HC2 Series PLC Motion Control

User Guide

HNC Electric Limited

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HAND	No	follow-through movement
FOLLOW	No	follow-through movement
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CAM	K14	Chasing flying shear motion
CAM	K7	Periodic cam movement
CAM	K2	Chase cam movement
CAMSYNC	No	Periodic synchronized motion
CAMADD	No	motion overlay

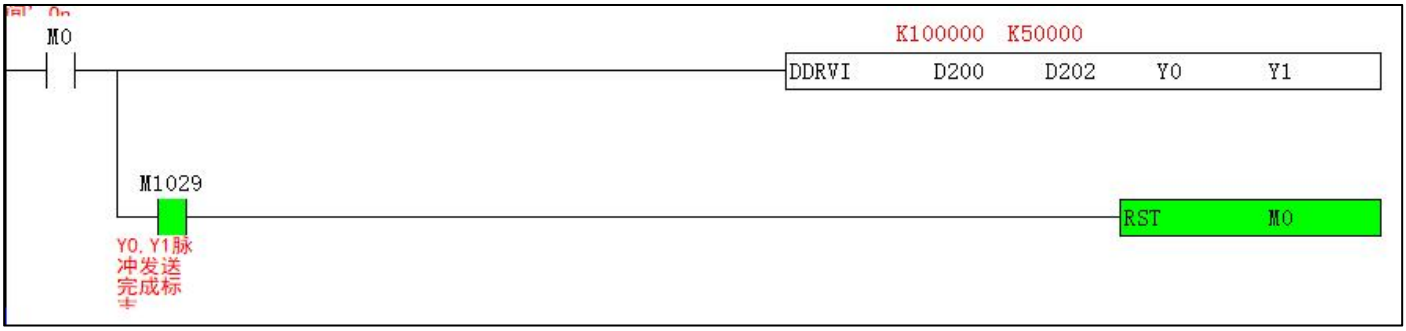
Definition of axis number

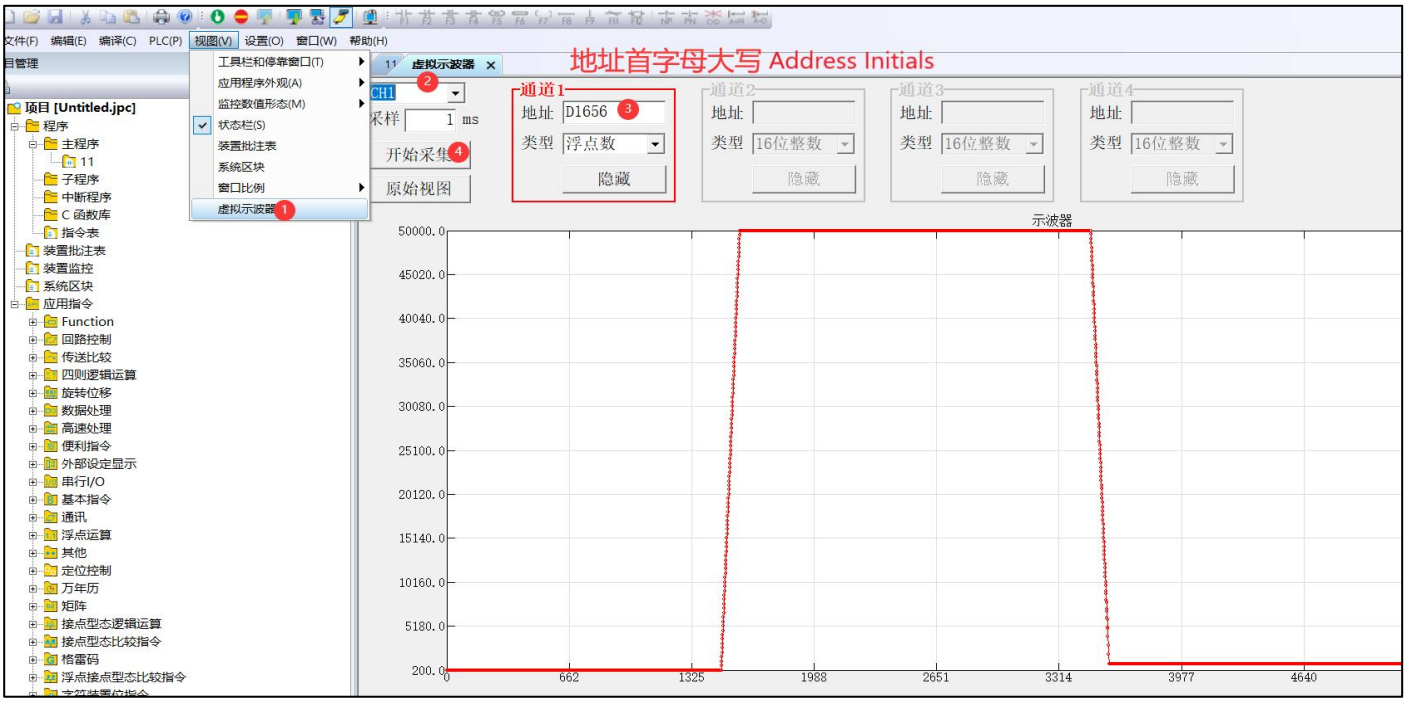
Channel	Device	Axis No. setting
CH0	(Y0 Y1)	K0
CH1	(Y2 Y3)	K1
CH2	(Y4 Y5)	K2
CH3	(Y6 Y7)	K3
CH4	(Y10 Y11)	K4
CH5	(Y12 Y13)	K5
……	……	……
C251(Encoder)	(X0 X1)	K-1

Using a virtual oscilloscope

It is only supported by HCM2 series motion control PLC. If you use serial port to debug the program, it is recommended to use 115200bps baud rate for monitoring.

Example 1: Such as monitoring the current speed of the displacement command.





Explanation:

1) Up to 4 channels CH0~CH3 can be selected, and each channel can be hidden or displayed.

2) The minimum default sampling period is 1ms.

3) The monitoring address is only the D register, which can be used to analyze the cause of the data.

Multi-axis linkage interpolation【TRACK】

1) Instruction overview

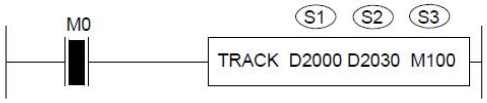
Multi-axis linkage interpolation can be understood that there is no need to decelerate and stop between multi-segment interpolation. After the current track is executed, the next track can be executed immediately.

Multi-axis linkage interpolation【TRACK】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2) Operands

Operands	Function
S1	Specify the starting address of the input parameter
S2	Specifies the start address of the input track register
S3	Specifies the starting address of the output status bits

3) Function and Action



- S1 specifies [input parameter start address]. Occupied registers S1~S1+29
- S2 specifies 【Start address of input track register】. Occupy registers S2~S2+ custom
- S3 specifies the [starting address of output status bit]. Occupy relay S3~S3+9
- Note: The axis group moves the coordinate point in the form of absolute displacement. Before turning on the command, it is necessary to clear the current pulse number (special D register) and set the origin.
- When M0 is turned from OFF to ON, interpolation motion control is performed on the specified axis group S1+10-S1+14, and its mode is controlled by S2+0. The trajectory position is jointly determined by S2+8-S2+17, the linear velocity is S2+6, and the acceleration between the two trajectories is controlled by S1+4. The acceleration/deceleration time is controlled by the special D register corresponding to the axis number specified by S1+0, see the special table of motor parameters for details. M100 is set when all traces are completed.

4) Related parameters

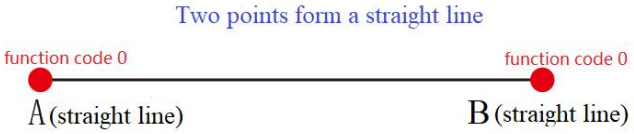
Input parameters	parameter name	type of data	Unit	Note
S1+0	virtual axis number	16 bit	/	Imaginary axis object, such as Y port has 16 points (Y17), then write K8
S1+1	Interpolation mode	16 bit	/	Write 0 in bus mode, write 1 in pulse mode
S1+2	Total number of tracks	16 bit	/	The total number of track points to be taken
S1+3	Register spacing between each trace	16 bit	/	Determine the first address of each track register (S2+0)
S1+4	cornering acceleration	32 bit	pulses/sec	acceleration between two trajectories
S1+6	Currently doing the first few tracks	16 bit (read only)	/	/
S1+7	current auxiliary code	16 bit (read only)	/	The mapped value of the current trajectory S2+1
S1+8	Number of interpolation axes	16 bit	/	Number of axes to be interpolated
S1+9	total number of axes	16 bit	/	Consistent with S1+8 parameters
S1+10	The axis number of the	16 bit	/	/

	first interpolation axis			
S1+11	2nd interpolation axis axis number	16 bit	/	/
S1+12	3rd interpolation axis axis number	16 bit	/	/
S1+13	4th interpolation axis axis number	16 bit	/	/
S1+14	5th interpolation axis axis number	16 bit	/	/
S1+15~29	system reservation	16 bit	/	/
S2+0	Track function code	16 bit	/	0-Linear interpolation, 1-Circular interpolation, 2-Elliptical interpolation
S2+1	auxiliary code	16 bit	/	0 is not used, 1~9999 S1+7 will be assigned after the execution of the trajectory is completed, and the trajectory running will not be suspended. After the execution of the 10000~19999 trajectory is completed, S1+7 will be assigned, and the trajectory running will be suspended until S1+7 is cleared to 0. .
S2+2~S2+5	System reserved, do not use	/	/	/
S2+6~S2+7	Imaginary axis frequency (linear velocity)	32 bit	/	Determines the speed at which this trajectory travels
S2+8~S2+9	Absolute coordinates of the first axis	32 bit	pulse	/
S2+10~S2+11	2nd axis absolute coordinates	32 bit	pulse	/
S2+12~S2+13	3rd axis absolute coordinates	32 bit	pulse	/
and so on	/	/	/	/
S3+0	All traces have been run	BOOT	/	Set when all traces have been run
S3+1~S3+9	system reservation	BOOT	/	/

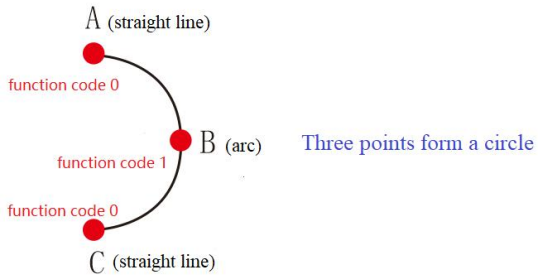
5) Description of track function code S2+0

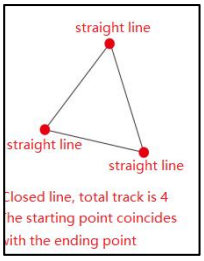
Definition: 0 means linear interpolation, 1 means circular interpolation

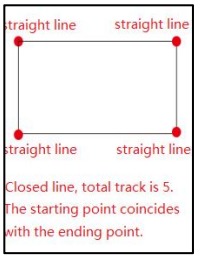
Define a straight line: as shown in the figure below, when the trajectory is a straight line, two points are required to form a straight line, then the function codes corresponding to the two points A and B are both 0, that is, straight line (function code 0) → straight line (function code 0).

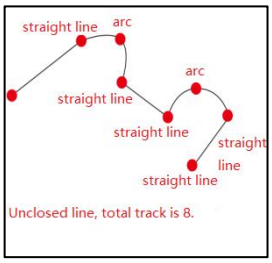


Define a circle: as shown in the figure below, when the trajectory is a circle, three points are required to form a circle, and the function codes corresponding to the three points A, B, and C are respectively straight line (function code 0) → arc (function code 1)→Line (function code 0).



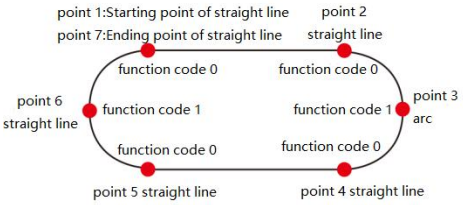




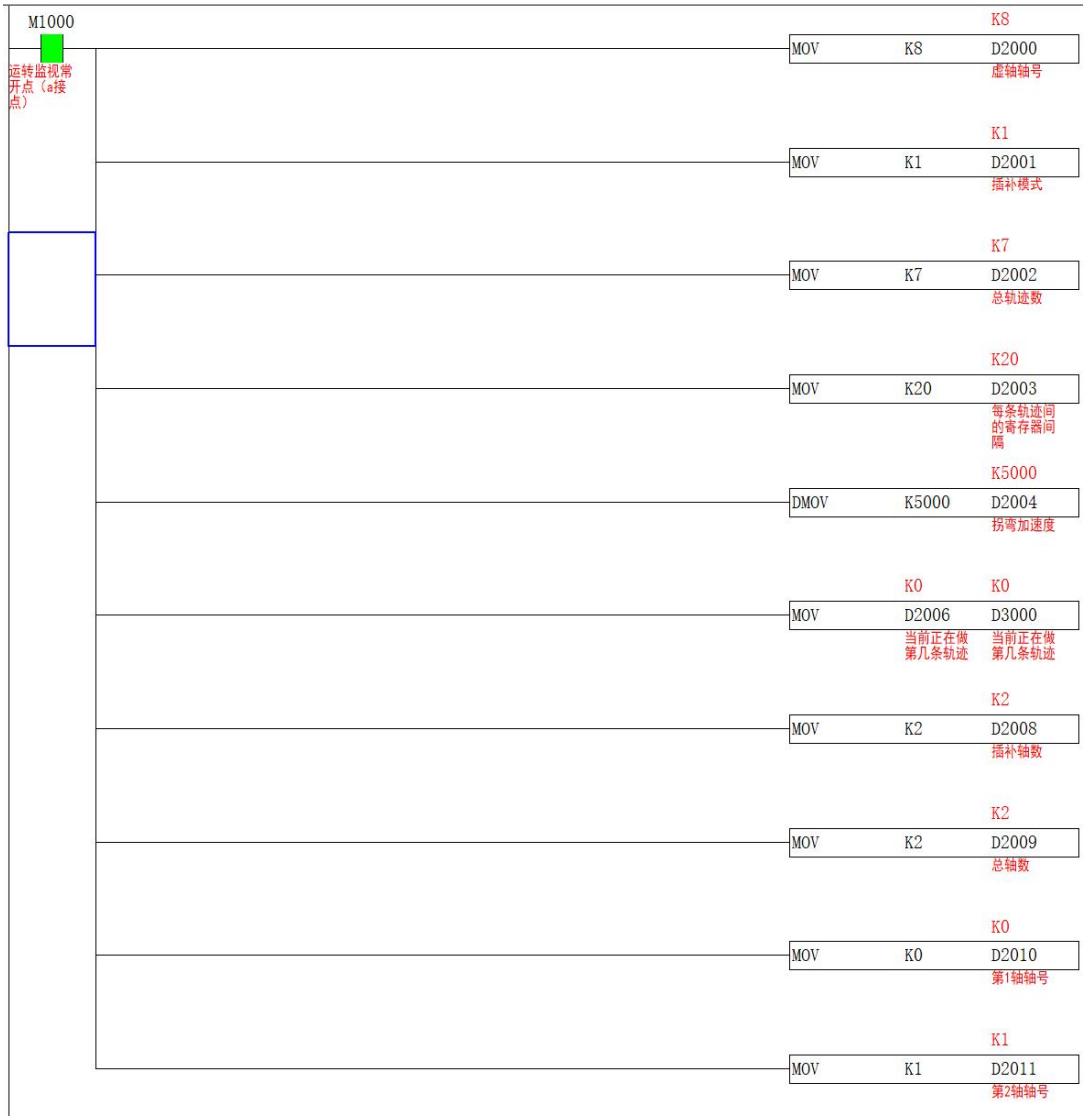


6) Example

For example: use the TRACK command to draw the figure below. It is known that the coordinates of point 1 are (0, 0) and the coordinates of point 2 are (1000, 0) and the coordinates of point 4 are (1000, -1000) The coordinates of point 5 is (0, -1000), and the coordinates of point 7 coincide with those of point 1. The unit of coordinates refers to the number of pulses, and the actual coordinates need to be calculated in pulse equivalent. Therefore, if you want to form a closed trajectory, you need to form 7 points, which are: point 1 line (function code 0) →

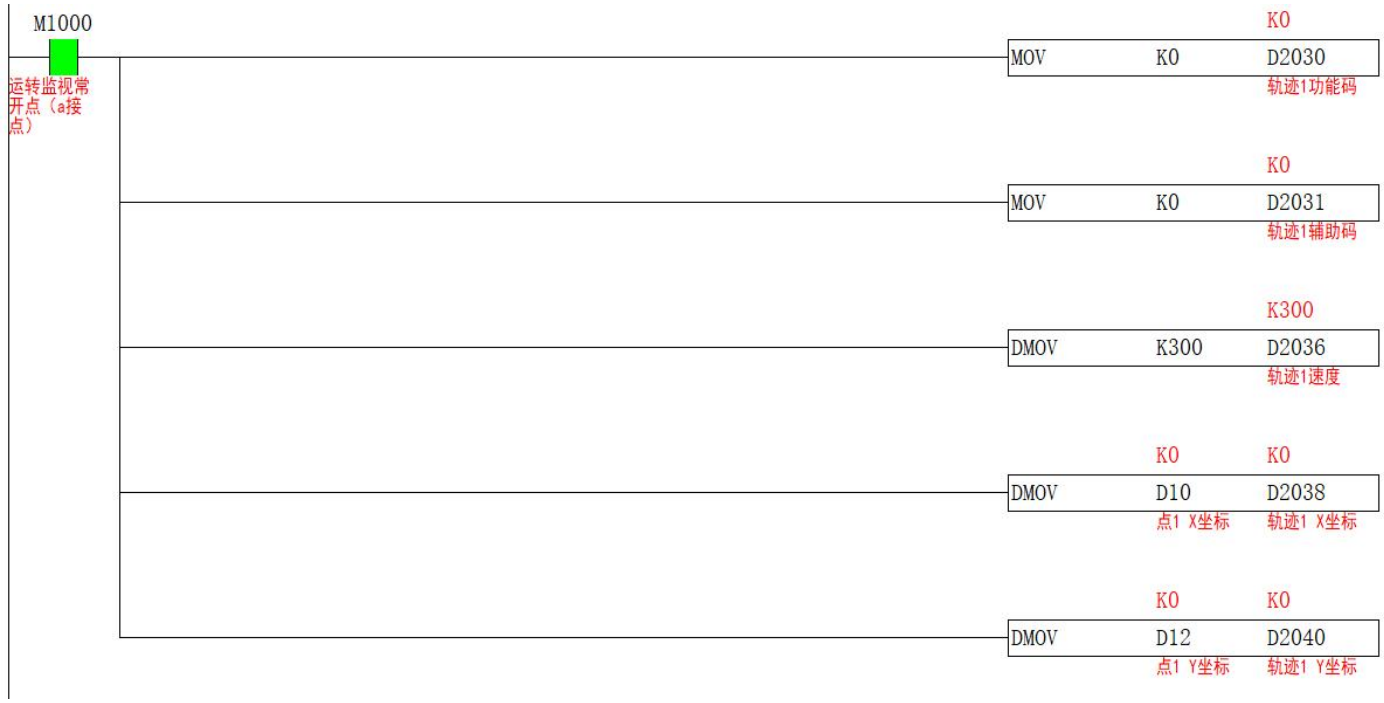


1. First fill in the data of the input parameter S1, there are 7 trajectory points (the starting point and the end point of the closed graph coincide, so a trajectory point needs to be added), the ladder diagram is as follows



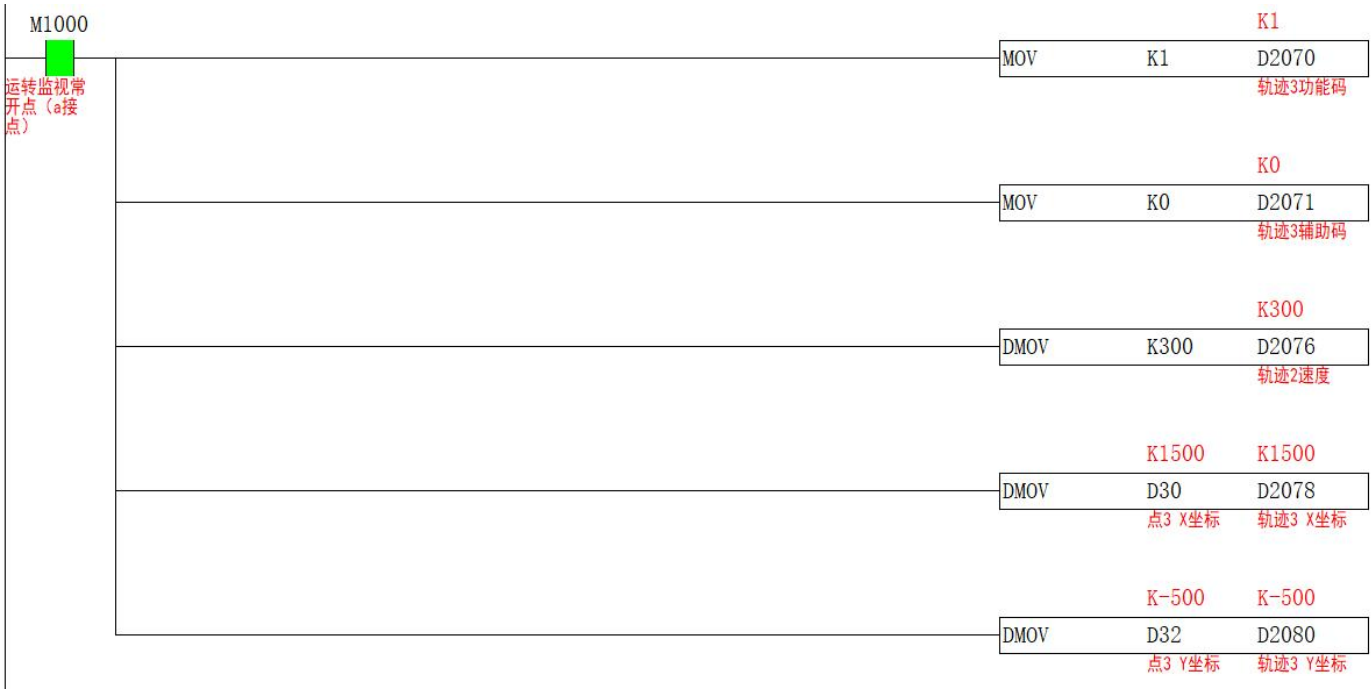
2. Knowing the coordinates of the four straight line points and calculating the coordinates of the center of the circle, you can know that the Y-axis coordinate of point 3 is {(-1000-0)/2}=-500, and the X coordinate is equal to 1000+500=1500. where 500 is the radius of the circle. The calculation method of point 6 is the same as that of point 3, then the coordinates of point 6 are (-500, -500). The ladder diagram is as follows.

3. Fill in the coordinate parameter of point 1 into the designated start address of the S2 track parameter. The ladder diagram is as follows

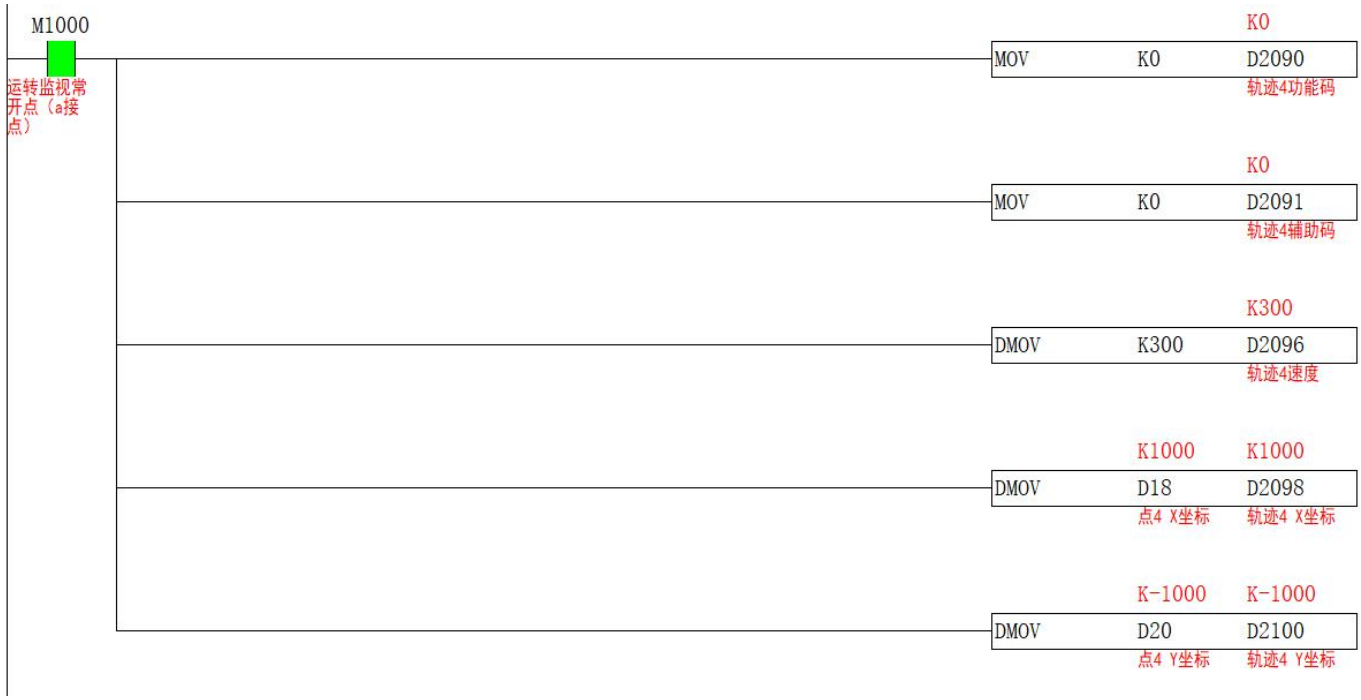


4. Fill in the coordinate parameters of point 2 into the address specified by S2. Since the value of S1+3 is 20, the track start register of point 2 is D2030+20=D2050, and the ladder diagram is as follows

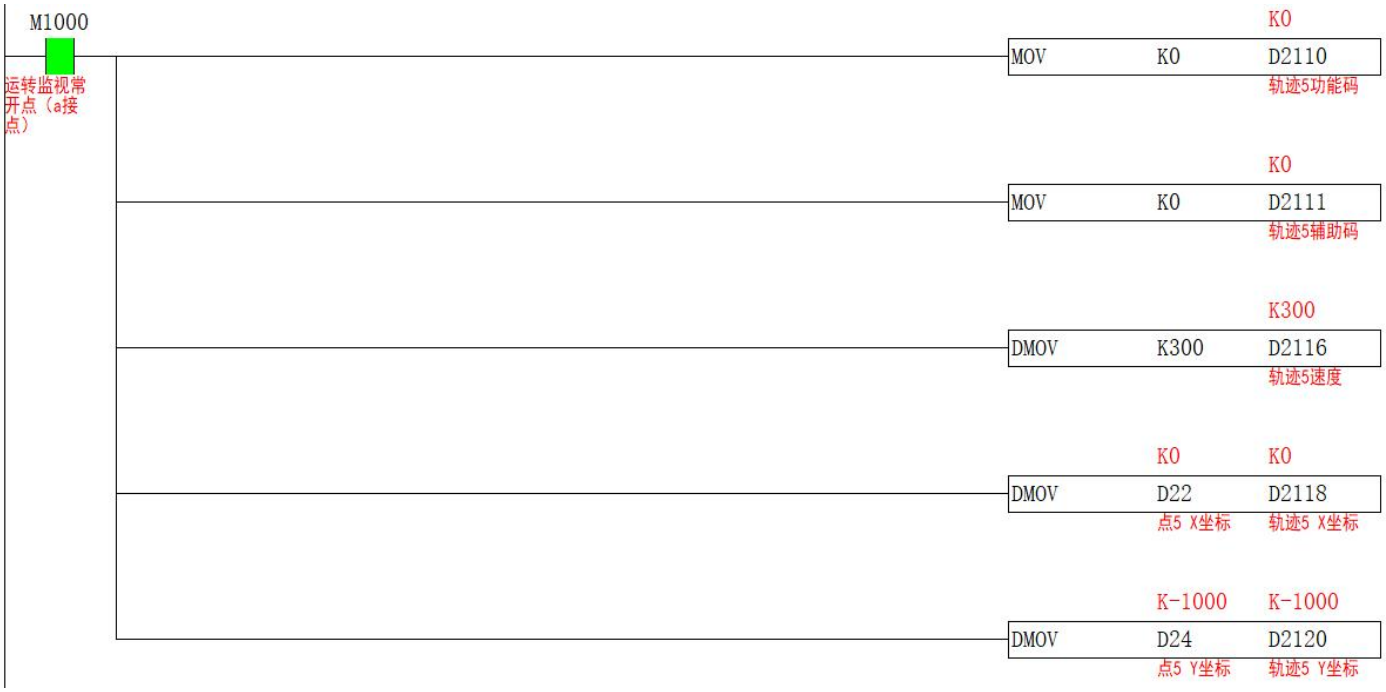
5. Fill the coordinate parameters of point 3 into the address specified by S2, and fill in K1 for the function code. The ladder diagram is as follows



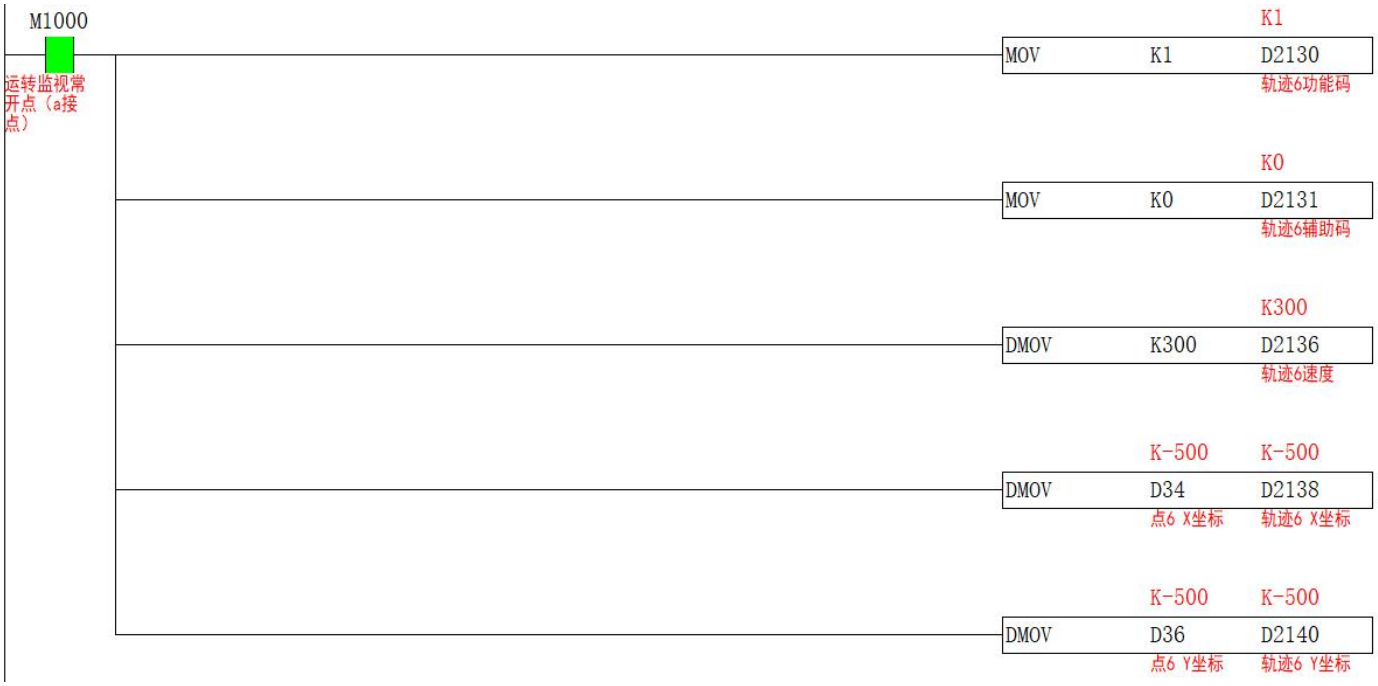
6. Fill the coordinate parameters of point 4 into the address specified by S2, the ladder diagram is as follows



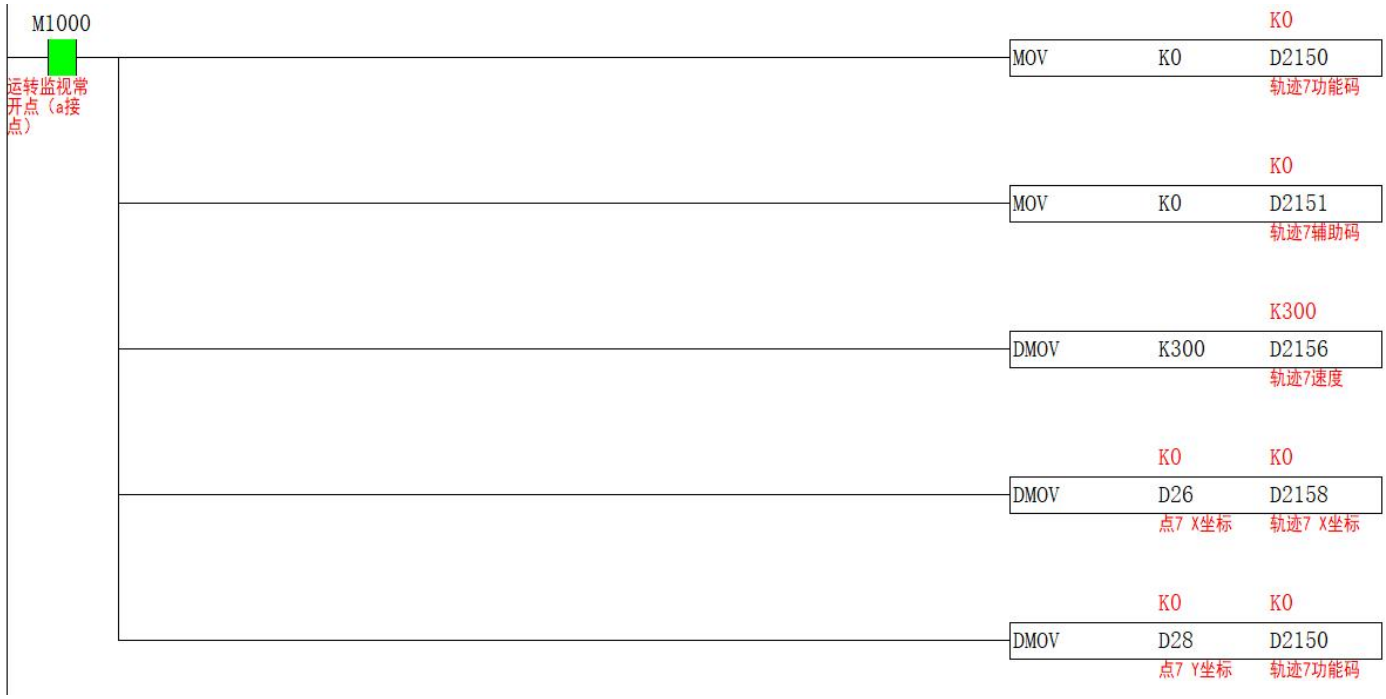
7. Fill in the coordinate parameters of point 5 into the address specified by S2, the ladder diagram is as follows



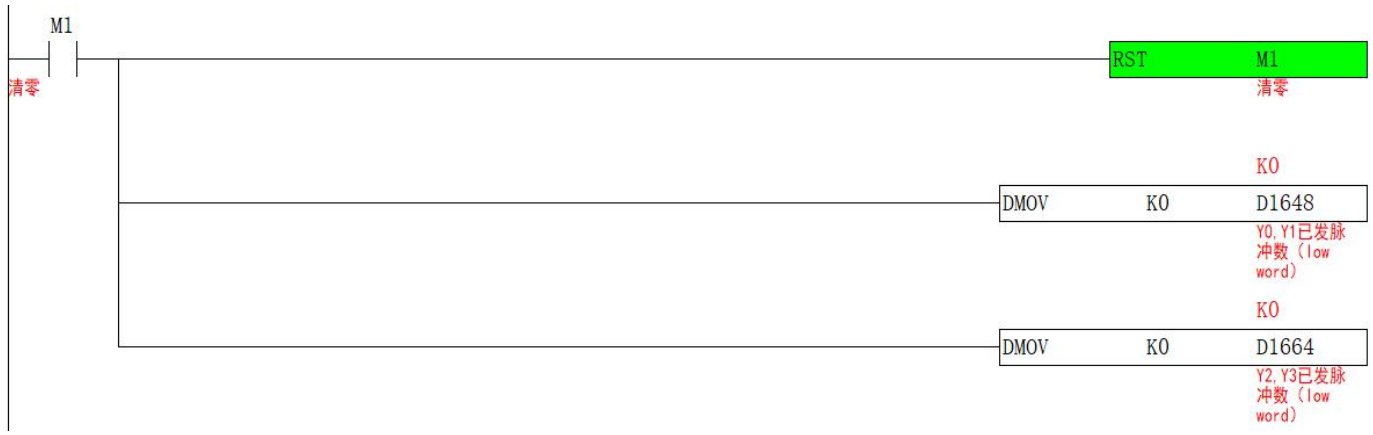
8. Fill the coordinate parameters of point 6 into the address designated by S2, and the function code is K1. The ladder diagram is as follows



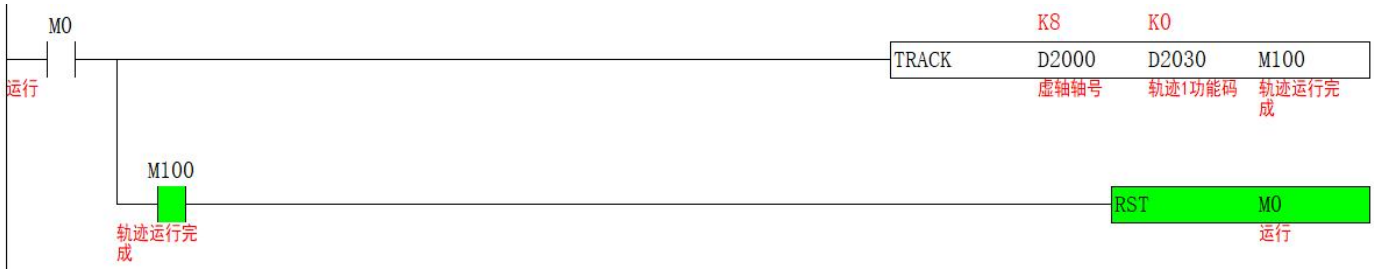
9. Fill the coordinate parameters of point 7 into the address specified by S2, and the coordinates are the same as point 1. The ladder diagram is as follows



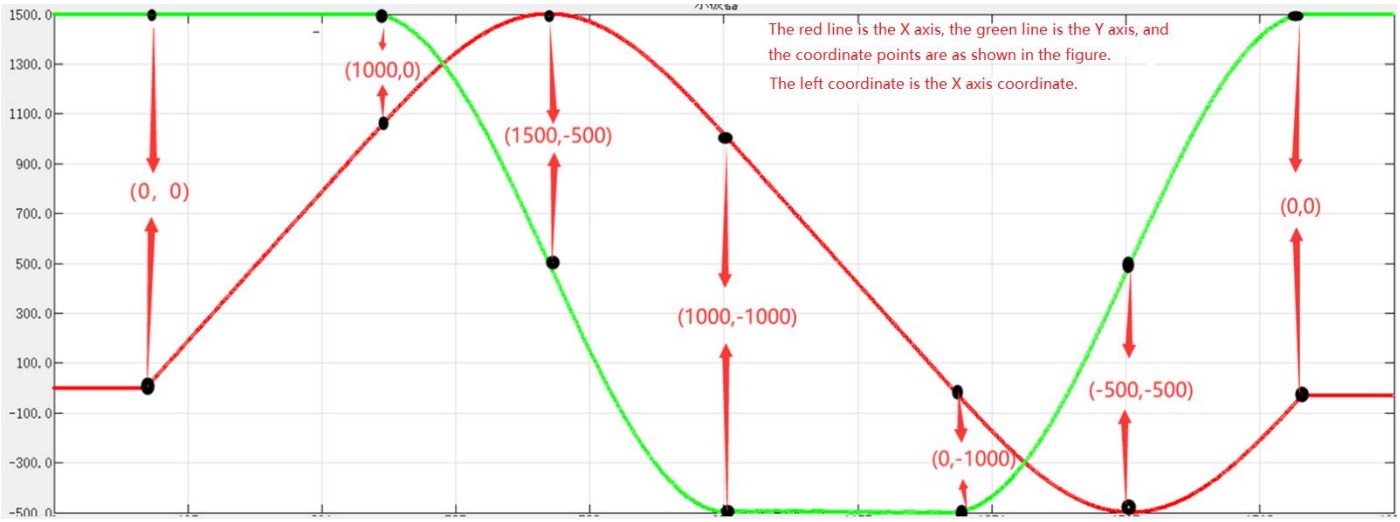
10. Since the command has been shifted in absolute form, after all parameters are filled, M1 needs to be turned ON to clear the current pulse number. The ladder diagram is as follows



11. After the current pulse is cleared, turn M0 ON, the specified axis group will travel according to the predetermined track, and M100 will turn ON after the track is completed. The ladder diagram is as follows



The position curve of the two-axis operation is as follows



Follow-up continuous movement [HAND]

1) Instruction overview

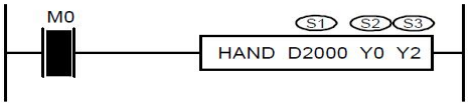
The slave axis follows the master axis (which can be an encoder) and continues to move, the direction of the master axis changes, and the slave axis changes accordingly. The speed ratio to follow is determined by the parameter.

Follow-up continuous movement [HAND]			
execution condition	Normally ON	Applicable models	HCG-32 points and above、HCD2-24 points and above、HCH2、HCM2
/	/	Software requirements	2.6.050 and above

2) Operands

Operands	Function
S1	Specify the starting address of the input parameter
S2	Specify the master axis number
S3	Specify the slave axis number

3) Function and Action



● S1 specifies [input parameter start address]. Occupied registers S1~S1+5

● S2 specifies 【master axis axis number】. Select the axis number of the master axis, if it is an encoder, write K-1 (X0, X1) for the axis number

● S3 specifies 【slave axis number】. Selected slave axis number

●When M0 is turned from OFF to ON, the slave axis group S3 follows the master axis axis group S2, the following speed ratio is determined by S1 and S1+1, the following acceleration and deceleration of the slave axis is determined by S1+2, and the response time is determined by S1+3 Decide.

●After the HAND command is enabled, the master axis group can use the pulse command to make it move, and the slave axis will follow according to the set ratio.

The pulse sent by the master axis/electronic gear ratio = the pulse sent by the slave axis, the current frequency of the master axis/electronic gear ratio = the current frequency of the slave axis

●Compared with CAMSYNC, this command has the advantage that it can follow both directions, while CAMSYNC can only follow one direction. The disadvantage is that the CAMSYNC instruction is more flexible, has cycle positioning, and is more powerful.

Note: Assuming that the electronic gear ratio is set to 10, the maximum frequency of the slave axis is set to 100K, and the master axis can only run at most 10K, otherwise the slave axis will have positional deviation

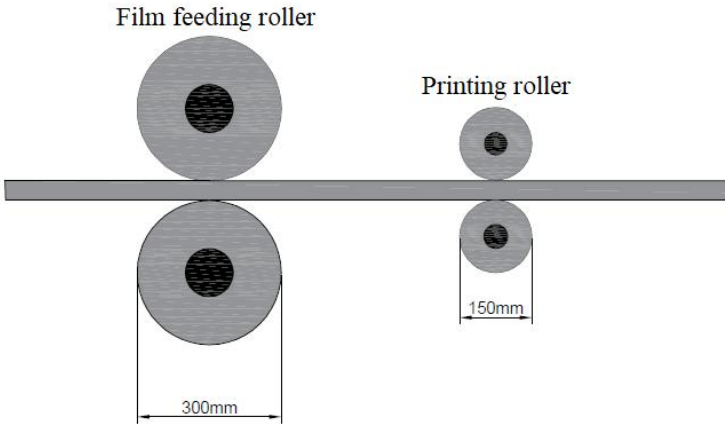
4）Related parameters

Input parameters	parameter name	type of data	Unit	Note
S1+0	electronic gear molecule	16bits	/	/
S1+1	Electronic gear denominator	16bits	/	Determine the following ratio jointly with S1+0
S1+2	Slave axis acceleration and deceleration time	16bits	Ms	It is recommended to set 200
S1+3	Slave Response Time	16bits	Ms	It is recommended to set 20
S1+4	Slave maximum frequency	32bits	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings from causing speeding

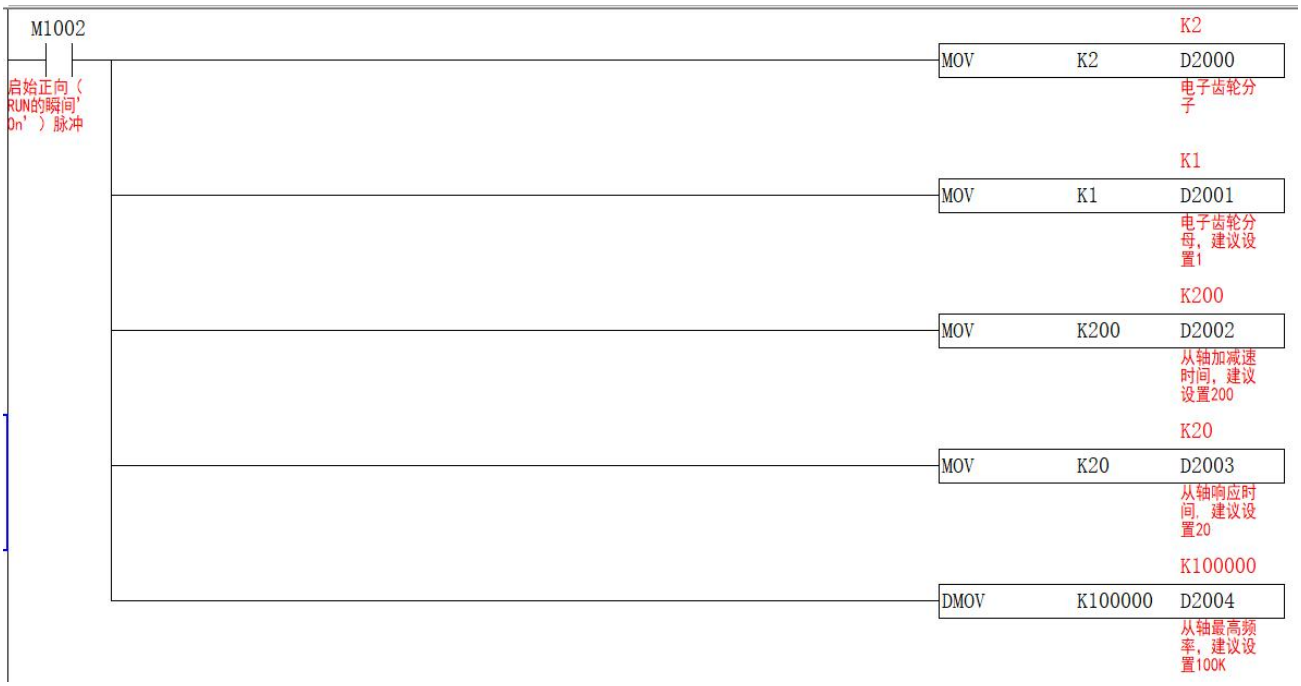
S2	master axis number	16bits	/	/
S3	Slave axis number	16bits	/	/

5) Example

Example: It is required that the film feeding roller and the printing roller keep the same linear speed, the diameter of the feeding roller is 300mm, the number of pulses in one circle is 2000, the diameter of the printing roller is 150mm, and the number of pulses in one circle is 2000.

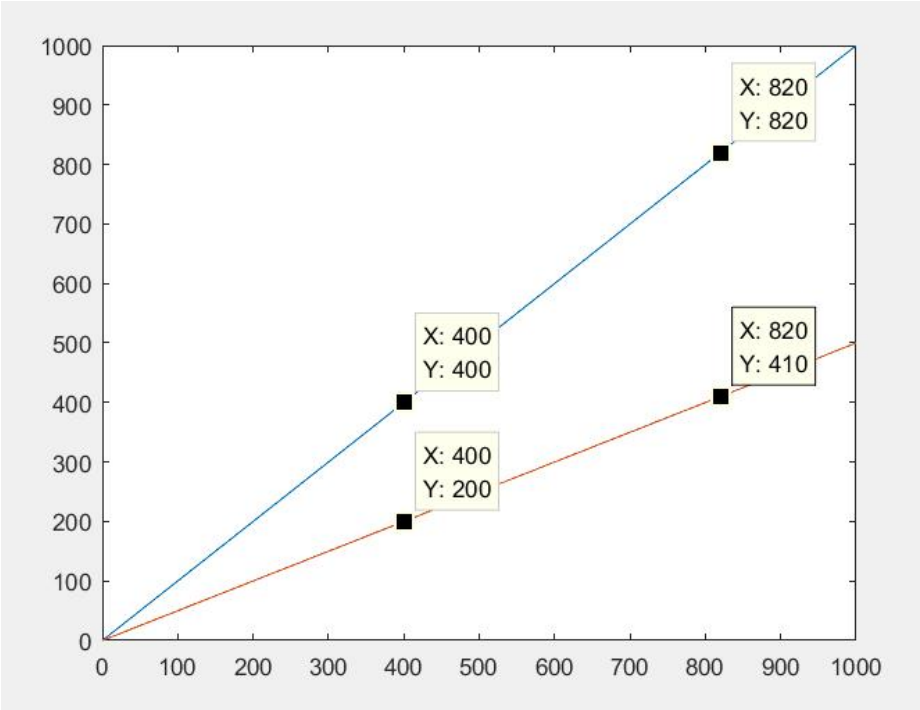


1. The diameter of the film feeding roller is proportional to the diameter of the printing roller, so the circumference is also proportional, and because the number of pulses per revolution of the two axes is equal, the pulse equivalent is also proportional, which is 2:1. The speed is twice the speed of the feeding axis, and the two axes can keep the line speed synchronous. The ladder diagram for the input parameters of S1 is as follows



2 After the parameters are set, turn M0 ON, and the slave axis will follow the set parameters proportionally. The ladder diagram is as follows

3. The pulse curves of the two axes are as follows, and the Y axis is the number of pulses sent. The blue line represents the pulse position of the printing roller, and the red line represents the pulse position of the feed roller.



Follow-up continuous movement [FOLLOW]

1) Instruction overview

The slave axis follows the master axis (which can be an encoder) and continues to move, the direction of the master axis changes, and the slave axis changes accordingly. The speed ratio to follow is determined by the parameter.

Follow-up continuous movement [FOLLOW]			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2) Operands

Operands	Function
S1	Specify the master axis number
S2	Specify the starting address of the input parameter
S3	Specify the slave axis number

3) Function and Action

● S1 specifies 【master axis axis number】. Select the axis number of the master axis, if it is an encoder, write C251 (X0, X1) or K-1 for the axis number.

● S2 specifies [input parameter start address]. Occupied registers S1~S1+5

● S3 specifies 【slave axis number】. Selected slave axis number

●When M0 is turned from OFF to ON, the slave axis group S3 follows the master axis axis group S1, the following speed ratio is determined by S2 and S2+1, the following acceleration and deceleration of the slave axis is determined by S2+2, and the response time is determined by S2+3 Decide.

●After the FOLLOW command is enabled, the master axis group can use the pulse command to make it move, and the slave axis will follow according to the set ratio.

The pulse sent by the master axis/electronic gear ratio = the pulse sent by the slave axis, the current frequency of the master axis/electronic gear ratio = the current frequency of the slave axis

● Compared with CAMSYNC, this command has the advantage that it can follow both positive and negative directions, and can use CMADD motion superposition for the slave axis, while CAMSYNC can only follow one direction. The disadvantage is that the CAMSYNC instruction is more flexible, has cycle positioning, and is more powerful. Compared with the HAND instruction, the precision is higher.

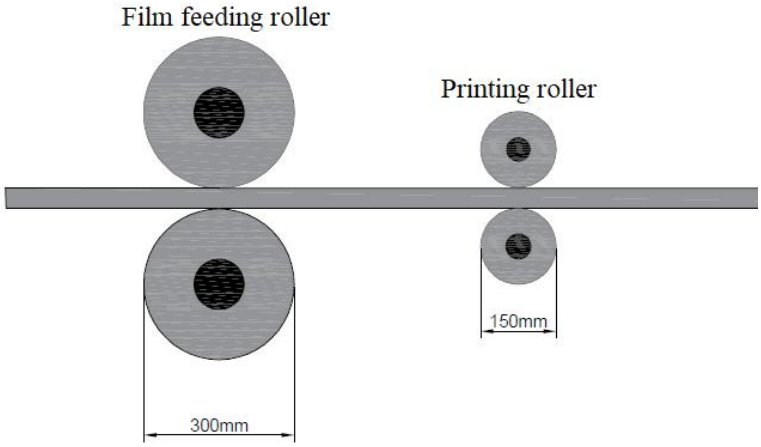
Note: Assuming that the electronic gear ratio is set to 10, the maximum frequency of the slave axis is set to 100K, and the master axis can only run at most 10K, otherwise the slave axis will have positional deviation

4) Related parameters

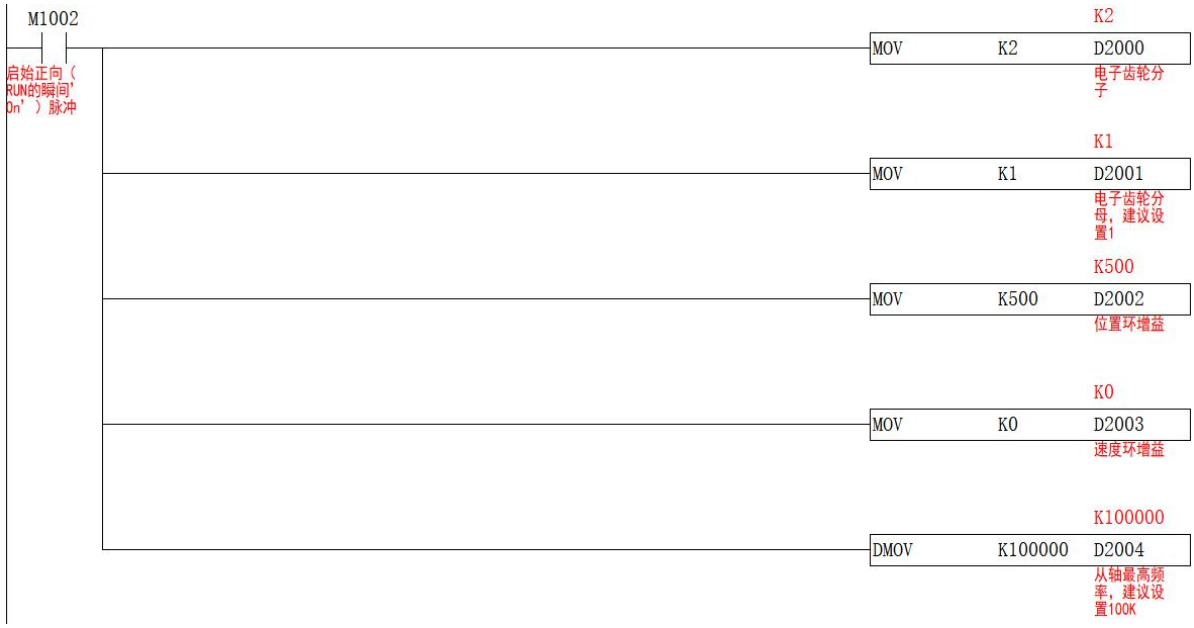
Input parameters	parameter name	type of data	Unit	Note
S1	Master axis number	16bits	/	/
S2+0	electronic gear molecule	16bits	/	/
S2+1	Electronic gear denominator	16bits	/	Determine the following ratio jointly with S2+0
S2+2	Position loop gain	16bits	Ms	It is recommended to set 500
S2+3	Speed loop gain	16bits	Ms	It is recommended to set 0
S2+4	master axis number	32bits	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings from causing speeding
S3	Slave axis number	16bits	/	/

5) Example

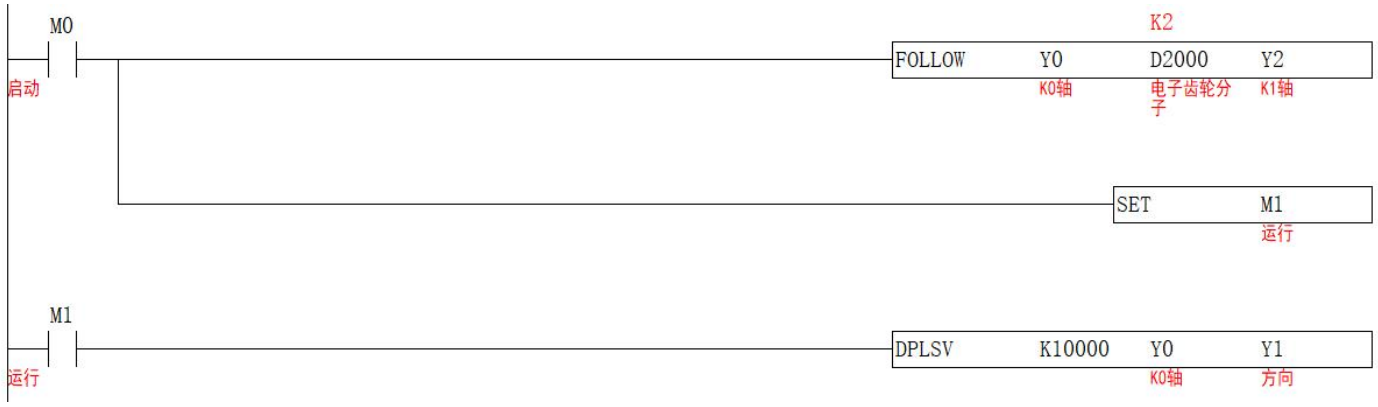
Example: It is required that the film feeding roller and the printing roller keep the same linear speed, the diameter of the feeding roller is 300mm, the number of pulses in one circle is 2000, the diameter of the printing roller is 150mm, and the number of pulses in one circle is 2000.



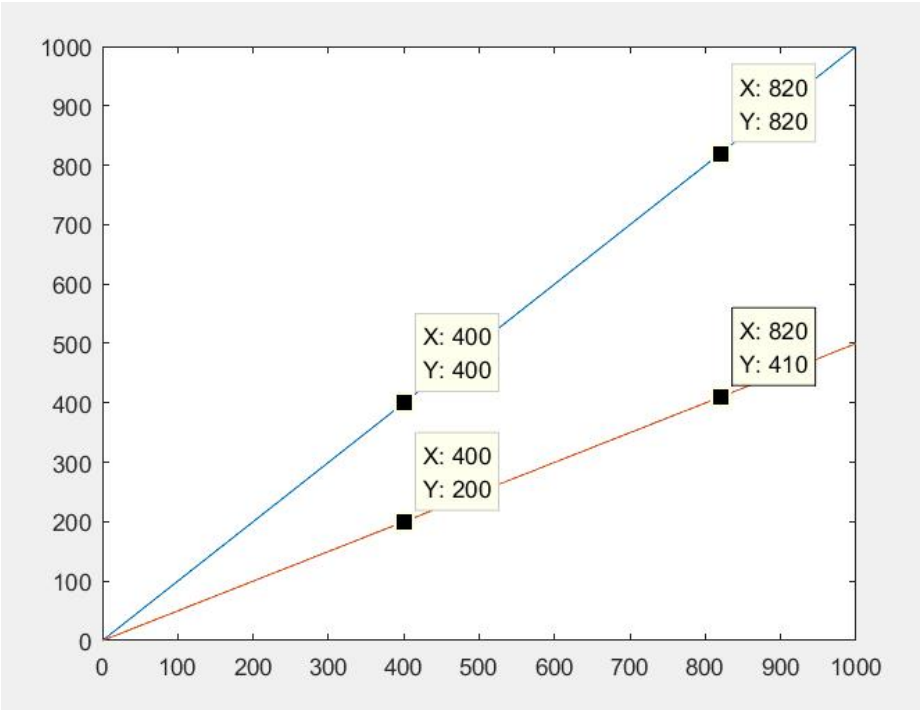
1. The diameter of the film feeding roller is proportional to the diameter of the printing roller, so the circumference is also proportional, and because the number of pulses per revolution of the two axes is equal, the pulse equivalent is also proportional, which is 2:1. The speed is twice the speed of the feeding axis, and the two axes can keep the line speed synchronous. The ladder diagram for the input parameters of S1 is as follows



2. After the parameters are set, turn M0 ON, and the slave axis will follow the set parameters proportionally. The ladder diagram is as follows



3. The pulse curves of the two axes are as follows, and the Y axis is the number of pulses sent. The blue line represents the pulse position of the printing roller, and the red line represents the pulse position of the feed roller.



Flying shears【CAMCUT】

1） Instruction overview

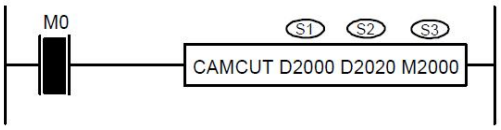
The shearing mechanism is parallel to the object to be sheared, and the shearing mechanism performs reciprocating motion to achieve the purpose of changing the shearing length by changing the speed in the asynchronous area.

Flying shears【CAMCUT】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2） Operands

Operands	Function
S1	Specify the starting address of the master axis input parameter
S2	Specify the starting address of the slave axis input parameter
S3	Specifies the starting address of the output status bits

3） Function and Action



● S1 specifies 【master axis input parameter start address】. Occupied registers S1~S1+7

● S2 designates【slave axis input parameter start address】. Occupy registers S2~S2+23

● S3 specifies the [starting address of output status bit]. Occupy relay S3~S3+3

●Before turning on the command, let the master axis return to the origin, and clear the current pulse number (special register) and S2+22 of the slave axis.

●When M0 changes from OFF to ON, the slave axis group performs Flying shears type reciprocating motion to the master axis axis group. After the master axis travels to the waiting distance of S2+4, the slave axis starts to accelerate from the starting position curve until the master axis completes S2+6. After the acceleration distance, enter the synchronization area, the speed of the two axes is the same, after the S2+8 synchronization distance is traveled, the slave axis starts the curve deceleration action, after the main axis travels the S2+10 deceleration distance, the slave axis starts to travel the reversing distance, and returns after completion. to the starting point, and S3+1 is turned ON at the same time. After the master axis completes S1+4, S3+3 turns ON.

●After the CAMCUT command is enabled, the main axis group can use the pulse command to make it move, and the slave axis reciprocates according to the set parameters.

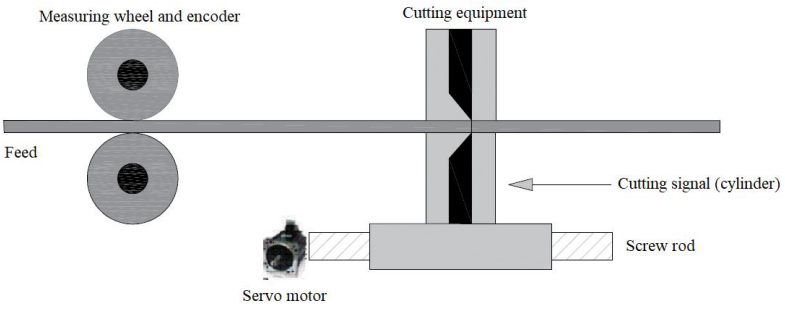
●Note: After changing the number of pulses in one cycle, the next cycle will take effect. S2+14 is greater than the sum of S2+6-S2+12.

4） Related parameters

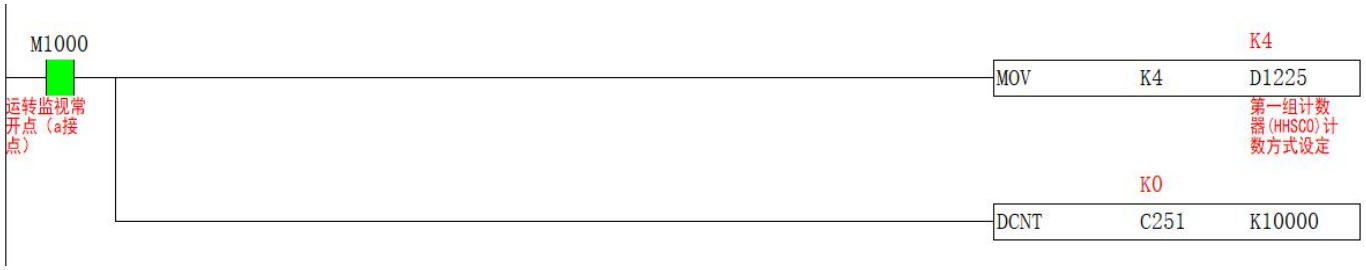
Input parameters	parameter name	type of data	unit	Remark
S1+0	master axis axis number	16 bit	/	If the master axis is an encoder, write K-1
S1+1	reserved	16 bit	/	/
S1+2	Position loop gain	16 bit	/	Write K500 by default
S1+3	Speed loop gain	16 bit	/	Write K0 by default
S1+4	The number of pulses per cycle of the master axis	32 bit	pulse	Number of pulses required to travel one product length
S1+6	master axis one cycle distance	32 bit	0.01mm	the length of a product
S2+0	slave axis number	16 bit	/	/
S2+1	Slave Axis Step	16 bit (read only)	/	Which step is currently running (0~9)
S2+2	Slave Scale	floating point number	0.01mm	1 circle travel distance from the axis (0.01mm)/1 circle pulse
S2+4	waiting distance	32 bit	0.01mm	The distance that the main axis moves at a constant speed and the slave axis does not move
S2+6	Acceleration distance	32 bit	0.01mm	The master axis moves at a constant speed, and the acceleration distance from the axis curve is recommended to be consistent with S2+10
S2+8	Sync distance	32 bit	0.01mm	The master axis moves at a constant speed, and the distance between the slave axis and the main axis line speed is synchronized
S2+10	deceleration distance	32 bit	0.01mm	The master axis moves at a constant speed, and the distance between the slave axis and the master axis to decelerate out of synchronization
S2+12	Commutation distance	32 bit	0.01mm	The distance that the master axis moves at a constant speed and the slave axis is reversing and ready to return
S2+14	Slave travel	32 bit	0.01mm	Soft limit protection, improper setting will cause the slave axis to behave abnormally
S2+16	offset distance	32 bit	0.01mm	The distance from the overall offset of the shaft, suitable for use when adjusting the deviation
S2+18	function code	32 bit	/	0 represents Flying shears back and forth , if one direction, set the number of pulses
S2+20	Slave maximum frequency	32 bit	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings
S2+22	master axis current pulse position	32 bit	/	The current pulse mapping address of the master axis, which works within a period of zero to one cycle
S2+24	fallback distance	32 bit	0.01mm	0 means return to the origin, it is recommended to set 0
S2+26	Slave start position	32 bit	0.01mm	It is recommended to set 0
S2+28	return distance	32 bit	0.01mm	If it is 0, the return distance is automatically calculated. If there is a value, the parameter setting shall prevail. If this parameter is greater than the system calculation value, the system calculation value shall prevail. The return distance should not be set too small, otherwise it may cause the slave to return to flying.
S3+0	Sync signal output	BOOT	/	ON when the slave axis enters the synchronization zone, and OFF when it leaves the synchronization zone
S3+1	Flying shears shaft has worked for one cycle	BOOT	/	ON when slave axis completes one cycle back to origin, OFF by PLC
S3+2	Flying shears shaft overspeed sign	BOOT	/	ON when the slave axis speed exceeds S2+20
S3+3	The master axis has worked for one cycle	BOOT	/	ON when the master axis runs out of S1+4 pulses per cycle
S3+4	synchronous termination	BOOT	/	Turn ON when the slave axis is working in the synchronization area, the synchronization will be ended immediately, and the return will be early.

5） xample

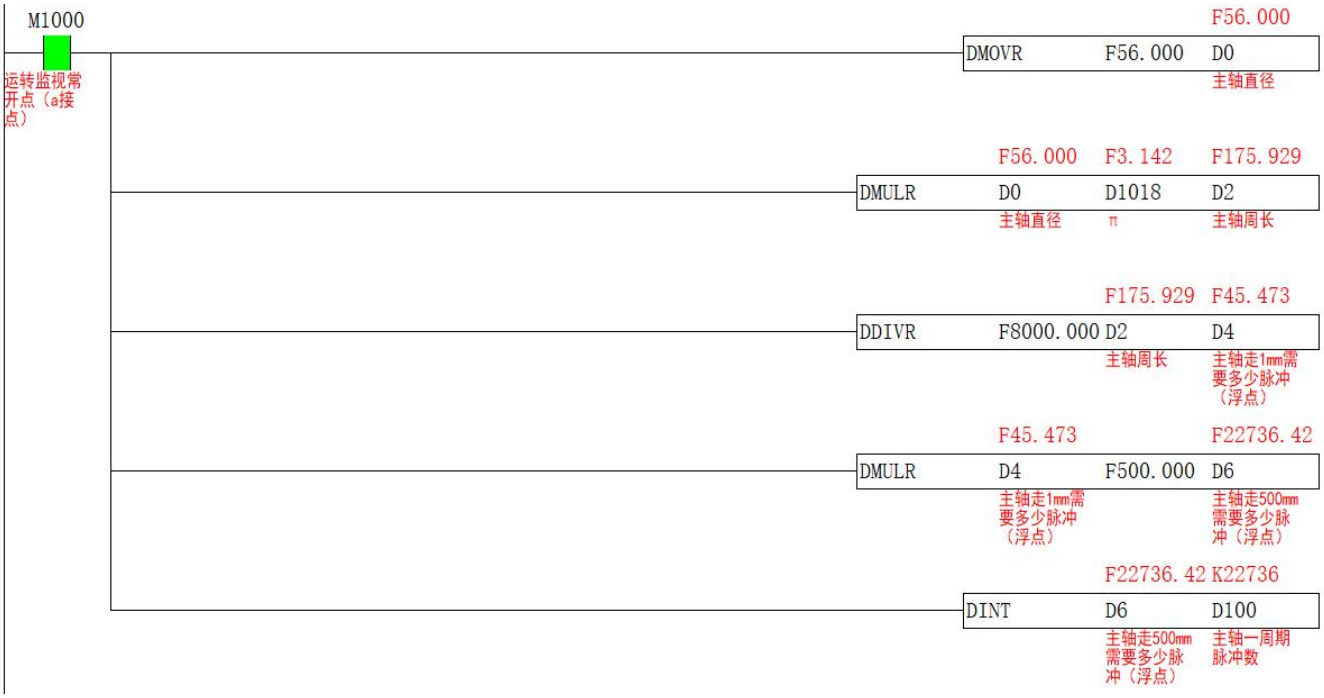
Example: The diameter of the measuring wheel is 56mm, the encoder is 2000 lines, and it is connected to the PLC input terminals X0 and X1. The servo motor is controlled by the PLC output terminals Y0 and Y1. The left and right movement of the cutting equipment is controlled by the servo motor. The servo rotates once (2000 pulses) and the screw travels 10mm. The cutting cylinder is controlled by the PLC output terminal Y4. The required cut out length is 500mm.



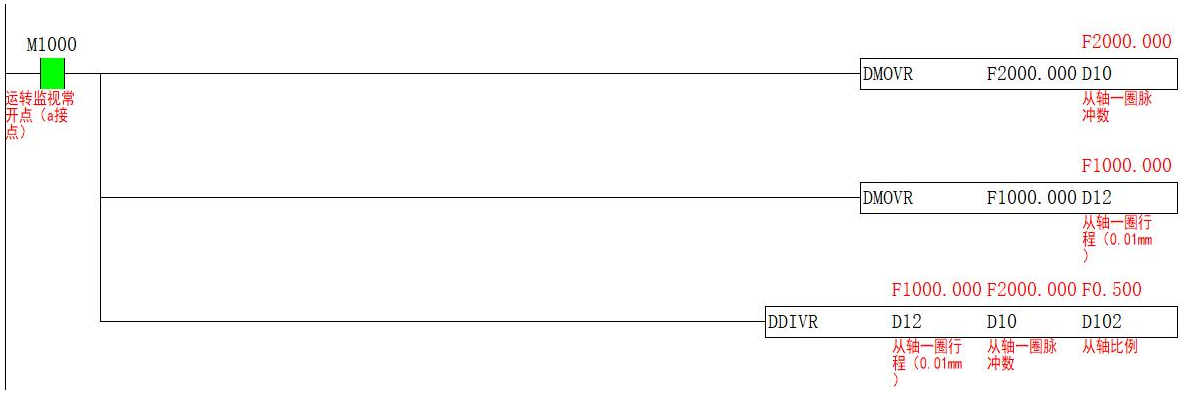
1. First, the high-speed counting input is multiplied by 4, and the number of feedback pulses in one circle of the measuring wheel is 2000*4=8000 (pulses)



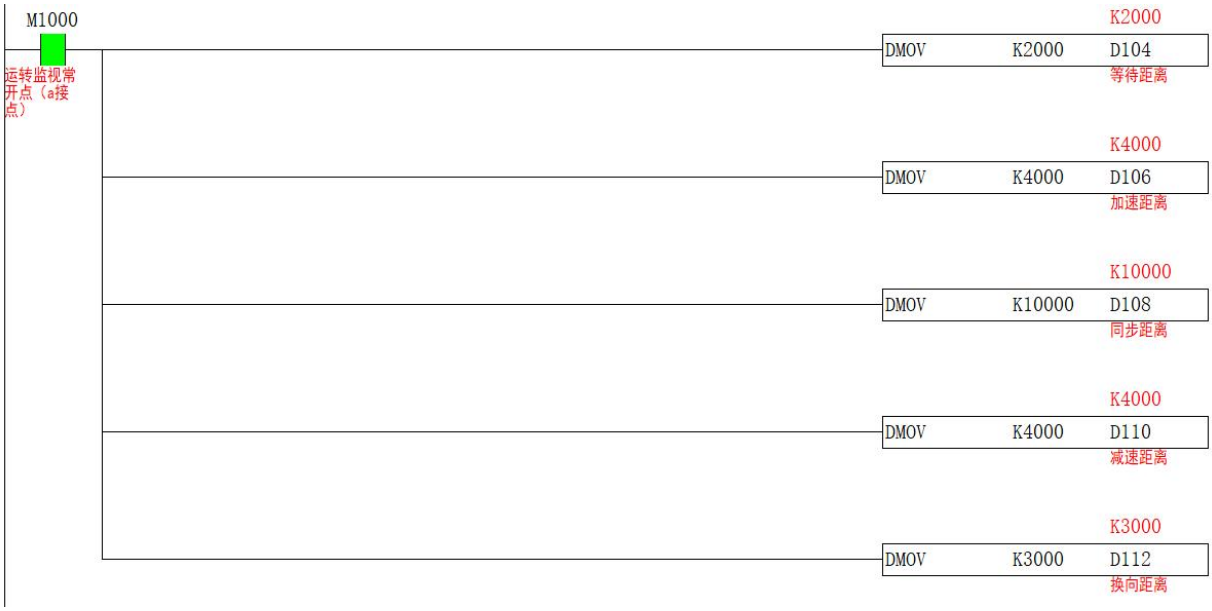
2. Calculate how many pulses the master axis needs to travel 1mm and fill in S1+4. It is known that the diameter of the measuring wheel is 56mm, the circumference is 56*π≈175.9mm, and because the number of feedback pulses in one circle of the measuring wheel is 8000, the measuring wheel needs 8000/175.9≈45 (pulses) to travel 1mm. When calculating how many pulses are needed to travel 500mm, the diameter in the ladder diagram, the number of feedback pulses per revolution of the master axis and the shear length can be done on the touch screen with the D register. The ladder diagram is as follows



3. Calculate the ratio of the S2+2 slave axis, the distance of one revolution of the slave axis (0.01mm) / the number of pulses of one revolution of the slave axis = 1000/2000 = 0.5, the ladder diagram is as follows



4. Determine the parameters from S2+4 to S2+12 according to the cutting length = waiting distance + acceleration distance + synchronization distance + deceleration distance + reversing distance + return distance. The cutting length is 500mm, and the synchronization distance is set as 100mm, the acceleration and deceleration distance is 40mm, the waiting distance is 20mm, and the reversing distance is 30mm, then the return distance=500-(100+40+40+20+0)=270, and the distance parameters can be adjusted according to the site conditions.

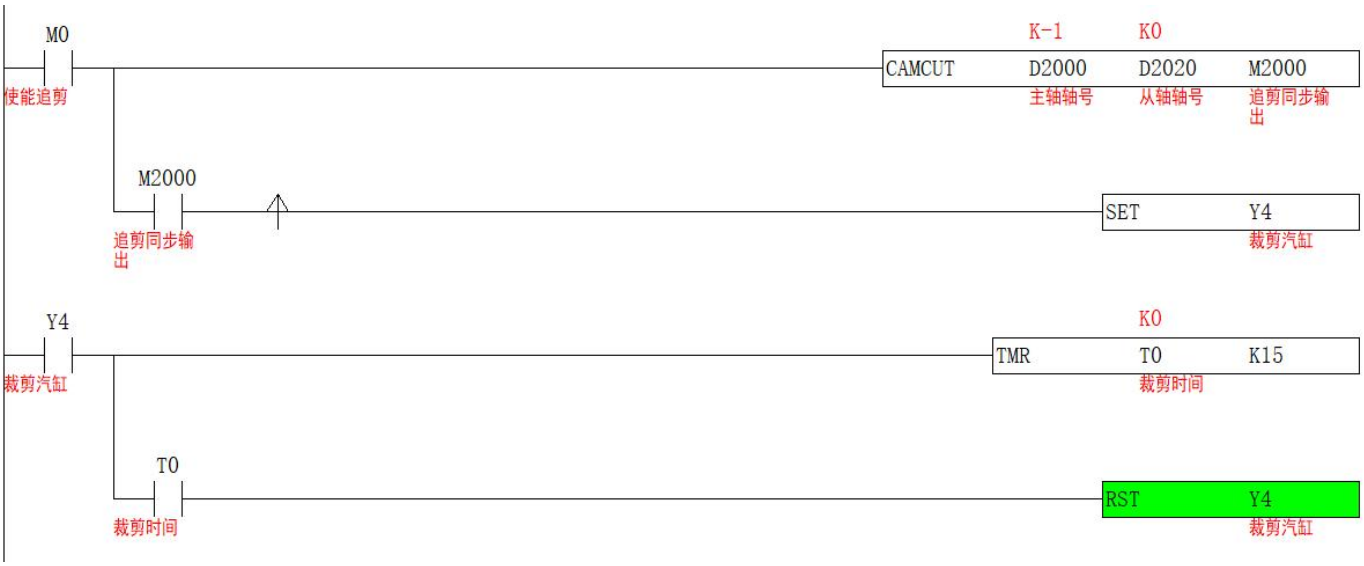


5. The ladder diagram of S1 master axis input parameters is as follows

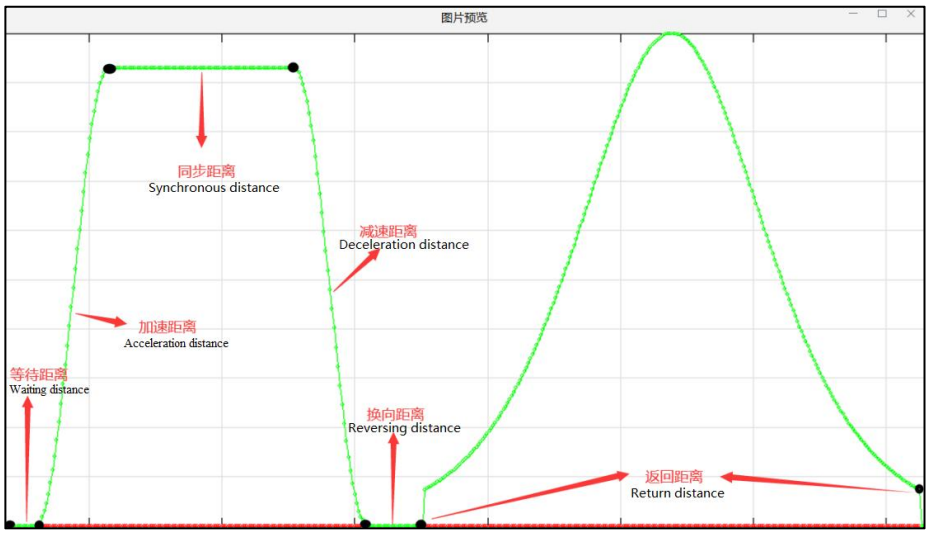
6. The S2 slave axis input parameter ladder diagram is as follows

7. Before turning on the CAMCUT instruction, it is necessary to return the slave axis to the origin, and clear C251, S2+22 and D1648, the ladder diagram is as follows

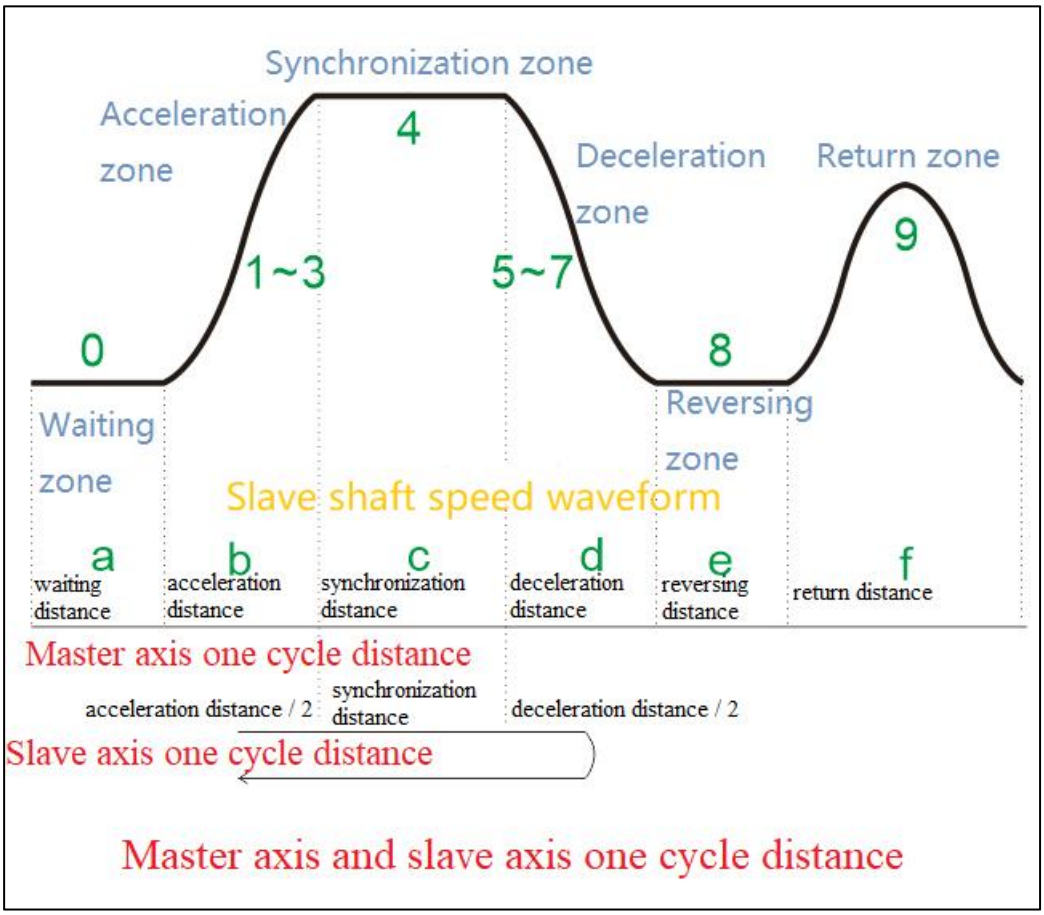
8. After the slave axis returns to the origin and clears the current number of pulses, the CAMCUT instruction is turned on, and the slave axis reciprocates according to the set parameters. The cutting signal is turned ON when the S3+0 synchronization signal is sent, and the cylinder output time is subject to the on-site process. The ladder diagram is as follows



9. The speed curve of the axis group operation is as follows



6) Principle description



master axis one cycle distance = shearing length (L) = waiting distance (a) + acceleration distance (b) + synchronization distance (c) + deceleration distance (d) + reversing distance (e) + return distance (f)

Slave axis to travel = acceleration distance / 2 + synchronization distance + deceleration distance / 2

Chase cut Flying shears【CAM】

1) Instruction overview

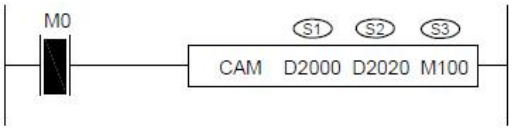
Different from ordinary Flying shears, the pursuit-type Flying shears do not need to set the length of one cycle of the main shaft, and the position is sensed by the sensor, which can cut products with different lengths.

Chase cut Flying shears【CAM】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2）Operands

Operands	Function
S1	Specify the starting address of the master axis input parameter
S2	Specify the starting address of the slave axis input parameter
S3	Specifies the starting address of the output status bits

3）Function and Action



● S1 specifies 【master axis input parameter start address】. Occupied registers S1~S1+5

● S2 designates【slave axis input parameter start address】. Occupy registers S2~S2+39

● S3 specifies the [starting address of output status bit]. Occupy relay S3~S3+5

●Before turning on the command, let the master axis return to the origin, and clear the current pulse number (special register) and S2+14, S2+6, S2+7 of the slave axis to zero.

●When M0 is turned from OFF to ON, the slave axis group performs the Flying shears type reciprocating motion to the main axis group. When S3+0 is turned ON, the system records the current position of the master axis, stacks the data, and stores the data in the register designated by S2+4. At the same time, S2+6 is incremented by 1. When walking the distance of S2+18, the system automatically fetches the stack. Add 1 to start the Flying shears action from the axis.

●Note: After the CAM command is enabled, the master axis axis group can use the pulse command to make it move, and the slave axis reciprocates according to the set parameters.

●Note: After changing the slave axis distance parameter, it will take effect in the next cycle, but not in this cycle. S2+14 is greater than the sum of S2+6-S2+12.

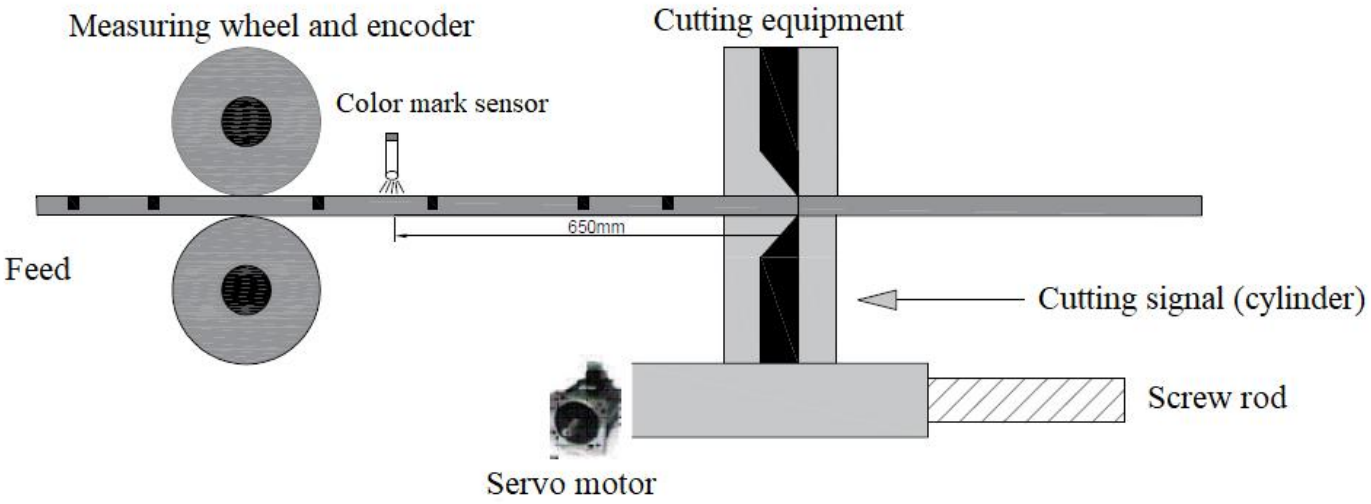
4）Related parameters

Input parameters	parameter name	type of data	unit	Remark
S1+0	master axis axis number	16 bit	/	If the master axis is an encoder, write K-1
S1+1	function code	16 bit	/	Fixed write K14
S1+2	Position loop gain	16 bit	/	Write K500 by default
S1+3	Speed loop gain	16 bit	/	Write K0 by default
S1+4	master axis pulse equivalent	floating point number	0.01mm	Calculate how much 0.01mm to send a pulse
S2+0	slave axis number	16 bit	/	/
S2+1	Slave Axis Step	16 bit (read only)	/	which step is currently running

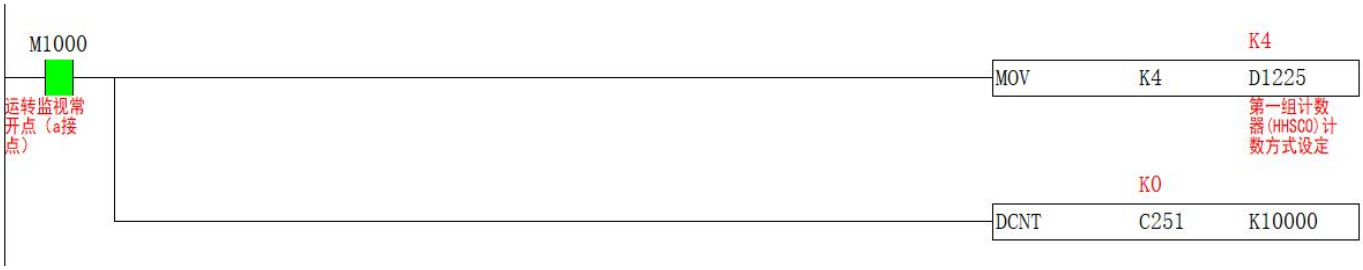
S2+2	Minimum spacing allowed per product	32 bit	0.01mm	If the measured product length is less than this value, it will not be pushed into the stack and filtered.
S2+4	Pre-stored coordinate start D register	16 bit	/	Store the starting address of the length data, write K4000, then start from D4000
S2+5	Pre-stored length	16 bit	/	If K10 is written, 20 addresses are occupied, and the starting address is determined by S2+4
S2+6	Prestore the current pointer	16 bit (read only)	/	Monitor how many data are currently stored
S2+7	get the current pointer	16 bit (read only)	/	Monitor several data currently taken out
S2+8	Slave pulse equivalent	floating point number	0.01mm	Calculate how much 0.01mm to send a pulse
S2+10	Slave travel	32 bit	0.01mm	Soft limit protection, improper setting will cause the slave axis to behave abnormally
S2+12	Slave maximum frequency	32 bit	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings
S2+14	master axis current pulse position	32 bit	/	The current pulse mapping address of the master axis, which works within a period of zero to one cycle
S2+16	specified push data	32 bit	number of pulses	Specifies the length of the data to be pressed, used with M+4
S2+18	get stack offset	32 bit	0.01mm	Distance between the sensor and the tangent point of the slave axis
S2+20	Acceleration distance	32 bit	0.01mm	The master axis moves at a constant speed, and the acceleration distance from the axis curve is recommended to be consistent with S2+24
S2+22	Sync distance	32 bit	0.01mm	The master axis moves at a constant speed, and the distance between the slave axis and the main axis line speed is synchronized
S2+24	deceleration distance	32 bit	0.01mm	The master axis moves at a constant speed, and the distance between the slave axis and the master axis to decelerate out of synchronization
S2+26	Commutation distance	32 bit	0.01mm	The distance that the master axis moves at a constant speed and the slave axis is reversing and ready to return
S2+28	return distance	32 bit	0.01mm	If the actual remaining return distance is smaller than the set return distance, the actual one shall prevail.
S2+30	function code	32 bit	/	0 represents Flying shears back and forth , if one direction, set the number of pulses
S2+32-S2+39	system reservation	/	/	/
S3+0	Coordinate storage	BOOT	/	Store a coordinate for ON, OFF by the system
S3+1	Sync signal output	BOOT	/	ON when the slave axis enters the synchronization zone, and OFF when it leaves the synchronization zone
S3+2	Flying shears shaft overspeed sign	BOOT	/	ON when the slave axis speed exceeds S2+20
S3+3	Flying shears shaft has worked for one cycle	BOOT	/	ON when the slave axis returns to the origin after completing one cycle
S3+4	Operating mode	BOOT	/	ON means that the pushed data is pushed from the data specified by S2+16, and OFF means that the data is pushed by the sensor.
S3+5	synchronous termination	BOOT	/	Turn ON when the slave axis is working in the synchronization area, the synchronization will be ended immediately, and the return will be early.

5）Example:

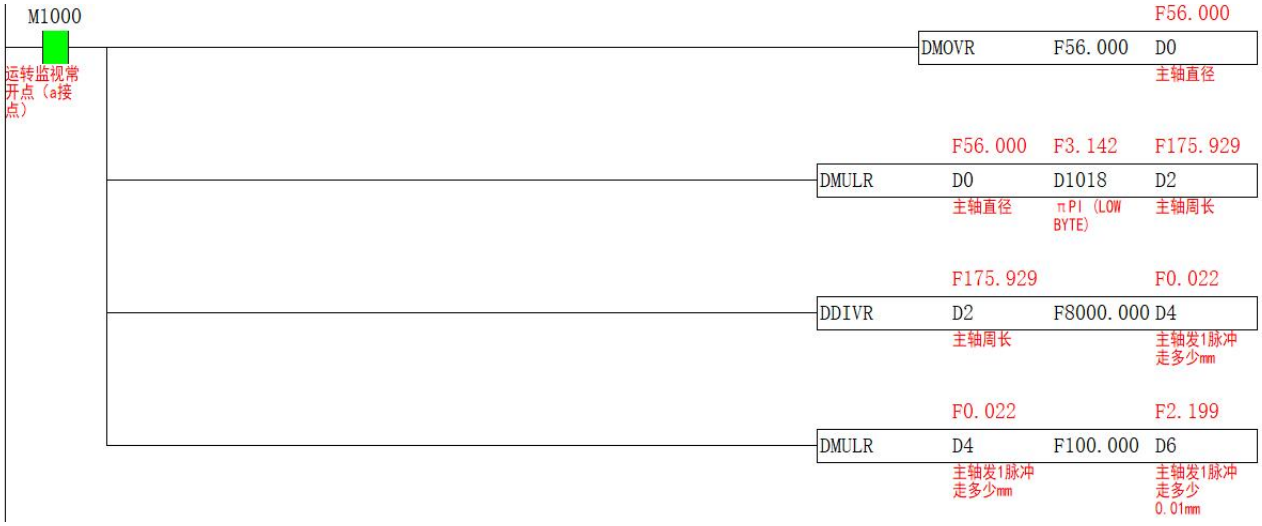
Example: The diameter of the measuring wheel is 56mm, the encoder is 2000 lines, and it is connected to the PLC input terminals X0 and X1. The servo motor is controlled by the PLC output terminals Y0 and Y1. The left and right movement of the cutting equipment is controlled by the servo motor. The servo rotates once (2000 pulses) and the screw travels 10mm. The cutting cylinder is controlled by the PLC output terminal Y4. The cutting equipment in the picture below is already at the origin, the distance from the color mark sensor to the cutting point of the cutting equipment is 650mm, the length of the known shortest material is 200mm, and the length of the longest material is not fixed, so it is required to cut right at the black point in the dot picture. point location,



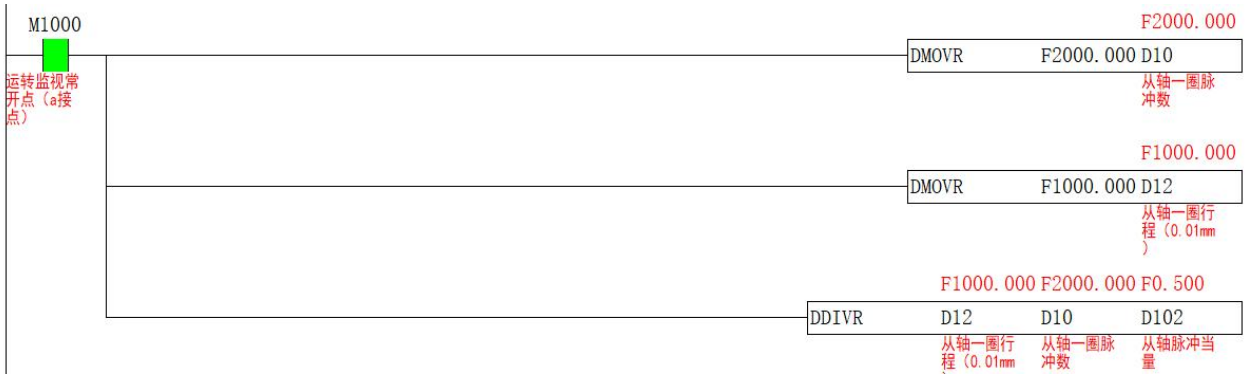
1. First, the high-speed counting input is multiplied by 4, and the number of feedback pulses in one circle of the measuring wheel is 2000*4=8000 (pulses).



2. Calculate how many pulses are required for the master axis to travel 0.01mm and fill in S1+4. It is known that the diameter of the measuring wheel is 56mm, the circumference is 56*π≈175.9mm, and because the number of feedback pulses in one circle of the measuring wheel is 8000, how many mm does one pulse travel = the circumference of the master axis/the number of pulses in one circle = 175.9/8000 =0.022. When calculating how many pulses are needed to travel 0.01mm, the diameter in the ladder diagram and the number of feedback pulses for one revolution of the master axis can be done on the touch screen with the D register. The ladder diagram is as follows

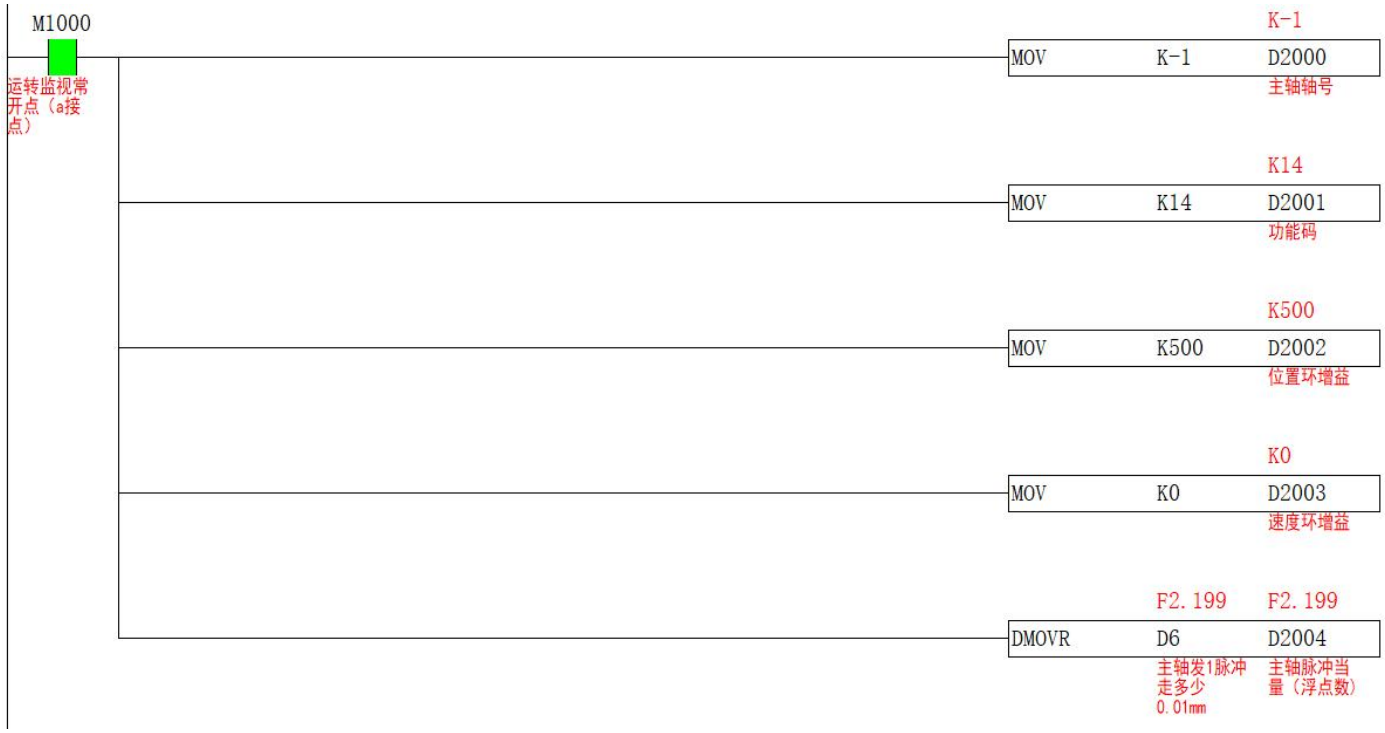


3. Calculate the pulse equivalent of S2+8 slave axis, the distance of one revolution of the slave axis (0.01mm) / the number of pulses per revolution of the slave axis=1000/2000=0.5, the ladder diagram is as follows, the ladder diagram is as follows

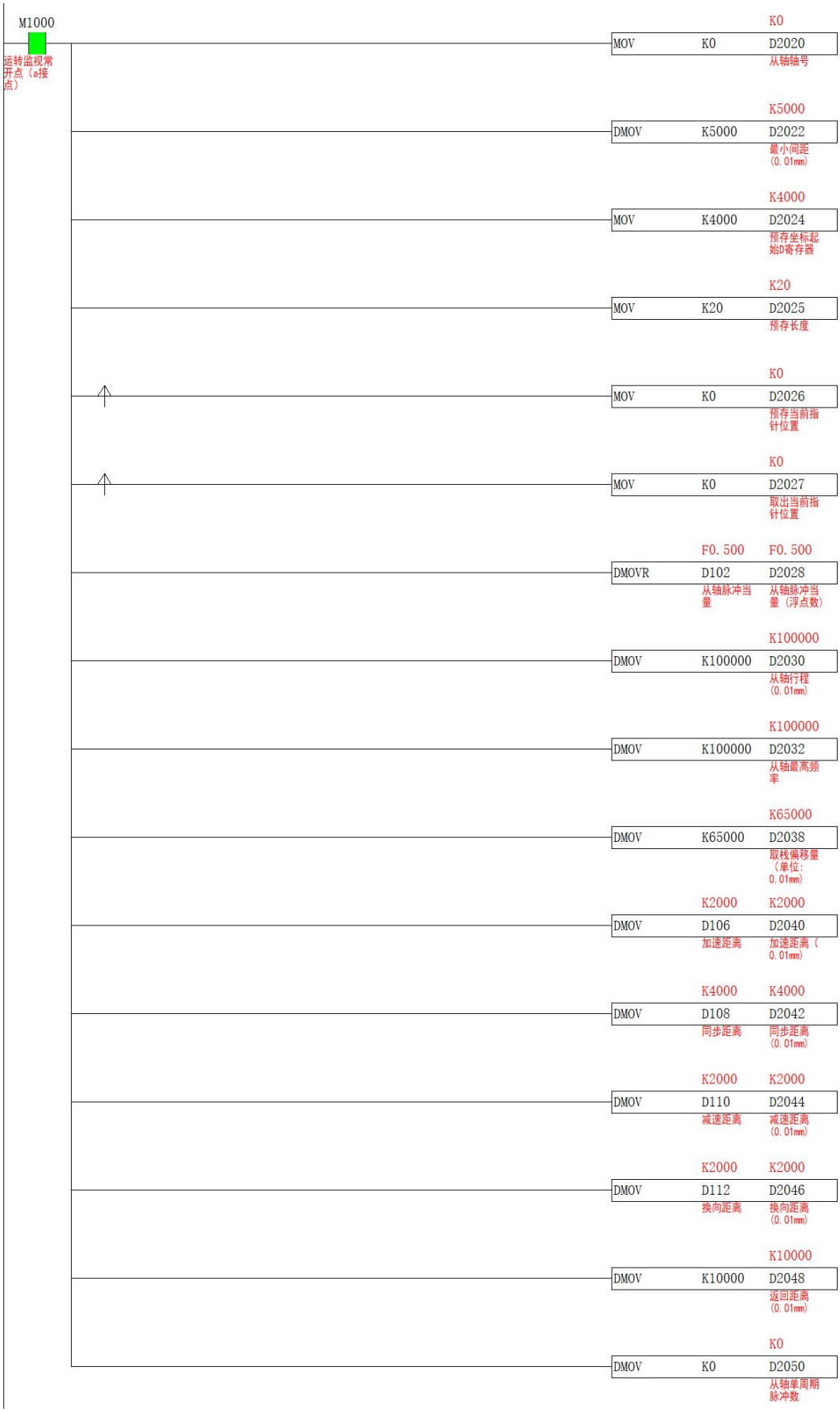


4. Determine the parameters from S2+20 to S2+28 according to the cutting distance = waiting distance + acceleration distance + synchronization distance + deceleration distance + reversing distance + return distance. The shortest cutting length is 200mm, and the synchronization distance is set to is 40mm, the acceleration and deceleration distance is 20mm, and the reversing distance is 20mm, then the return distance is 200-(40+20+20+20)=100mm, and the distance parameters can be adjusted according to the site conditions. The ladder diagram is as follows:

5. The ladder diagram of S1 master axis input parameters is as follows

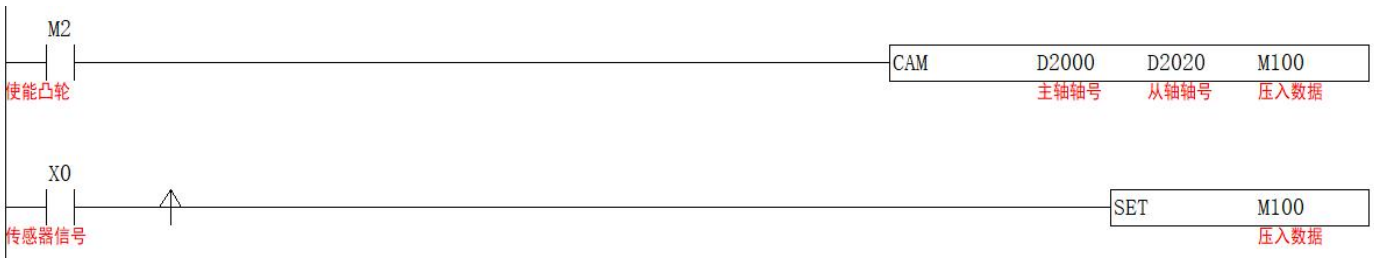


6. The ladder diagram of input parameters of S2 slave axis is as follows. It is known that the distance from the photoelectric to the tangent point of the slave axis is 650mm, so fill in K65000 for S2+18. S2+2 and S2+10 are subject to on-site conditions.



7. Before turning on the command, it is necessary to return the slave axis to the origin, and connect C251, D1648, S2+6, S2+7, S2+14, and the ladder diagram is as follows

8. Turn on the M2 ON command, the slave axis reciprocates according to the set parameters, and turns ON S3+0 when the color mark sensor senses the signal, which is used to store the coordinates. The ladder diagram is as follows



Periodic CAM movement【CAM】

1） Instruction overview

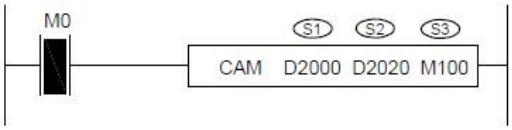
Periodic position control is performed on the specified axis, the master axis moves at a constant speed, and the slave axis performs cam motion.

Periodic CAM movement【CAM】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2） Operands

Operands	Function
S1	Specify the starting address of the master axis input parameter
S2	Specify the starting address of the slave axis input parameter
S3	Specifies the starting address of the output status bits

3） Function and Action



● S1 specifies 【master axis input parameter start address】. Occupied registers S1~S1+9

● S2 designates【slave axis input parameter start address】. Occupied registers S2~S2+14

● S3 specifies the [starting address of output status bit]. Occupy relays S3~S3+4

●Before the command is turned on, S3+4 must be turned on, otherwise the slave axis will not move in the first cycle. It is necessary to return the slave axis to the origin, for example, the movement of the slave axis is one cycle, then the origin should be at the position of "clock 12 o'clock", with the front side facing up. After returning to the origin, clear the current pulse number (special D register) and S2+10 of the slave axis to zero.

●When M0 is changed from OFF to ON, the slave axis group performs periodic cam motion to the main axis group. The number of pulses in a cycle of S1+4 for the master axis, and the number of pulses for a cycle of S2+4 by the slave axis, in which the number of synchronization pulses is determined by S2+6, the synchronization ratio is determined by S2+2, and the synchronization starting point of the slave axis = (S2 +4-S2+6)/2. The acceleration curve and deceleration curve are automatically planned by the system. When one cycle is completed, S3+2 turns ON.

●Note: After the CAM command is enabled, the master axis group can use the pulse command to make it move, and the slave axis performs periodic cam motion according to the set parameters.

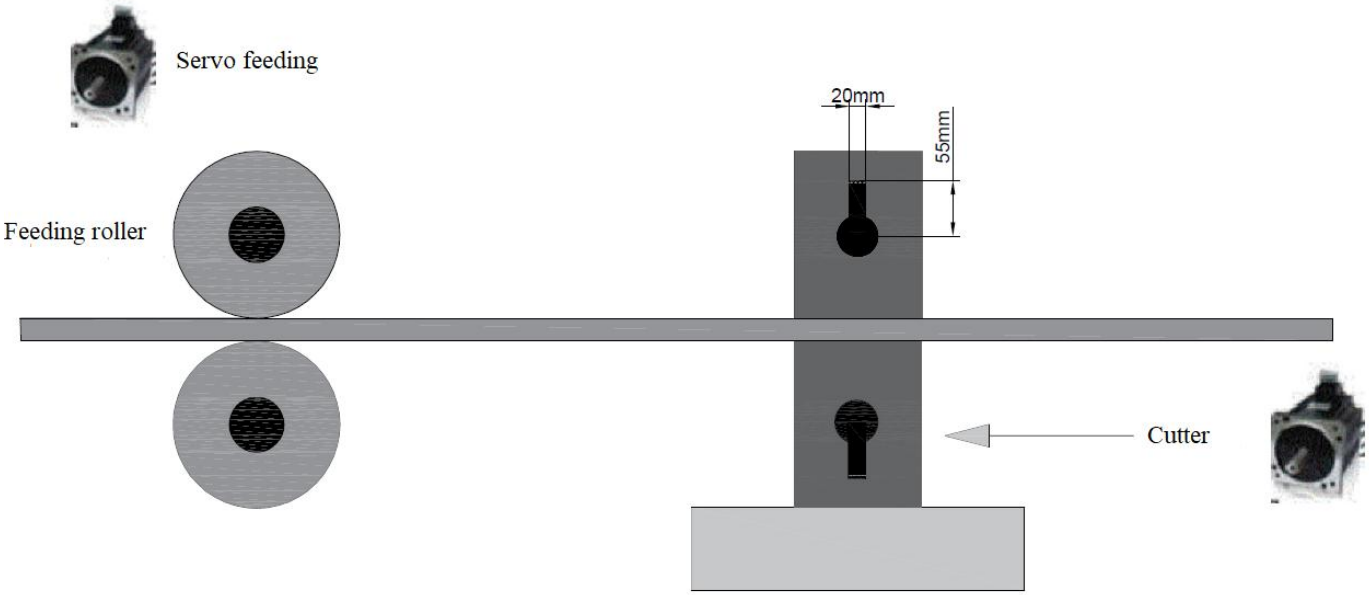
●Note: After changing the pulse parameters of one cycle, it will take effect in the next cycle, but not in this cycle.

4）Related parameters

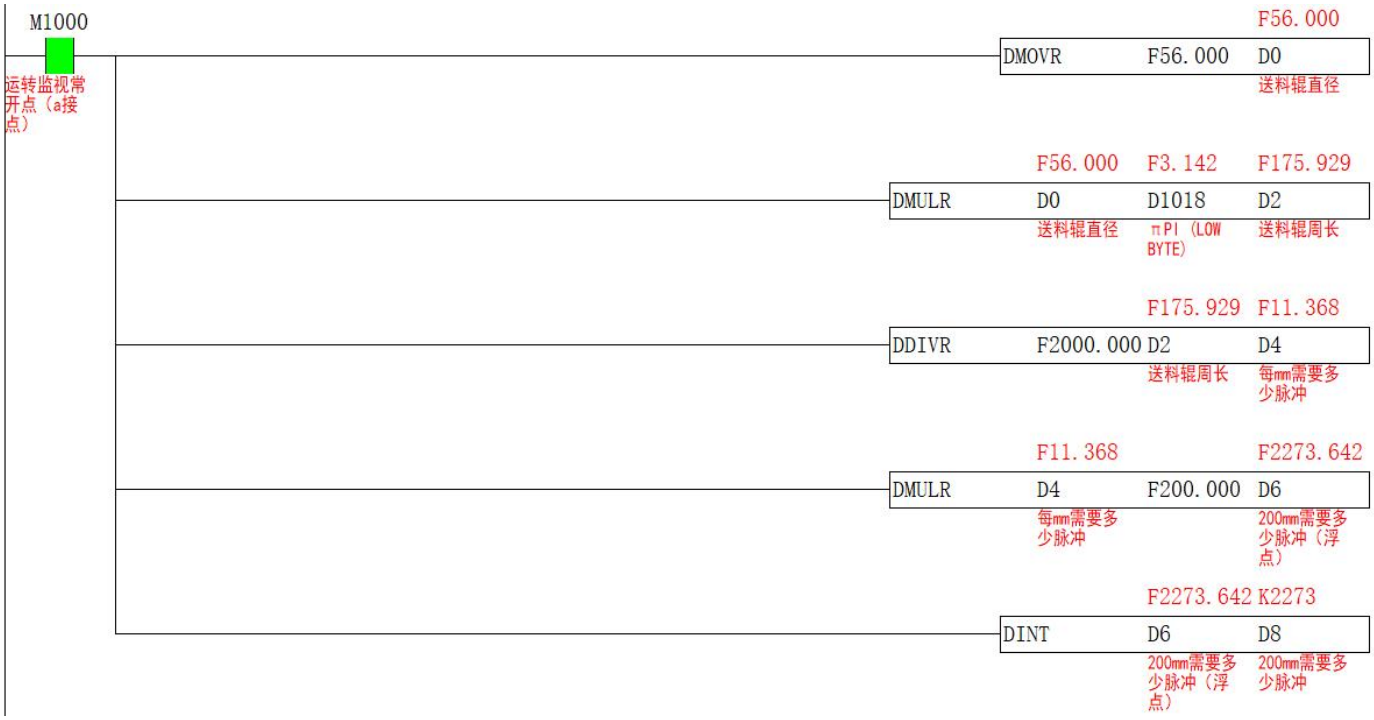
Input parameters	parameter name	type of data	unit	Remark
S1+0	master axis axis number	16 bit	/	If the master axis is an encoder, write K-1
S1+1	function code	16 bit	/	Fixed write K7
S1+2	Position loop gain	16 bit	/	Write K500 by default
S1+3	Speed loop gain	16 bit	/	Write K0 by default
S1+4	The number of pulses per cycle of the master axis	32 bit	number of pulses	Number of pulses required to travel one product length
S1+6	The maximum number of pulses of the master axis	32 bit	number of pulses	Write K0 by default
S1+8	Periodic pulse on master axis (read only)	32 bit	number of pulses	Read the number of pulses per cycle on the master axis
S2+0	slave axis number	16 bit	/	/
S2+1	Slave step (read only)	16 bit	/	which step is currently running
S2+2	Slave Sync Scale	floating point number	/	How many pulses does the master axis need for 1mm / how many pulses does the slave axis need for 1mm
S2+4	Number of pulses per cycle of slave axis	32 bit	number of pulses	The number of pulses required to move a product from the axis
S2+6	Slave synchronization pulse number	32 bit	number of pulses	It is desired to keep the distance from the master axis to keep the line speed consistent
S2+8	Slave maximum frequency	32 bit	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings
S2+10	master axis current pulse position	32 bit	/	The current pulse mapping address of the master axis, which works within a period of zero to one cycle
S2+12	Maximum acceleration of slave axis	16 bit	pulse/ms	Refers to the highest frequency increase per ms. When the current position of the slave axis does not match S2+10, it will be activated. It is used in conjunction with S2+13 and S2+14 to jointly plan the acceleration and deceleration curve and write K0 by default.
S2+13	Slave min speed percentage	16 bit	/	When the current position of the slave axis does not match S2+10, the function is activated, and K0 is written by default.
S2+14	Percentage of the maximum speed of the slave axis	16 bit	/	When the current position of the slave axis does not match S2+10, the function is activated, and K0 is written by default.
S3+0	Sync signal output	BOOT	/	ON when the slave axis enters the synchronization area and OFF when it leaves the synchronization area
S3+1	Slave shaft overspeed sign	BOOT	/	ON when the slave axis speed exceeds S2+8
S3+2	The master axis has worked for one cycle	BOOT	/	ON when the master axis completes one cycle, OFF by PLC
S3+3	sync status	BOOT	/	Slave axis synchronization, ON means it has been synchronized
S3+4	Anti-cut mode	BOOT	/	By default ON before the ON command , When it is OFF, judge whether the current pulse number of the slave axis is 0. If it is 0, the cutter will not move until the master axis has gone through a cycle. ON means that when S2+10 is not 0, the slave axis can run directly in the current cycle.

5）Example

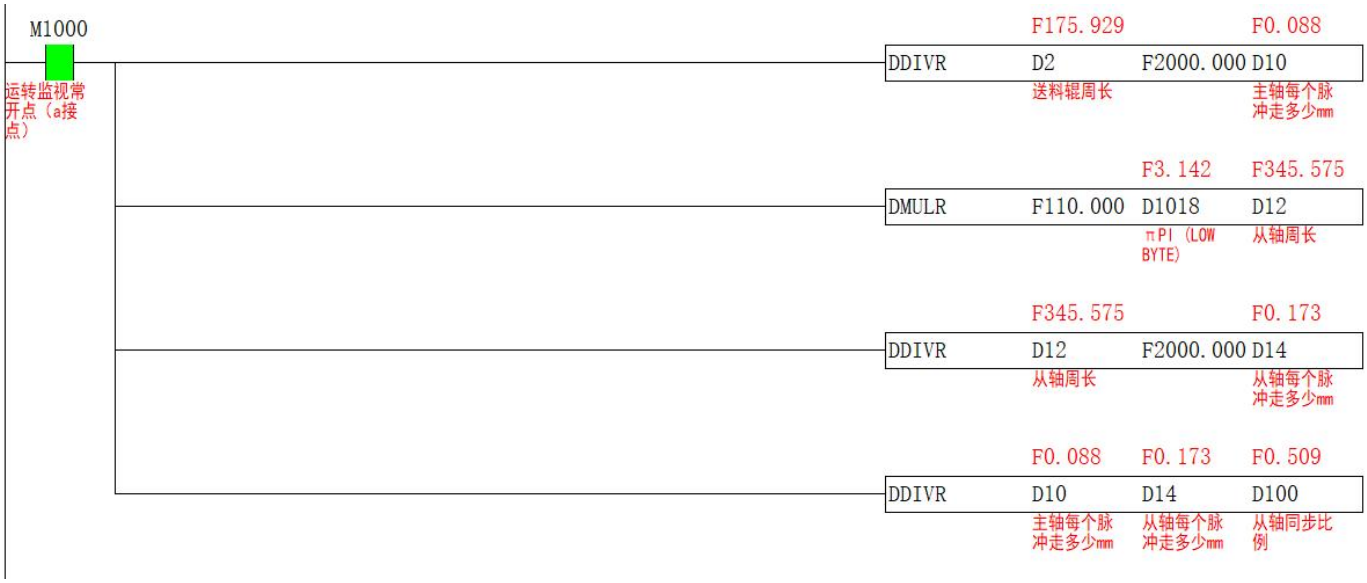
For example: The diameter of the feeding roller is 56mm, the number of pulses in one circle is 2000, controlled by PLC Y0, Y1, the radius of the cutter shaft is 55mm, the diameter is 110mm, the thickness of the knife is 20mm, the number of pulses in one circle is 2000, controlled by PLC Controlled by Y2 and Y3, the cutter axis in the picture is already at the origin, and the line speed is required to be synchronized when it is in contact with the material, and the length of the cutting material is 200mm



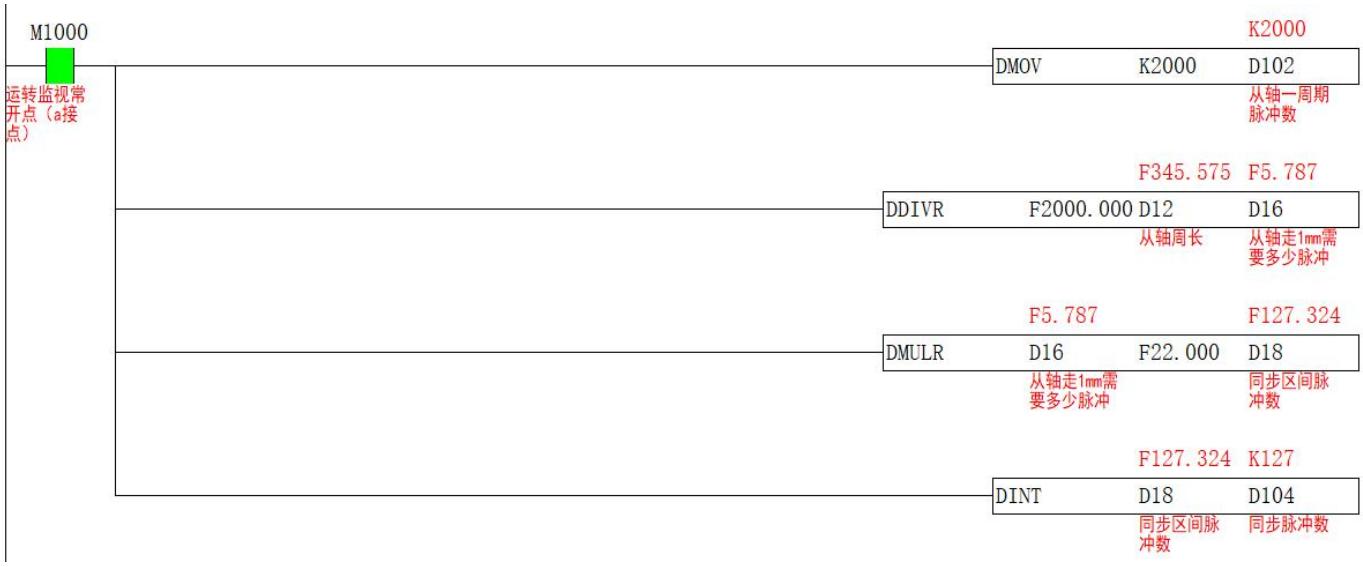
1. Calculate how many pulses the feeding shaft needs to travel 1mm to fill in S1+4. The diameter of the feeding roller is 56mm, the circumference is 56*π≈175.84, and because the number of pulses per revolution is 2000, so the pulses are required to travel 1mm = 2000/175.84≈11.37, if the cutting material length is 200mm, then pulse=11.37*200=2273 pulses, the diameter, the number of pulses in one circle, and the material length can be written on the touch screen with the D register according to the on-site process. The ladder diagram is as follows



2. Calculate how many mm of each pulse of the main shaft and how many mm of each pulse of the slave shaft, used to calculate the parameter S2+2, how many mm of each pulse of the main shaft = feeding roller circumference/number of pulses in one circle = 0.0879, slave shaft How many mm for each pulse = the circumference of the slave axis / the number of pulses in one circle = 0.1727, then S2+2 = 0.0879/0.1727 = 0.509, if the parameter calculation is not accurate, it will cause the master-slave axis to contact the interval out of synchronization, resulting in tearing If there is a phenomenon of material pulling, this parameter can be appropriately reduced according to the site conditions, and vice versa, the ladder diagram is as follows

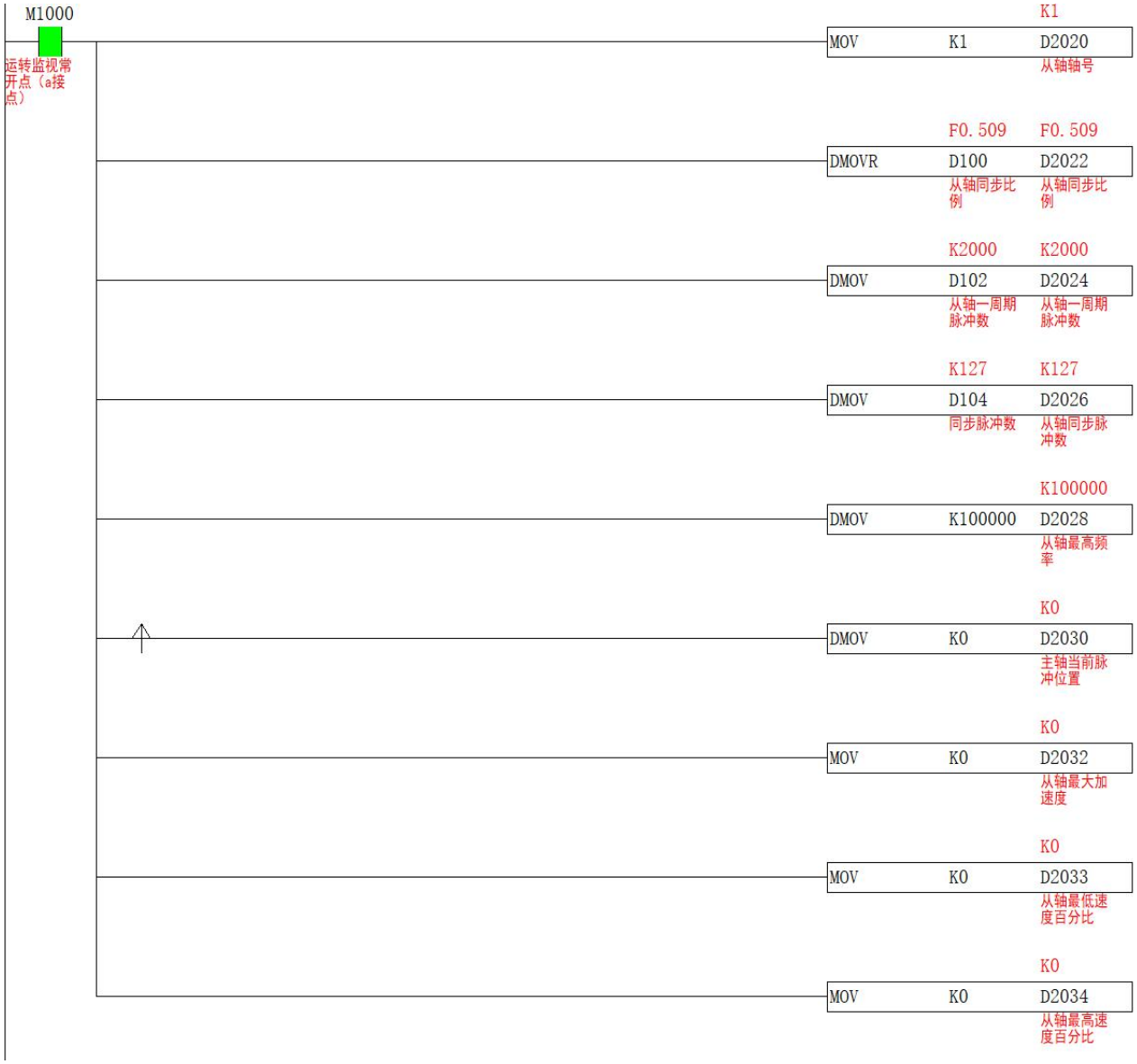


3. The slave shaft rotates once and cuts one piece of material, so the number of pulses per cycle of the slave shaft S2+4 = the number of pulses per revolution of the slave shaft, and the number of synchronous pulses S2+6 represents the number of pulses converted by the length of the interval between the master shaft and the slave shaft. It can be seen from the figure that the thickness of the knife is 20mm, then the length of the synchronization interval is 20mm, and the number of synchronization pulses = the length of the synchronization interval * how many pulses are required to travel 1mm from the axis. However, due to the problems of π and calculation errors, it is recommended to increase the synchronization interval by 1-2mm when calculating the number of synchronization pulses, so that the slave axis can enter the synchronization area earlier and prevent material from being pulled. The ladder diagram is as follows

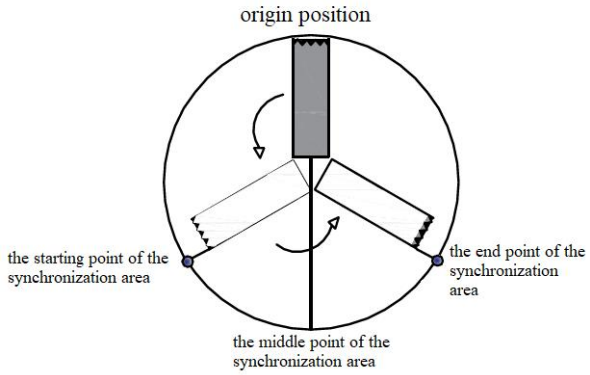


4. The ladder diagram of S1 master axis input parameters is as follows

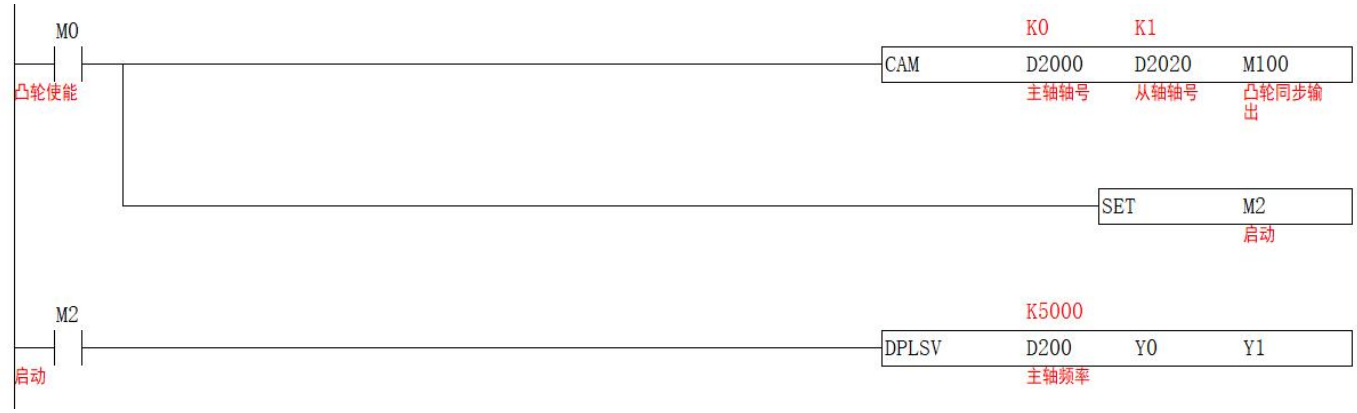
5. The ladder diagram of S1 master axis input parameters is as follows



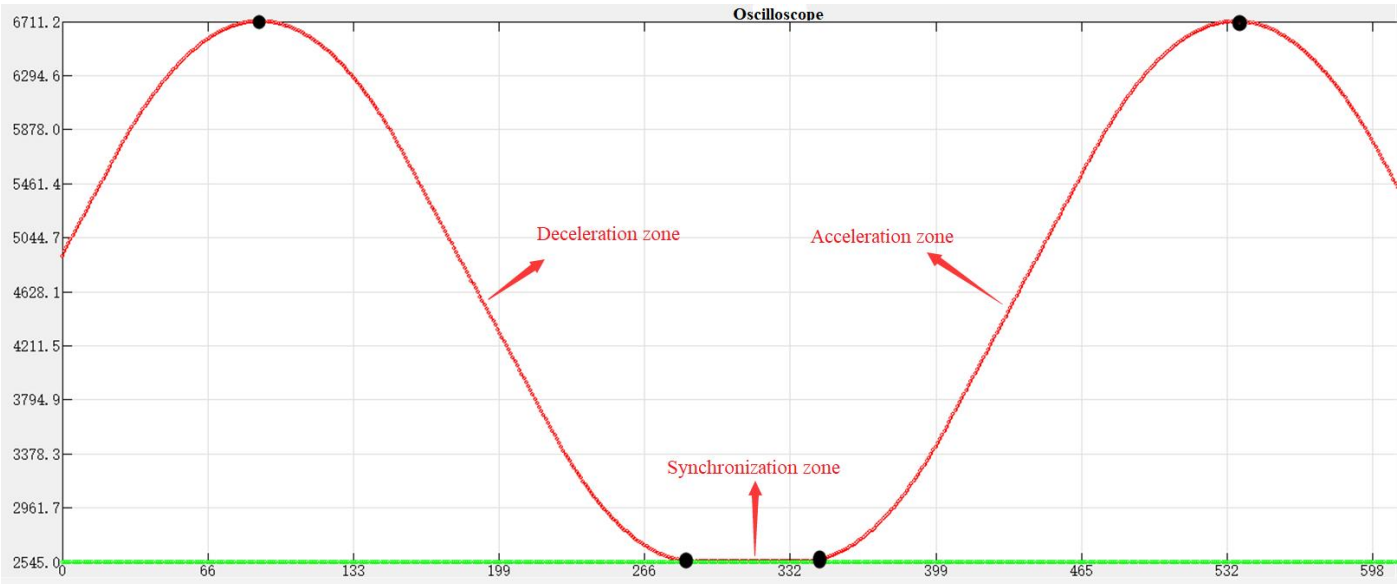
6. Since the cam curve synchronization area of the slave axis is fixed, the slave axis needs to be at a fixed origin position before turning on the command. The origin is set at the 12 o'clock position of the clock, and the midpoint of the synchronization area is at the 6 o'clock position of the clock. The starting point of the synchronization area = the middle point of the synchronization area - S2+6/2, the end point of the synchronization area = the middle point of the synchronization area + S2 + 6/2, as shown in the figure below, after returning to the origin, you need to put the D1648, D1664, S2+10 are cleared, and S3+4 is turned ON. When S3+4 is OFF, the slave axis will have no action in the first cycle. The ladder diagram is as follows



7. After the slave axis returns to the origin and clears the current number of pulses, turn on the CAM command, and the slave axis performs cam motion according to the set parameters. After completing one cycle, S3+2 outputs, the ladder diagram is as follows



The speed curve of the axis group operation is as follows



Chase cut CAM movement【CAM】

1) Instruction overview

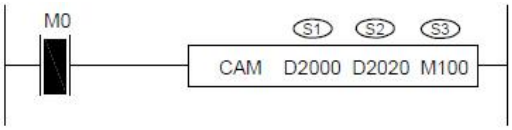
Different from the periodic cam, the chase-cut cam does not need to set the length of one cycle of the main shaft, and the position is sensed by the sensor, which can cut products of different lengths.

Chase cut CAM movement【CAM】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2）Operands

Operands	Function
S1	Specify the starting address of the master axis input parameter
S2	Specify the starting address of the slave axis input parameter
S3	Specifies the starting address of the output status bits

2) Function and Action



● S1 specifies 【master axis input parameter start address】. Occupied registers S1~S1+3

● S2 designates【slave axis input parameter start address】. Occupy registers S2~S2+24

● S3 specifies the [starting address of output status bit]. Occupy relays S3~S3+4

● Before turning on the command, let the master axis return to the origin, and clear the current pulse number (special register) and S2+22, S2+6, S2+7 of the slave axis to zero.

●When M0 is turned from OFF to ON, the slave axis group performs chase-cut cam motion to the main axis group. When S3+0 is turned ON, the system records the current position of the master axis, stacks the data, and stores the data in the register designated by S2+4. At the same time, S2+6 is incremented by 1. When walking the distance of S2+8, the system automatically fetches the stack. Add 1 to start the cam action from the axis. The start position of the sync area is determined by S2+14, and the length of the sync area is determined by S2+16.

●Note: After the CAM command is enabled, the master axis axis group can use the pulse command to make it move, and the slave axis reciprocates according to the set parameters.

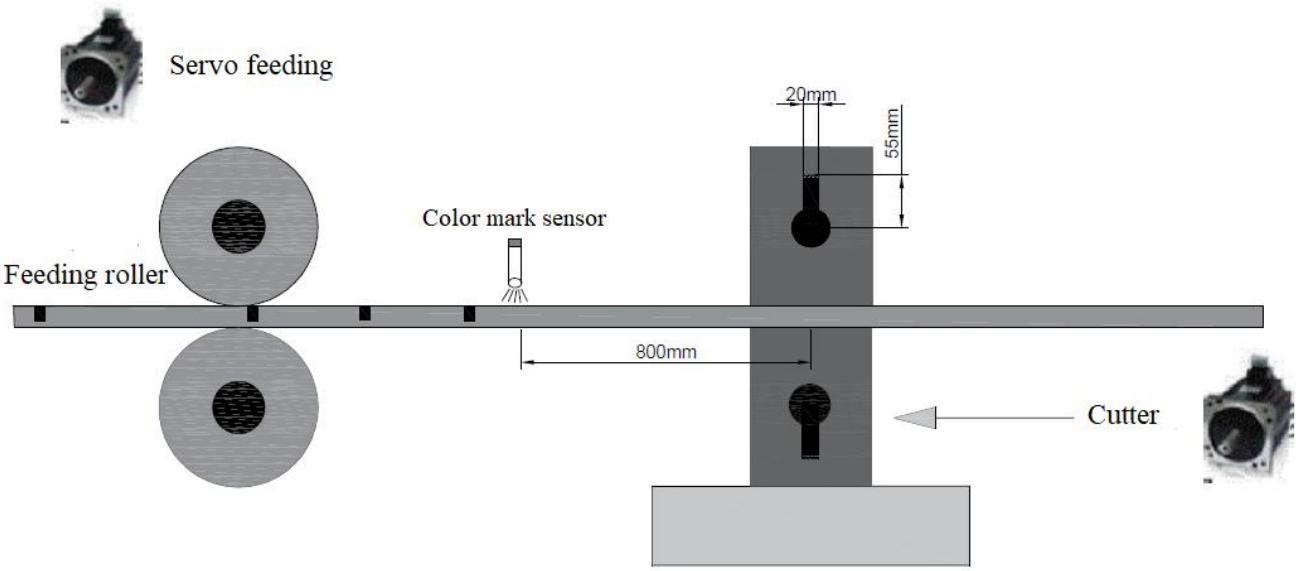
4）related parameters

Input parameters	parameter name	type of data	unit	Remark
S1+0	master axis axis number	16 bit	/	If the master axis is an encoder, write K-1
S1+1	function code	16 bit	/	Fixed write K2
S1+2	Position loop gain	16 bit	/	Write K500 by default
S1+3	Speed loop gain	16 bit	/	Write K0 by default
S2+0	slave axis number	16 bit	/	/
S2+1	Slave Axis Step	16 bit (read only)	/	which step is currently running
S2+2	Minimum spacing allowed per product	32 bit	0.01mm	If the measured product size is smaller than this value, it will not be pushed to the stack
S2+4	Pre-stored coordinate start	16 bit	/	The starting address of the stored data, write K4000, then start

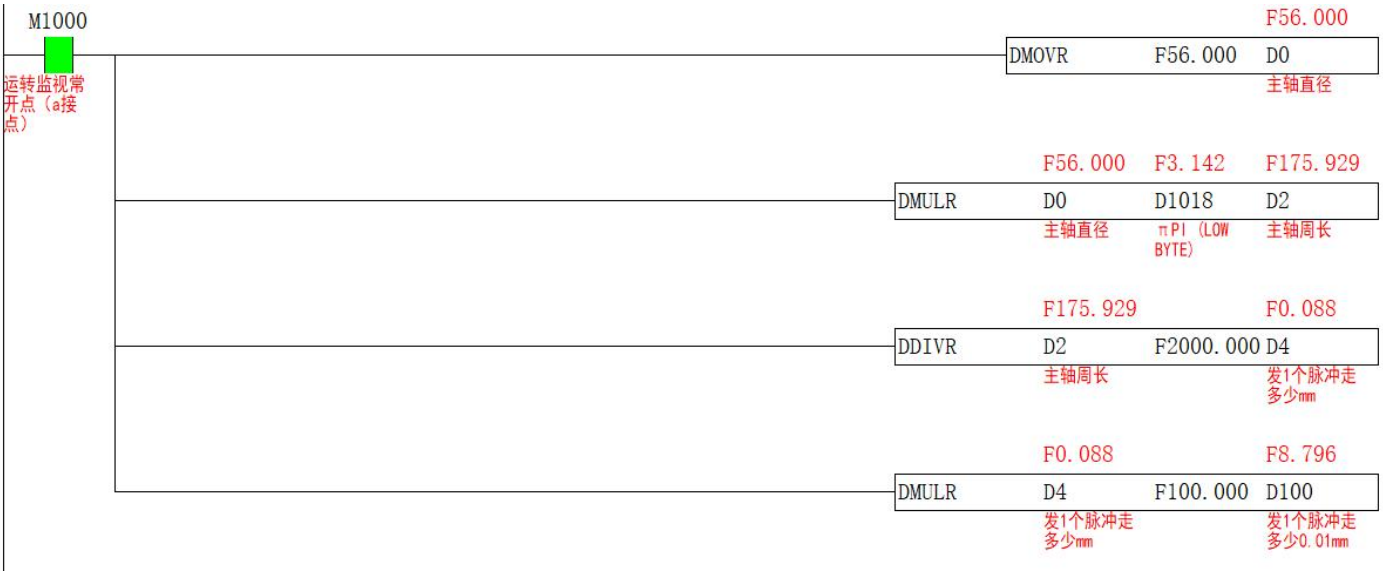
	D register			from D4000
S2+5	Pre-stored length	16 bit	/	If K10 is written, 20 addresses are occupied, and the starting address is determined by S2+4
S2+6	Prestore the current pointer	16 bit (read only)	/	Monitor how many data are currently stored,
S2+7	get the current pointer	16 bit (read only)	/	Monitor several data currently taken out, and S2+7 will automatically increase by 1 when the slave axis moves.
S2+8	get stack offset	32 bit	0.01mm	Distance between sensor and slave axis
S2+10	master axis ratio	floating point number	/	Calculate how many 0.01mm the master axis sends a pulse
S2+12	Sync scale	floating point number	/	(Number of pulses per revolution of slave axis/distance of one revolution of slave axis)/100 (0.01mm)
S2+14	Slave axis synchronization start position	32 bit	/	The starting position of the slave axis synchronization area, such as the origin is up [(S2+18)-(S2+16)]/2
S2+16	Slave sync length	32 bit	number of pulses	Slave synchronization pulse number
S2+18	Number of pulses per revolution of the slave axis	32 bit	/	Generally, the number of pulses required for one revolution of the slave shaft
S2+20	Slave maximum frequency	32 bit	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings
S2+22	master axis current pulse position	32 bit	/	The current pulse mapping address of the master axis, which works within a period of zero to one cycle
S2+24	specified push data	32 bit	number of pulses	Specifies the length of the data to be pressed, used with M+4
S3+0	Coordinate storage	BOOT	/	Store a coordinate for ON, OFF by the system
S3+1	Sync signal output	BOOT	/	ON when the slave axis enters the synchronization area and OFF when it leaves the synchronization area
S3+2	Slave shaft overspeed sign	BOOT	/	ON when the slave axis speed exceeds S2+20
S3+3	The master axis has worked for one cycle	BOOT	/	ON when the master axis completes one cycle, OFF by PLC
S3+4	Operating mode	BOOT	/	ON means that the pushed data is pushed from the data specified by S2+24, and OFF means that the data is pushed by the sensor.

5）Example

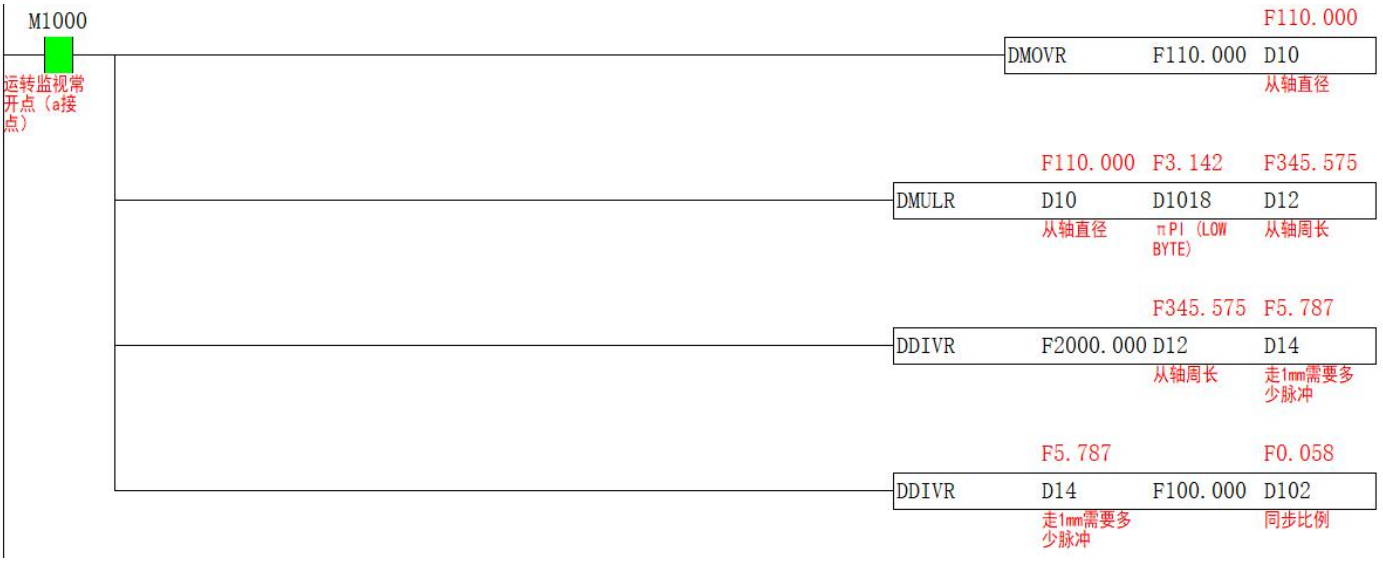
For example: The diameter of the feeding roller is 56mm, the number of pulses in one circle is 2000, controlled by PLC Y0, Y1, the radius of the cutter shaft is 55mm, the diameter is 110mm, the thickness of the knife is 20mm, the number of pulses in one circle is 2000, controlled by PLC Controlled by Y2 and Y3, the cutter axis in the figure is already at the origin, and the line speed is required to be synchronized when it is in contact with the material, and the black point position of the cutter is required to be cut on the material. , 800mm from the center point of the cutter shaft



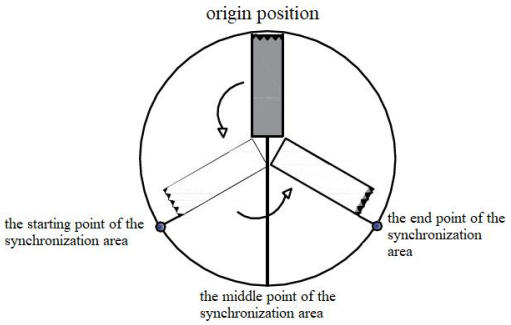
1. Calculate the ratio of S2+10 master axis, and calculate how many pulses the master axis needs to travel 0.01mm. It is known that the diameter of the feeding roller is 56mm, the number of pulses per revolution is 2000, and the circumference = 56*π=175.84, then the master axis sends 1 pulse to travel 175.84 /2000=0.08792 (mm), then send 1 pulse to go 8.792 (0.01mm) The ladder diagram is as follows



2. Calculate the synchronization ratio of S2+12. It is known that the diameter of the cutter shaft is 110mm, and the number of pulses per revolution is 2000, then the circumference of the cutter shaft is 110*3.14=345.4, then S2+12=(2000/345.4)/100 =0.058, the ladder diagram is as follows



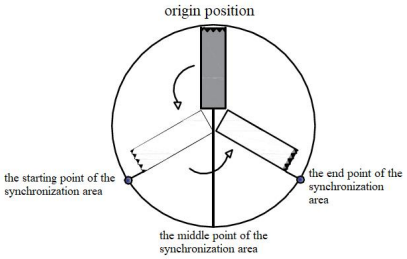
3. Determine the starting position of the synchronization area of the S2+14 slave axis and the synchronization length of the S2+16 slave axis. Because the thickness of the knife is 20mm, the length of the synchronization interval is 20mm, and the number of synchronization pulses = the length of the synchronization interval * the length of the slave axis to travel 1mm how many pulses. However, due to the problems of π and calculation errors, it is recommended to increase the synchronization interval by 1-2mm when calculating the number of synchronization pulses, so that the slave axis can enter the synchronization area earlier and prevent material from being pulled. Assume that the origin is in the figure below The position of the cutter facing upward, then S2+14=(number of pulses in one circle – S2+16)/2, the ladder diagram is as follows



4. The ladder diagram of S1 master axis input parameters is as follows

5. The S2 slave axis input parameter ladder diagram is as follows, because the distance from the cursor to the midpoint of the cutter is 800mm, then S2+8 takes the stack offset and fills in 80000, and because the cutter axis rotates once with 2000 pulses, the slave axis rotates One circle represents cutting one material, so S2+18 is filled with 2000. The ladder diagram is as follows

6. Assuming that the origin is set at 12 o'clock of the clock, the midpoint of the synchronization area is at 6 o'clock of the clock, the starting point of the synchronization area = the midpoint of the synchronization area - S2 + 6/2, the end point of the synchronization area = the end of the synchronization area Midpoint+S2+6/2, as shown in the figure below, after returning to the origin, it is necessary to clear D1648, D1664, S2+6, S2+7, the ladder diagram is as follows



7. After the slave axis returns to the origin and clears the current pulse number, turn on the CAM command. When the color mark sensor has a signal, turn S3+0 ON, which means that the coordinate position is filled in, and the coordinate is taken out when walking S2+8. , then the tangent point from the axis is exactly on the mark, the ladder diagram is as follows

Periodic synchronized motion【CAMSYNC】

1）Instruction overview

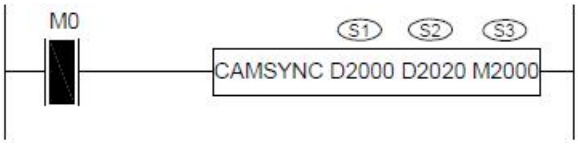
Periodic position control of the specified axis

Periodic synchronized motion【CAMSYNC】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2）Operands

Operands	Function
S1	Specify the starting address of the master axis input parameter
S2	Specify the starting address of the slave axis input parameter
S3	Specifies the starting address of the output status bits

3）Function and Action



● S1 specifies 【master axis input parameter start address】. Occupied registers S1~S1+5

● S2 designates【slave axis input parameter start address】. Occupy registers S2~S2+12

● S3 specifies the [starting address of output status bit]. Occupy relay S3~S3+5

● Before turning on the command, M+4 must be turned ON, otherwise the slave axis will not follow the master axis. Determine whether to turn M+5 ON according to site requirements. ON means the acceleration/deceleration curve is automatically planned by the bottom layer (S2+10, S2+11, S2+11 can all be set to 0), OFF means S2+10, S2 +11, S2+12 these three parameters to plan the acceleration and deceleration curve. Then make the master and slave axes return to the origin according to the on-site process, and then clear the current pulse number (special D register) and S2+6.

●When M0 changes from OFF to ON, the slave axis group performs periodic synchronous movement to the main axis group. The number of pulses per cycle of S1+4 for the master axis is completed, and the number of pulses for the slave axis to follow the cycle of S2+2. During the movement, S3+4 is OFF, and the slave axis stops after running the current cycle until S3+4 is set. The next cycle of ON restores synchronization, and the number of pulses required to restore synchronization is determined by S2+8, which does not change the phase between the master and slave axes. When one cycle is completed, S3+0 is turned ON.

●Note: After the CAMSYNC command is enabled, the master axis group can use the pulse command to make it move, and the slave axis performs periodic cam motion according to the set parameters.

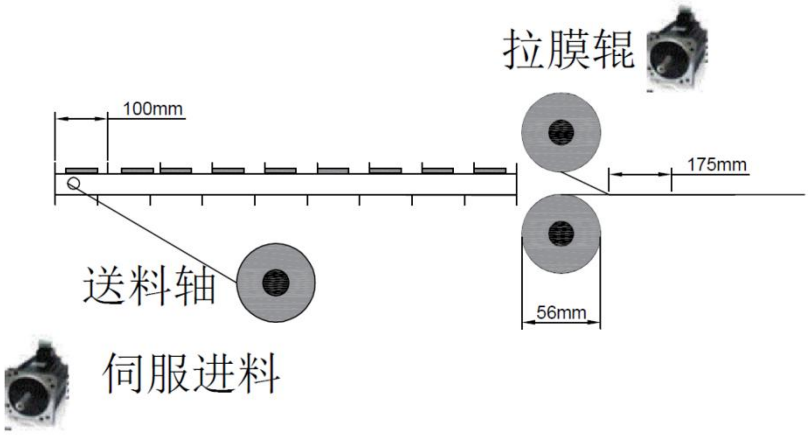
●Note: After changing the pulse parameters of one cycle, it will take effect in the next cycle, but not in this cycle.

4) related parameters

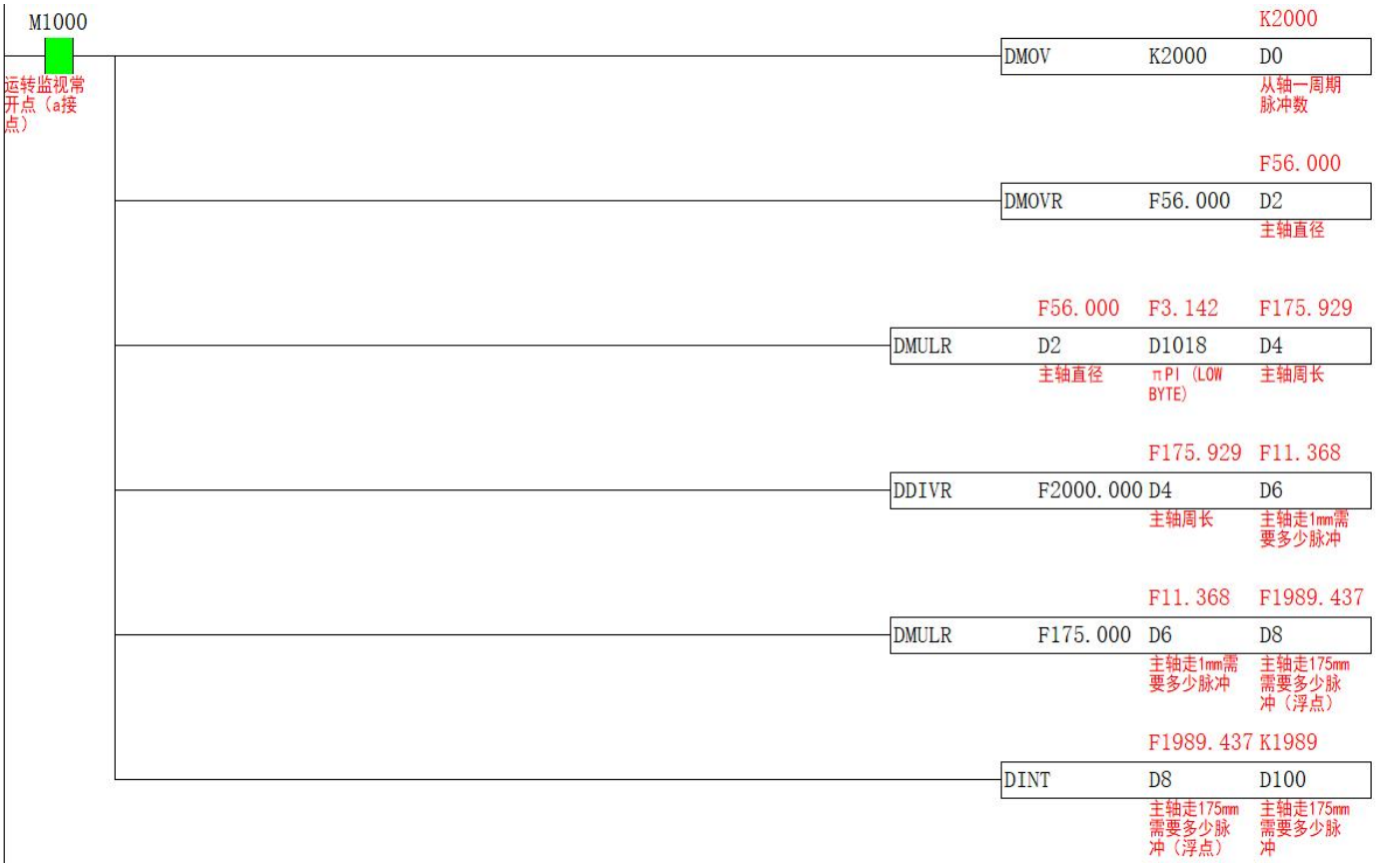
Input parameters	parameter name	type of data	unit	Remark
S1+0	master axis axis number	16 bit	/	If the master axis is an encoder, write K-1
S1+1	reserved	16 bit	/	/
S1+2	Position loop gain	16 bit	/	Write K500 by default
S1+3	Speed loop gain	16 bit	/	Write K0 by default
S1+4	The number of pulses per cycle of the master axis	32 bit	number of pulses	The number of pulses in one cycle of the master axis
S2+0	slave axis number	16 bit	/	/
S2+1	Slave step (read only)	16 bit	/	which step is currently running
S2+2	Number of pulses per cycle of slave axis	32 bit	number of pulses	The number of pulses in one cycle of the slave axis
S2+4	Slave maximum frequency	32 bit	pulses/sec	Limit the maximum frequency of the slave axis to prevent improper parameter settings
S2+6	master axis current pulse position	32 bit	/	The current pulse mapping address of the master axis, which works within a period of zero to one cycle
S2+8	Number of dynamic sync pulses	32 bit	/	The number of pulses required for dynamic up and down synchronization. This number of pulses refers to the number of pulses of the master axis. If you write 0, the slave axis will immediately synchronize with the master axis. If you write K1000, there will be 1000 pulses buffered.
S2+10	Maximum acceleration of slave axis	16 bit	pulse/ms	Refers to the highest frequency increase per ms. When the current position of the slave axis does not match S2+6, it will work. It is used in conjunction with S2+11 and S2+12 to jointly plan the acceleration and deceleration curve and write K0 by default.
S2+11	Slave min speed percentage	16 bit	/	It is activated when the current position of the slave axis does not match S2+6, and K0 is written by default.
S2+12	Percentage of the maximum speed of the slave axis	16 bit	/	It is activated when the current position of the slave axis does not match S2+6, and K0 is written by default.
S3+0	The master axis has worked for one cycle	BOOT	/	ON when the master axis completes one cycle, OFF by PLC
S3+1	Slave shaft overspeed sign	BOOT	/	ON when the slave axis speed exceeds S2+4
S3+2	Periodic valid mode	BOOT	/	Default OFF
S3+3	mode status	BOOT	/	The master axis works in the mode state, and the current number of pulses of the master axis cycles from 0 to the number of pulses in one cycle.
S3+4	Sync enable	BOOT	/	The default is ON before the command is turned on, and OFF during motion. The slave axis will stop after the current cycle is completed, and will resume synchronization from the next week when it is turned ON. It is used in conjunction with S2+8.
S3+5	Synchronous acceleration and deceleration processing on static	BOOT	/	If it is ON, it means that the acceleration and deceleration curve is automatically planned by the bottom layer (S2+10, S2+11, and S2+11 can all be set to 0), and if it is OFF, it means that the three parameters of S2+10, S2+11, and S2+12 are used to plan. Acceleration and deceleration curve.

5）Example

For example: the feeding axis is controlled by servo, connected to PLC output terminals Y2, Y3, and the number of pulses per revolution is 2000. The printing axis is controlled by servo and connected to the PLC output terminals Y0, Y1, the diameter is 56mm, and the number of pulses per revolution is 2000. It is known that the feeding servo rotates once, the feeding shaft travels 100mm, which is exactly one grid, and the film length of each package is 175mm. It is hoped that the feeding shaft travels 100mm and the film pulling shaft travels 175mm, so that there is one material in each film. Among them, the pulling film is the main axis, and the feeding is the slave axis as shown in the figure below.

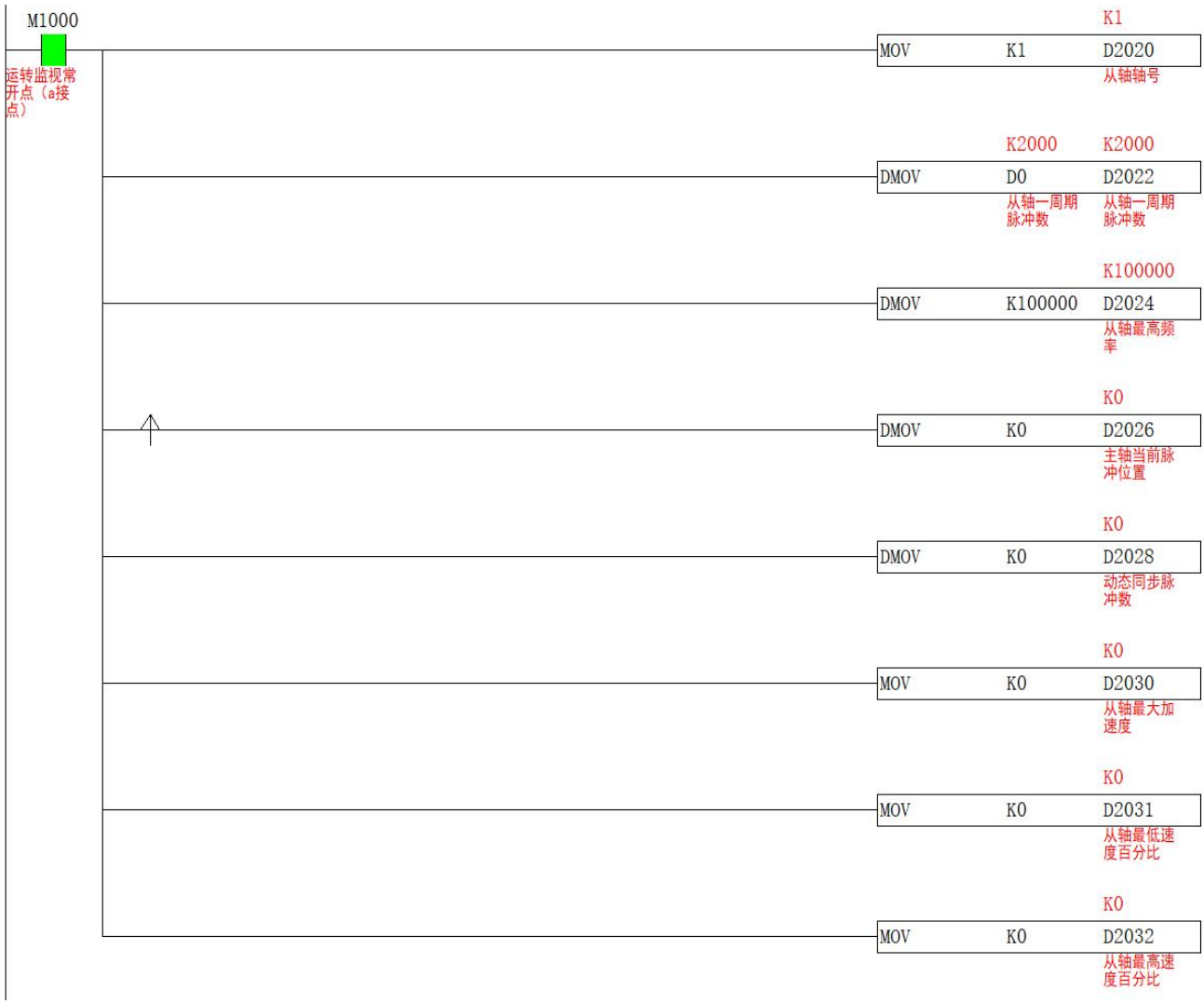


1. It is known that the feeding servo rotates once, the feeding shaft travels 100mm, which is exactly one grid, and because the feeding servo needs 2000 pulses to rotate once, so the number of pulses per cycle of the S2+2 slave shaft is filled with 2000. It is known that the diameter of the film pulling shaft is 56mm, then the circumference is 56*π=175.84mm, and because the number of pulses per revolution is 2000, the number of pulses required to travel 1mm = 2000/175.84=11.37, then the number of pulses required to travel 175mm is 175*11.37 =1989 (pulse), then S1+4 is written to K1990. Diameter, number of pulses in one circle, material length, can be written on the touch screen with D register according to the on-site process. The ladder diagram is as follows



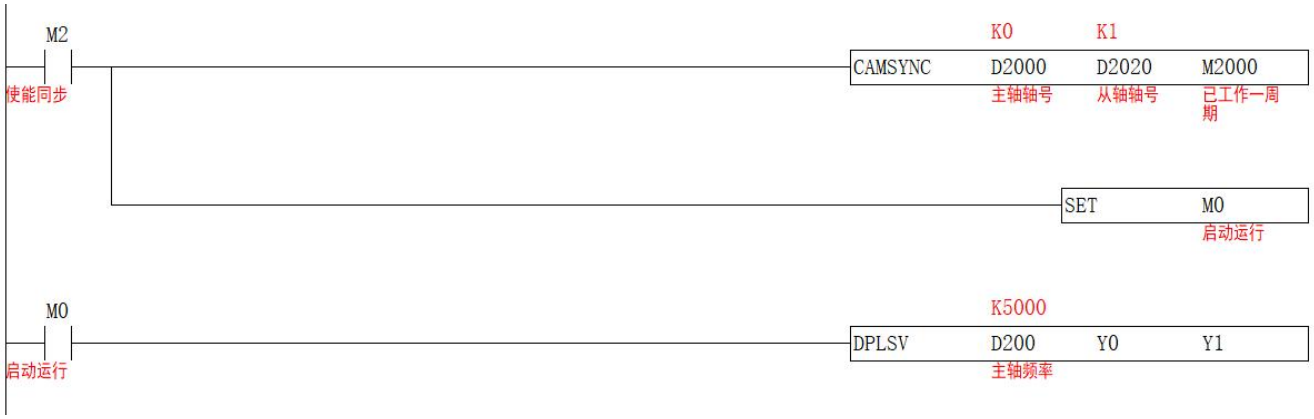
2. The S1 master axis input parameter ladder diagram is as follows

3.The S2 slave axis input parameter ladder diagram is as follows, since the dynamic up and down synchronization function is not used, then S2+8 write K0



4. Before turning on CAMSYNC, D1648, D1664, S2+6 need to be cleared, and S3+4 needs to be turned ON. If not turned ON, the slave axis will not operate, and S3+5 should be turned ON. The ladder diagram is as follows

5. After returning to the origin, after clearing the current number of pulses, turn M2 ON, turn on the CAMSYNC command, the master and slave axes perform periodic synchronous motion according to the set parameters, and S3+0 is turned ON after one cycle is completed, and the ladder diagram is as follows



Superimposed motion【CAMADD】

1) Instruction overview

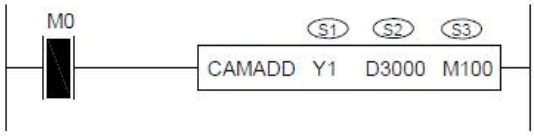
Perform superimposed motion control on the specified axis group (currently only supports the superposition of the slave axes of the FOLLOW instruction)

Superimposed motion【CAMADD】			
execution condition	Normally ON	Applicable models	HCM2
/	/	Software requirements	2.6.050 and above

2) Operands

Operands	Function
S1	Specify the axis number
S2	Specify input parameters
S3	Specify output status flags

3) Function and Action



- S1 specifies 【Superimposed axis number】. Selected overlay axis number
- S2 specifies [specify input parameters]. Occupied registers S2-S2+7
- S3 designates [designated output flag]. Occupy relay S3
- Note: This command temporarily only supports the superimposed motion of the slave axis specified by the FOLLOW command. It takes effect after the FOLLOW command is turned on.
- When MO is turned ON, superimpose motion on designated axis number S1. The number of superimposed pulses is determined by S2+0, the superimposed speed is determined by S2+2, the superimposed acceleration is determined by S2+4, and the superimposed deceleration is determined by S2+6. S3+0 turns ON after the superposition is completed.

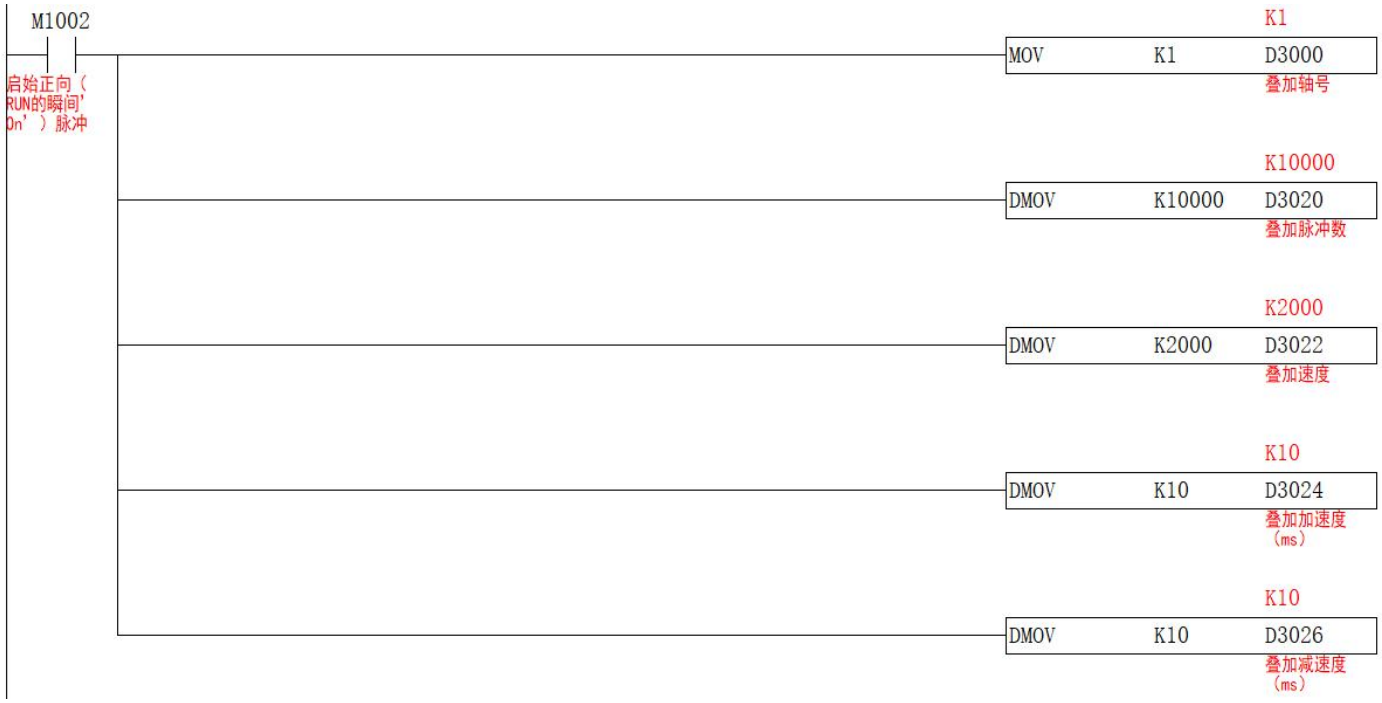
4) Related parameters

Input parameters	parameter name	type of data	Unit	Note
S1+0	Specify the Superimposed axis number	16bits	/	K0-K127, currently only supports the slave axis of the FOLLOW command
S2+0	Number of superimposed pulses	32bits	/	The number of pulses to be superimposed
S2+2	superimposed speed	32bits	pulses/sec	superimposed speed per second
S2+4	superimposed acceleration	32bits	pulses/ms	Want to get to S2+2 at how many pulses per ms
S2+6	superimposed deceleration	32bits	pulses/ms	How many pulses per ms do you want to reach the speed before superposition
S3+0	Superimposed done mark	BOOT	/	Turn ON after Superimposed is completed

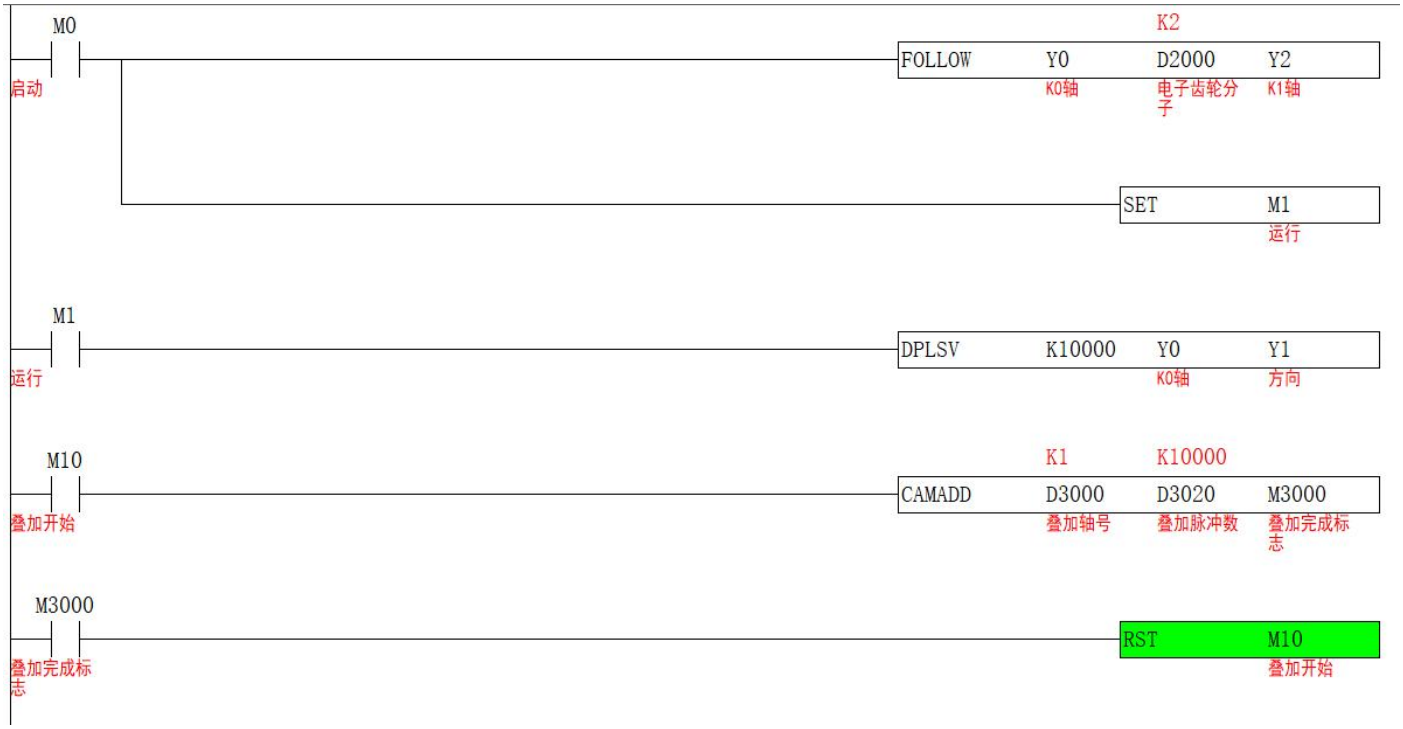
5) Example

Example: When the FOLLOW instruction is running, the slave axis is required to superimpose 10,000 pulses at a frequency of 2,000 pulses per second.

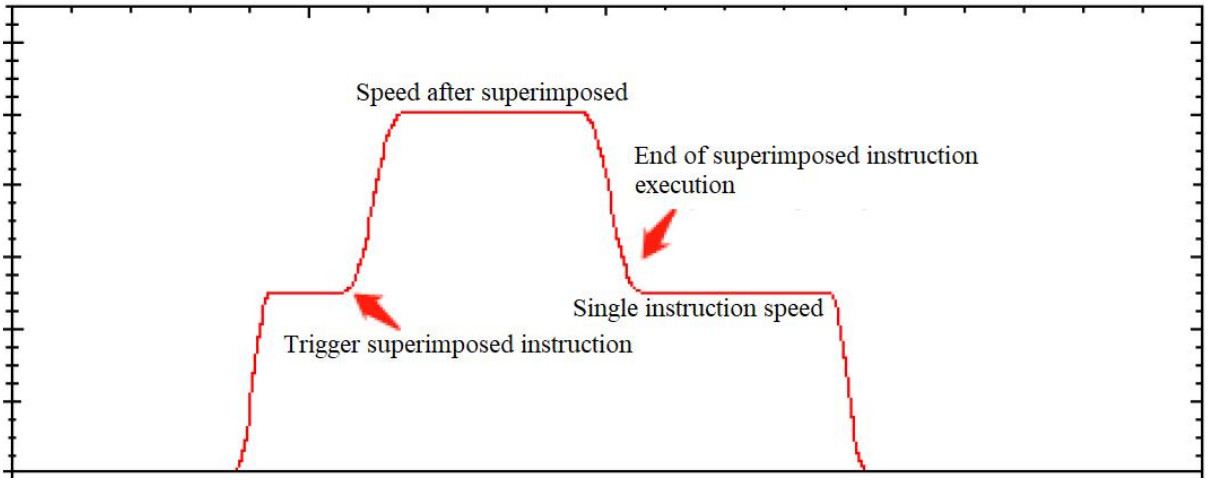
1. The superimposed motion of CAMADD currently only supports the use of the slave axis of FOLLOW, so write K1 for the superimposed axis number of S1, K10000 for the number of superimposed pulses in S2+0, and K2000 for the superimposed speed of S2+2. The ladder diagram is as follows



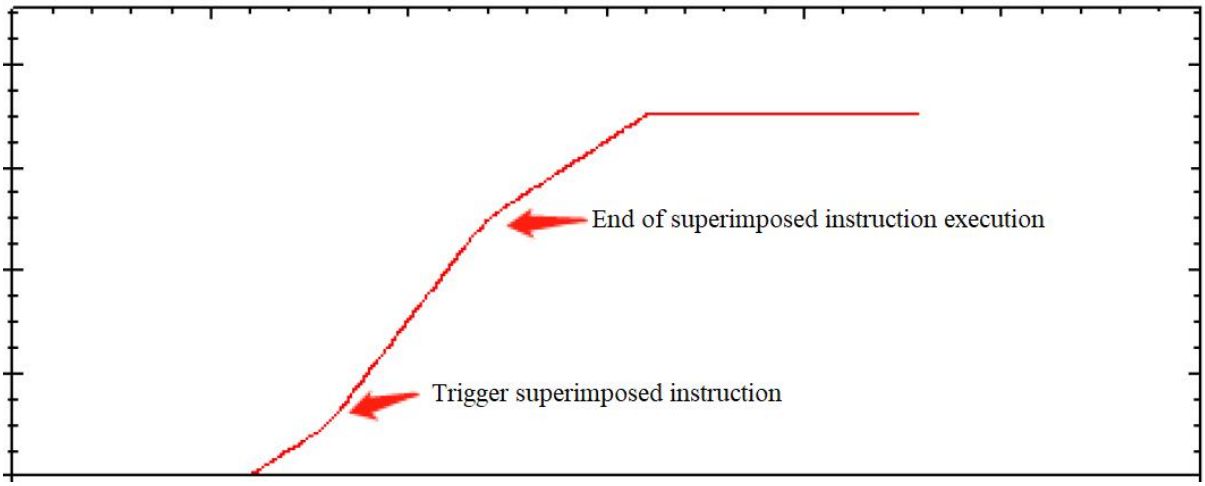
2. Turn on the FOLLOW command first to let the slave axis and the master axis move. After turning on the CMADD command, the slave axis will perform superimposed motion. The ladder diagram is as follows



3. The speed curve of the axis group operation is as follows



4.The position curve of the axis group operation is as follows



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