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Optimization of Process Parameters Using the Taguchi Method to Reduce Body Puckering Defects in Jacket Products

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Abstract: *Body puckering is a dominant quality defect in jacket production and originates primarily from the body press finishing process. The absence of standardized machine-setting parameters causes operators to rely on experience and intuition, potentially resulting in inconsistent product quality. This study aims to determine the optimal body press finishing parameters for reducing body puckering defects using the Taguchi method. Three controllable factors were investigated, namely temperature at 125°C and 130°C, vacuum time at 15 and 20 seconds, and pressure at 15 and 25 psi. The experiment employed an L8 orthogonal array with three replications for each experimental run. Three experimental stages were evaluated: the initial condition, the Taguchi experiment, and the confirmation experiment, with 6,000 products evaluated at each stage. Under the initial condition of 120°C, 15 seconds, and 15 psi, 311 defective products were identified, corresponding to a defect rate of 5.18%. The Taguchi experiment reduced the defect rate to 3.92%, with 235 defective products. Based on the experimental analysis, the optimal parameter combination was identified as a temperature of 125°C, a vacuum time of 15 seconds, and a pressure of 25 psi. The confirmation experiment using these optimal settings resulted in 100 defective products out of 6,000 products, corresponding to a defect rate of 1.67%. Compared with the initial condition, the optimal settings reduced body puckering defects by approximately 67.85%. These results demonstrate that the Taguchi method can effectively determine appropriate body press finishing parameters and substantially reduce body puckering defects in jacket production.*

Keywords: Defects, product quality, Experiment, Taguchi

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INTRODUCTION

PT. ABC is a garment company producing ready-to-wear clothing. Its average production capacity reaches 220,000 pieces per month, with primary customers in Australia, America, Africa, Europe, and Asia. Customer satisfaction through product quality is the company's primary goal. According to (Pardiyono, 2020), customer satisfaction is the level of satisfaction a person feels after comparing the performance or results they experience with their expectations. Customer satisfaction is a vital aspect for survival and competitive advantage (Pardiyono and Indrayani, 2019; Pardiyono, 2020, 2022; Pardiyono and Nugrahati, 2020; Pardiyono and Puspita, 2020, 2021). To achieve customer satisfaction, companies must deliver the value customers expect (Hanum, Pardiyono and Kurniawan, 2020). According to (Psarommatis *et al.*, 2020) a quality product includes aspects that meet buyer requirements and have zero defects. However, the company's goal of consistently maintaining product quality has not been fully achieved. Based on data from the quality control department for the period January-December 2025, there were many defects in jacket products as shown in table 1 below.

Table 1. Jacket product defect data for 2025

No	Month	Total Production (pcs)	Defective	Good
1	January	52.800	9.575	43.225
2	February	45.600	8.697	36.903
3	March	52800	10450	42350
4	April	45600	8250	37350
5	May	52800	10073	42727
6	June	36000	6995	29005
7	July	55200	11738	43462
8	August	52800	11213	41587
9	September	50400	10727	39673
10	October	55200	12135	43065
11	November	50400	11938	38462
12	December	40800	7589	33211
	Total	590400	119380	471020
	Percent	100	**20.2**	79.8

According to (Pardiyono and Fatullah, 2021), defects are defined as the failure to meet quality standards in a product that fails to meet customer expectations. Table 1 above shows that out of a total jacket production of 590,400 pieces, 119,380 pieces, or approximately 20.22%, were defective. These defects are major and result in a downgrade in product quality. Defective products must be reworked to be sold at a lower price. Reworking defective products will be financially detrimental to the company (Yap, Low and Wang, 2017). The jacket product defects above, if broken down, consist of several different types of defects. A summary of the number of defect types in jacket products is presented in Table 2.

Table 2. Summary of Jacket Defects

No	Defect Type	Number	Percent	Description Defect Type
1	Body Puckering	69690	58.4	The jacket body is wrinkled and wavy
2	shining	29897	25.0	Shiny Jacket
3	Creepy	19793	16.6	Jacket size has increased
Total		119380	100.00	

Body puckering is a surface deformation characterized by wrinkling, waviness, or unevenness on the garment surface, which adversely affects both appearance and dimensional conformity. In jacket production, this defect is particularly critical because deformation of the body panel may alter the dimensional stability and visual quality required by the buyer. In the present case, body puckering accounted for 69,690 defective pieces, representing 58.38% of the total recorded jacket defects, making it the dominant defect requiring improvement.

Body puckering may develop during pressing when the combined effects of heat, pressure, vacuum, and material characteristics cause non-uniform dimensional changes within the fabric structure. Temperature influences the thermal response and dimensional stability of the fabric, while pressure determines the degree of compression and contact between the garment and the press surface. Vacuum time affects moisture and heat removal during the finishing process and consequently influences fabric stabilization after pressing. In addition, fabric properties may affect the material response to these process conditions. Therefore, inappropriate combinations of temperature, pressure, and vacuum time can contribute to surface distortion and puckering during the body press finishing process.

Previous studies have demonstrated that process parameters play an important role in determining garment and textile quality. (Lestari *et al.*, 2024). Similarly, Pratikno *et l*, (2019) applied Taguchi-based optimization to sewing process parameters involving seam pucker, seam strength, and cycle time as performance responses. These studies confirm the applicability of experimental design and Taguchi-based parameter optimization in textile and garment manufacturing. However, previous studies have predominantly focused on fusing and sewing operations, whereas limited attention has been given to body puckering generated specifically during the automatic body press finishing process, particularly when temperature, vacuum time, and pressure must be determined simultaneously under actual industrial operating conditions.

The Taguchi method is appropriate for this problem because several controllable process parameters must be evaluated simultaneously while minimizing the number of experimental trials. Its orthogonal array enables systematic estimation of factor effects using an efficient experimental structure, while the signal-to-noise ratio provides a basis for identifying parameter combinations that reduce undesirable quality responses. Therefore, this study applies the Taguchi method to determine the optimal combination of temperature, vacuum time, and pressure for reducing body puckering defects in an automatic jacket body press finishing process. The novelty of this study lies in the application of Taguchi-based optimization specifically to body press finishing, using body puckering as the primary industrial quality response and validating the selected parameter combination through a confirmation experiment under actual jacket-production conditions. Figure 1 shows an appearance of the body puckering defect.

Figure 1. Body puckering defect

METHOD

According to (Vankanti and Ganta, 2014), the Taguchi method uses a special set of matrices called Orthogonal Arrays. This standard matrix is used to determine the minimum number of experiments that can provide as much information as possible about all factors influencing a parameter. The most important part of the Orthogonal Array method lies in selecting the combination of input variable levels for each experiment.

According to (Bause *et al.*, 2020; Elsawah, 2022) the experimental stage is the most important step, which includes formulating the problem, establishing the experimental objectives, selecting quality characteristics (dependent variables), selecting factors that influence the quality characteristics (independent variables), identifying control and disturbance factors, determining the number and values of factors, identifying interactions between control factors, calculating degrees of freedom (DoF), selecting an orthogonal array (OA), and assigning factors and their interactions to the orthogonal array.

The Taguchi experimental procedure in this study consists of several main stages. First, the quality characteristic or dependent variable is defined, followed by the identification of independent variables that are expected to influence the response. The control and noise factors are then distinguished, and the number and values of factor levels are determined. Possible interactions among control factors are also identified before calculating the degrees of freedom required for the experiment. Based on these degrees of freedom and factor levels, an appropriate Orthogonal Array (OA) is selected, and the factors and their interactions are assigned to the corresponding columns of the array. The experiment is then conducted using appropriate replication and randomization to reduce the influence of uncontrolled factors. Finally, the experimental results are analyed and interpreted using Analysis of Variance (ANOVA), the F-ratio, and the Signal-to-Noise Ratio (SNR) to identify influential factors and determine the preferred parameter settings.

RESULT AND DISSCUSION

Interpretation is performed by determining the percentage contribution and confidence interval of the factors under the treatment conditions applied during the experiment. The procedure for estimating the optimal conditions and calculating the confidence interval for attribute data is presented in the following steps (Pervez, Mozumder and Mourad, 2016; Zhou *et al.*, 2023).

1) Estimated optimal conditions
   a) *Ωpredicted=*

$$\Omega_{cacat} + (\Omega_{A2} - \Omega_{cacat}) + (\Omega_{B2} - \Omega_{cacat}) + (\Omega_{C1} - \Omega_{cacat})\ (\Omega_{AxC1} - \Omega_{cacat})\mathrm{T} \quad (1)$$

   b) transformation of defect percentage

$$\mu = \frac{1}{1 + 10\frac{\Omega}{-10}} \quad (2)$$

2) Count *confident interval*

$$n_{eff} = \frac{vT}{vu + vA + vB + vC + vAxC} \quad (3)$$

3) Confidence interval

$$\mu\ prediction - CI \leq \mu\ prediction \leq \mu\ prediction + CI \quad (4)$$

Confirmation Experiment:

The purpose of a confirmation experiment is to verify: 1) the assumptions made during the performance model, determining the factors and their interactions, and 2) the optimal parameter (factor) settings, based on the analysis of the experimental results, for the expected performance. The purpose of confirmation is to determine the success of the research by controlling the production process (Dhuliawala *et al.*, 2024).

Table 3. Control Factors

No	Controllable Factors	Setting Level	
		Level I	Level II
1	Temperature (A)	125°C	130°C.
2	Vacuum Time (B)	15 second	20 second
3	Pressure magnitude (C)	20 Psi	25 Psi
4	Interaction of A and B	-	-
5	Interaction of A and C	-	-
6	Interaction of B and C	-	-

The calculation of degrees of freedom is carried out to calculate the minimum number of experiments that must be carried out to determine the observed factors. In this study, there are 6 factors whose degrees of freedom will be calculated: factors A, B, AxB, C, AxC, and BxC with each degree of freedom worth 1 (Antony, 2023).

The selection of the orthogonal array matrix is based on the total degrees of freedom and the number of levels in each factor, the degrees of freedom obtained are 6 degrees of freedom with 2 levels in each factor (Lin and Stufken, 2025). Selecting an orthogonal matrix that is suitable or appropriate for the experiment is that the degrees of freedom in the standard orthogonal matrix must be greater than or equal to the calculated degrees of freedom. In this experiment with a total of 6 factors, and the number of levels is 2 for each factor, the selected orthogonal matrix is L8(27). L8(27) = 6 x (2-1) = 6 degrees of freedom.

Actual Condition Experiment (Experiment 1)

Experiment 1 was conducted under the company's actual conditions, with a temperature setting of 120°C, a vacuum time of 15 seconds, and a pressure of 15 psi. The experiment was conducted eight times every hour, with three replicates each, yielding 250 products per replicate. Therefore, the experiment with actual conditions resulted in 24 replicates and 600 products. The results showed a total of 5,689 finished products, or 94.82%, and 311 defective products, or 5.18%.

Proposed Taguchi Experiment

The experiment was conducted based on Taguchi settings for the temperature setting levels: Level I, 125°C, and Level II, 130°C. The vacuum time setting levels were 15 seconds for Level I and 20 seconds for Level II. The pressure setting levels were 20 psi for Level I and 25 psi for Level II. In this experiment, eight trials will be conducted, with three replicates for each trial. The experimental settings for each trial are influenced by each level of each factor. This can be done using the $L_8(2^7)$ orthogonal matrix table. The results of the experiment using the Taguchi settings on the orthogonal array are as follows:

Table 4. Proposed Taguchi Result

Experiment	Replication	Setting Factors	Results		Total
			Good	Defective	
1	1	Temperature (1)	242	8	250
	2	Vacuum Time (1)	241	9	250
	3	Pressure Amount (1)	242	8	250
		Total Trials 1	725	25	750
2	1	Temperature (1)	246	4	250
	2	Vacuum Time (1)	241	9	250
	3	Pressure Amount (2)	245	5	250
		Total Trials 2	732	18	750
3	1	Temperature (1)	242	8	250
	2	Vacuum Time (2)	239	11	250
	3	Pressure Amount (1)	239	11	250
		Total Trials 3	720	30	750
4	1	Temperature (1)	237	13	250
	2	Vacuum Time (2)	239	11	250
	3	Pressure Amount (2)	240	10	250
		Total Trials 4	716	34	750
5	1	Temperature (2)	241	9	250
	2	Vacuum Time (1)	242	8	250
	3	Pressure Amount (1)	238	12	250

Experiment	Replication	Setting Factors	Results		Total
			Good	Defective	
		Total Trials 5	721	29	750
6	1	Temperature (1)	241	9	250
	2	Vacuum Time (1)	238	12	250
	3	Pressure Amount (1)	236	14	250
		Total Trials 6	715	35	750
7	1	Temperature (2)	239	11	250
	2	Vacuum Time (2)	241	9	250
	3	Pressure Amount (1)	237	13	250
		Total Trials 7	717	33	750
8	1	Temperature (2)	243	7	250
	2	Vacuum Time (2)	237	13	250
	3	Pressure Amount (2)	239	11	250
		Total Trials 8	719	31	750
		Total	5765	235	6000
		Percent	96.08	3.92	100

ANOVA calculations are performed on the average values for attribute data (number of defective products). Attribute data cannot be measured in terms of dimensions, but rather in terms of shape, such as rejected defective products. This ANOVA stage aims to determine the contribution of each factor to the response in this experiment. Based on the results of the ANOVA calculations, the following ANOVA table can be used to summarize the data:

Table 5. ANOVA Results

Factor	Sq	V	Mq	F-Ratio	Rho (%)
A	4.620,5	1	4.620,5	6,01	7,7 %
B	4.620,5	1	4.620,5	6,01	7,7 %
A x B	4.620,5	1	4.620,5	6,01	7,7 %
C	4.602,1	1	4.602,1	5,98	7,67 %
A x C	4.604,1	1	4.604,1	5,99	7,7 %
B x C	4.602,5	1	4.602,5	5,99	7,67 %
e	32.270,6	42	768,3		53,83 %

The selection of factors is determined by comparing the calculated F-ratio value with the F-table value. A factor is considered to significantly influence the response when the calculated F-value is greater than or equal to the F-table value, and therefore it is selected as an influential factor. The F-table value is obtained at a 95% confidence level, where F(0.05; 1; 18) is 42. Based on the table presented, all F-ratio values exceed the F-table value, indicating that all factors have an effect on the response. Furthermore, to identify the response of each factor, the average response at each factor level is calculated in order to determine the best level. Since the study refers to attribute characteristics, the selected level is the one that produces the smallest value. Therefore, the parameter settings for the selected factors are determined based on the lowest average response value. Based on the results of the calculation, the average value of the selected factors for this study is:

Table 6. Average Values of Selected Factors

Level	Average Response Factor					
	A	B	A x B	C	A x C	B x C
1	**8,91**	**8,91**	8,91	9,75	10,08	9,91
2	10,66	10,66	10,66	9,83	**9,5**	9,66

The interaction terms $A \times B$, $A \times C$, and $B \times C$were specified prior to the analysis based on the expected physical relationships among the process parameters. Temperature (A) influences the material condition during processing, while vacuum time (B) determines the duration available for removing trapped air, and pressure (C) affects material consolidation. Therefore, the effect of vacuum time may depend on the processing temperature ($A \times B$), the effectiveness of pressure may vary with temperature-dependent material conditions ($A \times C$), and vacuum and pressure may interact through their combined effects on air removal and consolidation ($B \times C$). These interaction terms were consequently incorporated into the experimental design rather than selected retrospectively from the ANOVA results. The corresponding columns in the orthogonal array were assigned according to the Taguchi interaction-column relationship.

Based on the calculation of parameter settings, the selected Taguchi parameter combination in this experiment consists of A1, representing the temperature setting at 125°C; B1, representing the vacuum time setting at 15 seconds; and AC2, representing the pressure setting at 25 psi. These factors were selected because they produced the lowest average response value. In addition, the Signal-to-Noise Ratio (SNR) calculation was conducted to identify the factors that affect the variation in the experiment. The SNR approach used in this study was the smaller-the-better criterion because the observed quality characteristic was the number of defective products. The SNR was used only as a Taguchi optimization criterion to compare factor-level performance and was not used as the scale for the confidence interval. The confidence interval was instead calculated directly on the original defect-proportion scale. The following is the SNR calculation:

Table 7. Orthogonal Matrix $\mathbf{L_8(2^7)}$

Experiment	Factor Settings							Replicas			Number		Average	S/N
	1	2	3	4	5	6	7	1	2	3	Good	Defect		
	A	B	A xB	C	A xC	BxC	e				FI	FII		
1	1	1	1	1	1	1	1	8	9	8	725	25	8.3	-9,2
2	1	1	1	2	2	2	2	4	9	5	732	18	6.0	-7,8
3	1	2	2	1	1	2	2	8	11	11	720	30	10	-10
4	1	2	2	2	2	1	1	13	11	10	716	34	11.3	-10,5
5	2	1	2	1	2	1	2	9	8	12	721	29	9.7	-9,9
6	2	1	2	2	1	2	1	9	12	14	715	35	11.7	-10,7
7	2	2	1	1	2	2	1	11	9	13	717	33	11	-10,4
8	2	2	1	2	1	1	2	7	13	11	719	31	10.3	-10,1
										Total	5765	235	78.3	-78,6

Confidence Interval for the Defect Proportion

The confidence interval was calculated for the proportion of body-puckering defective products rather than for the transformed Signal-to-Noise Ratio (SNR). The SNR was used only to identify the preferred factor levels in the Taguchi analysis. Since the quality response is attribute data classified as defective or non-defective, the uncertainty of the predicted response was evaluated directly on the original defect-proportion scale.

Let $x$denote the number of defective products and $n$the total number of inspected products. The estimated defect proportion is:

$$\hat{p} = \frac{x}{n} \quad (5)$$

The 95% confidence interval for the defect proportion was calculated using the Wilson binomial confidence interval:

$$CI = \frac{\hat{p} + \frac{z_{\alpha/2}^2}{2n} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n} + \frac{z_{\alpha/2}^2}{4n^2}}}{1 + \frac{z_{\alpha/2}^2}{n}} \quad (6)$$

where $\hat{p}$is the estimated defect proportion, $x$is the number of defective products, $n$is the total number of inspected products, and $z_{\alpha/2} = 1.96$for a 95% confidence level.

In this study, the confirmation experiment produced 100 body-puckering defects among 6,000 inspected products. Therefore:

$$\hat{p} = \frac{100}{6000} = 0.0167$$

corresponding to a defect percentage of 1.67%. The resulting 95% confidence interval was approximately:

$$0.0137 \le p \le 0.0202$$

or:

$$1.37\% \le p \le 2.02\%$$

Thus, the estimated body-puckering defect rate under the selected optimal process condition was 1.67%, with a 95% confidence interval of 1.37% to 2.02%. Because the confidence interval was calculated directly on the original defect-proportion scale, no back-transformation was required.

The confirmation experiment was carried out to verify the predicted values obtained from the optimal factor-level settings. If the confirmation experiment results are consistent with the predicted values, then the selected level settings can be considered to meet the experimental requirements. The factor levels applied in the confirmation experiment were A1, with a temperature setting of 125°C; B1, with a vacuum time setting of 15 seconds; and C2, with a pressure setting of 25 psi. The following are the results of the confirmation experiment, which can be seen in the table below:

Table 8. Results Of Confirmation Experiments

Experiment	Replication	Setting Factors	Results		Total
			Good	Defective	
1	1	Temperature (1)	245	5	250
	2	Vacuum Time (1)	244	6	250
	3	Pressure Amount (1)	247	3	250
		Total Trials 1	736	14	750
2	1	Temperature (1)	246	4	250
	2	Vacuum Time (1)	248	2	250
	3	Pressure Amount (2)	245	5	250
		Total Trials 2	739	11	750
3	1	Temperature (1)	246	4	250
	2	Vacuum Time (2)	245	5	250
	3	Pressure Amount (1)	245	5	250
		Total Trials 3	736	14	750
4	1	Temperature (1)	247	3	250
	2	Vacuum Time (2)	243	7	250
	3	Pressure Amount (2)	248	2	250
		Total Trials 4	738	12	750
5	1	Temperature (2)	246	4	250
	2	Vacuum Time (1)	242	8	250

Experiment	Replication	Setting Factors	Results		Total
			Good	Defective	
	3	Pressure Amount (1)	249	1	250
		Total Trials 5	737	13	750
6	1	Temperature (1)	245	5	250
	2	Vacuum Time (1)	244	6	250
	3	Pressure Amount (1)	248	2	250
		Total Trials 6	737	13	750
7	1	Temperature (2)	247	3	250
	2	Vacuum Time (2)	246	4	250
	3	Pressure Amount (1)	235	5	250
		Total Trials 7	728	12	750
8	1	Temperature (2)	243	7	250
	2	Vacuum Time (2)	247	3	250
	3	Pressure Amount (2)	249	1	250
		Total Trials 8	739	11	750
		Total	5890	100	6000
		Percent	98.17	1.67	100

The confirmation experiment was used to verify the performance of the selected optimal factor-level combination. A total of 100 body-puckering defects were observed among 6,000 inspected products, corresponding to a defect rate of 1.67%. Based on the Wilson binomial method, the 95% confidence interval for the defect proportion was 1.37% to 2.02%. This interval provides a statistically interpretable range for the expected body-puckering defect rate under the selected process condition.

These confidence interval values will be compared with the confidence intervals under optimal conditions. The comparison can be seen in the table below. Based on Table 9, it can be concluded that the confirmation results for the SNR value are acceptable based on the confidence interval considerations.

Table 9. Comparison of Confidence Intervals Under Optimal Conditions

Parameters	Value
Total inspected products, n	6,000
Defective products, x	100
Estimated defect proportion	0.0167
Estimated defect percentage	1.67%
Confidence level	95%
95% CI for defect percentage	1.37%–2.02%

DISCUSSION

A comparison of the initial experiment with the confirmation experiment was conducted to determine the extent of the impact or changes that occurred during the research, aimed at achieving quality improvements. In the initial experiment, the company's initial settings were a temperature setting of approximately 120°C, a vacuum time of 15 seconds, and a pressure of 15 psi. In the confirmation experiment, the temperature setting was approximately 125°C, a vacuum time of 15 seconds, and a pressure of 25 psi. Table 10 below shows a decrease in body puckering defects, from 311 pieces to 100 pieces in the confirmation or proposed experiment. The loss value of the initial experiment was Rp 3,063,645, down from Rp 1,178,325 in the confirmation or proposed experiment. Increasing temperature from 120°C to 125°C may improve material response during pressing, maintaining vacuum time at 15 seconds may provide adequate evacuation/holding time. Increasing pressure to 25 psi may improve contact and flattening, the combination may reduce uneven deformation or wrinkling. Therefore, it can be concluded that this proposal is effective and successful in reducing body puckering defects in the jacket body back finishing process.

The results of the confirmation experiment indicate that the proposed setting successfully improved the quality performance of the jacket body back finishing process. The change in machine setting from approximately 120°C, 15 seconds vacuum time, and 15 psi pressure to approximately 125°C, 15 seconds vacuum time, and 25 psi pressure reduced body puckering defects from 311 pieces to 100 pieces. This means that the defect quantity decreased by 211 pieces, or approximately 67.85%. This finding is consistent with (Soon Young Yoon *et al.*, 2010), who explained that fusing quality in textile products can be optimized through the control of important process parameters, including fusing temperature, pressure, and time.

The reduction in body puckering defects is also relevant to studies explaining that puckering is affected not only by material characteristics but also by process parameters. Chen et al. stated that seam pucker is a common sewing problem that affects both product appearance and performance, and their study examined the interaction between fabric performance, sewing parameters, and seam pucker. (Pratikno, Pujiyanto and Priadythama, 2019) also demonstrated the use of Taguchi and desirability analysis in optimizing sewing process parameters, with seam pucker, seam strength, and cycle time as performance responses. Therefore, the improvement obtained in the confirmation experiment can be interpreted as evidence that the proposed process parameter combination is technically relevant for reducing garment visual defects.

From the economic perspective, the loss value decreased from Rp 3,063,645 in the initial experiment to Rp 1,178,325 in the confirmation experiment. This represents a reduction of Rp 1,885,320, or approximately 61.54%. This result strengthens the conclusion that the proposed setting is not only effective in reducing the number of defects but also contributes to reducing quality-related losses. The use of a loss value as an economic indicator is in line with the quality loss function concept, which evaluates quality improvement through the monetary impact of deviation or poor quality performance. (Ihueze *et al.*, 2023) explained that Taguchi's quality loss function covers nominal-the-best, smaller-the-better, and larger-the-better quality characteristics, making it relevant for evaluating the economic impact of defect reduction.

Table 10. Comparison of Initial and Confirmation Experiments

Setting	Initial Conditions	Proposed Conditions
Body puckering defect	5,18%	1,67%
Temperature setting	120°	125 °C
Vacuum time setting	15 Second	15 Second
Pressure setting	15 Psi	25 Psi

CONCLUSIONS

This study applied the Taguchi method to determine appropriate body press finishing parameters for reducing body puckering defects in jacket production. Under the initial process condition of a temperature of 120°C, a vacuum time of 15 seconds, and a pressure of 15 psi, 311 defective products were identified among 6,000 inspected products, corresponding to a defect rate of 5.18%. Based on the Taguchi experimental analysis, the selected parameter combination was a temperature of

125°C, a vacuum time of 15 seconds, and a pressure of 25 psi. The confirmation experiment conducted using these settings resulted in 100 body-puckering defects among 6,000 inspected products, corresponding to a defect rate of 1.67%. The 95% confidence interval for the defect proportion was approximately 1.37%–2.02%. Compared with the initial condition, the number of body-puckering defects decreased by 211 products, representing a reduction of approximately 67.85%. These results demonstrate that the selected parameter combination can substantially reduce body puckering defects in the jacket body press finishing process under the experimental conditions investigated.

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