

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Re-energizing the fence

Designing a Desirable Electric Fence System

Matthew.H.McKinley

ABSTRACT

The intent of this Master of Design study is to utilise design-aided research to develop a desirable, conceptual livestock electric fencing system in conjunction with Gallagher animal management Ltd.

Proudly known worldwide for their innovative agricultural products, Gallagher have identified an opportunity for a fence system to be marketed towards the comparatively niche industry of hobby/lifestyle farming, and provide hobby farmers with a fencing system that they can construct without requiring heavy machinery or fencing experience. This could provide a sound opportunity for Gallagher to maintain their industry status and provide a product that is really desirable to the market users.

This investigation intends to develop an electric fence design proposal, primarily for the European hobby farming market, which obtains the sought after market differentiation and innovation by proposing a new livestock fence concept that is desirable to the customer; commencing from the point of purchase, through to its installation and operation. A new product that will give the customer the traditional satisfaction of constructing their fence themselves without machinery and with a system that the user finds intuitive and physically less arduous to install, simple to operate and visually pleasing within a lifestyle farm environment.

The contemporary theory papers regarding Affective design (Warell, 2001) and 'utilitarian' and 'hedonic' design principles (Chitturi, et al. 2007) support the investigation's research methods used; determining existing product experiences through market analysis, observation, user interviews and focus

groups, followed by structured concept generation, prototypes and iterated design development.

The unresolved issues and desirable aspects identified throughout the research methods were categorised into 'performance' and 'experience' criteria attributes which the methods stated that the design required to produce a 'desirable' design proposal, and accomplish the research aim.

The final design was evaluated against the research criteria, based on the research knowledge. The testing method indicated that the fence design proposal had fulfilled most of the experience and performance design criteria, successfully achieving the research aim.

The investigation not only fulfilled the aim stated to create a desirable electric fence system, but additionally highlights the advantages of applying 'affective design' theories to this particular fencing industry which itself is so wrought by utilitarian tradition.

Keywords: Affective design, Desirable, Usability, Product experience, Fence systems.

CONTENTS

1.0	Study Background	1
2.0	Central Proposition	3
2.1	Research Aim	3
2.2	Research Objectives	4
2.3	Research Questions	5
3.0	The background of the Fence	6
3.2	Market analysis	8
3.3	Literature review	16
3.4	Background research conclusion	20
3.5	Initial design criteria	22
4.0	Research scope	24
5.0	Design Research	30
5.1	Research approach	30
5.2.	Research for design methods	32
6.0	Research for design results and discussion	37
6.1.	Observation:	38
6.2.	Scenario analysis	48
6.3.	Semi-structured Interviews: Results	51

6.4.	PPE analysis	60
6.7.	Research for design conclusion	72
7.0	Design criteria	74
8.0	Research through design results	78
8.1	Focus groups	79
8.2	Concept generation/ concept development	80
8.3	Prototypes/ Test rigs	90
8.4	Prototype evaluation	91
8.5	Final Design 1 : 1 scale model	93
8.6	Design Influences	104
8.7	Final design scenario	105
9.0	Design Evaluation	108
9.3	Design Evaluation discussion	114
10.0	Conclusion to the study	116
11.0	Recommendations for Future Work	118
12.0	Reference list	119

LIST OF FIGURES:

Fig 001:	<i>Affect logo</i>	2	Fig.019.	<i>Observation of the fencing process</i>	38
Fig 002.	<i>Bill Gallagher Snr</i>	2	Fig.020.	<i>The tools/equipment required for fencing</i>	39
Fig 003.	<i>Gallagher logo</i>	2	Fig.021.	<i>Fence installation storyboard, part-one</i>	40
Fig 004.	<i>Fence context</i>	6	Fig.022.	<i>Fence installation storyboard, part-two</i>	41
Fig 005.	<i>How an electric fence works</i>	7	Fig.023.	<i>Energizer connection storyboard</i>	42
Fig 006.	<i>Permanent Cattle & sheep fence</i>	7	Fig.024.	<i>Wire linking storyboard</i>	43
Fig 007.	<i>Mega-anchor 'anchor.'</i>	10	Fig.025.	<i>Fence installation storyboard</i>	44
Fig 008.	<i>Mega-Anchor system</i>	10	Fig.026.	<i>The Fieldays fencing competition</i>	45
Fig. 009.	<i>Speed Brace set up and assembly</i>	11	Fig.027.	<i>Fence material issues</i>	52
Fig. 010.	<i>Geo-Tek 'Mule' fence system</i>	12	Fig.028.	<i>Examples of unsafe fencing</i>	53
Fig. 011.	<i>CSIRO 'virtual fence' system</i>	13	Fig.029.	<i>Electric fence warning sign</i>	54
Fig.012.	<i>Corner post/end post comparison chart</i>	14	Fig.030.	<i>Utility related fence issues</i>	55
Fig.013.	<i>Line post comparison chart</i>	15	Fig.031.	<i>Examples of amateur fencing</i>	56
Fig.014.	<i>Gallagher Animal Management brand</i>	16	Fig. 032.	<i>Examples of amateur fencing contd</i>	57
Fig.015.	<i>European lifestyle farm environment</i>	25	Fig. 033.	<i>Examples of visually undesirable fences</i>	58
Fig.016.	<i>Examples of 'hobby' livestock</i>	27	Fig. 034.	<i>The classic post-and-rail fence and the imposters</i>	59
Fig.017.	<i>Examples of Gallagher electric tape</i>	29	Fig. 035.	<i>PPE framework diagram (Warell, 2006)</i>	60
Fig.018.	<i>Gallagher cable and wire</i>	29	Fig. 036.	<i>PPE Turboline insulator</i>	61
			Fig. 037.	<i>PPE XDI insulator</i>	61
			Fig. 038.	<i>PPE: Powerplus B40</i>	62

Fig. 039.	<i>PPE: Smartpower MX7500.....</i>	62	Fig. 059.	<i>Gate Concepts.....</i>	88
Fig. 040.	<i>PPE Powerplus B280.....</i>	63	Fig. 060.	<i>Gate development.....</i>	89
Fig. 041.	<i>PPE: Powerplus S50.....</i>	63	Fig. 061.	<i>Test rigs and prototype testing.....</i>	90
Fig. 042.	<i>PPE: Smart-fix fault finder.....</i>	64	Fig. 062.	<i>Prototype display at the Gallagher pavilion at Mystery Creek, Hamilton.....</i>	91
Fig. 043.	<i>PPE: Smartreader HR3.....</i>	64	Fig. 063.	<i>Prototype display and presentation.....</i>	92
Fig. 044.	<i>PPE: Termination Kit.....</i>	65	Fig. 064.	<i>The Final design's strainer post assembly.....</i>	94
Fig. 045.	<i>PPE: Geared reel.....</i>	65	Fig. 065.	<i>The final design; Strainer post and line post.....</i>	95
Fig. 046.	<i>Gallagher colour distribution.....</i>	68	Fig. 066.	<i>The final design; Strainer.....</i>	96
Fig. 047.	<i>Gallagher elliptical curved forms.....</i>	68	Fig. 067.	<i>The final design; Line post.....</i>	97
Fig. 048.	<i>Gallagher circular attributes.....</i>	69	Fig. 068.	<i>The final design; Stay assembly.....</i>	98
Fig. 049.	<i>Gallagher corrugated texture detail.....</i>	69	Fig. 069.	<i>The final design; Bracing platform.....</i>	99
Fig. 050.	<i>The 'Banding' visual trait in Gallagher products.....</i>	70	Fig. 070.	<i>The final design; The cut-out switch.....</i>	100
Fig. 051.	<i>Strainer post installation concepts.....</i>	80	Fig. 071.	<i>The final design; Strainer post foundation.....</i>	101
Fig. 052.	<i>Strainer post installation development.....</i>	81	Fig. 072.	<i>The final design; The gate set-up.....</i>	102
Fig. 053.	<i>Strainer assembly concepts.....</i>	82	Fig. 073.	<i>The final design; Gate details.....</i>	103
Fig. 054.	<i>Strainer assembly development.....</i>	83	Fig. 074.	<i>The final design; Inspiration and influences.....</i>	104
Fig. 055.	<i>Line post and insulators concepts.....</i>	84	Fig. 075.	<i>The final design; assembly storyboard.....</i>	106
Fig. 056.	<i>Line post and insulators development.....</i>	85	Fig. 076.	<i>The final design; assembly storyboard.....</i>	107
Fig. 057.	<i>Cut-out switch concepts.....</i>	86	Fig. 077.	<i>The final electric fence design.....</i>	116
Fig. 058.	<i>Cut-out switch development.....</i>	87			

LIST OF TABLES:

Table.001.	<i>Performance and experience criteria chart.....</i>	21
Table. 002.	<i>Performance criteria.....</i>	22
Table.003.	<i>Experience criteria.....</i>	23
Table.004.	<i>Research approach diagram.....</i>	30
Table.005.	<i>The investigation's Research methods.....</i>	31
Table. 006.	<i>Format analysis matrix.....</i>	67
Table. 007.	<i>Final Performance criteria part one.....</i>	74
Table. 008.	<i>Final Performance criteria part two.....</i>	75
Table. 009.	<i>Final Experience criteria part one.....</i>	76
Table. 010.	<i>Final Experience criteria part two.....</i>	77
Table. 011.	<i>The final design; Format analysis matrix.....</i>	109
Table. 012.	<i>Design evaluation of the performance criteria part one.....</i>	110
Table. 013.	<i>Design evaluation of the performance criteria part two.....</i>	111
Table. 014.	<i>Design evaluation of the experience criteria part one.....</i>	112
Table. 015.	<i>Design evaluation of the experience criteria part two.....</i>	113
Table. 016.	<i>Design evaluation of the criteria.....</i>	114