SEMMPF325

Maintaining pressure die casting machine performance

Overview

This standard identifies the competencies you need to monitor and maintain the performance of high pressure (hot or cold chamber), squeeze and low pressure die casting machines, in accordance with approved procedures. You will obtain information on the settings and conditions that are in place for production of the castings. You will need to check that the machine is operating effectively on the set conditions and that the castings produced are to the required quality. You will inspect the production on a regular basis, in accordance with company procedures and will identify any non-conformance in the production castings. You will monitor the machine services, to ensure that they are within agreed parameters.

When non-conformance in castings has been identified, either by the operator using Statistical Process Control (SPC), or some other methods, or during your own monitoring, you will take action to bring the process back into control. You will test all safety systems that are in place on the machines and will confirm in writing that they are operational.

Your responsibilities will require you to comply with organisational policy and procedures for the monitoring and maintaining of pressure die/mould casting machines. You will report any problems with monitoring and maintaining the die/mould casting machines, materials or equipment in use, which you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, taking personal responsibility for your actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will enable you to adopt an informed approach to the monitoring and maintenance of production pressure die/mould casting machines. You will understand the different types of pressure die/mould casting machines used, how the dies are located and secured to the machine platens and how the machine conditions are set to achieve the optimal results. Your knowledge will enable you to identify when there are defects/flaws in the produced castings and why these defects/flaws have occurred. You will know which defects/flaws are caused by incorrect machine settings and how to adjust the machine operating parameters to eliminate the defects/flaws.

You will understand the safety precautions required when monitoring and maintaining pressure die/mould casting machines and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation, regulations, directives and other relevant guidelines
2. follow relevant job instructions and specifications
3. ensure that all the required inspection equipment is within current calibration dates
4. carry out quality sampling checks at suitable intervals on the pressure die casting machine
5. record and review the outcomes of the quality sampling checks
6. adjust the machine conditions/operating parameters to restore the castings to specification requirements
7. check that the cast components meet the required specifications and standards
8. deal promptly and effectively with problems within your control and report those that cannot be solved
9. ensure that work records are completed, stored securely and available to others, as per organisational requirements
10. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. how to obtain the job instructions, machine performance requirements and how to interpret the information
6. the basic parts and functions of a pressure die/mould casting machine (to include dies, die location points, secondary die locations, core locations, die heating arrangements, die coolant supply, connection and operation of die spray system, furnace type, machine controls, hydraulic, pneumatic and electricity supplies, metal transfer systems, guards and other safety devices)
7. the importance of monitoring and making checks on the machine performance and services of die/mould casting machines
8. the methods used to monitor the machine performance and the tools and equipment that is used
9. why measuring equipment needs to be correctly calibrated and how to check that the equipment you are using is within the current calibration dates
10. the different types of pressure die/mould-casting machines used
11. the different methods used to locate dies/moulds and associated parts
12. the different types of core used in the pressure die/mould casting process
13. the benefits and limitations of the high pressure hot chamber process, high pressure cold chamber process, low pressure and squeeze process
14. the range of machine controls/conditions that can be adjusted and the effect of the controls/conditions on the quality of the castings produced
15. the different metals used in producing pressure die/mould castings
16. the pouring temperature range of the metal alloy being cast
17. why castings need time to solidify before removing them from the die/mould

18. why dies need to have release agent applied prior to casting
19. why some dies need to have coolant circulating through them
20. how to identify casting defects/flaws (such as mis-runs, broken sections, blows, distorted sections, sinks, die-dressing runs, short runs, shrinkage, cracks, inclusions and flash)
21. the organisational quality control checks to be carried out on the prepared pressure die/mould (to include cleanliness, complete and freedom from foreign bodies and defects/flaws)
22. the importance of keeping the pressure die/moulds and equipment clean and free from damage, good housekeeping of metal handling tools and equipment and maintaining a clean and unobstructed working area
23. the extent of your own responsibilities and to whom you should report if you have problems that you cannot resolve
24. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Complete the pressure die/mould casting machine maintenance, by carrying out all of the followings:

- 1.1 comply with job instructions equipment operating and adjustment procedures and documentation
- 1.2 adhere to health and safety regulations, systems and procedures to realise a safe system of work
- 1.3 ensure that all molten metal handling and transfer equipment is maintained in good order
- 1.4 leave the work area in a safe condition on completion of the activities

2.

Maintain the performance of one of the following pressure die/mould casting machines:

- 2.1 high pressure hot chamber
- 2.2 high pressure cold chamber
- 2.3 low pressure
- 2.4 squeeze process
- 2.5 other specific process

3.

Monitor, control and adjust two of the following types of pressure dies:

- 3.1 split die with no secondary die movement
- 3.2 split dies with one core
- 3.3 split die with one secondary die movement
- 3.4 split dies with two or more cores
- 3.5 split die with two or more secondary die movements
- 3.6 core assembly with external cores
- 3.7 split die with no cores
- 3.8 core assembly with internal cores

4.

Maintain the condition of the die/mould casting process and equipment, to include checking all of the following:

- 4.1 die/mould is free from damage or defects
- 4.2 die/mould locations are clean, free moving and undamaged
- 4.3 all die/mould securing devices are effective and secure
- 4.4 the die is heated to the appropriate operating temperature
- 4.5 the molten metal is maintained at the correct temperature
- 4.6 all safety features are functioning correctly
- 4.7 all machine services are maintained within operational parameters

5.

Visually inspect production castings to identify both of the following:

5.1 castings which meet the required specification
5.2 castings which have defects/flaws

6.

Take corrective action when production castings are outside of specification, by checking and adjusting all of the following:

6.1 machine settings
6.2 ejection systems
6.3 machine services
6.4 molten metal condition

SEMMPF325

Maintaining pressure die casting machine performance

Developed by	Enginuity
Version Number	2
Date Approved	30 Mar 2020
Indicative Review Date	31 Mar 2023
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMMPF325
Relevant Occupations	Engineering and Manufacturing Technologies, Manufacturing Technologies, Process Operatives, Process, Plant and Machine Operatives
Suite	Materials Processing and Finishing Suite 3
Keywords	Engineering; manufacturing; processing; monitor; maintaining; performance; pressure die casting; setting; procedures; parameters