Parts Machining Process Evaluation Report

Zhihui Precision

www.zhm5axis.com

Basic Information

Customer Name		**Customer No.**		**Report No.**		**Review Date**	
Products Name		**Part Name**	**Impeller**	**Part No.**	**Impeller-xxxxxx**	**Part View**	

Evaluation Dept. Marketing Team, Project Team,Engineering Team, Quality Team, Production Team.

Purpose Of Evaluation

Determine the feasibility, rationality and reliability of this precision 5-axis CNC parts machining process, ensure that the product can meet the design requirements and quality standards, identify and solve potential problems in advance, and provide technical support for formal production.

Basis Of Evaluation

Product design drawings, parts plus specifications and related technical documents, clear dimensional tolerances, shape and location tolerances, surface roughness, surface treatment requirements, delivery cycle and other specific requirements.

In-house CNC machining process specifications, standards and experience in machining similar products.

Relevant industry standards and specifications - 19001 Quality Management , Aerospace Industry AS9100 and Medical 13485 System Standard for Processing Related Sections.

Contents Of Evaluation

	Drawing Review	Conclusion	Remark
1.1	Completeness: The drawings are complete in view, including main view, top view, side view and necessary sectional view, with comprehensive dimensioning, clear technical requirements and no obvious omissions.		
1.2	Accuracy: The dimension tolerance labeling is clear and reasonable, and there is no contradiction or conflict between the dimensions; the form and position tolerance meets the functional requirements of the product and is in line with the industry standard. For example, the positional tolerance of the key hole is ±0.05mm, which is within the machinable range.		
2	**Design Requirements Understanding**		
2.1	Clearly the product is used for [specific equipment or scene], there are high requirements for the strength and wear resistance of the parts, and the surface needs to be treated with (specific surface treatment process).		
3	**Process Analysis**		
3.1	Structural processability: the structure of the part exists partially thin-walled and deep hole structure. Thin wall thickness of the smallest place is 2mm, easy to deform when machining, it is recommended to use a number of times to take the knife, smaller cutting parameters, and optimize the clamping method, such as the use of elastic fixtures; deep hole diameter of 10mm, depth of 80mm, the length of the diameter is relatively large, you need to choose the right deep hole drilling tool, the use of graded drilling method, with high-pressure cooling system to ensure that the chip removal is smooth.		
3.2	Precision rationality: According to the existing 5-axis CNC machining equipment precision, most of the precision requirements can be realized. However, some high-precision shape and position tolerances, such as flatness. Degree requirements to reach 0.005mm, need to optimize the process route, increase the number of semi-finishing and finishing, the selection of high-precision tools and suitable cutting parameters to ensure.		
3.3	Machining sequence planning: preliminary planning for the first machining of the datum surface, the datum surface positioning processing of other major planes, and then the hole system processing, and finally the contour finishing. Separate roughing and finishing, reasonable distribution of machining allowance, to avoid machining stress affecting accuracy.		
4	**Material Evaluation**		
4.1	Material suitability: the selected material is [material grade], its strength, hardness, wear resistance and other properties to meet the product requirements, and good compatibility with the subsequent surface treatment process.		
4.2	Material processing performance: the cutting performance of the material is medium, the machining process may produce a certain degree of hardening, need to pay attention to the selection of cutting tools and cutting parameters of the adjustment, such as appropriately increase the cutting speed, reduce the amount of feed.		
4.2	Material specifications and margin: the specifications of the purchased raw materials are [specific size, after accounting, the margin is sufficient to meet the requirements of each processing procedure, in the roughing, semi-finishing and finishing process can ensure that enough material is removed to achieve the design size.		
5	**Processing Equipment Matching**		
5.1	Machine Type: [Machine Model [XXXX]] 5-axis CNC machining center is selected, which is equipped with high-precision rotary and linear axes to meet the needs of machining complex curved surfaces and polyhedra of parts.		
5.2	Machine accuracy: machine positioning accuracy of ± 0.005mm, repeat positioning accuracy of ± 0.003mm, the precision indicators to meet the requirements of parts processing, the test verified that the accuracy of the machine is in a good state.		
5.3	Machine performance: the maximum spindle speed of the machine [X] r/min, the maximum torque [X] N-m, feed speed range [X] m/min, can meet the requirements of different materials and machining processes on cutting parameters.		
6	**Tool And Fixture Selection**		
6.1	Tool selection: The corresponding tools are selected for different machining processes. Roughing selection of carbide coated tools to improve cutting efficiency; finishing selection of ceramic tools to ensure machining accuracy and surface quality. Such as milling plane, rough milling selection of 50mm diameter carbide face milling cutter, finishing milling selection of 30mm diameter ceramic face milling cutter.		
6.2	Fixture solution: A special fixture is designed, which adopts two pins on one side for positioning to ensure accurate and reliable positioning of the workpiece. The fixture structure is simple, easy to clamp, can meet the requirements of different directions of cutting force during 5-axis machining, and will not cause damage to the machined surface of the workpiece.		
7	**Programming Feasibility Evaluation**		
7.1	Program readability: the processing program adopts a standardized programming format, with clear code comments and standardized variable naming, which is easy for debugging, modification and maintenance.		
7.2	Path planning: tool path planning is reasonable, through the simulation of processing did not find tool interference phenomenon, less empty stroke, cutting path in line with the shape of the parts and machining process requirements, can effectively ensure the quality and efficiency of processing.		
7.3	Cutting parameters: the cutting parameters are set and optimized according to the tool, material and machining process, such as rough milling spindle speed of 800r/min, feed speed of 800mm/min, depth of cut 3mm; fine milling spindle speed of 1500r/min, feed speed of 500mm/min, depth of cut 0.5mm.		
8	**Cost And Efficiency Analysis**		
8.1	Processing cost: It is estimated that the material cost accounts for [X]% of the total cost, the tool cost accounts for [X]%, and the depreciation of equipment, labor cost, etc. accounts for [X]%. The cost can be further reduced by optimizing the process, such as reasonable selection of tools and improving the material utilization rate.		
8.2	Machining time: According to the process planning and program simulation, the machining time of a single part is about [X] hours. By optimizing the machining sequence and cutting parameters, it is expected that the machining time can be shortened by [X]% to meet the production schedule.		
9	**Risk Assessment And Response**		
9.1	Potential Risks: Risks such as equipment failure, excessive tool wear, material defects, and process instability may occur.		
9.2	Countermeasures: formulate a regular maintenance plan for equipment and increase spare tools; strengthen the incoming inspection of materials; fully validate and optimize the process during the trial production stage, and formulate an emergency plan to ensure that timely measures can be taken to solve the risk when it occurs.		
10	**Conclusion Of The Evaluation**		
10.1	Process feasibility: After a comprehensive review of the precision 5-axis CNC parts machining process, the process is considered technically feasible and can meet the product design requirements and quality standards.		
10.2	Improvement Requirements:For the problems and suggestions raised in the review process, the relevant departments need to improve and optimize before the official production, to ensure that the processing is carried out smoothly.		
	Trial Production Decision		
	Agree that the processing technology into the trial production stage, in the trial production process to pay close attention to product quality and production efficiency, summarize the experience in a timely manner, continuous improvement of the process.		

Evaluator's Signature |Department |Name|

Marketing Team		**Processing Engineer**	
Project Team		**Project Engineer**	
Engineering Team		**Quality Engineer**	
Quality Team			
Production Team			