

CONTENTS

	Page
<i>Resume</i>	7
<i>Streszczenie</i>	8
I. Introduction.....	9
II. The subject matter	11
II.1 Cast aluminum composites and their recycling	11
II.2 Recycling methods	13
II.2.1 Composite component separation.....	13
II.2.2 The Disintegrated Melt Deposition Technique (DMD).....	16
II.2.3 Separation of the metal matrix from the reinforcement phase in composites produced by preform infiltration	18
II.2.4 Recycling of waste foundry materials	20
II.2.5 Recycling of waste scobs	21
II.2.6 The pushing-out method	22
II.2.7 Direct remelting	24
III. Experimental part.....	33
III.1 Test material.....	33
III.2 Recycling simulation	34
III.3 Chemical composition analysis of the A359 alloy and the Al- SiC composites	36
III.3.1 Test methodology.....	36
III.3.2 Chemical analysis results, discussion and conclusions	38
III.4 Radiographical research	43
III.4.1 Test methodology.....	43
III.4.2 Radiographic analysis results, discussion and conclusions	43
III.5 Density tests	45
III.5.1 Test methodology.....	45
III.5.2 Density test results, discussion and conclusions	45
III.6 Electrical conductivity tests	49
III.6.1 Test methodology.....	49
III.6.2 Electrical conductivity test results, discussion and conclusions	49
III.7 Dilatometric tests	53
III.7.1 Test methodology.....	53
III.7.2 Dilatometric test results, discussion and conclusions	54
III.8 Temperature conductivity tests	59
III.8.1 Test methodology.....	59
III.8.2 Temperature conductivity test results, discussion and conclusions	60

III.9 Vibration damping tests.....	63
III.9.1 Test methodology.....	63
III.9.2 Calculation procedures.....	64
III.9.3 Vibration damping test results, discussion and conclusions.....	65
III.10 Hardness tests	68
III.10.1 Test methodology	68
III.10.2 Hardness test results, discussion and conclusions	68
III.11 Strength property tests	74
III.11.1 Test methodology	74
III.11.2 Strength property test results, discussion and conclusions.....	74
III.12 Tribological tests – evaluation of wear resistance	80
III.12.1 Test methodology	80
III.12.2 Tribological test results, discussion and conclusions	82
III.13 Structural tests	88
III.13.1 Qualitative metallographic studies	88
III.13.2 Quantitative metallographic tests (light microscopy)	97
III.13.3 X-ray phase analysis	114
III.14 Quantitative dependences of the relation: mechanical properties-microstructure of alloy A359 and composites, in the context of multiple remelting	138
III.14.1 Correlation analyses.....	138
III.14.2 Result discussion.....	170
IV. Summary of the performed tests.....	175
V. Practical result verification	181
V.1 Prototype cast of ready product (brake disc) from multiply remelted material.....	181
V.2 Technical reception of the ready product (brake disc).....	182
VI. Summary	187
References	189