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Motion laws

Motion laws

General information

The ctrlX Cam Designer supports 36 different motion laws to define the motion between the starting and end point of a motion step. Free curve tables can also be imported for defining motions.

Further information on motion laws is given in the FlexProfile documentation.

The different motion laws provide different degrees of freedom in terms of limit values and are subdivided into categories:

Boundary conditions of the FlexProfile motion law

Boundary conditions of the FlexProfile motion law

	Definition of the motion law at the input "MotionLaw" (ProfileStepAdr)		Traversing range			Boundary values left			Boundary value right			Max (not taken into consideration everywhere)		
			Distance	Section	StVel	StAcc	StJerk	EndVel	EndAcc	EndJerk	MaxVel	MaxAcc	Ma	
Rest-in-rest														
Standstill	REST_IN_REST_LINEAR	2048	0	*	0	0	0	0	0	0	=	=	=	
Sine curve	REST_IN_REST_SINE	2560	*	*	0	0	=	0	0	=	=	=	=	
Inclined sine line	REST_IN_REST_INCLINEDSINE	0	*	*	0	0	=	0	0	=	=	=	=	
Acceleration- optimized inclined sine line	REST_IN_REST_SINEACC	3072	*	*	0	0	=	0	0	=	=	=	=	
Torque- optimized inclined sine curve	REST_IN_REST_SINETORQUE	3328	*	*	0	0	=	0	0	=	=	=	=	
Gutman sinusoid	REST_IN_REST_GUTMANSINE	2816	*	*	0	0	=	0	0	=	=	=	=	
Modified sinusoid	REST_IN_REST_MOD_SINE	3840	*	*	0	0	=	0	0	=	=	=	=	
Modified acceleration trapezoid	REST_IN_REST_MOD_TRAPEZE	3584	*	*	0	0	=	0	0	=	=	=	=	
Polynomial 5th order	REST_IN_REST_POLY5	256	*	*	0	=	=	0	=	=	=	=	=	
Polynomial 7th order	REST_IN_REST_POLY7	2304	*	*	0	0	=	0	0	=	=	=	=	
Polynomial 8th order	REST_IN_REST_POLY8	5120	*	*	0	0	0	0	0	0	=	=	=	
Square parabola	REST_IN_REST_PARABOLA	4864	*	*	0	0	0	0	0	0	=	=	=	

Rest-in-velocity

Polynomial 5th order	REST_IN_VELOCITY_POLY5	512	*	*	0	0	=	*	0	=	=	=	=
-------------------------	------------------------	-----	---	---	---	---	---	---	---	---	---	---	---

Polynomial 7th order	REST_IN_VELOCITY_POLY7	768	*	*	0	0	0	*	0	0	=	=	=
-------------------------	------------------------	-----	---	---	---	---	---	---	---	---	---	---	---

Velocity-in-velocity

Constant velocity	CONSTANT_VELOCITY	1536	*	*	=	0	0	=	0	0	=	=	=
----------------------	-------------------	------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 5th order	VELOCITY_IN_VELOCITY_POLY5	1792	*	*	*	0	=	*	0	=	=	=	=
-------------------------	----------------------------	------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 7th order	VELOCITY_IN_VELOCITY_POLY7	4096	*	*	*	0	0	*	0	0	=	=	=
-------------------------	----------------------------	------	---	---	---	---	---	---	---	---	---	---	---

Modified sinusoid	VELOCITY_IN_VELOCITY_MOD_SINE	4352	*	*	*	0	=	*	0	=	=	=	=
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Velocity-in-rest

Polynomial 5th order	VELOCITY_IN_REST_POLY5	1024	*	*	*	0	=	0	0	=	=	=	=
-------------------------	------------------------	------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 7th order	VELOCITY_IN_REST_POLY7	1280	*	*	*	0	0	0	0	0	=	=	=
-------------------------	------------------------	------	---	---	---	---	---	---	---	---	---	---	---

General motion

Polynomial 2nd order	COMMON_POLY2	16896	*	*	*	=	=	=	=	=	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 3rd order	COMMON_POLY3	17152	*	*	*	=	=	*	=	=	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 4th order	COMMON_POLY4	17408	*	*	*	=	=	*	=	=	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 5th order	COMMON_POLY5	16384	*	*	*	*	=	*	*	=	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 7th order	COMMON_POLY7	16640	*	*	*	*	*	*	*	*	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Polynomial 8th order	COMMON_POLY8	17664	*	*	*	*	*	*	*	*	=	=	=
-------------------------	--------------	-------	---	---	---	---	---	---	---	---	---	---	---

Extended motion

- Resulting distance

Velocity 2nd Order (start accel. zero)	X_VEL_STARTACC	33280	=	*	*	0	=	*	=	=	=	=	=
Velocity 2. Order (end accel. zero)	X_VEL_ENDACC	33280	=	*	*	=	=	*	0	=	=	=	=
Linear velocity	X_LINEAR_VEL	33024	=	*	*	=	=	*	=	=	=	=	=
Linear acceleration	X_LINEAR_ACC	32768	=	*	*	*	=	=	*	=	=	=	=

- Resulting master axis range

Acc.-limited motion (trapezoidal profile)	X_FIT_VEL_TRAPEZE_ALIM	7000	*	=	*	=	=	*	=	=	*	*	=
Acc.-limited sine curve	X_FIT_SINE_TRAPEZE_ALIM	28928	*	=	*	=	=	*	=	=	*	*	=
Jerk-lim. motion (trapezoid profile)	X_FIT_ACC_TRAPEZE_JLIM	29184	*	=	*	=	=	*	=	=	*	*	*

- Other

Velocity limit. polynomial 5th order	X_MOTION_IN_MOTION_POLY5_VLIM	24576	*	*	*	*	=	*	*	=	*	=	=
Overshoot-free polynomial 5th order	X_MOTION_IN_MOTION_POLY5_SLIM	24832	*	*	*	0	=	*	0	=	=	=	=
Acc.-limited (trapezoidal profile)	X_VELOCITY_IN_VELOCITY_TRAPEZE_ALIM	20480	*	*	*	0	=	*	0	=	*	*	=

Points table

Cam	CAMTABLE_1	1...99	*	*	=	=	=	=	=	=	=	=	=
-----	------------	--------	---	---	---	---	---	---	---	---	---	---	---

- 0 explicit 0
- * user-defined
- = calculated automatically

**Analytic functions
General information**

The following motion laws enable a selection based on different criteria.

A high quality is achieved by reducing damaging oscillations and abrasion and noise are also minimized.

Rest-in-rest

There are 12 rest-in-rest motion laws available. These motion laws are only defined by the distance and the master axis range. Starting and end velocity are 0.

Rest-in-rest, standstill

$$f(z) = 0$$

Fig. 41: Function: Rest-in-rest, standstill

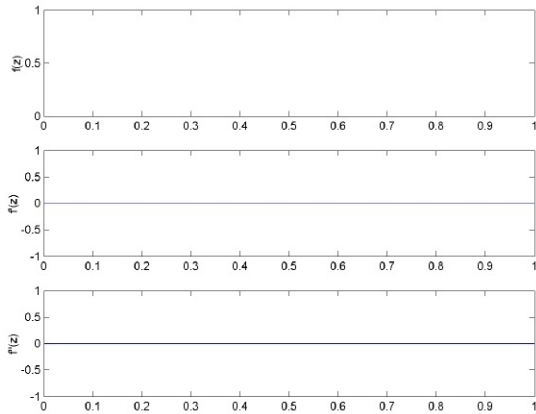


Fig. 42: Graph: Rest-in-rest, standstill

Rest-in-rest, simple sine line

Advantage:

- Low velocity characteristic value
- Low acceleration characteristic value
- Low dynamic torque characteristic value

Disadvantage:

- Acceleration jump
- Oscillations, noise, wear

$$f(z) = \frac{1}{2} [1 - \cos(\pi z)]$$

Fig. 43: Function: Rest-in-rest, simple sine line

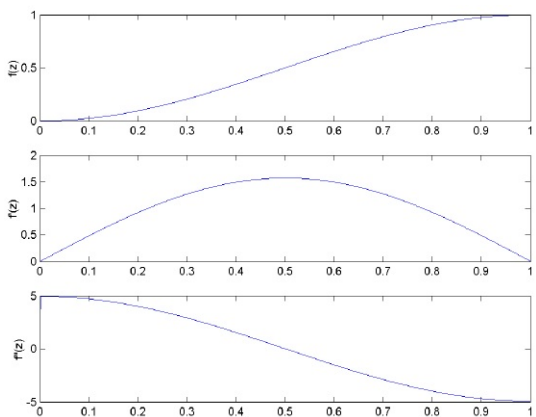


Fig. 44: Graph: Rest-in-rest, sinusoidal line (simple sinoids)

Rest-in-rest, inclined sine line (Bestehorn sinoids)

Advantage:

- Especially low jerk characteristic value
- Low oscillation, ideal for high speeds

Disadvantage:

- Velocity characteristic value, acceleration characteristic value and
- Dynamic moment coefficient higher than for polynomial 5th order

$$f(z) = z - \frac{1}{2\pi} \sin(2\pi z)$$

Fig. 45: Function: Rest-in-rest, inclined sine line (Besthorn sinoids)

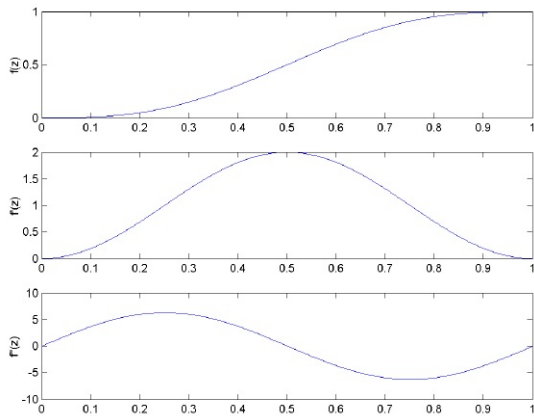


Fig. 46: Graph: Rest-in-rest, inclined sine line (Besthorn sinoids)

Rest-in-rest, acceleration-optimized inclined sine line

$$f(z) = z - \frac{1}{2\pi} \sin(2\pi z)$$

$$g(z) = z - \frac{0.41}{2\pi} \sin(2\pi z)$$

Fig. 47: Function: Rest-in-rest, acceleration-optimized inclined sine line

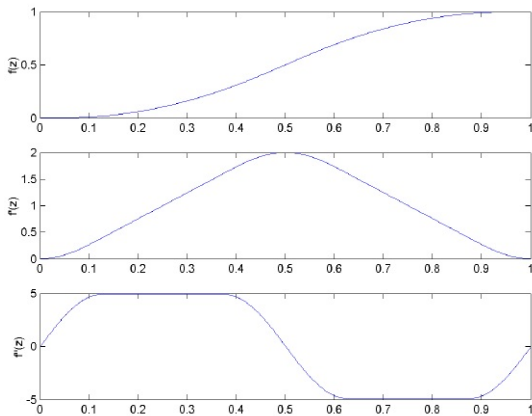


Fig. 48: Graph: Rest-in-rest, acceleration-optimized inclined sine line

Rest-in-rest, torque-optimized inclined sine line

$$f(z) = z - \frac{1}{2\pi} \sin(2\pi z)$$

$$g(z) = z - \frac{0.134}{2\pi} \sin(2\pi z)$$

Fig. 49: Function: Rest-in-rest, torque-optimized inclined sine line

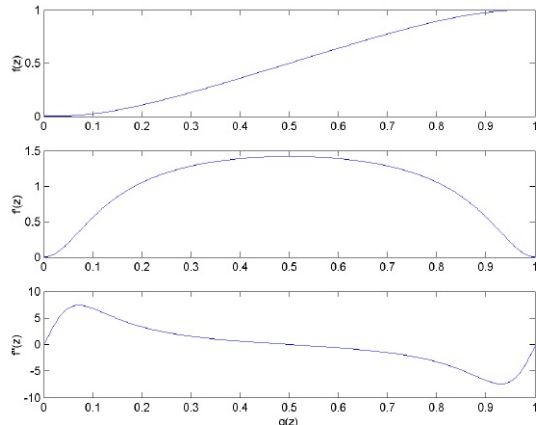


Fig. 50: Graph: Rest-in-rest, torque-optimized inclined sine line

Rest-in-rest, Gutman sinusoids

$$f(z) = z - \frac{15}{32\pi} \sin(2\pi z) - \frac{1}{96\pi} \sin(6\pi z)$$

Fig. 51: Function: Rest-in-rest, Gutman sinusoids

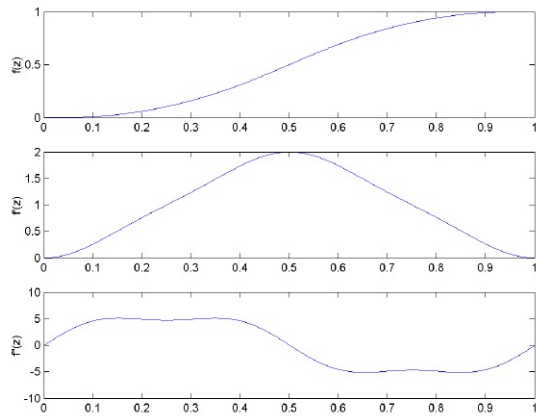


Fig. 52: Graph: Rest-in-rest, Gutman sinusoids

Rest-in-rest, modified sinoids

Advantage:

- Ideal for high speeds
- Low velocity characteristic value
- Low acceleration characteristic value
- Low dynamic torque characteristic value

Disadvantage:

- Jerk characteristic value higher than for the inclined sine curve

$$0 \leq z \leq \frac{1}{8}: f(z) = \frac{1}{4 + \pi} \left[\pi z - \frac{1}{4} \sin(4\pi z) \right]$$

$$\frac{1}{8} \leq z \leq \frac{7}{8}: f(z) = \frac{1}{4 + \pi} \left[2 + \pi z - \frac{4}{9} \sin\left(\frac{4\pi}{3}z + \frac{\pi}{3}\right) \right]$$

$$\frac{7}{8} \leq z \leq 1: f(z) = \frac{1}{4 + \pi} \left[4 + \pi z - \frac{1}{4} \sin(4\pi z) \right]$$

Fig. 53: Function: Rest-in-rest, modified sinoids

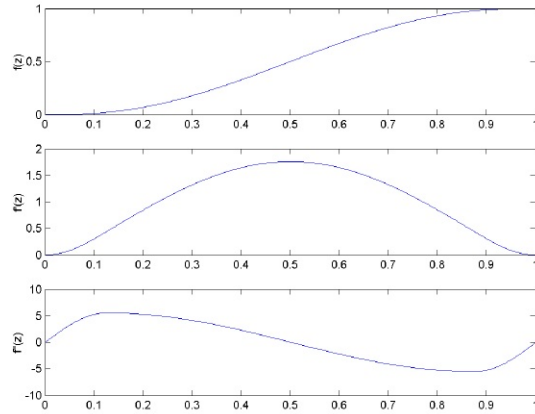


Fig. 54: Graph: Rest-in-rest, modified sinoids

Rest-in-rest, modified acceleration trapezoid

Advantage:

- Especially low acceleration characteristic value
- Low inertia forces

Disadvantage:

- Jerk characteristic value higher than for the inclined sine curve

$$0 \leq z \leq \frac{1}{8}: f(z) = \frac{1}{2 + \pi} \left[2z - \frac{1}{2\pi} \sin(4\pi z) \right]$$

$$\frac{1}{8} \leq z \leq \frac{3}{8}: f(z) = \frac{1}{2 + \pi} \left[-\frac{1}{2\pi} + 2z + 4\pi \left(z + \frac{1}{8} \right)^2 \right]$$

$$\frac{3}{8} \leq z \leq \frac{1}{2}: f(z) = \frac{1}{2 + \pi} \left[-\frac{\pi}{2} + 2(1 + \pi)z - \frac{1}{2\pi} \sin(4\pi z - \pi) \right]$$

$$\frac{1}{2} \leq z \leq 1: f(z) = 1 - f(1 - z)$$

Fig. 55: Function: Rest-in-rest, modified acceleration trapezoid

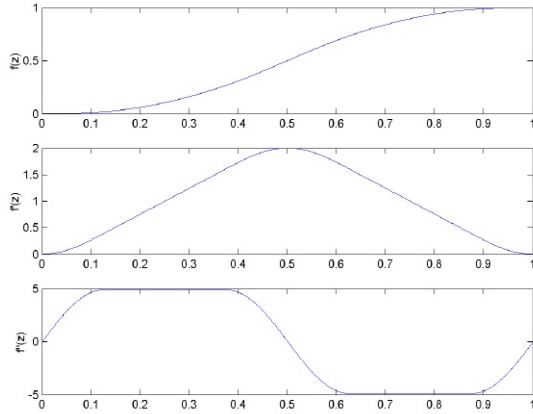


Fig. 56: Graph: Rest-in-rest, modified acceleration trapezoid

Rest-in-rest, square parabola

$0 \leq z \leq 0.5: f(z) = 2z^2$

$0.5 \leq z \leq 1: f(z) = 1 - 2(z-1)^2$

Fig. 57: Function: Rest-in-rest, square parabola

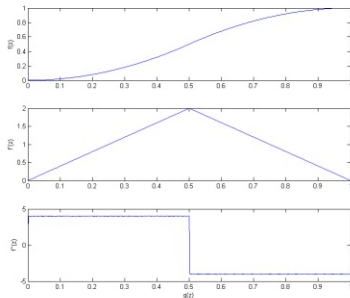


Fig. 58: Graph: Rest-in-rest, square parabola

Rest-in-rest, polynomial 5th order

Advantage:

- Low velocity characteristic value
- Low acceleration characteristic value
- Low dynamic torque characteristic value
- Low forces and torques

Disadvantage:

- Jerk characteristic value higher than for the inclined sine curve

$f(z) = 6z^5 - 15z^4 + 10z^3$

Fig. 59: Function: Rest-in-rest, polynomial 5th order

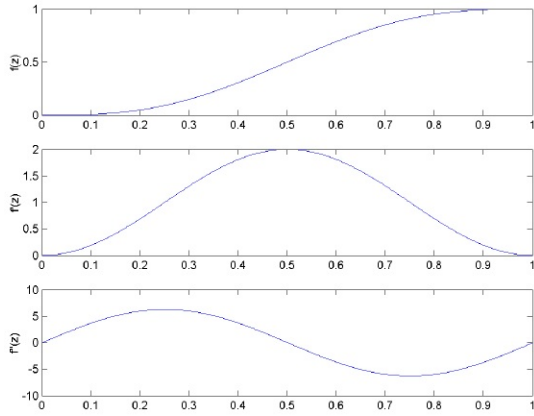


Fig. 60: Graph: Rest-in-rest, polynomial 5th order

Rest-in-rest, polynomial 7th order

$$f(z) = -20z^7 + 70z^6 - 84z^5 - 35z^4$$

Fig. 61: Function: Rest-in-rest, polynomial 7th order

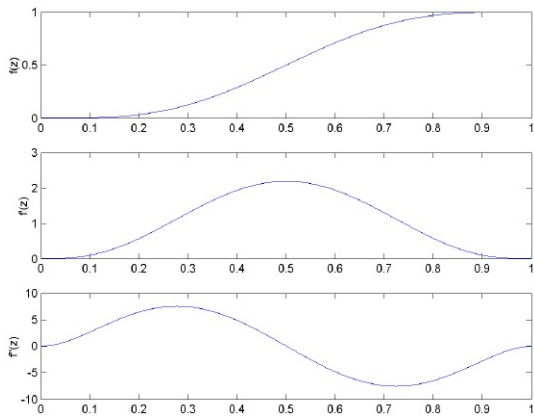


Fig. 62: Graph: Rest-in-rest, polynomial 7th order

Rest-in-rest, polynomial 8th order

$$f(z) = A_8z^8 + A_7z^7 + A_6z^6 + A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 63: Function: Rest-in-rest, polynomial 8th order

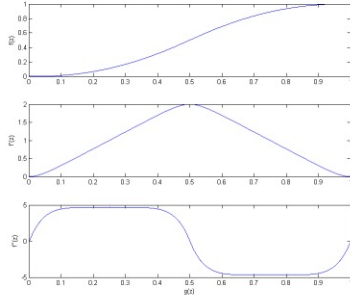


Fig. 64: Graph: Rest-in-rest, polynomial 8th order

Rest-in-velocity

Rest-in-velocity motion laws are used for impact-free and jerk-free transition from standstill to defined velocities.

Rest-in-velocity, polynomial 5th order

$$f(z) = A_5 z^5 + A_4 z^4 + A_3 z^3$$

Fig. 65: Function: Rest-in-velocity, polynomial 5th order

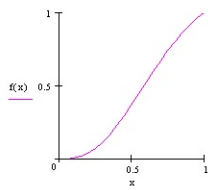


Fig. 66: Graph: Rest-in-velocity, polynomial 5th order

Rest-in-velocity, polynomial 7th order

$$f(z) = A_7 z^7 + A_6 z^6 + A_5 z^5 + A_4 z^4 + A_3 z^3$$

Fig. 67: Function: Rest-in-velocity, polynomial 7th order

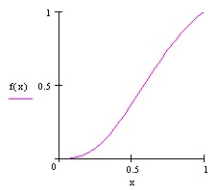


Fig. 68: Graph: Rest-in-velocity, polynomial 7th order

Velocity-in-rest

Velocity-in-rest motion laws are used for impact-free and jerk-free transition from defined velocities to standstill.

Velocity-in-rest, polynomial 5th order

$$f(z) = A_5 z^5 + A_4 z^4 + A_3 z^3 + A_2 z$$

Fig. 69: Function: Velocity-in-rest, polynomial 5th order

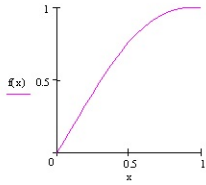


Fig. 70: Graph: Velocity-in-rest, polynomial 5th order

Velocity-in-rest, polynomial 7th order

$$f(z) = A_7z^7 + A_6z^6 + A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 71: Function: Velocity-in-rest, polynomial 7th order

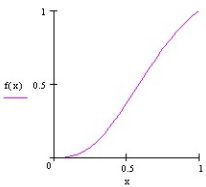


Fig. 72: Graph: Velocity-in-rest, polynomial 7th order

Velocity-in-velocity

Velocity-in-velocity motion laws are used for impact and jerk-free transition from defined velocities to other defined velocities.

Velocity-in-velocity, constant velocity

The velocity is calculated using the specified distance and the given master axis range. Specify a constant velocity in the motion law "Extended, linear velocity" (see ↘ "Resulting distance").

$$f(z) = z$$

Fig. 73: Function: Velocity-in-velocity, constant velocity

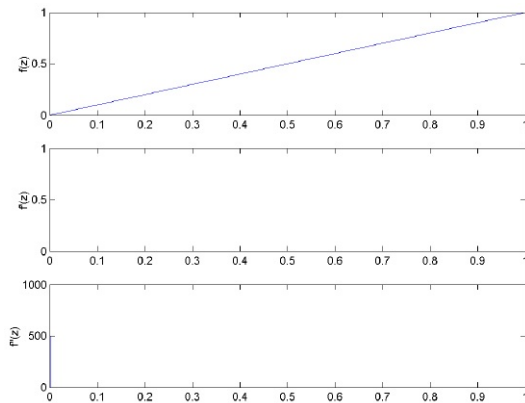


Fig. 74: Graph: Velocity-in-velocity, constant velocity

Velocity-in-velocity, polynomial 5th order

$$f(z) = A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 75: Function: Velocity-in-velocity, polynomial 5th order

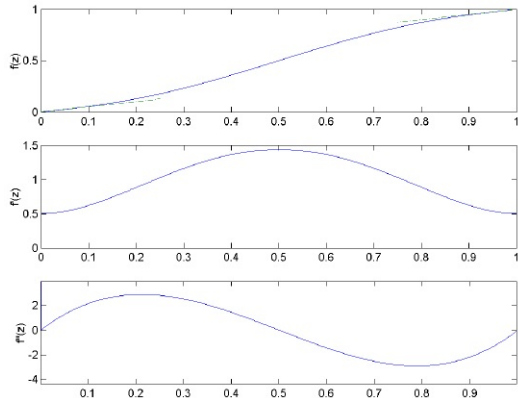


Fig. 76: Graph: Velocity-in-velocity, polynomial 5th order

Velocity-in-velocity, polynomial 7th order

$$f(z) = A_7z^7 + A_6z^6 + A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 77: Function: Velocity-in-velocity, polynomial 7th order

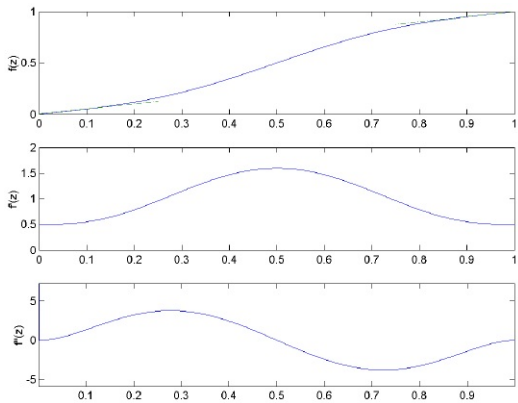


Fig. 78: Graph: Velocity-in-velocity, polynomial 7th order

Velocity-in-velocity, modified sine curve

$$0 \leq z \leq \frac{\lambda}{8}: f'(z) = C_s \frac{\lambda}{2\pi} \left(z - \frac{\lambda}{2\pi} \sin \left(2\pi \frac{z}{\lambda} \right) \right) + f'(0)z$$

$$\frac{\lambda}{8} \leq z \leq \lambda: f'(z) = C_s \frac{\lambda}{2\pi} \left(z - \frac{9\lambda}{2\pi} \sin \left(2\pi \frac{z + \frac{\lambda}{2}}{3\lambda} \right) + \frac{4\lambda}{\pi} \right) + f'(0)z$$

$$\lambda \leq z \leq 1 - \frac{1-\lambda}{4}: f'(z) = C_s \frac{1-\lambda}{2\pi} \left(z - \frac{9(1-\lambda)}{2\pi} \sin \left(2\pi \frac{z + \frac{3-5\lambda}{3(1-\lambda)}}{3\lambda} \right) + \frac{4\lambda}{\pi} \right) + f'(1) + (f'(0) - f'(1)) \left(\frac{3}{4} - \frac{1}{\pi} \right) + \lambda$$

$$1 - \frac{1-\lambda}{4} \leq z \leq 1: f'(z) = -C_s \frac{1-\lambda}{2\pi} \left(z - \frac{1-\lambda}{2\pi} \sin \left(2\pi \frac{z + \lambda}{1-\lambda} \right) - 1 \right) + 1 + f'(1) + (z-1)$$

Fig. 79: Function: Velocity-in-velocity, modified sine curve

General motion

Motion laws for general motion can always be used.

General motion, polynomial 2nd order

$$f(z) = A_2 z^2 + A_1 z$$

Fig. 80: Function: General motion, polynomial 2nd order

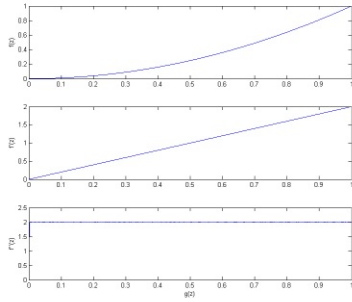


Fig. 81: Graph: General motion, polynomial 2nd order

General motion, polynomial 3rd order

$$f(z) = A_3 z^3 + A_2 z^2 + A_1 z$$

Fig. 82: Function: General motion, polynomial 3rd order

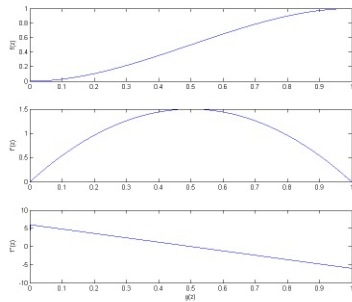


Fig. 83: Graph: General motion, polynomial 3rd order

General motion, polynomial 4th order

$$f(z) = A_4 z^4 + A_3 z^3 + A_2 z^2 + A_1 z$$

Fig. 84: Function: General motion, polynomial 4th order

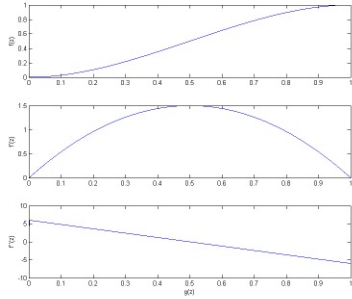


Fig. 85: Graph: General motion, polynomial 4th order

General motion, polynomial 5th order

$$f(z) = A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 86: Function: General motion, polynomial 5th order

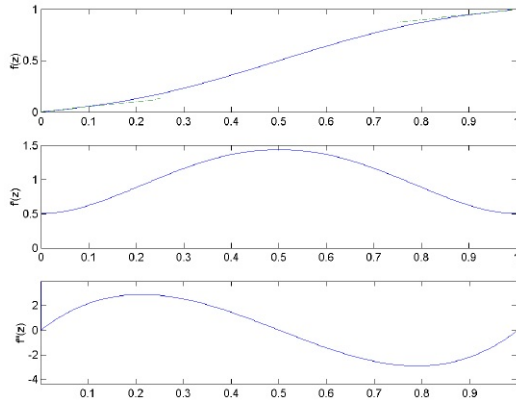


Fig. 87: Graph: General motion, polynomial 5th order

General motion, polynomial 7th order

$$f(z) = A_7z^7 + A_6z^6 + A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 88: Function: General motion, polynomial 7th order

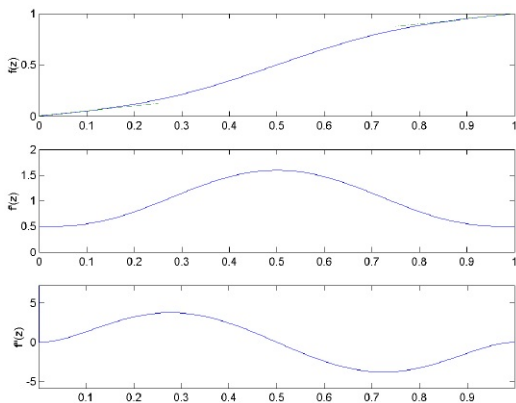


Fig. 89: Graph: General motion, polynomial 7th order

General motion, polynomial 8th order

$$f(z) = A_8z^8 + A_7z^7 + A_6z^6 + A_5z^5 + A_4z^4 + A_3z^3 + A_2z^2 + A_1z$$

Fig. 90: Function: General motion, polynomial 8th order

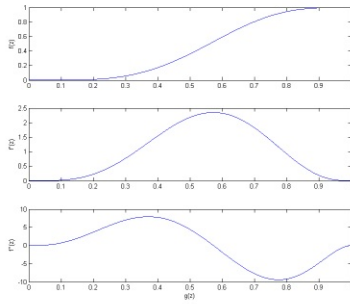


Fig. 91: Graph: General motion, polynomial 8th order

Extended motion laws

Resulting distance

Extended, linear velocity

$$f(z) = A_3z^3 + A_2z^2 + A_1z$$

Fig. 92: Function: Extended, linear velocity

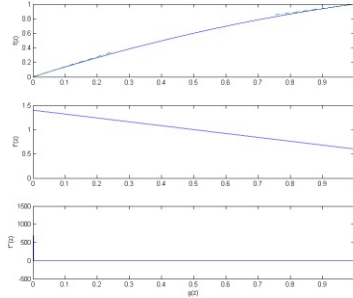


Fig. 93: Graph: Extended, linear velocity

Extended, linear acceleration

$$f(z) = A_3z^3 + A_2z^2 + A_1z$$

Fig. 94: Function: Extended, linear acceleration

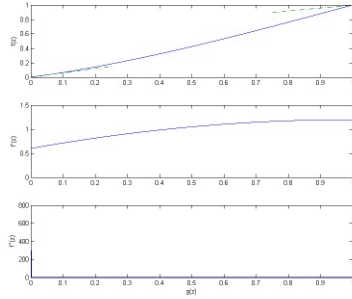


Fig. 95: Graph: Extended, linear acceleration

Extended, velocity 2nd order (start accel. zero)

$$f(z) = A_3 z^3 + A_2 z^2 + A_1 z$$

Fig. 96: Function: Extended, velocity 2nd order (start accel. zero)

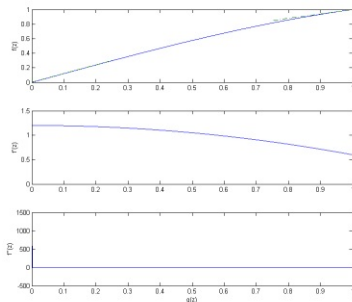


Fig. 97: Graph: Extended, velocity 2nd order (start accel. zero)

Extended, velocity 2nd order (end accel. zero)

$$f(z) = A_3 z^3 + A_2 z^2 + A_1 z$$

Fig. 98: Function: Extended, velocity 2nd order (end accel. zero)

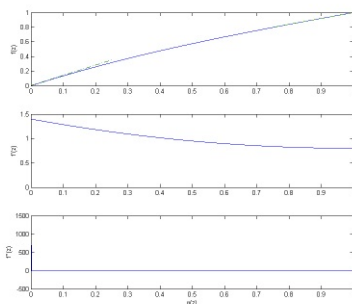


Fig. 99: Graph: Extended, velocity 2nd order (end accel. zero)

Extended, resulting master axis range

These extended motion laws are special motion laws. They differ from the known motion laws from the VDI guidelines due to their new degrees of freedom. While a standard motion law is clearly defined by specifying its left and right boundary values, the motion laws allow for more setting options, such as a required maximum velocity. In this case, the master axis section of the motion step does not need to be specified. Instead, this results from the parameterization of the

motion law and the specification of characteristic values. Thus, for example, acceleration-limited motion allows the distance, starting and end velocity to be specified, but not the setting of a master axis range. This, and therefore the duration of the motion step, results from the values of maximum acceleration and maximum velocity, which can also be defined.

Extended, acceleration-limited motion (trapezoid profile)

The trapezoid profile, often also known as a ramp profile, can be seen as the simplest form of path interpolation. If a distance "s" is to be traveled, it is accelerated up to a specified travel velocity in the first phase (acceleration phase) using a given acceleration value. In the second phase (constant phase), it is traveled with a constant velocity and finally, in the third phase (deceleration phase), it is decelerated with a predetermined delay. The function of the path interpolation is to calculate the starting and end points in time t_1 , t_2 and t_3 and the individual travel times T_1 , T_2 and T_3 from these specified acceleration values a_1 and a_3 as well as the desired velocity v_m and the distance to be traveled "s". In the variant shown, the required starting velocity v_0 and end velocity v_3 is also taken into consideration.

Extended, acceleration-limited motion (sine curve)

With the sine profile, the starting and end velocity can be unequal to "0" and have the different acceleration factors a_1 and a_3 for the acceleration and deceleration phase. Moreover, the special cases are also taken into consideration, in which the starting velocity v_0 is already greater than the required travel velocity v_m . The same also applies to the end velocity v_3 .

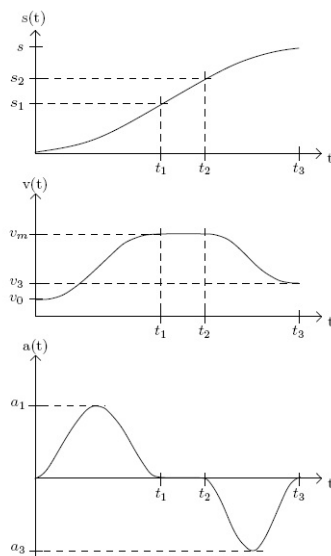


Fig. 100: Graph: Acceleration-limited motion (sine curve)

Extended, jerk-limited motion (trapezoid profile)

The acceleration with jerk limitation applies to many motion tasks, for example, to the transportation of fluids and to machines easily susceptible to vibration.

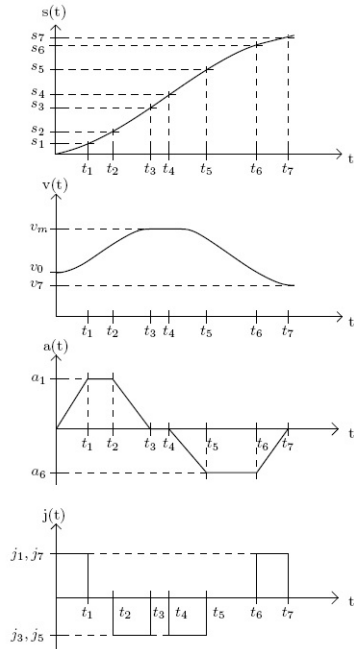


Fig. 101: Graph: Jerk-limited motion

Miscellaneous

Extended, velocity-limited polynomial 5th order

The polynomial 5th order known from the VDI 5th order does not allow control of the maximum traversing velocity. The motion law is subdivided into three sections to solve this problem. The middle section corresponds to a straight line with the required velocity. This is surrounded by two polynomials 5th order. This ensures a smooth transition from the starting to the travel velocity and from the travel to the end velocity. The intersecting points between the first and second and the second and third sections have to be determined. The points are selected in such a way that no turning point is set for the two polynomials.

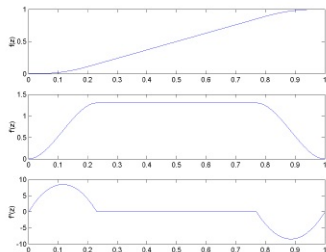


Fig. 102: Graph: Velocity-limited polynomial 5th order

Expanded, overshoot-free polynomial 5th Order

The overshoot-free polynomial 5th order detects and prevents the possible polynomial overshoot. The kind of modification depends on the combination of the standardized boundary velocity values. The result is that there are four different cases. This motion law cannot be used for combinations in which the normalized starting velocity V_1 and the normalized end velocity V_2 have different signs. This means that the motion path would have a bend at a limit point if it was not able to leave the standardized range of $0 \leq z \leq 1$ and $0 \leq v(z) \leq 1$.

Example 1:

$V_0 \leq 1$ and $V_1 \leq 1$

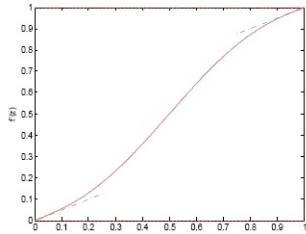


Fig. 103: Case 1

Example 2:

$V_0 \leq 1$ and $V_1 > 1$

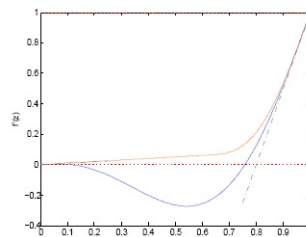


Fig. 104: Case 2

Example 3:

$V_0 > 1$ and $V_1 \leq 1$

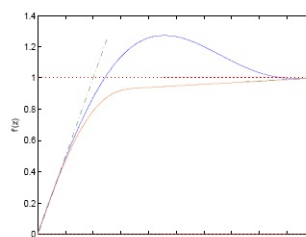


Fig. 105: Case 3

Case 4:

$V_0 > 1$ and $V_1 > 1$

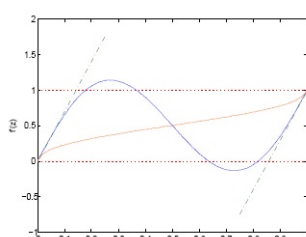


Fig. 106: Case 4

Cam tables

The slave axis motion of a motion step can be defined via a curve table.

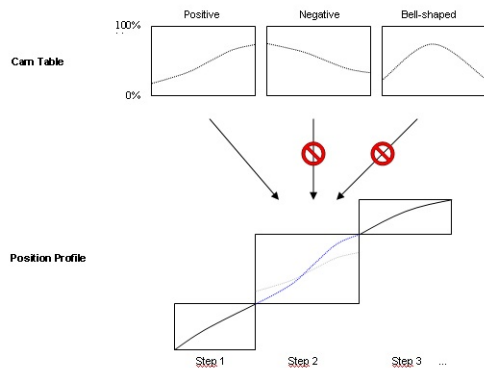


Fig. 107: Curve tables supported by the ctrlX Cam Designer

To use the ctrlX Cam Designer to assign a curve table to a motion step as a motion law, the menu item Curve table → Import curve table... or an already imported table is selected. If a new table is to be imported, an import dialog opens.

There are three options to select a cam table:

1. Import curve table from a cam plate of the current project
All cam disks in the current project can be listed and selected in a selection dialog.
2. Importing a cam table from a parameter file
3. Importing a cam table from a CSV file

For cam disks of the project, you can specify how many interpolation points are to be generated (minimum 3, maximum 1024). Furthermore, the distance for calculating the support points can be specified (0 corresponds to an automatic stroke factor support point of 0 % to 100 %). Following the import, a memory space number has to be defined for the subsequent memory location on a device for this selected cam table.

When handling cam tables in the ctrlX Cam Designer, it is differentiated between cam disks consisting of one and several motion steps.

Cams consisting of one motion step:

All curve table forms are supported here, i.e. curve tables whose end value is greater or less than the start value. Start values not equal to 0 are also permitted, as are curve tables with the same start and end point (e.g. bell). The behavior here is identical to the MotionProfile, i.e. the points from the curve table are simply multiplied by the distance (no offset, no scaling).

Cams consisting of multiple motion steps:

Cam tables whose end point is greater than the starting point are scaled to end at 100%. A starting point, which is not equal to 0%, is offset to 0%. Thus, the entire cam table is automatically adapted to the distance preset for the respective motion step. Cam tables with the same or smaller end point than the starting point are not supported.