

1.1 INTRODUCTION

The INDEX DRIVES, RIGHT ANGLE INDEXING TABLES, OSCILLATING DRIVES and MANIPULATORS manufactured by COLOMBO FILIPPETTI are mechanisms which transform the constant speed rotary motion of the input shaft into intermittent one-way or oscillating movement of the output shaft by way of a cam drive with conjugate profiles and roller feelers. The features which make these mechanisms a high quality product are their simple structure, direct motion transmission, principles of motion with mathematically calculated acceleration tested in numerous applications, the use of modern design and manufacturing technologies, precise, ongoing checks of the parts during the production cycle, and long experience in the calculation, manufacture and application possibilities of cams. The following characteristics:

- Precise, repeatable index motion
- Self locking in dwell and zero backlash
- Smooth and shock-free movement
- High load capacity
- Regular operation at low, medium and high speeds
- Easy, versatile assembly
- Low level of maintenance
- Low running costs (low level of energy input)
- Extensive range of models

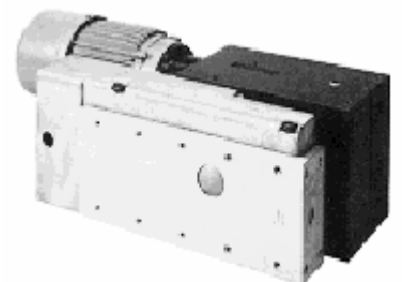
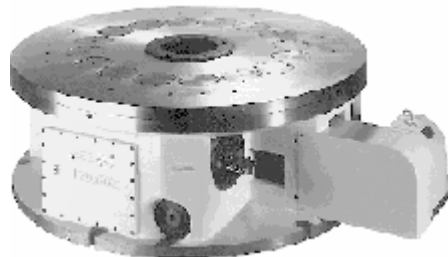
are such as to meet the requirements involved in any type of application.

1.2 - CAM MECHANISMS

The high speeds and productivity rates required by every type of industry nowadays mean that components of intermittent one-way or oscillating motion machinery must be driven at gentle, continuous, absolutely precise acceleration and speed. The systems producing this type of motion must therefore guarantee control of the movement throughout the TRANSFER-PAUSE cycle. Cam mechanisms allow accurate design of motion characteristics and fully meet the above requirements. The production of intermittent motion by systems other than cam systems involves one or more of the following disadvantages:

- Uncontrolled acceleration
- Dynamic shocks
- High level of maintenance
- Unknown time/transfer ratios
- High running costs

Even the Geneva mechanism has some of these limitations, and their use is consequently inadvisable today.



1.3 - DESIGN PRINCIPLES OF CAM MECHANISMS



The major feature of the cam drives manufactured by COLOMBO FILIPPETTI consists in the transformation of constant oneway rotary motion from intermittent to simple, direct motion by the use of ground, hardened, conjugate profile steel cams on which at least two cam followers, pre-loaded on assembly, roll simultaneously in opposite directions.

This system, which keeps the cams in constant contact with the cam followers, ensures zero backlash throughout the motion-dwell periods cycle, reduces wear as it uses a roller contact, eliminates dynamic shocks and noise due to the absence of backlash, and effects a positive, constant control of the movement by implementing the principles of acceleration and speed, calculated at the design stage, thereby ensuring that the output rotation (of the follower) is exactly proportional to the input rotation (of the cam)

1.4 - BASIC MOTION LAW

On the basis of extensive experience in the application of cam drives to automatic machinery and the effect of the speed, and especially of the acceleration, of the intermittent motion parts on the operation of the same, COLOMBO FILIPPETTI has introduced and standardised motion law for its drives which present the very best kinematic and dynamic properties. This standardisation guarantees high quality and allows a rapid direct comparison to be made between different types, sizes and varieties of drive.

The standardised motion law, which are named after form of the acceleration curve, are as follows:

- **SINE CURVE**

This is the curve generally known as the cycloidal curve. It presents the highest peak acceleration value of all the standardised curves, but has the gentlest passage between zero and peak acceleration values.

- **MODIFIED SINE CURVE**

This curve is obtained from a combination of the Sine Motion Acc. and Cosine Motion Acc. curves. It presents the gentlest passage between peak acceleration and peak deceleration of all the standardised curves.

- **MODIFIED TRAPEZOID CURVE**

This curve is obtained from a combination of the Sine Motion Acc. and Constant Acc. curves. Its main feature is that it has the lowest peak acceleration of all the standardised curves.

- **MODIFIED SINE CURVE WITH CONSTANT VELOCITY**

This curve is a further development of the modified Sine Motion curve. The addition of a constant speed, zero acceleration stretch at the mid-point of the acceleration curve reduces the maximum speed and makes it suitable for long-stroke applications.

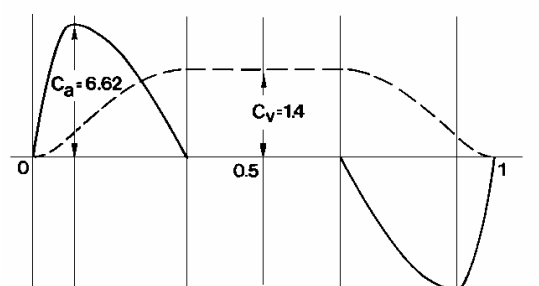
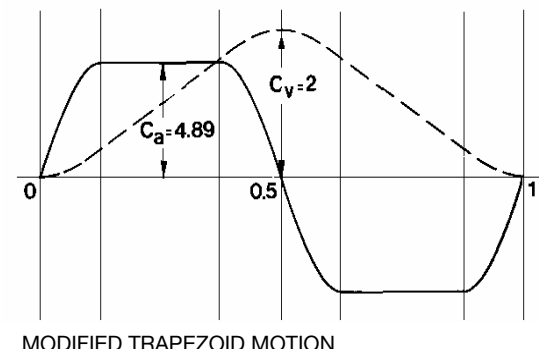
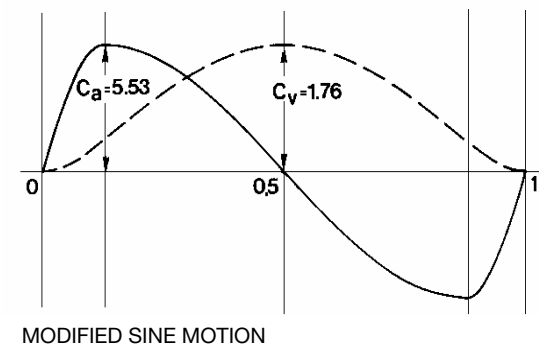
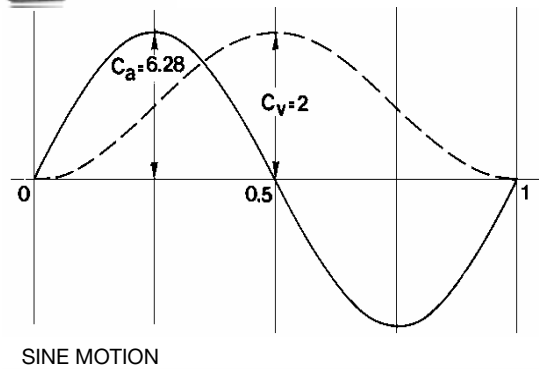


Fig.1 Standardised curve, velocity and acceleration diagrams.