

"VALUE ANALYSIS COURSE"

PROCON'S PROJECT REPORT

MAY/JUNE 1962

SCHEDULE - PREPARATION - ORGANIZATION

PROJECT.-

It was agreed that Procon should supply one project, consisting of the "Princesa" washer, in form of a finished washer, subassemblies and a complete set of parts, being each part tagged with information such as drawing number, material and labor cost, price and name of vendor if the part is purchased.

ORGANIZATION.-

The PROCON team was divided in four subgroups as follows:

Group Nº 1:

R. Fernández M.
F. Díaz S.
A. Cosío.

Group Nº 2:

S. González G.
J. L. López
A. Ferriz C.

Group Nº 3:

A. De La Peña
M. Zúñiga R.
J. Salazar L.

Group Nº 4:

R. Zurita A.
A. Velázquez
S. Alvarado

Project Managers: R. Coria B.

Accordingly, the project was divided into four main functional areas, which were assigned one to each of the groups.

PROJECT DEVELOPMENT. -

The following step was to determine the present cost of the functional area, according to the information provided by the Cost Accounting Section, taking into consideration the material cost, labor and IME.

The tentative cost reduction bogey was established by Product Planning through its representative J. Salazar L., being this bogey of approximately 13% of the manufacturing cost.

Since the present manufacturing cost for the "Princesa" washer is \$ 951.00, the 13% amounts to \$ 124.00. Mr. L. Miles questioned that bogey, and mentioned that it should be a more ambitious figure, because according to his experience it is much easier to reach, higher goals and besides the Value Analysis should not be applied to the same problem very often. Therefore the goal to reach should be high enough to cover the position of the product in the market for at least a 2 or 3 year period ahead.

According to Mr. Miles recommendations, Mr. Salazar presented a new figure of - about 55% of cost to be removed from the present manufacturing cost. This gave us a total amount of \$ 320.00.

The present cost is made up of:

Material,
Labor,
IME,

Development,
Tooling,

It was decided that these last two items could not be changed at the present time, because they were considered fixed expenses already incurred on. Therefore the cost reduction had to be made only on the first three items, that is, Material, Labor and IME.

Considering the above, the total amount to remove was divided among the various groups.

It was also established that the current overhead assigned to any part of subassembly should be considered as follows:

2/3 of present overhead as fixed.

1/3 of same as variable and depending on direct labor

All of the above mentioned is explained in the following table.

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PROJECT: "Princesa" Washer

PRESENT COST:

Material	\$ 681.25	\$ 893.25
Labor	20.00	
IME	192.00	
Development	27.75	
Tooling	30.00	
	<u>\$ 951.00</u>	

COST REDUCTION NEEDED: 35% approximately

PROJECT DIVISION							
Team No.	Main Parts	Function	Material Cost	Labor	IME	TOTAL	Amount to Remove
1	Cabinets + Tub Packing	Provide Enclosure Provide Appearance Provide Protection	98.96	3.82	31.90	134.68	65.00
2	Transmission + Activator	Provide Motion	168.82	0.74	7.14	176.70	75.00
3	Pump Motor + Controls	Remove Water Control Power	292.21	2.38	22.89	317.48	130.00
4	Wringer head	Wringe Clothes	126.41	3.38	32.46	162.25	50.00
Gen Assembly			-----	9.68	97.61	107.29	-----
TOTAL			686.40	20.00	192.00	898.40	320.00

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PROCEDURE

The procedure followed by each group, applying the teachings of Mr. Miles consisted of:

- 1.- Identify the function.
- 2.- Determine present cost of such functions (not Parts).
- 3.- Determine reduction to be made in the cost of each function.
- 4.- Develop alternatives.
- 5.- Evaluate alternatives.
- 6.- Select logic alternatives.

Due to the fact that several of the proposed alternatives involved major changes in design and manufacturing processes, it was requested from Product Planning and Marketing, through its representative, that a cost reduction program for this washer be prepared.

The above mentioned schedule was prepared taking in account that there is at present a considerable stock of finished washers and the parts for the production during the rest of the year have been bought.

THE SCHEDULE IS THE FOLLOWING:

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VALUE ANALYSIS - COMPACT WASHER PROJECT

SOME FACTS IN ORDER TO SCHEDULE IMPROVEMENTS AND FINDINGS:

	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
Actual Stock Finished product	2,400.00							\$ 2,400.00
Remaining Production Programmed in 1962				1,044.				1,044.00
				(Parts in stock or already ordered)				3,444.00
Estimated sales								- 2,747.00
								<u>\$ 597.00</u>

CONCLUSION: No improvement can be scheduled for this year.

NECESSARY COST REDUCTION FOR MARKETING
AT DIFFERENT PERIODS.

Actual Cost	Immediately necessary Cost	Necessary Cost January 1963	Necessary Cost July 1963	Necessary Cost January 1964	Necessary Cost July 1964	Necessary Cost Dec. 1964
951.00	(1) 827.00 (less 13%=\$124.)	(2) 794.00 (less 16.5%=\$157.)	(2) 760.00 (less 20%=\$191.)	(2) 727.00 (less 23.5%=\$224.)	(2) 694.00 (less 27%=\$257.)	(2) 660.00 (less 30.5%=\$291.)

(1) In order to have an average gross profit of 30%.

(2) Estimations were made based on an average cost increase in washers in the period 1958-1960 of 7% yearly, and assuming no increases in list prices to keep a competitive position

J. Salazar-Leyte
New Product Development

In accordance to the aforementioned schedule, a revision was made of the proposed changes in an effort to reach the most feasible changes that could be included in the 1963 production in order to achieve the first cost reduction needed.

The results of said revision, which was made taking into consideration the criteria of Product Planning, Design Engineering, Manufacturing, Materials and Cost Accounting are presented in the following table.

Table N ^o	Functional Area	Main Parts	Present Cost	Total Amount to remove	Changes that could be included for 1963 production*	Cost Red. for these Changes.
1	Provide enclosure, appearance, protection.	Cabinets Tub packing	155.00	65.00	Finish, 8.00 packing, 7.40 cover, 7.40 gasket & booklet 7.90	30.70
2	Provide motion	Transmission And Activator.	176.70	75.00	mounting plate, 3.61 shafts 35.45 agitator, 15.86 agitator support, 5.00	59.92
3	Remove water Control power	Pump, motor & constols	317.48	130.00	Change motor	40.00
4	Wringe clothes	Weinger Head	162.25	50.00	rubber rolls $\frac{23}{12}$ 35.03 handle 2.00 wringe support 5.00	42.03
TOTALS			811.43	320.00		\$ 176.65

\$ 811.43	Amount evaluated
86.97	General Assy. Cost
<u>\$ 898.40</u>	TOTAL COST

ANNUAL SAVINGS \$ 620,000.00

* FOR A DETAILED DESCRIPTION, SEE APPENDIXES.

Of course the selection of these changes, does not mean that the remainder of the changes proposed are to be deleted, but that these are to be developed in the future, in order to incorporate them gradually to the washer, if the next cost reductions suggested by Marketing are needed.

Engineering will proceed to develop the proposed changes for the first cost reduction, in order to issue formal Engineering information to be in a condition of incorporating those changes in the 1963 production of Economic Washer.

All the figures appearing in this report, were taken from the estimates made by the members of the teams, and are to be revised in full detail.

R. Coria B

c.c.

HC Cozza,
R Fernández,
W Hernández,
GM Kaplan,
RB Lennox,
FD Lundgren,
L Miles,
JM Warren.

APPENDIX "A"

GROUP No. 1.-

Project: Cabinets, Tub, Packing.

- Functions: 1.- Enclosure.
2.- Appearance.
3.- Protection.

The following are the proposed changes, as well as involved parts.

ACTUAL	PROPOSED
1.- ENCLOSURE	
SKIRT	MAKE ONE PIECE BODY
TUB BODY	ELIMINATE (See Sketch)
TUB BOTTOM	USE THINNER MATL.
SKIRT GASKET	ELIMINATE
REINFORCEMENT RING	REDUCE WIDTH OF MATL.
FOOT	MODIFY DESIGN
CASTERS	ELIMINATE
MAIN COVER	SIMPLIFY (See Sketch)
ALUMINUM COVER	ELIMINATE
TUB GASKET	ELIMINATE
HOSE SUPPORT	ELIMINATE (See Sketch)
BOLTS - NUTS - WASHERS	USE ECONOMIC ITEMS
2.- APPEARANCE	
OUTSIDE TUB FINISH	PAINT (Oven Dried)
INSIDE TUB FINISH	DARK VITREOUS ENAMEL
OUTSIDE SKIRT FINISH	PAINT (Oven Dried)
INSIDE SKIRT FINISH	SAME AS ACTUAL
COVER FINISH	PAINT (Oven Dried)
DECALS	USE SILK SCREEN STENCIL
INSTRUCTION BOOKLET	CHANGE TO PERMANENT TAG
HANDLE	ELIMINATE
HOSE GROMMET	ELIMINATE & CHANGE HOLE
CORD SET	USE DUPLEX CORD
3.- PROTECTION	
BASE SUPPORT	ELIM.-SUPPORT FROM FOOT
"J" BOLTS FOR SUPPORT	ELIM.-USE STANDARD SCREWS
SKID	USE ANOTHER ONE SIMPLIFIED
CORRUGATED PASTBOARD PACKAGE	USE WOOD CRATE

C O S T S

FUNCTION	PRESENT COST	COST IF PROPOSED CHANGES ARE INCORPORATED	T O T A L COST RED.
1.	95.95	60.94	35.01
2.	33.26	15.78	17.48
3.	25.83	13.32	12.51
	<u>\$ 155.04</u>	<u>\$ 90.04</u>	<u>\$ 65.00</u>

BOGEY: \$ 65.00

DESCRIPTION OF CHANGES

SKIRT & BODY.-

We propose to make a one-piece body, which might or should be painted on the outside and would have vitreous enamel finish on the inside of the tub.

The material would be CRS EI .0035" for the body, as well as for the bottom of the tub.

This change would permit the elimination of the gasket which is actually placed in the joint of tub and skirt..

REINFORCEMENT RING, FEET & CASTERS.-

We are using a 1.5" width reinforcement ring with two foot and two casters. We propose to eliminate the casters, simplify the foot which would provide the assembly to the skid with standard low priced bolts, thus eliminating the "J" bolts allowing more savings.

COVERS.-

There are actually two covers: One of them is a complete white painted cover, and the other one is made of aluminum. We propose to eliminate the second one, and to modify the first. (See sketch). There is actually one expensive gasket and we propose to use a simpler gasket like the one we are going to eliminate from the body. Also, the hose support would be eliminated and the hose would be inserted in a hole on the cover.

DECALS.-

We suggest to apply to the body the various legends using silk screen stencils instead of those expensive decals we are using now.

It is also proposed to make an economic booklet or tag instead of the one actually used.

HANDLE & CORD SET.

By eliminating the casters the handle could be eliminated saving also the price of screws & washers. The cord set could also be changed using another less expensive.. We propose the Duplex type used during the first production of this washing machine.

PACKING.-

It is suggested to use a simple wood crate instead of the corrugated board package we are using now.

The proposed packing would permit to pile the units in the warehouse. The "J" bolts are actually used for assembling the washing machine to the skid. The new assembly would be made using standard low-cost screws.

CHANGES THAT COULD BE INCORPORATED IN 1963 PRODUCTION

- 1.- Simplify or eliminate the packing.
- 2.- Changes on finish.
- 3.- Eliminate one of the two lids.
- 4.- Eliminate the tub gasket.
- 5.- Reduction of tub material thickness.

APPENDIX "B"

GROUP No. 2.-

Project: Transmission and Activator.

Function: Provide Motion.

Alternatives:

- 1.- Modify some of the present mechanism parts.
- 2.- Use a new transmission with a worm gear, links and rod.
- 3.- Use a new transmission with a fork and twisted shaft

C O S T S

Alternatives	Present Cost	Cost if proposed changes are incorporated	Total Cost Reduction	Bogey
1	175.00	103.00	75.00	75.00
2	175.00	94.00	81.00	75.00
3	175.00	84.00	91.00	75.00

DESCRIPTION OF CHANGES

1st. Alternative.-

1.- Transmission.

- a) Modify support plate TW-8058. The steel sheet used is of 1/8" thickness, it would be changed to 1/16" with reinforcement to provide the required rigidity (See sketch No. 1).
- b) Modify the wheel shaft and the rod shaft.- (drawings KW-2489 and KW-2492-P1). These parts would be changed to a cold rolled steel length of 3/4" O.D. x 1 27/32" with female thread and a 1/2" dia., 13 T.P.I. screw. (figure No. 2), using the same part as a substitute for both shafts.
- c) Substitute 4 washers KST-2089- P2B by KST-2096-P12B.

- d) Modify the rod assembly (KW-2495 G-1), using a cold rolled steel piece of rectangular cross section with 2 bushings made of standard tubing, welded one on each end of said steel piece (see figure 3).
- e) Use a cold rolled steel screws (as is explained under "b") instead of the hex nuts, drawing number 2078 P15B.
- f) Eliminate damper KW-2695 P1.

2.- Activator.

- a) Eliminate the 4 stops KW-2584 P1.
- b) Modify spacer KW-2526 P1 using a cold rolled steel ring welded to a cold rolled steel flat washer (see figure 4).
- c) Eliminate the aluminum washer KW-2088 P1, (see f below).
- d) Modify the hollow shaft MW-4144 P1 by using a galvanized steel tube with a cast-in Zamac base (see figure 5).
- e) Add an extra damper bushing at the upper end of the hollow shaft, as shown in figure 5.
- f) Substitute the nut KW-2089 P1 by using a standard flat washer and a hex nut of galvanized steel.
- g) Make in plant the activator shaft (see figure 6).
- h) Make the driver KW-2583 P1 of nylon, and make it in plant.
- i) Make in plant the activator TW-8059.

2nd. Alternative.-

1.- Transmission.

This transmission is similar to one used in an old washing machine (without brand).

This would be a gear box where it would be assembled a worm gear to a celoron gear, driving this assembly two links and one rod.

2.- Activator.

Similar to the activator described for the first alternative.

APPENDIX "C"

GROUP No. 3.-

Project: Motor and pump.

Functions: 1.- Remove Water.
2.- Control power

1st. Alternative.-

Provide motion by using a shaded pole motor; remove water by mechanical means (pump); provide control by using a double clutch.

2nd. Alternative.-

Provide motion by using a shaded pole motor; remove water by gravity; provide control by a single clutch.

3rd. Alternative.-

Provide motion by using a shaded pole motor; remove water by mechanical means (pump); provide control by mean of a double clutch.

C O S T S

Alternatives	Present Cost	Cost if proposed changes are incorporated	Total Cost Reduction	Bogey
1	322.21	204.03	118.18	130.00
2	322.21	180.50	141.71	130.00
3	322.21	219.36	102.85	130.00

CHANGES THAT COULD BE INCORPORATED IN 1963 PRODUCTION

Provide motion by using a shaded pole motor; this includes a fan for cooling the motor.

3rd. Alternative.

1. Transmission.

This mechanism comprises as a main element, a special shaft with 4 bents, coupled to a fork which in turn transmits reciprocating motion to the activator.

2. Activator

Similar to that described for alternative No. 1.

CHANGES THAT COULD BE INCORPORATED IN 1963 PRODUCTION

Use alternative No. 1.

Modify wheel shafts; make the activator in our plant, modify hollow activator shaft, spacer and nut, reduce support plate thickness using reinforcements, utilizing existing tooling for making this modified plate.

APPENDIX "D"

GROUP No. 4.

Project: Wringer.

Functions: 1.- Wringe Clothes
 2.- Provide Support
 3.- Provide motion by hand.

Proposed Alternative.-

To mount the wringer fixed on the tub, eliminating the actual folding feature.
In order to achieve these, the following changes are suggested:

Function 1.-

Change material for the wringer support bracket - use cold rolled steel sheet instead of aluminum casting.

Function 2.-

Buy directly from the manufacturer the rubber rolls avoiding intermediators.
Reduce rubber roll diameter. Eliminate inner tubes from the rubber damper Assembly

Function 3.-

Substitute the 2 parts assembly of handle - shaft, for the driver roll, using instead of a single part to accomplish the function. Change the handle material using thermoplastic instead of machined aluminum.

COSTS

Functions	Present Cost	Cost if proposed changes are incorporated	Total Cost Reduction
1	50.88	29.28	21.60
2	74.50	43.29	31.21
3	37.55	26.33 (1)	11.21 (1)
		25.61 (2)	11.91 (2)
TOTAL	<u>\$ 162.93</u>	<u>\$ 98.90 (1)</u> <u>\$ 98.18 (2)</u>	<u>\$ 64.02 (1)</u> <u>\$ 64.75 (2)</u>

(1) With Plastic handle

(2) with rubber handle

BOGEY: \$ 50.00

CHANGES THAT COULD BE INCORPORATED IN 1963 PRODUCTION

- 1.- Change supplier for the aluminum cast support.
- 2.- Buy the rubber rolls directly from the manufacturer.
- 3.- Reduce diameter of the rubber rolls.
- 4.- Change the wringer mounting parts, which is made actually of cast aluminum, using instead of an assembly of cold rolled steel sheet parts.