CHAPTER 6

MANUAL INSTRUCTION

This manual instruction explains the component unit, the list of specifications and the operating procedure of spin casting machine.

6.1. Component Unit of Spin Casting Machine

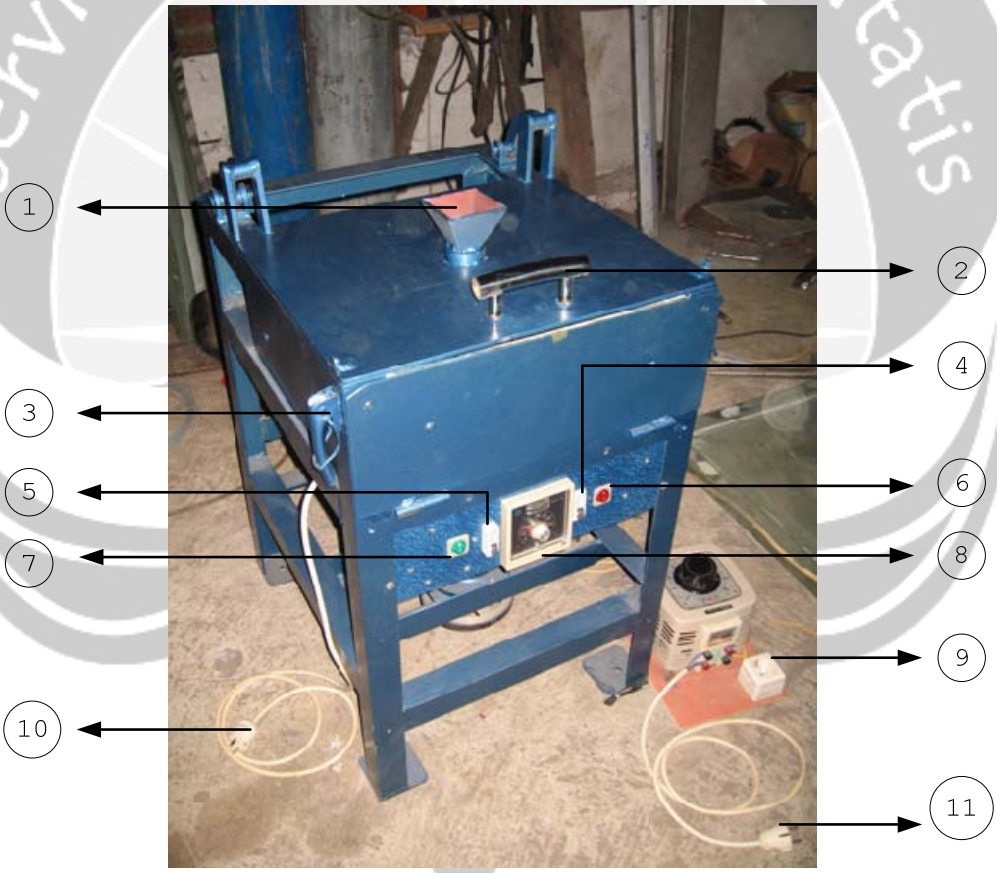

Figure 6.1. Spin Casting Machine (View 1)

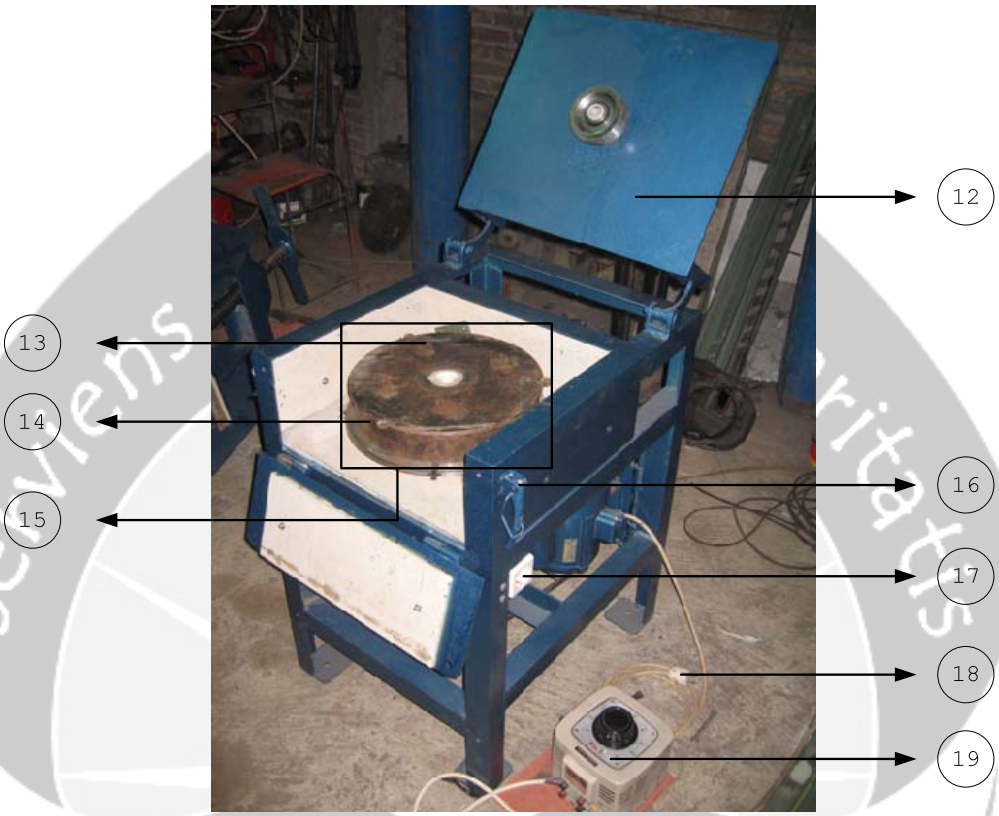

Figure 6.2. Spin Casting Machine (View 2)

Components Unit of Spin Casting Machine:

1. **Funnel Presser**

   Entrance of molten metal and press Cover Plate

2. **Handle**

   Open Top Enclosure

3. **Left Latch**

   Lock Top Enclosure to top part of the machine, give pressure on Cover Plate

4. **Thermocouple MCB**

   Cut short circuit current happens in Thermocouple

5. **Electrical Motor MCB**

   Produce rotation force

6. **Thermocouple Switch**

   Flow electric current to Thermocouple

7. **Electrical Motor Switch**

   Flow electric current to Electrical Motor

8. **Thermocouple**

   Manage stability temperature of Heating Element

9. **Voltage Regulator Socket**

   Connect current in/out from Voltage Regulator

10. **Spin Casting Machine Plug**

    Connect current in/out from Spin Casting Machine

11. **Voltage Regulator Plug**

    Connect current in/out from Voltage Regulator

12. **Top Enclosure**

    Top cover of Spin Casting Machine

13. **Cover Plate**

    Prevent upward movement of silicone rubber

14. **Side Plate**

    Keep silicone rubber mold from shifting movement

15. **Head Casting**

    Housing for silicone rubber mold

16. **Right Latch**

    Lock Top Enclosure top part of the machine, give pressure on Cover Plate

17. **Spin Casting Machine Socket**

    Connect current in/out from spin casting machine

18. **Electrical Motor Plug**

    Connect current in/out from Electrical motor

19. **Voltage Regulator**

    Manage voltage in order to change speed

6.2. The List of Specification of Spin Casting Machine

Table 6.1. Specification of Spin Casting Machine

PHYSICAL SPECIFICATION	
Dimension	500mm x 600mm x 862mm
Weight	80 kg
Maximum speed	1400 RPM
Operating speed	460 RPM
Maximum dimension of silicone rubber mold	Ø300mmx40mm
POWER SUPPLY	
Input voltage	220V AC, 50/60Hz
Power Consumption	373 Watt
PRICE	
Spin Casting Machine	Rp. 10,000,000

6.3. The Operating Procedure of Spin Casting Machine

STEP 1: Prepare Tools and Material

1. Molten metal
2. Silicone Rubber Mold
3. Ladle

STEP 2: Unlock Left Latch

Figure 6.3. Unlock Left Latch

STEP 3: Unlock right Latch

Figure 6.4. Unlock Right Latch

STEP 3: Open Top Enclosure by lifting Handle

Figure 6.5. Open Top Enclosure

STEP 3: Remove Cover Plate

Figure 6.6. Remove Cover Plate

STEP 4: Load Silicone Rubber Mold

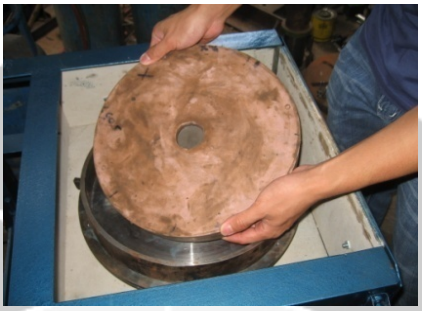

Figure 6.7. Load Silicone Rubber Mold

STEP 5: Put Cover Plate back to close Head Casting

Figure 6.8. Close Head Casting Using Cover Plate

STEP 6: Close Top Enclosure

Figure 6.9. Close Top Enclosure

STEP 7: Lock Right and Left Latch

Figure 6.10. Lock Right and Left Latch

STEP 8: Put Electrical Motor Plug to Voltage Regulator Socket

Figure 6.11. Put Electrical Motor Plug to Voltage Regulator Socket

STEP 9: Put Voltage Regulator Plug to Spin Casting Machine Socket

Figure 6.12. Put Voltage Regulator Plug to Spin Casting Machine Socket

STEP 10: Put Spin Casting Machine Plug to the socket

Figure 6.13. Put Spin Casting Machine Plug to the socket

STEP 11: Switch "ON" Thermocouple MCB and Electrical Motor MCB

Figure 6.14. Switch "ON" Thermocouple MCB and Electrical Motor MCB

STEP 12: Set the temperature of Thermocouple

Figure 6.15. Set the temperature of Thermocouple

STEP 13: Switch "ON" the Thermocouple Switch and wait until reaching the temperature set

Figure 6.16. Switch "ON" the Thermocouple Switch

STEP 14: Switch "ON" the Electrical Motor Switch

Figure 6.17. Switch "ON" the Electrical Motor Switch

STEP 15: Rotate clockwise the Voltage Regulator to maximum voltage and wait until sound "click" from Electrical Motor to set the expected voltage

Figure 6.18. Rotate clockwise the Voltage Regulator to maximum voltage

STEP 16: Rotate counter-clockwise to set the expected voltage

Figure 6.19. Rotate counter-clockwise to set the expected voltage

STEP 17: Pour molten metal to the Funnel Presser and wait for spinning process about 1 minute

Figure 6.20. Pour molten metal to the Funnel Presser

STEP 18: Turn "OFF" the Voltage Regulator

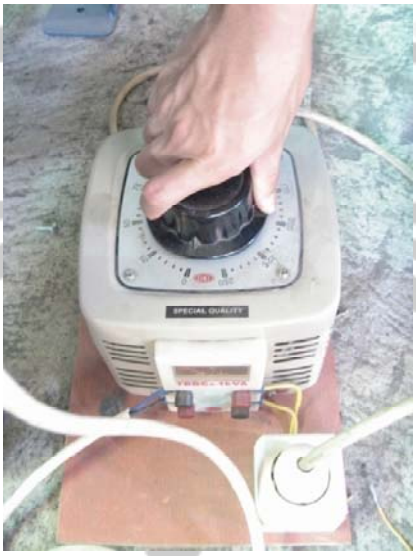

Figure 6.21. Turn "OFF" the Voltage Regulator

STEP 20: Switch "OFF" Thermocouple MCB and Electrical Motor MCB

Figure 6.22. Set "OFF" Thermocouple MCB and Electrical Motor MCB

STEP 21: Switch "OFF" the Electrical Motor Switch

Figure 6.23. Switch "OFF" the Electrical Motor Switch

STEP 22: Switch "OFF" the Thermocouple Switch

Figure 6.24. Switch "OFF" the Thermocouple Switch

STEP 23: Unlock Left Latch

Figure 6.25. Unlock Left Latch

STEP 24: Unlock right Latch

Figure 6.26. Unlock Right Latch

STEP 25: Open Top Enclosure by lifting Handle

Figure 6.27. Open Top Enclosure

STEP 26: Remove Cover Plate

Figure 6.28. Remove Cover Plate

STEP 27: Remove Side Plate

Figure 6.29. Remove Side Plate

STEP 28: Open silicone rubber mold to obtain casting result

Figure 6.30. Result of Spin Casting Process

CHAPTER 7

CONCLUSION AND SUGGESTION

7.1. Conclusion

Based on analysis and discussion on chapter 5, the conclusions are:

1. The improvement specification of the new spin casting machine compares to the current one is available on Table 7.1 while the constructions are available on Appendix 1.

Table 7.1. The Specification of Spin Casting Machine

COMPARISON	The Current Spin Casting Machine	The New Spin Casting Machine
PHYSICAL SPECIFICATION		
Dimension	500mm x 600 x 920mm	500mm x 600mm x 862mm
Weight	50 kg	80 kg
Maximum speed	1400 RPM	1400 RPM
Operating speed	780 RPM	460 RPM
Maximum dimension of silicone rubber mold	Ø250mmx50mm	Ø300mmx40mm
POWER SUPPLY		
Input voltage	220V AC, 50/60Hz	220V AC, 50/60Hz
Power Consumption	186.5 Watt	373 Watt
PRICE		
Spin Casting Machine	Rp. 2,000,000	Rp. 10,000,000

2. The visualization result of spin casting process compares to the master is shown on Table 7.2.

Table 7.2. Comparison Result

	Master	Spin Casting
Front Side		
Back Side		
Note:	The casting product was visually the same as master model and there were no defects anymore.	

3.a) The production time for UAJY keychain:

- 8 pieces requires 12 minutes 9 seconds

- 500 pieces requires 3 working days
- 600 pieces requires 2 working days
- 700 pieces requires 3 working days
- 800 pieces requires 3 working days
- 900 pieces requires 3 working days
- 1000 pieces requires 4 working days
- 2500 pieces requires 8 working days
- 5000 pieces requires 16 working days
- 10000 pieces requires 32 working days

3.b) The spin casting machine cost is IDR 3,529.6/hour

7.2. Suggestion

The redesigned spin casting machine has two major weaknesses: longer setup time and incomplete casting product as the cause of head casting design modification. Hence, for future research it is suggested to conduct a head casting design to solve non-flatness silicone rubber mold and eliminate the current weaknesses.

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