

**INSTYTUT AUTOMATYZACJI PROCESÓW
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Wydział Mechaniczny Technologiczny

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ROZPRAWA DOKTORSKA

**Metoda recyrkulacji środków technicznych z uwzględnieniem
inżynierii odwrotnej**

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Summary

The Thesis shows preposition of the complex the technical mean recirculation method, which make possible universal systematization of knowledge. The proposed solution computer aids the following stages of recirculation process like: disassembly, initial decision for sending elements to technical state examinations, element technical state examination, final decision for sending elements to refurbishing. The presented thesis proves that is possible to retrieve with reverse engineering an element approximate design and material features with assumption of similar like pattern element exploitation conditions. Other aspect presented in the thesis is the automatic material loss (surface) detection based on 3D model of element (rotational symmetric shape) that was laser scanned (point cloud – solid model). The detection is based on singular space volumetric compare of sample model and reference model. Then in itch singular space where material loss is detected, automatic the depth detection is made. According to the retrieved data, is possible to modify reference model and prepare turning technological operation for cladding reconstruction operations. Simultaneously data are stored in the database for future analysis oriented for element refurbishing in next singular cycle in the technical mean recirculation. The automatic material loss detection correctness is proved with the two separate research experiments on the two different elements (different in geometry and material features). Thesis contains preposition of the solution for semi-automatic disassembly sequence preparation, which results are: the disassembly sheet and the directional graph that describes disassembly range in technical mean. Next presented aspect, is the automatic element relative cost computation, which is an aggregation of the dissimilar, originate values ratios, like: joins quantity, surfaces quantity, total element surface, total element mass. The presented solution show that relative cost is reflects to mass of element and its complexity. Each case is stored in the date base prepared with MS SQL Server software. The source code and interface is prepared in MS Visual Studio environment. The case description is based on literature analysis and data gathered in coal mine exploitation environment examination. The thesis consist preposition of the new solution, oriented to computer aid overhaul in technical mean multiple recondition to preserve it further exploitation.