

PROCEEDINGS

AN INTERNATIONAL WORKSHOP ON QUALITY IN UNDERWATER WELDING OF MARINE STRUCTURES

Sponsored by:

The Offshore Minerals Management Service
The Colorado School of Mines—Center for Welding Research
The National Bureau of Standards



November 4-6, 1985
Golden, Colorado — USA

TABLE OF CONTENTS

	<u>Page</u>
I. EXECUTIVE SUMMARY	1
II. INTRODUCTION	3
2.1 BACKGROUND	3
2.2 WORKSHOP ORGANIZATION	3
2.3 WORKSHOP OVERVIEW	4
III. FIRST KEYNOTE ADDRESS - H.C. COTTON	7
IV. SECOND KEYNOTE ADDRESS - C.E. GRUBBS - "Future Needs - Prevention and Repair of Underwater Damage to Marine Structures"	9
4.1 INTRODUCTION	9
4.2 CAUSES AND TYPES OF UNDERWATER DAMAGE	9
4.2.1 Design Errors	9
4.2.2 Unanticipated Loads	10
4.2.3 Accidents	10
4.2.4 Conclusions	10
4.2.5 Corrosion	10
4.2.6 Fatigue	10
4.2.7 Prevention of Damage	11
4.2.8 Inspection of Underwater Damage	11
4.2.9 Preparation for Repair of Damage	11
4.2.10 Specification for Underwater Welding (ANSI/AWS D3.6)	12
4.2.11 Wet/Dry Hyperbaric and One-Atmosphere Welding	12
4.2.12 Quality Assurance of Underwater Welds	12
4.2.13 Future Needs	13
V. DEEP UNDERWATER WELDING	
A. WHITE PAPER - N. Christensen/H. Hoffmeister	17
5.1 THE RANGE OF DEPTH AND CORRESPONDING WELDING PROCESSES	17
5.1.1 Summary	18
5.2 TYPES OF MATERIALS AND REQUIREMENTS	19
5.2.1 Summary	20
5.3 AREAS OF RESEARCH AND DEVELOPMENT	21
B. SESSION REPORT - H. Hoffmeister	23
5.4 INTRODUCTION	23
5.5 THE RANGE OF DEPTHS	23
5.6 TYPES OF MATERIALS	25
5.6.1 Materials	26
5.6.2 Hydrogen	27
5.7 AREAS OF RESEARCH AND DEVELOPMENT	27