

Table of Contents

LECTURES

EXPERIMENTAL INVESTIGATIONS IN RESPECT TO THE RELEVANCE OF SUCTION SPECIFIC SPEED FOR THE PERFORMANCE AND RELIABILITY OF CENTRIFUGAL PUMPS	3
Bernd Stoffel, Ralf Jaeger	
THE SUCTION PERFORMANCE OF CENTRIFUGAL PUMPS POSSIBILITIES AND LIMITS OF IMPROVEMENTS	13
Peter Hergt, Alexander Nicklas, Gerhard Mollenkopf, and Sönke Brodersen	
DESIGN AND TESTING OF SEALS TO MEET API 682 REQUIREMENTS	27
Ralph P. Gabriel, Syed K. Niamathullah	
DEVELOPMENT OF A NONCONTACTING SEAL FOR GAS/LIQUID APPLICATIONS USING WAVY FACE TECHNOLOGY	39
Lionel A. Young, William E. Key, and Ronald L. Grace	
CENTRIFUGAL PUMP VIBRATION CAUSED BY SUPERSYNCHRONOUS SHAFT INSTABILITY	47
Donald R. Smith, Stephen M. Price, and Friedrich K. Kunz	
TORSIONAL VIBRATION IN PUMP/DRIVER SHAFT TRAINS– THE ROLE OF EXTERNAL DAMPING FROM PUMP IMPELLERS	61
Rainer Nordmann, Peter Weiser, Arno Frei, and Rudolph Stuerchler	
FIELD INVESTIGATION OF BEARING HOUSING OIL CLEANLINESS	71
William V. Adams, R. Barry Erickson, Bill Needelman, and Michael D. Smith	
DOUBLE ROW ANGULAR CONTACT BALL BEARINGS IN CENTRIFUGAL PUMPS	81
Keith Meyers	
A CASE STUDY–UNUSUAL PROBLEMS DISCOVERED DURING THE RERATE OF 2800 HP BOILER FEEDWATER PUMPS AND TURBINES	89
John P. Henderson	
THE CONTROL OF VARIABLE SPEED PUMPS IN PARALLEL OPERATION	97
Anthony B. Crease	
MAG DRIVE PUMPS: WHY THEY WORK–HOW THEY FAIL	105
Micheal T. Stevens	
ASME B73.1M PUMP RELIABILITY PROGRAM FORMATION–A DATA BASED APPROACH	115
Steven J. Hrivnak	
IMPROVED MECHANICAL SEAL FOR HIGH PRESSURE PUMPS IN SEVERE ABRASIVE TAILINGS SERVICES	125
Frank E. Manning, Rod Mosher, and Doug McCullough	
DETERMINATION OF NPSHR FOR RECIPROCATING POSITIVE DISPLACEMENT PUMPS–A NEW APPROACH	131
Pawan J. Singh, Stephen D. Able	

TUTORIAL SESSIONS

ABRASIVE WEAR IN PUMPS—A TRIBOMETRIC APPROACH TO IMPROVE PUMP LIFE143
Gerhard Vetter, Ralph Kießling, and Wolfgang Wirth

MULTIPHASE GAS-LIQUID PUMPING159
Paul Cooper, Bruno Schiavello, Jacques de Salis, Charles D. Marolles, Allan J. Prang, Dan Broussard

THE USE OF BASIC HYDRAULICS TO SOLVE FIELD PROBLEMS175
Lev Nelik, Joseph A. Silvaggio, Jr., John P Joseph II, Jeffery Freeman

MATERIAL PROBLEMS AND SOLUTIONS—A METALLURGICAL PERSPECTIVE183
Colin McCaul

SLURRY PIPELINE DESIGN FOR OPERATION WITH CENTRIFUGAL PUMPS193
Graeme R. Addie

EVALUATION OF PUMP NOZZLE LOADING ANALYSIS AND EFFECTS213
Daniel Wood, Raymond Schussler, Y. Jay Reddy

DISCUSSION GROUPS AND LEADERS215

SHORT COURSE SPEAKERS245

ADVISORY COMMITTEE261

PROFESSIONAL STAFF267

TURBOMACHINERY LABORATORY271