

CONTENTS

INTRODUCTION	5
1. BASIC PHYSICAL PROPERTIES OF FLUIDS	7
1.1 Basic Terms and Definitions Relevant to Hydraulic Process and Technical Engineering	
1.2 Specific Weight of Liquids	10
1.3 Viscosity	12
1.4 Compressibility of Real Liquids	12
1.5 Expansivity of Liquids	15
1.6 Surface Tension	16
2. BASIC EQUATIONS USED IN HYDRAULIC PROCESSES	21
2.1 Basic Hydrodynamic Equations	21
2.2 Equation of Conservation of Energy – Bernoulli’s Equation	26
2.3 Pressure Change Propagation Velocity	29
2.4 Zhukovsky’s Theorem – Water Surge	35
2.5 Real Liquid Flow Character	38
3. REAL LIQUID FLOW PROPERTIES	43
3.1 Newtonian Liquids	43
3.2 Non-Newtonian Liquids	46
3.3 Viscosity of Multiphase Systems	56
4. AWJM TECHNOLOGICAL PROCESS OVERVIEW	59
4.1 Water Jet Cutting Principle	59
4.2 Recommended Water Quality for Water Jet Cutting	65
4.3 Abrasive	66
4.3.1 Garnet GMA Abrasive	66
4.3.2 Abrasives Used in Practice	68
4.4 Cutting Area Surface and Application Potentials for Technology	73
4.5 Water Jet Cutting Head	75
4.6 Water Jet Quality and Cutting Performance	78
4.7 Abrasive Recycling Methods	80
4.8 Approaches to High Pressured Water Flow Change	84
4.8.1 Some Workplaces Equipped with High Pressured Water Flow Distribution	85
4.8.2 Some high-pressured water distribution workplaces abroad	93
5. AWJM FACTORS CATEGORIZATION AND IDENTIFICATION	95
5.1 Factors of Basic Physical Properties and Hydrodynamic Relations of Liquids	96
5.2 Technical Factors Affecting Hydroerosive Manufacturing Process	96
5.3 Technological Factors Affecting Hydroerosion Cutting Surface	101

6. HIGH PRESSURED WATER FLOW EFFECT ON CUTTING AREA SURFACE RESEARCH	107
6.1 Flow Change Combination Sizing for Water Jet Cutting	107
6.2 Experimental Testing Methodology	109
6.3 Analysis and Processing of Specimens	114
6.4 Analysed and Processed Specimen Evaluation	124
6.4.1 1st Factors Category Evaluation	125
6.4.2 2nd Factors Category Evaluation	128
6.4.3 3rd Factors Category Evaluation	130
6.4.4 4th Factors Category Evaluation	134
6.5 Verification and Recommendation for Practice	135
7. CONCLUSION	142
LITERATURE	146