

IMPLEMENTING SMART DIGITAL SOLUTIONS FOR ROTARY SCREEN PIGMENT PRINTING METHOD

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Abstract: Rotary screen printing, a conventional technique, involves human labor throughout the rotating printing processes. At every process, there is a decision maker specialized for five to ten years, tasked with responsibilities including screen mesh preparation, stage design, printing machine parameter adjustment, and printing paste preparation. Still, human error is unavoidable. This causes loss of efficiency and time, increase in cost and wastage in mass production. In rotation printing, printing paste is prepared for each color. Accurately determining the quantity of printing paste is challenging due to the intricate complexity of the printing paste consumption mechanism, pattern variety, fabric structure, and the interplay of machine parameters. Printing machine parameters directly affect printing consumption. Furthermore, the quantity of printing paste and machine parameters are determined by a different decision-makers. In this project, sustainable and smart solutions were developed to precisely quantify the consumption of printing paste. Convolutional neural networks (CNN) were employed for estimating machine parameters, which were then used to prepare accurate amount of printing paste for each color.

Table 1 Machine parameters classification used in CNN

Printing machine parameters			
Bar size (mm)	Screen mesh count (holes/inch)	Magnet pressure	Machine speed (m/min)
12	125	40	30
16	155	50	40
-		60	50
-		70	-

Kart No	Reç. No	Makine Adı	Kumaş Cinsi	Mam.En
23R-04145	0	1	RANFORSE	240
Metre	Makine Hızı	Desen Eni	Desen Boyu	Kumaş Eni
2240	40	31,39	32	240
			Kumaş Tipi	Boya Türü
			Bezayağı	PIGMENT
ŞABLONLAR				
S.N.	Renk	Mesh	Raport %	Pres
1	K. YEŞİL	125	17,24	50
2	A. YEŞİL	125	33,05	50
3	FRAMBUAZ	125	35,18	50
			Mil	Viskozite
			16	
				PAT
				110
				Hazır. PAT
				200
				Atılan PAT
				215

Figure 1 Printing paste calculation with proposed method

Machine parameters and printing paste amounts determined by traditional method and new proposed method were compared. This study aims to eliminate waste, minimize mistakes, increase efficiency and assist decision makers. Thus, the conventional rotary screen printing process was digitalized, and the production method improved with a more sustainable manner.

Keywords: Rotary screen printing, deep learning, optimization, waste reduction.

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