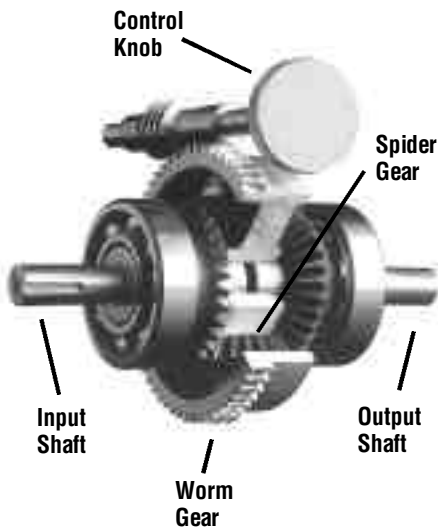
DESCRIPTION

Principle of Operation

Power transfer through the Dynamic Differential begins at the input shaft, transfers at right angles through the spider gears, and then back to the output shaft to provide a 1:1 ratio, reverse rotation drive. To change timing or angular position between the input and output shafts, the spider gears are rotatable about the main shaft centerline. Adjusting the worm rotates the worm gear, which changes the position of the spider gears in relation to the pinion gears. Suppose that the input shaft is stationary. If the spider gears are repositioned by means of the adjusting worm, the movement of the spiders causes a related change in position of the output shaft. Since this control action is independent of the drive function, this shaft adjustment can be made while the drive is in motion to provide precise, while running, timing control.

Applications

The Dynamic Differential is a precision timing mechanism used to advance or retard timing of mechanical actions. Installed in the drive train to the component to be controlled, these timing differentials may be manually or motor adjusted while running or stopped. The input and output shafts rotate in a 1:1 ratio, counter-rotating relationship. Either shaft may be used as the input. When the control knob is adjusted the output shaft advances or retards its angular position relative to the input shaft. Correction is unlimited in either direction.

Shaft Positioning

Because the Dynamic Differential is both a positive drive and adjustable while running it is an excellent solution to problems involving timing relationships of machine components. If, for example, a cut-off knife or a feeder mechanism is operating a little too late, you simply turn the control knob, even while running, to establish the exact timing required for optimum performance.

Registration

When there is variable or cumulative timing error in a machine process a motor controlled differential is used to automatically compensate for those errors. If a packaging machine is wrapping candy bars using a web of pre-printed plastic film there will be a cumulative error in the process because of stretch or shrink of the film causing misalignment between the candy bar and the wrapper. The solution lies in a registration system using an electric eye and a controller to operate the differential. Please consult factory for full details on complete systems.

Speed Trimming

The Dynamic Differential can also be used to modify speed. By the use of a customer supplied motor to drive the control shaft the Dynamic Differential may be used to add or subtract a few RPM to a given input RPM. This speed trimming can be at a fixed speed, variable speed or intermittent. Please consult factory for details.

Options: Control Shaft and Control Motor.
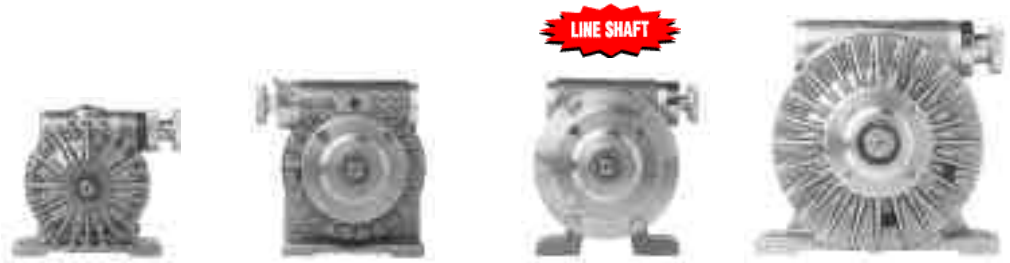
TYPICAL APPLICATIONS
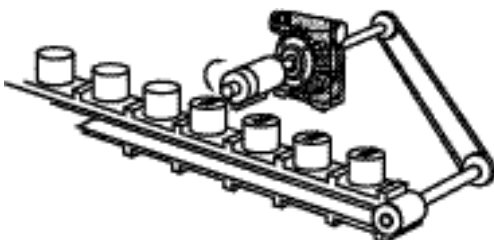
**Advance or retard timing of one machine component in relation to another.**
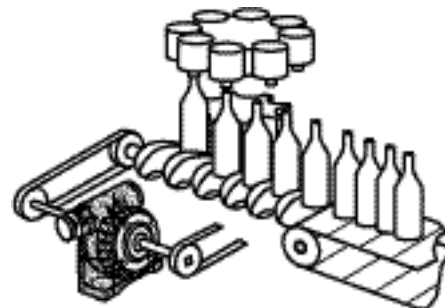
Position food, beverage and pharmaceutical containers for forming filling and sealing applications.

TECHNICAL DATA

| Technical Data	DD-1A	DD-5A	DD-5ALS	DD15A
HP Rating	1 @ 1,800 rpm	5 @ 1,200 rpm	5 @ 1,200 rpm	15 @ 1,800 rpm
Torque (Inch lbs.) @ 1750 rpm	36	225	225	600
Torque (Inch lbs.) @ 375 rpm	45	300	300	800
Torque (Inch lbs.) @ 100 rpm	50	350	350	1,000
Maximum Static Torque (Inch lbs.)	65	500	500	1,500
Maximum Overhung Load (lbs.)	75	225	225	575
Degrees of Rotation (1-turn of Control Knob)	14.4	12	12	9
360 Degree Rotation (Control Knob Rotation)	25	30	30	40
Net Weight (lbs.)	11	24	32	82

DD5ALS is a Line Shaft unit with input and output shafts rotating in the same direction.
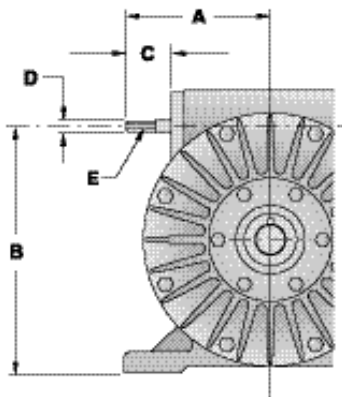
Control Shaft in Place of The Knob

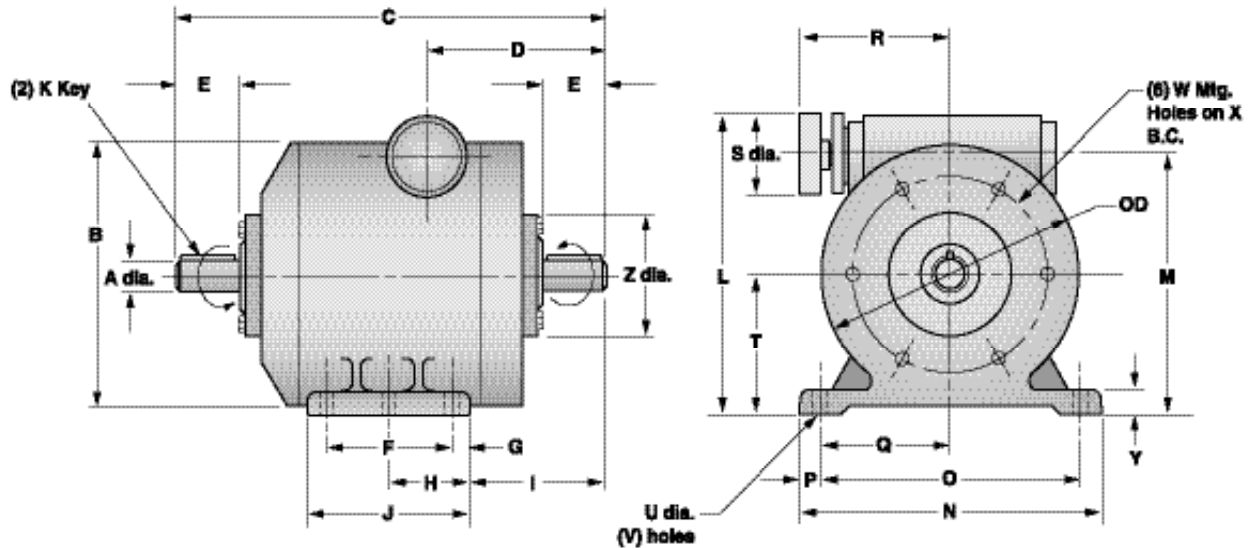| Model	DD1A	DD5A	DD5ALS	DD15A
A	3.03	4.75	4.75	5.95
B	4.38	7.25	7.25	10.00
C	.938	1.44	1.44	1.50
D	.312	.374	.374	.498
E (Optional Key)	3/32 x 3/32 x 3/4	1/8 x 1/8 x 3/4	1/8 x 1/8 x 3/4	1/8 x 1/8 x 1-1/4

All units in inches
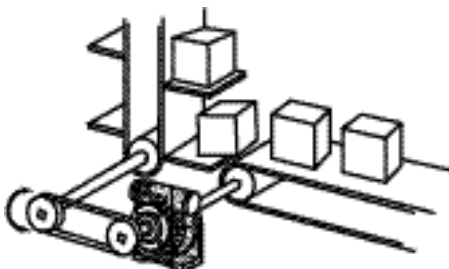
Synchronize the timing of machine components driven from a common line shaft.
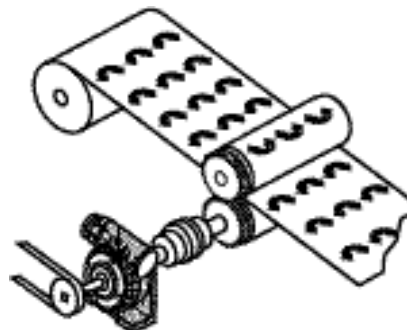
Register printing, perforating and die cutting cylinders with open or closed loop control systems.

Candy Manufacturing Co. • 5633 W. Howard St. • Niles, IL 60714 • 847-588-2639 • www.candycontrols.com

SPECIFICATIONS

Model	DD1A	DD5A	DD5ALS	DD15A
A	1/2	3/4	3/4	1-1/4
B	4-7/16	7	7	10-1/8
C	6	8-3/4	11-7/8	16-3/4
D	2-19/32	3-3/4	3-3/4	7
E	1	1-1/2	1-1/2	2-5/8
F	0	0	3-1/8	4-1/2
G	1-1/8	2	5/8	3/4
H	1-1/8	2	2-3/16	3
I	1-7/8	3-1/8	3-5/8	5-3/8
J	2-1/4	3-3/8	4-3/8	6
K	1/8 sq.	3/16 sq.	3/16 sq.	1/4 sq.
L	5-1/8	8-7/16	8-7/16	11-3/8
M	4-3/8	7-1/4	7-1/4	10
N	5-1/4	6-7/8	6-7/8	11-7/8

Model	DD1A	DD5A	DD5ALS	DD15A
O	4-1/2	5-3/8	5-9/16	10-1/4
P	3/8	3/4	21/32	13/16
Q	2-1/4	2-11/16	2-25/32	5-1/8
R	3-3/8	4-15/16	4-15/16	6-1/4
S	1-1/2	2	2	2-3/4
T	2-1/2	4-1/4	4-1/4	5-3/8
U	11/32	7/16	7/16	9/16
V	2	2	4	4
W	10-24	5/16-18		
X	2-3/4	6-1/8		
Y	1/2	13/16	5/8	7/8
Z	1-7/8	5-1/8		
O.D.	4-1/2	7-1/8	7-1/8	10-1/8

Optional Control Motors

Model	Rate of Correction for Output Shaft (Degrees per minute)						Unit Height (inches)
DD1A	**51.8**	103.6	207.24	414.4			7-9/16
DD5A	16	40	70	140	200	250	13-1/8
DD5A-LS	16	**40**	70	140	200	250	13-1/8
DD15A	12	20	30	**50**	75	90	19-1/2

Slo-Syn® motor control. Stepping/Synchronous motor. 120 VAC, 60HZ, reversible, continuous duty, constant speed.

All dimensions and specifications are subject to change without notice. Consult the factory for speeds over 1,750 RPM.