

II INTERNATIONAL CONFERENCE
Krasnoyarsk-St Petersburg, RUSSIA
3-6 March 2021



«Metrological Support of Innovative Technologies» ICMSIT-II 2021

«Metrological support of cylinder liner inspection»

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Problem statement

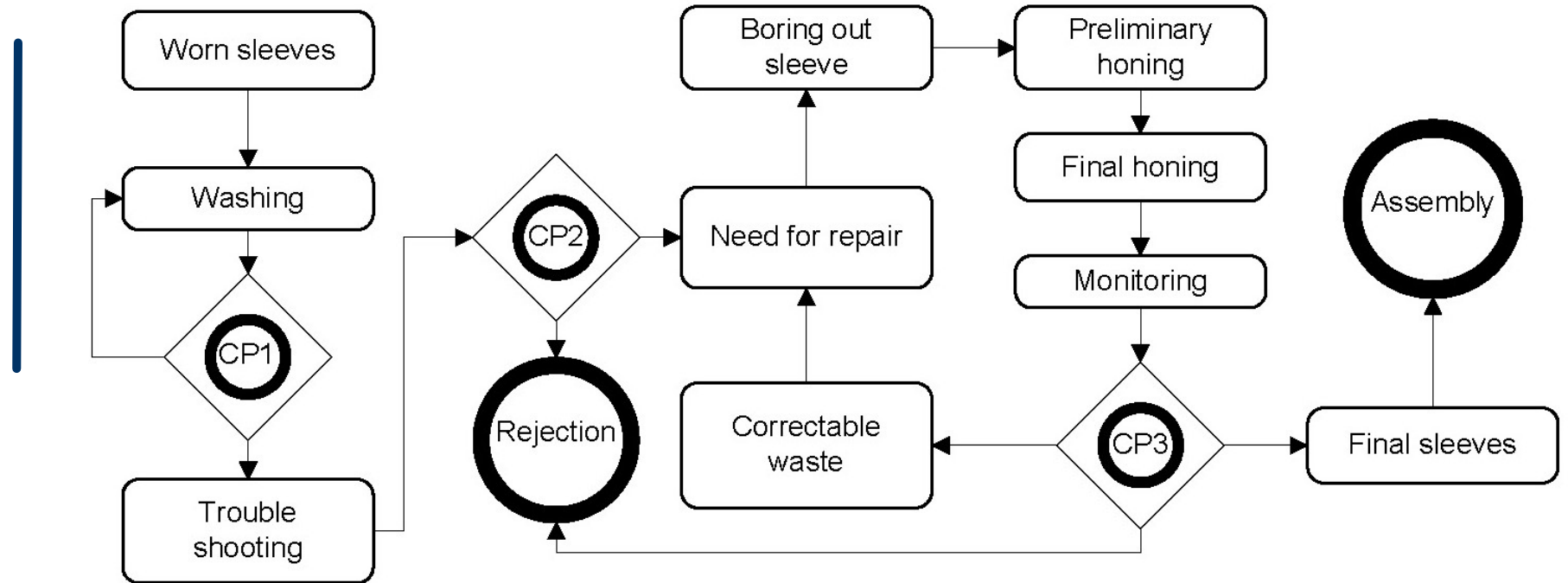
- Much attention is currently being paid to the quality of control processes and metrological support of production in mechanical engineering. Increasing requirements for the reliability of units lead to stricter requirements in relation to the accuracy of machinery and equipment in order to ensure the durability of critical connections in movable landings and in fixed mates of parts. To improve the accuracy, methods of incomplete interchangeability are also used. An increase in the accuracy of manufacturing and assembly of joints leads to the need to ensure the accuracy of the means and methods of their control. Separately, we can single out the technologies for ensuring the accuracy of sealing devices during assembly.
- When organizing control, economic losses are formed associated with the costs of measurements and losses from the measurement error. New approaches are being formed to the choice of measuring instruments, including elements of risk management, which ultimately ensures the quality of repair processes.



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Solution methods



Justification of control points of the process of repairing cylinder liners



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Application of statistical methods and tools for quality control of control points in the repair of cylinder liners

Solution methods

Check Point	Controlled parameter	Recommended control tool	Statistical quality management techniques			
			Process planning	Determination of the level of defectiveness	Process stability management	Defectiveness assessment
Operation: Cleaning						
CP1	Complete cleaning	loupe	Ishikawa diagram	checklist for registering types of defects	-	-
Operation: Defect detection						
CP2	Inner diameter of cylinder liner	Indicator bore gauge	Ishikawa diagram	checklist for registering the distribution of the measured parameter	-	-
	cracks, shells, etc.	loupe	Ishikawa diagram	checklist for registering types of defects	-	
	Shape deviation	Indicator bore gauge	Ishikawa diagram	defect location checklist	-	
	diameter of the size for rings	lever bracket calipers	Ishikawa diagram	checklist for registering the distribution of the measured parameter	-	



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Solution methods

Check Point	Controlled parameter	Recommended control tool	Statistical quality management techniques			
			Process planning	Determination of the level of defectiveness	Process stability management	Defectiveness assessment
Operation: Control						
CP3	Shape deviation	Indicator bore gauge		defect location checklist	-	Defectiveness assessment
	Inner diameter of cylinder liner	Indicator bore gauge		checklist for registering the distribution of the measured parameter	Shewhart control charts	
	Roughness of the working surface	profilograph		-	-	



Conclusions

Results, implementation

- The recommendation of control instruments for the repair production processes was carried out. It is recommended to use the Ishikawa diagram to identify parameters that affect the quality of the repair of the "piston-sleeve" connection. The use of Shewhart control charts of sliding ranges and individual values will allow assessing the stability of the technological process of finishing the liner. The checklist will allow you to determine the number of recoverable and irreparable defects and losses across the entire range of possible defects.



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