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Quality Control Analysis to Reduce Downgrade Product in Viscosy Rayon Fiber Production in PT. SPV

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Abstract:- Companies that carry out a very useful process to reduce or reduce the productivity of the product that occurs during the production process. Because of the decline in product prices, the company will suffer losses in terms of promotion as promotions will lower prices until prices are lower than products that are not down. The concept of PDCA (Plan, Do, Check, Act) is a form for every individual to work on a non-stop speed but be upgraded to better and better conditions in all areas. Identifying problems that need to be solved and finding reasons and determining corrective action, must always be done on facts. This is used to avoid the elements of subjectivity and results that are too fast and emotional. In addition, to facilitate the problem solved and as a benchmark for improvement, the company must characterize service standards. PT. The South Pacific Viscose (SPV) at low / high is divided from 3.48% to 1.53% or about 50% of the total product produced in November 2018

Keywords:- *PDCA, Downgrade Product, Quality Control.*

I. INTRODUCTION

PT. South Pacific Viscose (SPV), the division of The Lenzing Group, located in Purwakarta, Indonesia, has been a producer of viscose and sodium sulfate staple fibers since 1982. Based on the installation of a sophisticated new production line in 2010, the total capacity of SPV viscose fiber for textile applications and Non-Woven currently amounts to 320,000 tons per year. The current sodium sulfate capacity is around 140,000 tons per year.

Based on reports issued by the Quality Control Department of PT. SPV, product downgrade was found in the process until October 2018. The following is the product downgrade data produced by PT. SPV.

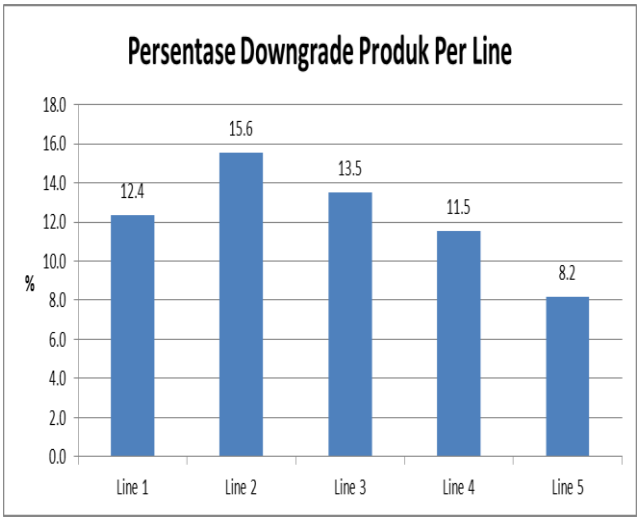

Fig 1:- Percentage of Product Downgrade Per Line
(Source: Quality Control of PT. SPV)

Based on the picture above, it is found that the highest percentage of product downgrade is in production in Line 2 of 15.5%. Based on the data above, line 2 is a top priority for research.

II. THEORETICAL BASIS

A. Quality

Quality is an expectation that exists in a product purchased by consumers or a product that the producer wants to produce. Of these two hopes, the two met. Consumers want product quality in accordance with the same desires produced by manufacturers [1].

The importance of quality in achieving competitive advantage has been proven by several studies during the 1980s. PIMS Associates, Inc., which is one of the subsidiaries of the Strategic Planning Institute, maintains a database of 1200 companies and studies the effect of product quality on company performance [2].

B. PDCA

PDCA is a model in making continuous improvements by planning, doing, checking, and acting. The PDCA cycle is generally used to test and implement changes to improve the performance of products, processes or a system in the future [3]. The explanation of the stages in the PDCA cycle is as follows [4]:

- Develop a plan (Plan)
- Carry out the plan (Do)
- Check or examine the results achieved (Check)
- Make adjustments if necessary (Action)

III. RESEARCH METHODOLOGY

To facilitate the research carried out, the steps taken are as follows:

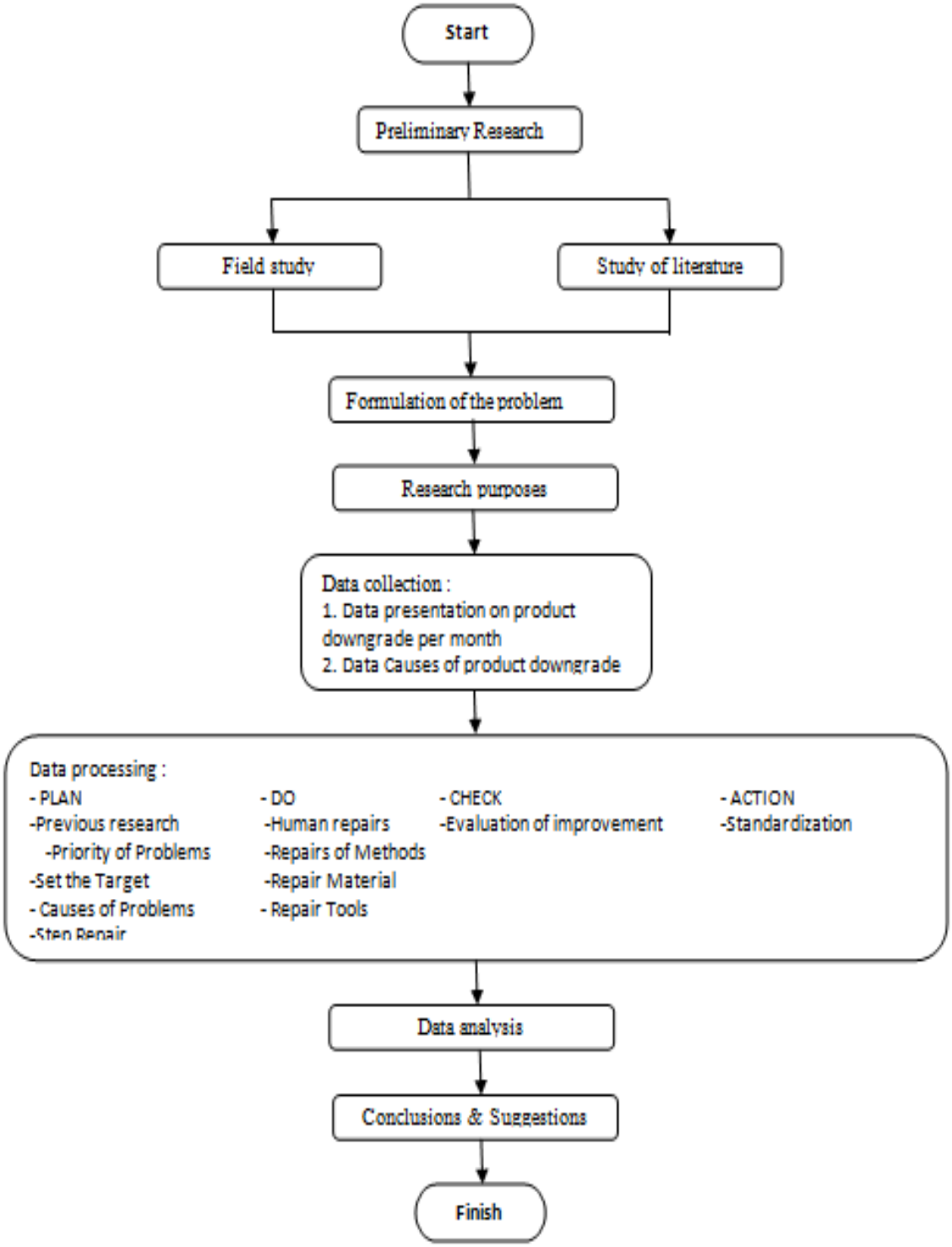

Fig 2:- Research Process Scheme

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IV. RESULTS AND DISCUSSION

A. Plan

➢ *Preliminary Research*

Preliminary research was conducted to find out product downgrade information through percentage data from product downgrade from Line 2's production process PT. SPV. The following is the product downgrade data produced by Line 2 until October 2018.

Month	%
January	21.1
February	15.6
March	13.0
April	14.1
May	13.1
June	12.5
July	17.9
August	10.9
September	20.8
October	16.4

Table 1:- Number of Product Downgrades / month in the PT. SPV Line 2 until 2018

From Table 1 we can see that the number of Product Downgrades at PT. SPV Line 2 is the highest in January 2018 with a percentage of 21.1%

➢ *Determining Priority Problems*

From the initial findings regarding the percentage of product downgrades per month, the next process is to find the majority of the types of product downgrade categories. The following is data from the category of product downgrade in the production process of Line 2 PT. SPV

Category of Causes of Downgrade	%
Whitness Low/High	3.48
Low/High Oil Pick Up	0.37
Moisture	2.57
Length	1.08
Visual Bale Inspection	0.86
Spinning Fault	2.44
Low/High Titer	0.74
Low/High Elongation	0.42
High Contamination	0.29
Cutter Broke	0.16
Mix Fiber	0.10
Gap Fiber	1.76
Dryer Over Heat	0.15
Low/High Bleaching pH	0.18
Soft Finish Temperature Low/High	0.17
Long Fiber	3.19
Low/High Acid Concentration	0.30
Viscose Quality Problem	1.82
Low/High Rippening Index	0.98

Table 2:- Percentage of Categories of Product Causes of Downgrade in Production Process Line 2 PT. SPV January 2018

Based on table 2 above, it can be concluded that 3 major causes of product downgrade are based on Figure 3 below:

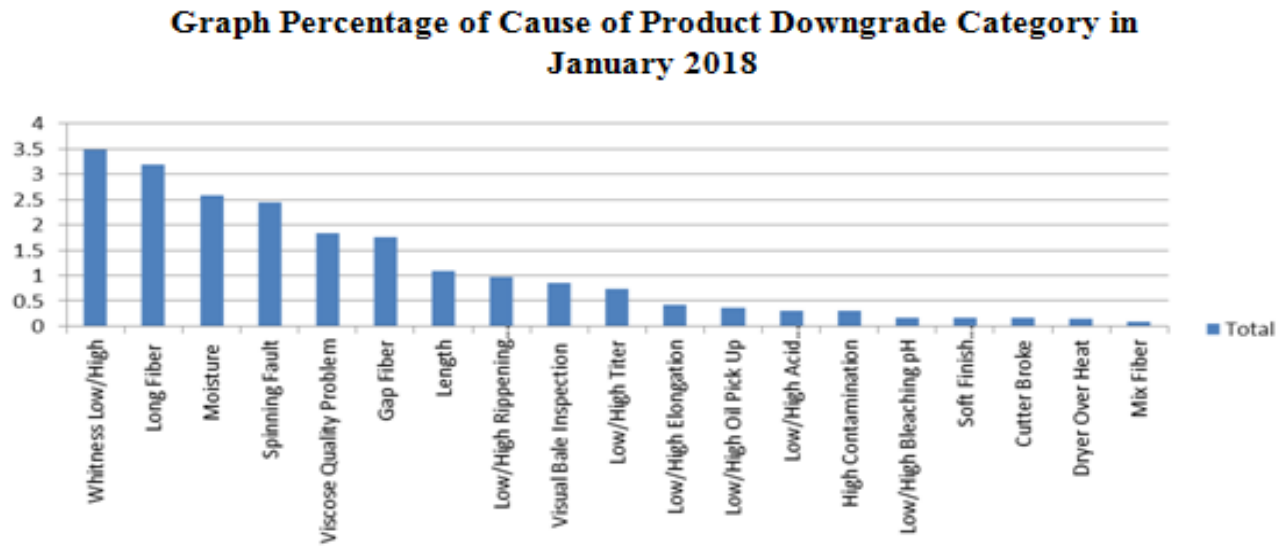

Fig 3:- Percentage ChartCategory Causes of Product Downgrade in Line 2 Production Process PT. SPV January 2018

From Figure 3 above shows that the top three causes of product downgrade in Line 2's production process at PT. SPV is Low / High Whitness (3.48%), Long Fiber (3.19%), and Moisture (2.57%). To improve the quality of the production process, it is necessary to analyze it based on industrial engineering theories. PDCA is a method to reduce the causes of product downgrades. Therefore, research on improving quality by minimizing the number of downgrades needs to be studied in the framework of continuous improvement (1).

➢ *Finding the cause of the problem*

After it was discovered that the cause of the product downgrade was Low / High Whitness, it was searched for the causes of Low / High Whitness using the fishbone diagram tools.

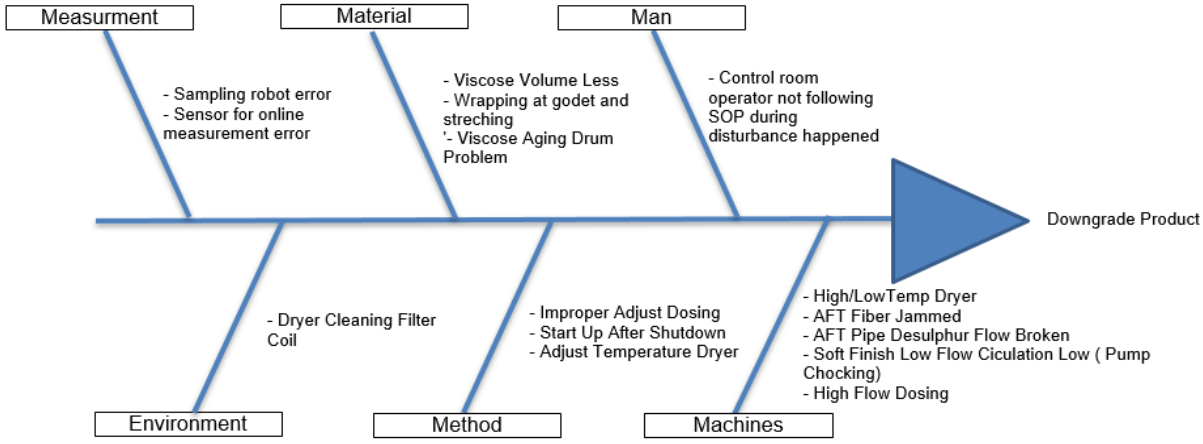

Fig 4:- Fishbone Diagram of a Product Downgrade (Low / High Whitness)

- *Man*

✓ The Control Room operator does not follow the SOP when a disruption to production occurs

- *Machines*

✓ Occurs Dryer temperature too high or low
✓ Fiber blockage occurred in the Aftertreatment area
✓ The Desulphur groove is broken
✓ The Soft Finish groove is low, there is a blockage in the pump
✓ Bleaching dosing is too high

- *Material*

✓ Low material supply volume
✓ Wrapping occurs in the godet and streaching area
✓ Problem in ripening drums

- *Method*

✓ There is no SOP about handling production after shutdown
✓ There is no SOP about the dryer temperature setting

- *Measurement*

✓ Robot Sampling error causes the sample to be taken not in time
✓ Sensor testing tool for whitness error (not yet calibrated)

- *Environment*

✓ Dirty coil filter area

➢ *Setting Targets*

After finding out the causes of low / high witness, then set the target of a 50% reduction in product downgrade due to low / high whitness, in accordance with the direction of company management.

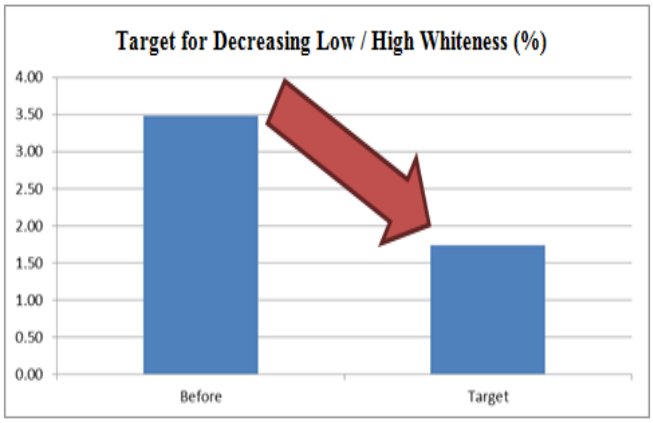

Fig 5:- Product Downgrade Decline Target due to Low / High Whitness

B. Repair Implementation (Do)

Using the 5W-1H method, here are the steps that need to be taken to reach the goal of Figure 5 above. Intensive coordination involves 4 departments, namely, Spinning Department, Viscose Department, Maintenance Department, Instrument Department and Quality Control Department. The following is an analysis using 5W-1H based on table 3 below:

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Problem	Description	6M	Potential causes							
			What	Why	Who	Where	When (Deadline)	How		
Control room operator not following SOP during disturbance happenend	Less attention from Operator	Man	Make Training for the operator	Operator need to remind and refresh their knowledge	Spinning Dept	Spinning Meeting Room	Week 43	Training and briefing weekly		
Wrapping godet	Find Spinerette Leakage due to Ruber Seal Damage	Material	Check and Repleace Rubber Seal	Spinerette Leakage affected to Wrapping Godet Happened	Spinning Dept	Spinerette Area	Week 45	1. Check Rubber Seal before assembly	2. If the Rubber seal broken, change with new rubber seal	3. Make it sure the stock in Warehouse avalaible
Viscose Aging drum problem	Due to maintenace job	Material	Coordination Meeting	Operator can be take action during find the abonormality of material supply	Spinning Dept, Viscose Dept	Control room	Week 46	1. Conduct weekly quality meeting		
Start Up After Shutdown	No Procedure related handling during start up the production after shutdown	Method	Make SOP for Operational during Start up after shutdown	Standarize knowledge of operator	Spinning Dept	Control room	Week 45	1. Release a SOP	2. Training for operator	
Miss understanding of each operator to adjust temperature dryer concerning during the material rate drop	No detail Procedure related handling during start up the production after shutdown	Method	Make a more detail procedure for a method of adjust temperature	Standarize knowledge of operator	Spinning Dept	Control room	Week 42	1. Release a SOP	2. Training for operator	
High/Low Temperature Dryer	High Temperature make the fiber yellowish, Low Temperatur make the fiber wet	Machine	Check condition of dryer perfomance	Make performance of dryer stable	Spinning Dept	Dryer Area, Dryer Control room	Week 45	1. Make the request for regular check to Maintenance Dept	2. Cleaning Dryer machine every shutdown	
Fiber Jammed in AFT Area	Mouth peace choking due to Motor Trip	Machine	Make alarm or notification to control room if the material chocking	To maintain mouth piece running well	Maintenance Dept	Aftertreatment area, control room	Week 45	1. Setting alarm to notification to operator control room	2. Preventive Maintenance Job	
Pipe Desulphur Flow Broke	Due to Life Time of pipe caused dossing desulphur abnormal	Machine	Regulary check condition of Pipe Desulphur	To maintain dossing of desulphur running well	Maintenance Dept	Aftertreatment area, control room	Week 45	1. Regulary check of desulphur pipe		
Pump of Soft Finish Chocking	Due to Life time of machine	Machine	Regulary check condition of Soft Finish Pump	To maintain Soft Finish Pump Well	Maintenance Dept	Aftertreatment area, control room	Week 45	1. Regulary check of Soft Finish Pump		
High Flow Dosing of bleaching effect from Actuator Device Problem	Due to Life time of machine	Machine	Regulary check online trend of bleaching dosing	Maintain Trend of dossing bleaching in limit control	Spinning Dept, Maintenance Dept	Aftertreatment area, control room	Week 45	1. observe trend of bleaching dosing still in control limit	2. PM Job from Maintenance	3. Change of actuator device
Sampling Robot Error due to cencor device error	Due to Life time of cencor caused the sample for laboratory check wrong	Measurement	Change Cencor Device and re-calibrate	Maintain sampling robot running well	Instrument Dept, Quality Control	Balling Press Area	Week 44	1. Change device censore	2. PM Job from Maintenance	3. Review a procedure standard calibration
Device of measurement of Whitness test error	Due to error of device, measurement of whitness test not accurate	Measurement	Change Device and re-calibrate	Maintain realibility of meausurment of whitness tes	Quality Control	Laboratory	Week 44	1. Change Device and recalibrate the measurement		
Cleaning filter coil dirty	Found contamination due to Filter Coil Dirty	Environment	Cleaning and change filter coil (if broken)	Reduce contamination	Spinning Dept	Aftertreatment area	Week 44	1. Cleaning filter coil every one week		

Table 3:- Analysis of 5W-1H for Overcoming Low / High Whitness Product Downgrades

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C. Evaluation of Improvements (Check)

Impact evaluation activities for repairs are carried out daily in November 2018, the evaluation of which is carried out by calculating the presentation of product downgrade due to low / high whitness and compared to the previous percentage and targets determined by management.

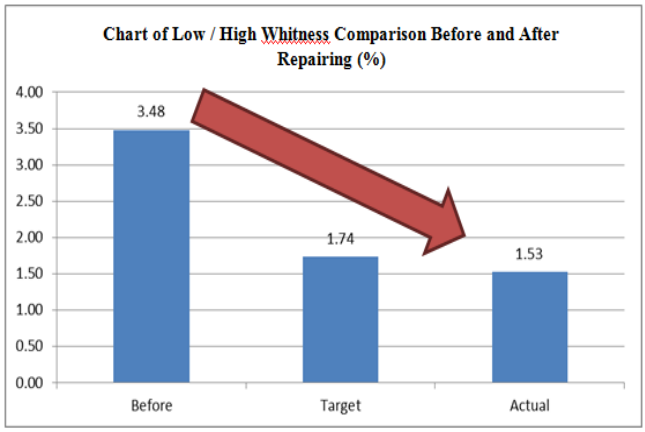

Fig 5:- Graphs of Comparison of Presentations of Low / Whiteness before and After Improvements

From the picture above shows that the percentage of product downgrades due to low / high whitness has decreased from 3.48% to 1.53% or around 50% of the total products produced in November 2018. This certainly reaches the target implemented by management by 50%.

D. Standardization (Action)

After making improvements, standardization is needed to maintain the quality of the products produced. Standardization is carried out

- Handover meeting between shifts
- Weekly meetings between relevant departments to discuss any downgrades that occur every week
- Determine the critical area that affects the occurrence of product downgrades due to low / high whitness, namely, after treatment area, dryer area and balling press area
- Make regular shut down schedules to maintain the odidity of the engine
- Carefully monitor the trend parameters of the control room and online report made by the company

V. CONCLUSION

Conclusions that can be taken from this research are that:

- Line 2 is a line that needs to get priority over repairs because it is the biggest contributor to product downgrades from January to October 2018 with a percentage of 15.6%.
- The highest percentage of causes of Downgrade Products in viscose rayon fiber production is low / high whitness.
- Using the PDCA method can reduce up to 60% of the product downgrade produced. This certainly exceeds the target set by management by a 50% decrease in the percentage of downgrade.
- Consistency of operators is needed to maintain the quality of the products produced.

SUGGESTION

Suggestions that can be taken from this study are:

- Training and observation of operational standards must continue to be developed.
- Emphasizing the importance of SOPs in running production activities, such as attaching in areas related to the production process, such as near the machine in the control room area and providing intensive training to improve the skills of each employee.

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