

Indiana University – Purdue University Fort Wayne
Opus: Research & Creativity at IPFW

Manufacturing & Construction Engineering
Technology and Interior Design Senior Design
Projects

School of Engineering, Technology and Computer
Science Design Projects

4-14-1988

Automatically Timed Lifting Device for the Removal of Plastic Gearboxes from Boiling Water

Troy Lagemann

Indiana University - Purdue University Fort Wayne

Follow this and additional works at: http://opus.ipfw.edu/etcs_seniorproj_mctid

Opus Citation

Troy Lagemann (1988). Automatically Timed Lifting Device for the Removal of Plastic Gearboxes from Boiling Water.
http://opus.ipfw.edu/etcs_seniorproj_mctid/26

This Senior Design Project is brought to you for free and open access by the School of Engineering, Technology and Computer Science Design Projects at Opus: Research & Creativity at IPFW. It has been accepted for inclusion in Manufacturing & Construction Engineering Technology and Interior Design Senior Design Projects by an authorized administrator of Opus: Research & Creativity at IPFW. For more information, please contact admin@lib.ipfw.edu.

FINAL REPORT ON THE
DESIGN, FABRICATION, AND TESTING OF AN
AUTOMATICALLY TIMED LIFTING DEVICE
FOR THE REMOVAL OF PLASTIC GEARBOXES FROM BOILING WATER

Prepared for: Mr. Don McAleece
Mr. Steve Hollander

Prepared by: Troy Lagemann

MET 497
ENG W421

APRIL 14, 1988

INFORMATIVE ABSTRACT

This report describes the design, fabrication, and testing of an automatic gearbox boiler which prepares sample gearboxes for a strip test by boiling them in water. This preparation method has been an important problem for Power Wheels, Inc., the leader in children's ride-on vehicles. Critical design information and restrictions for purchased components, test results, a completion schedule, a cost estimate, diagrams, and drawings are included to fully analyze the solution to this problem.

TABLE OF CONTENTS

<u>SEC</u>	<u>TOPIC</u>	<u>PAGE</u>
1.	Power Wheels: An introduction to the opportunity	1
2.	A lack of consistent boiling time: The problem	2
3.	Design elements of the gearbox boiler . . .	2
3.1.	A design to provide a solution . . .	2
3.1.1.	Criteria to meet	2
3.1.2.	Overview of the design . . .	3
3.1.3.	Components of the gearbox boiler	3
3.1.3.1.	The Cutler Hammer programmable controller	5
3.1.3.2.	The ARO air-line filter, regulator, and lubricator . . .	6
3.1.3.3.	The 4-way ARO solenoid valve . . .	6
3.1.3.4.	The Bimba pneumatic cylinder	7
3.1.3.5.	The control/indicator box . . .	7
3.1.3.6.	The structural assembly	9
3.1.3.7.	Various hook-up components	9
3.1.4.	The gearbox boiler at work . . .	9
3.2.	Fabrication of the gearbox boiler . . .	13
3.3.	Testing the gearbox boiler	14
3.4.	Technical assurance of the gearbox boiler design	15
3.5.	Cost estimate of the gearbox boiler . . .	15
4.	Gearbox boiler prototype completion schedule	18
5.	Advantages of using the gearbox boiler . . .	19
6.	Bibliography	21

LIST OF APPENDICES

APPENDIX A.	Power Wheels catalog	A-1
APPENDIX B.	December project proposal	B-1
APPENDIX C.	Calculations, ladder diagrams, sketches, and notes	C-1
APPENDIX D.	Purchased part information	D-1
APPENDIX E.	Drawings	E-1