

Reformation in existing micro size laundry system by using product design and development process to enhance the productivity level

Vijay.M¹, Deepak Kumar², Krishna.P³

¹M.Tech student, Ramaiah Institute of Technology, Bangalore, Karnataka, India

²Associate professor, Dept of IEM, Ramaiah Institute of Technology, Bangalore, Karnataka, India

³Proprietor, Minchu products and services, Bangalore, Karnataka, India

Abstract - Laundry and dry cleaning is in much demand in all India. This has got tremendous demand especially in all small and big star category hotels, nursing, homes, hospitals, garment exports, apartments, textile units, schools etc. The present day sophisticated standard of living recognizes the importance of cleanliness and smart dressings. Due to the busy life and change in the standards of life people hardly have 7-8 hours per week to manage the laundry and it has become the huge pain point. To overcome this they will rush to the retail laundry and they have to wait for the hours. These micro sized laundries are still using the traditional laundry equipments and the process is not in a systematic way this leads the increase of waiting time of the customers. To overcome this, changes in the existing layout design in the micro sized laundry by replacing the traditional laundry equipments and changes are made in the overall process by the new product development process.

Key Words: reformation, product development, ergonomics, cycle time, multifunctional product

1.INTRODUCTION

Clothing is the one of the basic need of human beings other than the food and shelter. According to the KPMG (Klynvald Man Goerdeler) report the Indian laundry sector is fragmented with 767000 establishments, in this 98% are micro sized laundries with fewer than 10 workers. Reformation is the systematically changes made in the existing design to overcome the problems faced by the small scale laundry. The modern development in the field of technology has made laundry an attractive industry which can be started with a very moderate investment.

These micro sized laundries are still using the traditional laundry equipments and the process is not in a systematic way this leads the increase of waiting time of the customers. To overcome this, changes in the existing layout design in the micro sized laundry by replacing the traditional laundry equipments and changes are made in the overall process by the new product development process.

1.1 laundry process

- Receiving
- Registering

- Marking
- Segregation and Weighting
- Pre-spotting
- Wet cleaning/Dry-cleaning
- Post spotting
- Drying
- Pressing/ironing
- Checking
- Sorting and packing
- Billing
- Delivering

2. GENESIS OF THE PROBLEM

Renovation in the existing micro sized laundry layout equipments and process to enhance the productivity level was considered necessary because of following reasons:

- Equipments used are not ergonomically designed which will lead to the muscular skeletal disorders in the workers.
- The traditional process followed in this type of laundry is not scientific and it will affect the overall quality of the clothes.
- Improper design of the layout leads to the delay of the process and increases the waiting time of the customer.

2.1 Objectives of the paper

The problem genesis led to the formulation of following objectives:

- Making the changes in order to improve the system by replacing the traditional design and process by new modern equipments.
- To develop tools which is multifunctional and reliable
- Reduce human effort
- Proper utilization of space
- Effectively utilization of the men, machine, materials, energy
- To promote safety of plant as well as workers.

- To increase production capacity of organization.
- To increase the agility level.

3. METHODOLOGY

There are various tools and techniques for the concept development which includes morphological analysis, brain storming, spider chart, analogy, TRIZ etc. In this we are using the TRIZ, morphological chart for concept development.

3.1 TRIZ

TRIZ is a powerful methodology for the creative problem solving. TRIZ is Russian acronym of “Theoria Resheneyva Isobretelskehuh Zadach” which means the theory of inventive problem solving. TRIZ was developed by the Russian inventor Genrich Altshuller by studying more than thousands of patents & he postulated 40 principles in that we have selected the segmentation, nesting dolls, self-service principle for the concept generation.

3.2 Morphological chart

This is the idea generation tool developed by the swizz scientist Ftitz Zwicky. By using this morphological chart, we can explore the all possible solutions which is relevant to product development to overcome the problem identified.

KPMG survey report gives information about the percentage of energy used in laundry; in this the maximum energy is consumed by the dryer.

In micro size laundry due to the space problem, once the clothes are washed laundry people will take it to some other places for dry so, we are planned to develop the dryer using telescopic nesting principle of TRIZ.

Table -1: Morphological chart for dryer

SI.NO	OUTER PANEL MATERIAL	SHAPE	COLOUR	BASE SUPPORT
1	Poly propylene	Rectangle	White	Legs
2	Sheet metal	Square	Orange	Wheels
3	Glass	Circular	Yellow	Rubber
4	fibre	octagonal	blue	wheels

3.3 Pugh’s concept evaluation method

Evaluations of concepts are based on the comparison of the different attributes identified in the table & select the best combination by looking at various parameters by rating the each concept then the concept which got the highest weighting total is identified as the most preferred concept, and the remaining concept is used for reference.

Table -1: concept selection by Pugh’s method

S.I.NO	SELECTION CRITERIA	WEIGHT %	RATING			
			Concept1	Concept2	Concept3	Concept4
1	Mfg cost	30	0.75	0.75	0.50	0.60
2	Material	10	0.20	0.12	0.13	0.20
3	Weight	10	0.12	0.10	0.30	0.15
4	Portability	7	0.10	0.10	0.30	0.20
5	Durability	10	0.50	0.50	0.20	0.50
6	Comfort to use	9	1.00	0.80	0.90	0.75
	TOTAL		2.67	2.37	2.33	2.40
	RANK		1	2	4	3

So, based on the Pugh’s method the concept1 has got the highest rating so it is finalized for the detailed design

3.4 3D Model created in solid works software

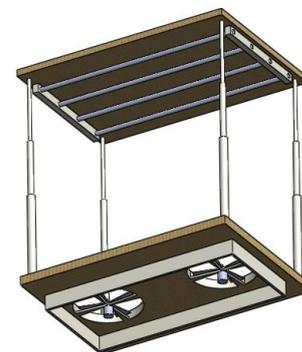


Fig -1: 3D model of dryer with telescopic nesting design

3.5 Bill of Materials for dryer

Item number	Part number	description	Quantity
1	01	Base plate	1
2	02	Fan	2
3	03	Base support	2
4	04	Fastners	4
5	05	Supporting rods	4
6	06	Fastners2	16
7	07	Top plate	1

Fig -2: Bill Of Materials for dryer

3.6 How the dryer will works

Open the dryer which is enclosed in the form of telescope nest & .connect the wire to switch board and then semi wet clothes are took out from dryer and hang in the roof section. Actuate the fans by initiating the switch, after 15-20 minutes take out the dry clothes then turn off the switch.

4. OTHER CONCEPTS DESIGNED IN SOLID WORKS

4.1 Multipurpose cupboard

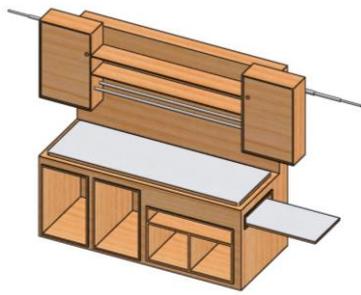


Fig -3: 3D Model of multipurpose cupboard

In the micro size laundry the space available is less, they don't maintain one separate cyclic order for the laundry process so to avoid this, multifunctional cupboard with the nesting principle can be used. The specialty of this product is ,there is a separate section for each and every process and there is a ironing pad enclosed in the design ,the side stands are designed in a such a way that it can used as hangers to hang the clothes . It is like a complete package that washing, drying; ironing can be done by using this cupboard which is designed based on principle of TRIZ's telescopic nesting design.

5. RENOVATED MICRO SIZE LAUNDRY LAYOUT IN 3D

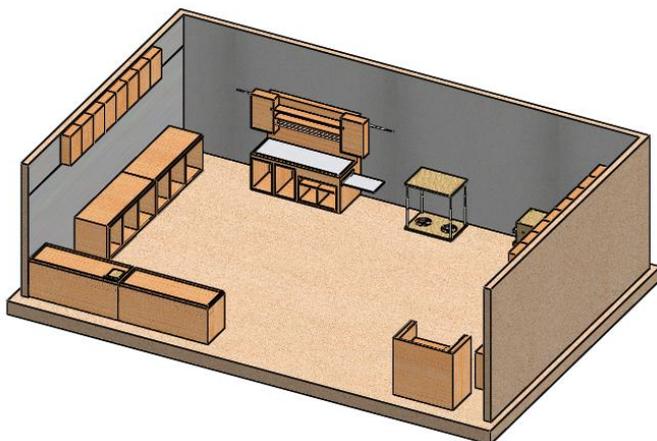


Fig -3: Isometric view of renovated laundry layout

The Ergonomically designed layout which is created in solid works helps in running the process smooth and effectively

and also there is a enough place for the movement of workers.

6. TIME STUDY

Time study is done in micro size laundry to know how much time it will consume to process the five shirts and five pants.

Table -2: Time study carried out in micro size laundry

Before renovation	Time in minutes	After renovation	Time in minutes
Receiving	15	Receiving	10
Sorting	15	Sorting	10
Washing	30	Washing	25
Drying	60	Drying	20
Inspection	10	Inspection	10
Ironing	30	Ironing	15
Billing and packing	5	Billing and packing	5
Total	165	Total	95

7. CONCLUSION

- The Ergonomically designed layout helps in running the process smooth and effectively and also there is a enough place for the movement of workers.
- The new products like dryer which is based on the concept of telescopic nested principle is requires very less space and cost effective and can be used in rainy season and winter season for drying of clothes
- The hanger and the flat bed iron which is designed within the cupboard based on the nesting principle will be helpful for this kind of laundry.
- The multipurpose tables can be used for the different process in the laundry which is cost effective and occupies a very less space.
- By looking at the results of time study we can conclude that reformation made in the existing micro sized laundry layout by using new product design and development process can reduce the processing time and increases the agility level.

REFERENCE

- [1] Dr.S.Sukumar, V.Karthiga, "A study on laundry workers attitude towards health care industry in Trichy city", International journal of scientific and research publications, Volume 4, Issue 1, January2014 (pp 1-4).
- [2] <http://www.kpmg.com/in/en/home/media/press-release/2012/04>

- [3] Dr.Amue G.J, Kenneth adiele, “New product development and consumer innovative behavior: An empherical validation study”, European journal of business and social science, Volume 1, Issue 6, October 2012 (pp 97-109).
- [4] Diana Starovoytova Madara, “Theorey of inventive problem solving (TRIZ): history”, International journal of innovative science, engineering and technology”, Volume2, Issue7, July 2015 (pp 89-95).
- [5] Nagappan Annamalai, Shahrul Kamaruddin, Ishakabdul Azid, “Clustered model TRIZ & applications in industries”, International journal of innovation management & technology, Volume 5, Issue 5, October 2014 (pp 368-373).
- [6] N.U.Kokde, D.B. Meshram, G.R.Jodh, A.S.Puttewar, “Innovation with TRIZ”, International journal of engineering research and general science, Volume 2, Issue 3, April 2014 (pp 232-238).
- [7] D.P.Fitzgerald, J.W.Hermann, L.C.Schmidt, “Improving environmental design using TRIZ”, International journal of innovative science, engineering and technology, Volume3, Issue7, July 2014 (pp 93-95).