

## 6 Troubleshooting

### 6-1 POOR MILLING QUALITY, MILLING POSITION IS SHIFTED

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Milling condition is not appropriate	Change Milling condition		If you increase the speed or cutting-in depth to shorten the milling time, the milling quality becomes poor.
2	Workpiece is not attached firmly	Attach the workpiece firmly		Big load is given to the workpiece by a milling operation. If the workpiece is not attached firmly, it might moves in the middle of the milling.
3	Nut to fix the collet is not tightened up firmly	Tighten up the nut firmly		If the collet is not fixed firmly, the tool might slip up or down due to the vibration of the milling.
4	Tool extension amount is too big	Make the tool extension amount shorter		Although the degree differs dependent on the tool diameter, as the tool extension amount is getting bigger, the tool tends to vibrate widely .
5	Tool is worn out	Replace the tool		
6	There is cutting dust or scratch on the Ball Thread	Clean/Lubricate/Replace the Ball Thread	MDX-540 Service Note	If there is cutting dust or scratch put on the ball thread, it prevents the smooth motion of the carriage or the table, resulting in poor milling quality.
7	There is cutting dust or scratch on the LM Guide	Clean/Lubricate/Replace the LM Guide	MDX-540 Service Note	If there is cutting dust or scratch put on the LM Guide, it affects the smooth motion of the carriage or the table, resulting in poor milling quality.
8	Setscrew fixing the coupling of the motor is loosen	Tighten up the setscrew		If the coupling that connects the Motor and the Ball Thread is loose, the motor revolution cannot be transferred to the Ball Thread correctly.
9	Bearing that holds the ball screw is broken	Replace the bearing		The bearing that holds the Ball Thread wears after long time operation of the machine. The worn bearing can prevents the smooth motion of the carriage or the table.
10	FINE U-NUT is loose	Tighten up the FINE U-NUT		If the FINE U-NUT that is fixing the Ball Thread is loose, the Ball Thread becomes loose and affects the milling operation.

### 6-2 POOR MILLING QUALITY, MILLING POSITION IS SHIFTED (ZCL-540-related factors)

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	The center of the A-axis is not detected accurately	Detect the A-axis center	ZCL-540 User's Manual	If the A-axis center detection using the Y-origin sensor is not performed correctly, it shows up as the step or wrong thickness in the milling result. Refer to the user's manual, and detect the A-axis center again with attaching the Y-origin sensor correctly.
2	Y and Z origins are not perfectly aligned to the A-axis center	Fine tune of the Y and Z origins	ZCL-540 User's Manual	Even if you set the Y and Z origins with the correct procedures, they are not perfectly aligned to the A-axis center. It shows up as the step or wrong thickness in the milling result.
3	Talestock is not attached correctly	Re-attach the Talestock	ZCL-540 User's Manual	If the Talestock is not fixed while pushed to the front, the rotation axis tilts and causes the step in the milling result.
4	Drive unit is not attached correctly	Re-attach the Drive unit	ZCL-540 User's Manual	If the Drive unit is not fixed while pushed to the front, the rotation axis tilts and causes the step in the milling result.
5	Workpiece warps during the milling	Reinforce the supports Change the milling condition		As a characteristic of the Rotary-axis unit, it is not possible to avoid the warp of the workpiece. How much it warps depends on the material, shape of the workpiece and also the shape of the object. The warp can be relieved by using the suitable material, reinforcing the supports and also changing the milling condition.
6	Setscrew fixing the coupling of the Gear unit is loose	Tighten up the setscrew		If the coupling that connects the Motor and the Gear unit is loose, the motor revolution cannot be transferred to the Gear unit correctly.

### 6-3 NOISE

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Milling dust is accumulated inside the machine	Remove milling dust		
2	There is cutting dust or scratch on the Ball Thread	Clean/Lubricate/Replace the Ball Thread	MDX-540 Service Note	
3	There is cutting dust or scratch on the LM Guide	Clean/Lubricate/Replace the LM Guide	MDX-540 Service Note	
4	Spindle Belt has reached its lifetime	Replace the Spindle Belt		Spindle Belt flutters when it becomes close to the life and noise comes out. Also, the fluttered belt affects the revolution of the Spindle and causes the noise to come out. Life expectancy of the Spindle Belt is 1500 hours.
6	Spindle has reached its lifetime	Replace the Spindle Bearing Replace the Spindle	MDX-540 Service Note	If the bearing inside the Spindle wears, it might cause the noise to come out when the Spindle rotates.
7	Spindle Motor has reached its lifetime	Replace the Spindle Motor	MDX-540 Service Note	
8	Bearing that holds the ball screw is worn out	Replace the bearing		The bearing that holds the Ball Thread wears after long time operation of the machine. The worn bearing might cause the noise to come out when the Ball Thread rotates.

### 6-4 OVERLOAD ERROR (X/Y/Z-axis)

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Milling condition is not appropriate	Change Milling condition		If you increase the speed or cutting-in depth to shorten the milling time, big load will be given to the motor resulting in the overload error. Instruct the user to have suitable milling condition for the material.
2	There is cutting dust or scratch on the Ball Thread	Clean/Lubricate/Replace the Ball Thread	MDX-540 Service Note	If there is cutting dust or scratches put on the Ball Thread, big load will be given to the motor that rotates the Ball Thread, resulting in the overload error.
3	There is cutting dust or scratches on the LM Guide	Clean/Lubricate/Replace the LM Guide	MDX-540 Service Note	If there is cutting dust or scratch put on the LM Guide, big load will be given to the motor that rotates the Ball Thread, resulting in the overload error.
4	X/Y/Z Motor has reached its lifetime X/Y/Z Motor is defective	Replace the Motor	MDX-540 Service Note	Since MDX-540 uses the AC Servo Motors, there is no motor brush to be worn out. However, if bearing wears out after long time operation of the machine, the revolution load becomes bigger resulting in the overload error.
5	Motor Driver IC on the Main board is defective	Replace the Main Board		Motor Driver IC is a chip to supply the current to drive the motor. If it is broken, the current is not supplied to the motor correctly and results in the overload error.
6	There is a cut-line in the cable	Replace the cable		If there is a cut-line between the Main board and the Motor, it may cause the overload error.

## 6-5 OVERLOAD (A-axis)

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Moment of inertia exceeds the limit	Reduce the size of the workpiece		The maximum moment of inertia of the ZCL-540 is 0.02kgm <sup>2</sup> . The moment of inertia can be reduced by making the workpiece smaller or reloading the workpiece with its turning radius being smaller. The loadable workpiece weight is 5 kg.
3	Motor Driver IC on the Main board is defective	Replace the Main Board		Motor Driver IC is a chip to supply the current to drive the motor. If it is broken, the current is not supplied to the motor correctly and results in the overload error.
4	There is a cut-line in the Rotary Cable	Replace the Rotary cable		
6	A Motor has reached its lifetime A Motor is defective	Replace the A Motor	ZCL-540 Service Note	Since MDX-540 uses the AC Servo Motors, there is no motor brush to be worn out. However, if bearing wears out after long time operation of the machine, the revolution load becomes bigger resulting in the overload error.
5	Gear Unit is defective	Replace the Gear Unit	ZCL-540 Service Note	

## 6-6 POWER CAN NOT BE TURNED ON

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Power voltage for the Motor doesn't come out	Replace SW Power Supply		If 41V is not supplied on the 6 pin of the CN12, SW Power Supply might be defective.

## 6-7 ROTARY-AXIS UNIT IS NOT DETECTED

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	There is a bad contact in the Rotary Cable connection	Disconnect and connect the Rotary Cable again		
2	There is a cut-line in the Rotary Cable	Replace the Rotary Cable		
3	Main Board is defective	Replace the Main Board	MDX-540 Service Note	

## 6-8 TOOL CHANGE ERROR

NO	CHECK POINT	ACTION	REFERENCE	OUTLINE
1	Tool Magazine is not fixed correctly	Re-fix the Tool Magazine	ZAT-540 User's Manual	
2	Machine Origin Offset has not been performed	Perform the Machine Origin Offset	MDX-540 Service Note	The position of the machine origin is different depending on the mechanical tolerance or fixation error. If the offset adjustment is correctly done, it might cause a tool change error.
3	Tool-change location in the Z direction is not adjusted	Adjust the Tool-change Location	MDX-540 Service Note or ZAT-540 User's Manual	Since the height of the table surface is different depending on the table type, this adjustment is necessary when switching tables. Also, the adjustment is necessary if the Main board is replaced and the parameter cannot be transferred to the new Main board.

## 6-9 SERVICE CALL

CODE	CONTENTS	CAUSE	ACTION
FE:2	There is a communication problem between the Main CPU and XY Servo CPU.	There is a problem in the electric route between the Main CPU and the XY Servo CPU. XY Servo CPU is not operating correctly.	Replace the Main board.
FE:3	XY Servo CPU on the Main board is not operating correctly.	The program for the XY Servo CPU fails to be downloaded from the Main CPU in the initial operation.	Replace the Main board.
FE:4	There is a communication problem between the Main CPU and ZA Servo CPU.	There is a problem in the electric route between the Main CPU and the ZA Servo CPU. ZA Servo CPU is not operating correctly.	Replace the Main board.
FE:5	ZA Servo CPU on the Main board is not operating correctly.	The program for the ZA Servo CPU fails to be downloaded from the Main CPU in the initial operation.	Replace the Main board.
FE:6	There is a communication problem between the Main CPU and Spindle Servo CPU.	There is a problem in the electric route between the Main CPU and the Spindle Servo CPU. Spindle Servo CPU is not operating correctly.	Replace the Main board.
FE:7	Spindle Servo CPU on the Main board is not operating correctly.	The program for the Spindle Servo CPU fails to be downloaded from the Main CPU in the initial operation.	Replace the Main board.
FE:8	X Limit SW can not be detected.	X Limit SW is not attached correctly or defective. There is a bad contact or a cut-line in the cable.	Fix the X Limit SW at the correct position. Replace the X Limit SW. Check the cable connection or replace the cable.
FE:9	Y Limit SW can not be detected.	Y Limit SW is not attached correctly or defective. There is a bad contact or a cut-line in the cable.	Fix the Y Limit SW at the correct position. Replace the X Limit SW. Check the cable connection or replace the cable.
FE:10	Z Limit SW can not be detected.	Z Limit SW is not attached correctly or defective. There is a bad contact or a cut-line in the cable.	Fix the Z Limit SW at the correct position. Replace the X Limit SW. Check the cable connection or replace the cable.
FE:11	A Limit SW can not be detected.	A Limit SW is not attached correctly or defective. There is a bad contact or a cut-line in the cable.	Fix the A Limit SW at the correct position. Replace the X Limit SW. Check the cable connection or replace the cable.
FE:12	Phase signal or encoder of the X Motor becomes out of order in the initial operation.	X Motor is defective. There is a bad connection or cut-line in the cable.	Replace the X Motor. Check the cable connections or replace the cable.
FE:13	Phase signal or encoder of the Y Motor becomes out of order in the initial operation.	Y Motor is defective. There is a bad connection or cut-line in the cable.	Replace the Y Motor. Check the cable connections or replace the cable.
FE:14	Phase signal or encoder of the Z Motor becomes out of order in the initial operation.	Z Motor is defective. There is a bad connection or cut-line in the cable.	Replace the Z Motor. Check the cable connections or replace the cable.
FE:15	Phase signal or encoder of the A Motor becomes out of order in the initial operation.	A Motor is defective. There is a bad connection or cut-line in the cable.	Replace the A Motor. Check the cable connections or replace the cable.
FE:16	EEPROM on the Main board is not operating correctly.	Setting cannot be written in the EEPROM on the Main board.	Replace the Main board.
FE:17	ATC fails to grab a tool.	ATC fails to grab a tool. Tool Hold Sensor is not operating correctly.	Replace the Tool Hold Sensor. Replace the Air Cylinder.
FE:18	ATC fails to release the tool.	ATC fails to release the tool. Tool Hold Sensor is not operating correctly.	Replace the Tool Hold Sensor. Replace the Air Cylinder.
FE:19	Rear Magazine Cover Sensor doesn't become the expected state in the initial operation.	Rear Magazine Cover Sensor is not operating properly. The motor for the Magazine Cover is not operating properly.	Fix the Rear Magazine Cover Sensor at the correct position. Replace the Magazine Cover Sensor. Check the cable connection or replace the cable. Check the driving parts (Motor, Belt, Pulley) of the Magazine Cover.

CODE	CONTENTS	CAUSE	ACTION
FE:20	Rear Magazine Cover Sensor doesn't become the expected state when opening the Magazine Cover.	Rear Magazine Cover Sensor is not fixed correctly or broken. The stepping motor for the Magazine Cover is not operating properly.	Fix the Rear Magazine Cover Sensor at the correct position. Replace the Magazine Cover Sensor. Check the cable connection or replace the cable. Check the driving parts (Motor, Belt, Pulley) of the Magazine Cover.
FE:21	Front Magazine Cover Sensor doesn't become the expected state when closing the Magazine Cover.	Front Magazine Cover Sensor is not fixed correctly or broken. The stepping motor for the Magazine Cover is not operating properly.	Fix the Front Magazine Cover Sensor at the correct position. Replace the Magazine Cover Sensor. Check the cable connection or replace the cable. Check the driving parts (Motor, Belt, Pulley) of the Magazine Cover.
FE:23	Panel CPU is not operating correctly.	The program for the Panel CPU fails to be downloaded from the Main CPU in the initial operation. Panel Junction board is defective. There is a bad contact or a cut-line in the cable.	Replace the Handy Panel Board. Replace the Panel Junction Board. Check the cable connection or replace the cable.
XY:1	There is a big difference between the direction for the X Motor and the position detected by the motor encoder.	X Motor is defective. There is a bad contact or a cut-line in the cable.	Replace the X Motor. Check the cable connection or replace the cable.
XY:5	There is a big difference between the direction for the Y Motor and the position detected by the motor encoder.	Y Motor is defective. There is a bad contact or a cut-line in the cable.	Replace the Y Motor. Check the cable connection or replace the cable.
XY:14	XY Servo CPU can't communicate with the Main CPU.	There is a problem in the electric route between the Main CPU and the XY Servo CPU.	Replace the Main board.
XY:16	Error is detected with the XY Servo CPU.		Replace the Main board.
ZA:1	There is a big difference between the direction for the Z Motor and the position detected by the motor encoder.	Z Motor is defective. There is a bad contact or a cut-line in the cable.	Replace the Z Motor. Check the cable connection or replace the cable.
ZA:5	There is a big difference between the direction for the A Motor and the position detected by the motor encoder.	A Motor is defective. There is a bad contact or a cut-line in the cable.	Replace the A Motor. Check the cable connection or replace the cable.
ZA:14	ZA Servo CPU can't communicate with the Main CPU.	There is a problem in the electric route between the Main CPU and the ZA Servo CPU.	Replace the Main board.
ZA:16	Error is detected with the ZA Servo CPU.		Replace the Main .
IS:2	Power voltage of the Spindle Motor is 20V or less.	Spindle Motor is defective. There is a bad contact or a cut-line in the cable. Spindle Board is defective.	Replace the Spindle Motor. Replace the Spindle board. Check the cable connection or replace the cable.
IS:6	There is a problem in the Spindle motor.	Spindle Motor is defective There is a bad contact or a cut-line in the cable.	Replace the Spindle Motor. <span style="border: 1px solid red; padding: 2px;">Revised14</span> Check the cable connection or replace the cable.
IS:10	There is a problem in the spindle control circuit.	There is a problem in the spindle control circuit or the electric route between the Main board and Spindle board.	Replace the Spindle Motor. Replace the Spindle board. Check the cable connection or replace the cable.

## 6-10 ERROR MESSAGE

CODE	CONTENTS	CAUSE	ACTION
X overload [peak]	Instantaneous excessive load was given to the X-axis.	Instantaneous excessive load was given to the X-axis.	Check if there was no collision. Perform Load check. Check the Ball Thread.
X overload [short]	Big load has been given to the X-axis continuously.	Big load has been given to the X-axis continuously.	Check the milling condition. Perform Load check. Check the Ball Thread.
X overload [long]	Big load has been given to the X-axis continuously for a long time.	Big load has been given to the X-axis continuously for a long time.	Check the milling condition. Perform Load check. Check the Ball Thread.
X overheat	X motor driver becomes too hot.	Big load has been given to the X-axis continuously. Thermister of the X driver IC is defective.	Check the milling condition. Perform Load check. Check the Ball Thread. Replace the Main board.
Y overload [peak]	Instantaneous excessive load was given to the Y-axis.	Instantaneous excessive load was given to the Y-axis.	Check if there was no collision. Perform Load check. Check the Ball Thread.
Y overload [short]	Big load has been given to the Y-axis continuously.	Big load has been given to the Y-axis continuously.	Check the milling condition. Perform Load check. Check the Ball Thread.
Y overload [long]	Big load has been given to the Y-axis continuously for a long time.	Big load has been given to the Y-axis continuously for a long time.	Check the milling condition. Perform Load check. Check the Ball Thread.
Y overheat	Y motor driver becomes too hot.	Big load has been given to the Y-axis continuously. Thermister of the Y driver IC is defective.	Check the milling condition. Perform Load check. Check the Ball Thread. Replace the Main board.
Z overload [peak]	Instantaneous excessive load was given to the Z-axis.	Instantaneous excessive load was given to the Z-axis.	Check if there was no collision. Perform Load check. Check the Ball Thread.
Z overload [short]	Big load has been given to the Z-axis continuously.	Big load has been given to the Z-axis continuously.	Check the milling condition. Perform Load check. Check the Ball Thread.
Z overload [long]	Big load has been given to the Z-axis continuously for a long time.	Big load has been given to the Z-axis continuously for a long time.	Check the milling condition. Perform Load check. Check the Ball Thread.
Z overheat	Z motor driver becomes too hot.	Big load has been given to the Z-axis continuously. Thermister of the Z driver IC is defective.	Check the milling condition. Perform Load check. Check the Ball Thread. Replace the Main board.
A overload [peak]	Instantaneous excessive load was given to the A-axis.	Instantaneous excessive load was given to the A-axis.	Check if there was no collision. Perform Load check. Check the Ball Thread.
A overload [short]	Big load has been given to the A-axis continuously.	Big load has been given to the A-axis continuously.	Check the milling condition. Perform Load check. Check the Ball Thread.
A overload [long]	Big load has been given to the A-axis continuously for a long time.	Big load has been given to the A-axis continuously for a long time.	Check the milling condition. Perform Load check. Check the Ball Thread.
A overheat	A motor driver becomes too hot.	Big load has been given to the A-axis continuously. Thermister of the A driver IC is defective.	Check the milling condition. Perform Load check. Check the Ball Thread. Replace the Main board.
S driver overload	Big load is given to the Spindle motor driver for a long time.	Big load has given to the A-axis continuously.	Check the milling condition.
S overheat	Spindle motor becomes too hot.	Big load has given to the A-axis continuously. Thermister of the Spindle motor is not operating correctly.	Check the milling condition. Replace the thermister for the Spindle motor.
S driver overheat	Spindle motor driver becomes too hot.	Big load has given to the A-axis continuously. Thermister of the Spindle motor driver IC is not operating correctly.	Check the milling condition. Replace the Spindle board.
S power overload	Current to the Spindle motor driver becomes abnormal condition.	Big load has given to the A-axis continuously.	Check the milling condition.