X Regrind Usage for TY27MX

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Abstract

TY27MX is a high-runner catalog from ABB Caribe. Since the first quarter of 2020, high levels of scrap were detected at the production line caused by process variation and inherent conditions. Resin X regrind usage was selected as the best method to achieve scrap reduction of 15% and optimize material consumption. A regrind material validation was performed in order to assure catalog's functional performance and acceptable quality criteria. Internal quality procedure establishes that all parts must comply with RBT, Tensile Strength and Insertion Force specifications. A total of 48 parts per hour (3 hours total) were tested representing the molded full shot. RBT results were favorable, with all parts complying with the 2.50% maximum criteria. Likewise, all parts performed successfully during tensile testing complying with the 120 pounds minimum requirement. Also, insertion testing was positive with all parts complying with 6.00 pounds maximum force. Since TY27MX's properties were not compromised with the material mixture, regrind usage can be used permanently as part of the process.

Introduction

Since the first quarter of 2020, ABB Caribe, an electrical device company specialized in cable ties manufacturing, identified high levels of scrap in the production line corresponding to the TY27MX catalog, shown in Figure 1. The molding process for this product requires about 117,000 pounds of resin X per quarter. However, process variation and inherent conditions are affecting material consumption, which increases scrap production up-to 15% approximately. By implementing the use of X regrind, a scrap reduction will be achieved with estimated cost savings of $190,000 yearly.

Figure 1
TY27MX

Objectives

By the completion of this project, the following objectives were expected to be achieved:

- Reduce scrap production for TY27MX catalog by 15%.
- Save up-to $190,000 a year in material consumption.
- Maintain customer satisfaction by producing a high-quality product regardless of the resin mixture used.

Problem

Catalog TY27MX is one of the high-runners of ABB Caribe. Process variation and inherent conditions caused mainly by mold and machine aging increased scrap rate to 15% as shown in Figure 2. Savings on material consumption for about $190,000 a year are expected to be achieved as shown in Figure 3.

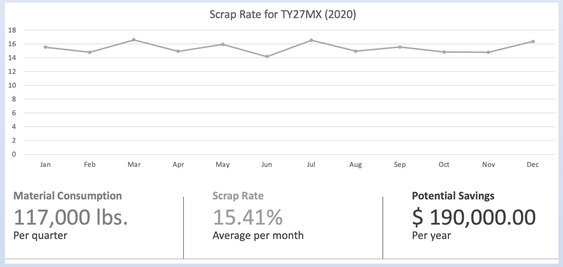

Figure 2
Scrap Rate for TY27MX Catalog in 2020

Figure 3
Virgin Material versus Regrind Material Cost Comparison

Methodology

Scrap reduction of 15% was achieved by optimizing X resin usage for TY27MX by mixing regrind with virgin material. In order to assure compliance with required quality criteria, a regrind material validation was performed. Mold 263 with 48 cavities was used for trial runs. Recovered material from production waste was properly grinded and dried in order to maintain resin's properties and parts performance. Functional testing including Tensile Test, Insertion Force Test, and Rotary Bend Test (RBT) were performed to produced parts. Regrind percentage utilized was monitored by retrieving reports from resin X blender's software.

Results

Table 1. Summary of Functional Testing Results for TY27MX Validation Run in Dry as Mold (DAM) and Conditioned Phase

Catalog: TY27MX
Material: 47H Black
Molding Machine: # 17
Barbing Machine: # 2
Barbing Machine Die: # 21.2

DAM				CONDITIONED			
1st Hour				1st Hour			
	RBT	Tensile	Insertion		RBT	Tensile	Insertion
Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.	Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.
Min =	0.0	182.3	2.53	Min =	0.0	175.9	3.02
Max =	0.0	196.0	4.01	Max =	0.0	187.1	4.18
Avg =	N/A	190.1	3.35	Avg =	N/A	180.8	3.46
48 parts tested				48 parts tested			
2nd Hour				2nd Hour			
	RBT	Tensile	Insertion		RBT	Tensile	Insertion
Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.	Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.
Min =	0.0	189.1	2.25	Min =	0.0	179.0	3.09
Max =	0.0	211.1	4.2	Max =	0.0	192.8	4.26
Avg =	N/A	196.4	3.14	Avg =	N/A	187.3	3.64
48 parts tested				48 parts tested			
3rd Hour				3rd Hour			
	RBT	Tensile	Insertion		RBT	Tensile	Insertion
Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.	Spec.	2.5% Max.	120 lbs Min.	6.00 lbs Max.
Min =	0.0	190.2	2.84	Min =	0.0	171.3	2.73
Max =	0.0	214.3	4.4	Max =	0.0	193.9	4.06
Avg =	N/A	200.5	3.50	Avg =	N/A	184.0	3.45
48 parts tested				48 parts tested			

Discussion

TY27MX produced parts during validation phase were properly tested according to quality procedure. Table 1 shows the results of the full molded shot (48 parts) during a three-hour period. A total of 288 parts were tested for each criteria. RBT tests were performed to detect material brittleness, tensile tests to measure catalog's tensile strength and insertion tests to measure catalog's insertion force. Collected data shows that all parts performed successfully and passed functional testing according to specifications.

Conclusions

Regrind usage is a proven and reliable method used to reduce scrap, while optimizing material consumption. Resin X regrind implementation for TY27MX had positive results during the validation process, complying with all functional and cosmetic criteria. Since the catalog's properties were not compromised with the material mixture, regrind usage can be implemented permanently as part of the process. The objectives of this project were met, since scrap reduction for the TY27MX production line was achieved by using 15% of recovered material as regrind.

Future Work

Implement regrind usage for another production line which is reporting similar levels of scrap at the extrusion area (Figure 4). This project would require the acquisition of new equipment such as grinder, blender and dryer in order to assure adequate material handling. Total investment would be $50,000.

Figure 4
CSS-50R

Acknowledgements

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