

7th International Conference on Engineering, Project and Production Management

## Methodology for Assessing the Factors Affecting the Quality and Efficiency of Flexographic Printing Process

Jan Lipiak\*

*Warsaw University of Technology, Faculty of Production Engineering, 85 Narbutta Str., 02-524 Warsaw, Poland*

---

### Abstract

The main objective of this paper is to determine the methodology for assessing key factors that affect the quality and efficiency of a flexographic printing process. The subject of theoretical considerations is quality evaluation and basic information about efficiency method evaluation, like OEE, SMED and other. The article also presents an evaluation survey of the quality level of printing requirements for customers, conducted by the author. The presented results reveal that those methods are suitable as advanced tools for measuring the quality and efficiency level of manufactured products and the production processes, which also improve customer satisfaction.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of EPPM2016

*Keywords:* efficiency; flexographic printing; labels; OEE; QFD; SMED

---

### 1. Characteristics of the object of the study – “Etigraf” printing house

“Etigraf” company, based in Sulejowek near Warsaw, is a printing house with a long-standing tradition and experience, continuously improving its art of printing since 1994. The company specialises in producing labels and laminates on a roll. This is possible thanks to the possession of a modern machine park, a creative team, a professional graphic studio and own digital prepress studio. All these factors enable the company to perform many diversified tasks, beginning with a graphic project, through printing and finishing processes, until delivering a ready-made product to the customer. Constant development allows “Etigraf” to print every type of a label up to the maximum width of 430 mm and a repetitive length of 600 mm on all sorts of paper, PP, PE, PS, BOPP foils, multilayer laminates on

---

\* Corresponding author. Tel.: +4-825-756-2210.

*E-mail address:* [janlipiak@etigraf.pl](mailto:janlipiak@etigraf.pl)

sachets and TBL laminates. In recent years, the company has also implemented the production of a sleeve manufactured from PVC and PET foil with oriented shrinkage; however, one of the main products comprises self-adhesive labels (Fig. 1). The modern machine park allows for printing materials in up to 10 colours and additional processing with UV inks, foil, cold stamping and hot-stamping as well as in-line embossed marking. There also exists the possibility of multilayer label print of a label and from the glued side. “Etigraf” specialises in not only producing decorative labels, but also labels for weighing-labelling appliances, as well as thermal-transfer and thermal printers. The production is maintained at a continuously high level, based on raw materials of renowned Western companies, such as: Avery Dennison, Raflatrac, Ritrama, Tesa, Leipa, Toyobo, Toraya, Kanzan, Zing, Klockner etc.



Fig. 1. Self-adhesive labels from “Etigraf”.

The combination of swift work organisation and professional technical resources that guarantee high quality was based on ISO 9001:2008 and ISO 14001:2004 certificates as well as an international BRC certificate. For years, the company has gained the confidence of many customers from various industries: meat, grocery, pharmaceuticals, cosmetics and chemistry. In the process of roll flexographic printing, the company uses printing presses of an Italian company GIDUE. They can be applied to printing in up to 10 colours in a flexographic technique with the use of UV paints. The process is of a constant nature and takes place from one roll to another. It is possible to apply the in-line processing technology by means of cold stamping or a rotary sieve.

## 2. The identification of waste in printing industry

Nowadays each company has to permanently improve their processes and manufactured goods and services. In addition, the presented company has undertaken many improvement actions in the last several years but before that, it has been decided to verify where the reserves were. By the word ‘reserves’ we understand different types of waste. In the printing house under the scope of this paper, Pareto-Lorenz analysis (Fig. 2) was used in order to identify which elements of waste, such as material waste or nonconformities, generate the biggest financial loss for the enterprise. For this cause, the data from the whole year of 2013 was gathered with regard to various types of waste experienced by the organisation. In order to generate the Pareto-Lorenz curve, Statistica programme was used. It is an engineer software kit for analysing data and data mining. The analysis conducted in the enterprise indicates that downtime and regulation-induced waste was the most adverse for the entire organisation and comprised ca. 21% of all waste, despite the fact that waste arising from changeovers made over 60% of total waste [4, 6].

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات