OF SHAFTS BY WELDING

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A THESIS

Submitted in Partial Fulfilment of the Requirements of the Degree of Master

Ιn

MECHANICAL ENGINEERING (Production Engineering)



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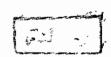
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FACULTY OF ENGINEERING AIN SHAMS UNIVERSITY 1986

Central Library - Ain Shams University

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DEDICATION

TO MY LATE FATHER WHO ENCOURAGED AND ASSISTED ME STRONGLY IN LIFE, IN GENERAL, AND TO MY DEAR WIFE WHOSE LOVE AND SUPPORT ENABLED ME TO WORK HARD.

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CONTENTS

		<u>PAGE</u>
۹B:	STRACT	1
<u>-</u>	INTRODUCTION	3
<u>?</u> -	LITERATURE REVIEW	5
	 2-1 Definition and General Description of Surfacing	5 5 7
	2-5 Special Considerations 2-5-1 Dilution control 2-5-1-1 Current density 2-5-1-2 Polarity	10 11 12 13
	2-5-1-3 Electrode size 2-5-1-4 Electrode extension 2-5-1-5 Bead spacing pitch 2-5-1-6 Electrode oscillation	13 13 14 14
	2-5-1-7 Travel speed 2-5-1-8 Welding position and work inclination	15 16 17 18
	2-5-2 Contamination 2-5-3 Thermal stresses	18 19
	2-6 Preheating	20 22 22 23 24 25
	2-8 Discontinuities in Welds 2-8-1 Porosity 2-8-2 Slag inclusions 2-8-3 Incomplete fusion	27 27 27 28
	2-9 Definition of Wear 2-10 Classification of Wear 2-11 Wear Testing Techniques 2-12 Typical Wear-Versus-Time Curve	29 29 31 34
	2-13 Relationship Between the Wear of Materials and their Mechanical Properties	37

		PAGE
3-	PROBLEM IDENTIFICATION	38
4-	EXPERIMENTAL WORK	41
	4-1 Materials	41
	4-1-1 Base material	4] 44
	4-2 Equipment	45
	4-2-1 Welding equipment	46
	4-2-2 Equipment for testing mechanical properties	46
	4-2-3 Wear test apparatus	48
	4-2-4 Surface roughness measuring	51
	4-2-5 Temperature measuring	51 51
	4-2-6 Metallugraphic investigation 4-3 Experimental Procedure	52
	4-3-1 Welding parameters	52
	4-3-2 Preliminary test for selection of welding electrodes	53
	4-3-3 Wear tests	55
	4-3-3-1 Conditions of wear tests	55
	4-3-3-2 Measurement of wear by determination of the	
	decrease in diameters	56
	4-3-3-3 Measurement of wear by determination of the	57
	loss in weights4-3-4 Metallugraphic investigation	57 59
	included the street of the str	
5-	RESULTS AND DISCUSSIONS	60
	5-1 Results of Preliminary Tests for Selection of Welding Electrodes	60
	5-2 Determination of the Preheating Temperature for the	
	Cylindrical Specimen	62
	5-3 Wear Test Results	64
	5-3-1 Results of wear test by measuring the decrease in	<i>c</i> 1.
	diameters5-3-2 Results of wear test by weight loss	64 67
	5-3-3 Results of surface roughness (R ₇) measuring during wear	67
	test using weight loss method	73
	5-3-4 Relation between periodic wear values, and "R " at the	,,
	start of each period	84
	5-3-5 Temperature rise during wear test	89
	5-4 Metallographic Investigation	94
	5-4-1 Microhardness test	99
6-	CONCLUSIONS	104
_		
7-	REFERENCES	106
AR	ARIC SUMMARY	

ABSTRACT

ABSTRACT

The work represents a study of the possibility of renewal of shafts and axles by deposit welding. The experimental work was carried out on specimens of the arm of the road wheel of a vehicle.

Renewal was carried out by the deposition of filler metal on the surface of the shaft to regain the surface properties and dimensions necessary to meet the service and assembly requirements.

Manual arc welding with coated electrodes for surfacing was used in the experiments.

Several kinds of electrodes for deposition of the surface layers were chosen from different sources.

The carbon content in the steel of the road wheel arm is 0.43%, therefore a preheat treatment for the arm was essential. This was done at $225\,^{\circ}\text{C}$ prior to surfacing process.

No distortion due to surfacing, so residual thermal stresses were encountered because of the nearly uniform Central Library - Ain Shams University heating and the rigidity of the arm.

Hardness, wear resistance and microstructure investigations were made for the choice of the suitable electrode.

Results indicated that the proper electrode to renew the road wheel arm is "Gridur 45" with composition 0.17%C, 6.25% Mn, 27.8% Cr, 2.46% Ni, 0.0319 Si and 0.031% S and the suitable technique for welding is one layer coil-shaped beads.

INTRODUCTION Central Library - Ain Shams University

1- INTRODUCTION:

Design and production has to ensure the necessary properties of vehicle components in the form of dimensions, geometry, finish, accuracy of machining, etc.... based on service conditions and service life. All these properties are specified by the designer to ensure the performance suitable for the working conditions during service life.

By exploitation, vehicle components are changed due to wear as it deviates from the specified limits. Due to the excessive wear, the adequate performance of the vehicle deteriorates.

From the technical point of view it is necessary to replace those worn components either by new parts or by renewing them. In the developing countries new parts are to be imported from abroad in most cases. In many cases lot of difficulties arise, either due to non-availability of the required part in the market or by manufacturer or it needs long time to import it. Beside these difficulties it is in most cases costly. Egypt as one of the developing countries had suffered during the last 25 years from such troubles. Ιt is therefore necessary to think about some concerning solutions that problem. One of the logical Central Library - Ain Shams University save the worn parts by renewing solutions is to

them. This should be done at any way on scientific and economical basis. The purpose of this thesis is to present results obtained on the renewal of the arm of the vehicle road wheel by welding and to optimise the renewal process.

LITERATURE REVIEW

2- LITERATURE REVIEW:

2-1 Definition and General Description of Surfacing:

In general, the base metal and size of a mechanical component are decided by strength requirements, while the surface properties are decided by the service working conditions, environmental requirements and life time required.

Surfacing in general is the deposition of filler metal or alloy on the surface of a worn part to obtain or regain certain desired properties, dimensions and surface quality. This can lead to life extention of that part which may not otherwise have all the properties necessary for an engineering application. It may also be used to replace metal which has worn out or corroded away with new layers. The overlay may contribute corrosion and wear resistance, toughness or antifriction properties.

2-2 Principles of Surfacing:

Hardfacing is usually achieved by depositing filler metal or alloy after melting by means of arc or gas fusion welding processes.