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Data in Brief

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Data Article

Digital press shops: Data of an online survey among press shop experts



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ARTICLE INFO

Article history:

Received 24 November 2020

Revised 6 February 2021

Accepted 11 February 2021

Available online 13 February 2021

Keywords:

Press shop

Body in white

Part tracking

Digitalisation

Process connection

Automotive

Process data

Data mining quality information

ABSTRACT

Modern automotive press shops are reaching their process limits due to increasing demands on car body shapes. At the same time, transmission of information and readjustment in the event of quality losses because of process errors is still largely controlled manually. The survey presented here, deals with better connected processes as well as data acquisition, and track and trace applications in press shops. The survey was directed to experts from the automotive industry and is to determine how automated and connected the processes in press shops already are. The survey was conducted from March till April 2020. With a total of 24 questions, an attempt is made to gain a comprehensive picture of the current status and the existing potential regarding smart press shops. In addition to questions on the marking and tracking of pressed parts, the objective is to find out which process data is already being recorded today and what conclusions can be drawn from it regarding the expected part quality. The evaluation of the survey is intended to build the basis for research activities on smart, connected press shops.

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Specifications Table

Subject	Industrial and Manufacturing Engineering
Specific subject area	Press shops of the automobile industry, Data and information about connectivity in modern press shops
Type of data	Table Chart
How data were acquired	Data was gathered using an online survey and converted into excel format.
Data format	Data is in raw format and has been processed in charts. The raw data is provided in excel format.
Parameters for data collection	The target group of the survey was experts of the automotive manufacturing industry. Experts were contacted through the network of the Laboratory for Machine Tools and Production Engineering (WZL), RWTH Aachen University.
Description of data collection	The data was conducted through an online questionnaire, which was delivered to various experts of the German automotive industry. The questionnaire was in German.
Data source location	Information was collected from Laboratory for Machine Tools and Production Engineering (WZL), RWTH Aachen University in Germany.
Data accessibility	Data is supplied with the paper.

Value of the Data

- The data gives insights to the current status of press shops in automotive industry and an overview of specific process characteristics of press shops. It also provides information on the potentials and restriction of using track & trace systems in press shops to track body parts amongst the production chain.
- The data will be useful for production scientist, press shop planers, and quality planers. Researchers can use the data to identify further research topics and studies. The data can be used to get insight of the characteristics of production systems in automotive press shops.
- The data can be used as input information to develop and implement a real demonstrator of a potential track and trace system in the production of body parts. It can provide an information basis to identify specific areas of the production where the need of a track and trace system of body parts is the highest.

1. Data Description

The data set provides an insightful information based on survey data on knowledge and practice among manufacturing automation and data networking in automotive press shops. The data include three parts of information. The first part shows the company and participant information, which are shown in Figs. 1–4. Figs. 5–13 shows the answers of the participants regarding the current status of the production in automotive press shops. The last part of the data set provides information about the data and information flows in the press shop (Figs. 14–24).

1. Which industry does your company belong to?



Fig. 1. Industry of the participants.

2. Which of the following describes your profession best?

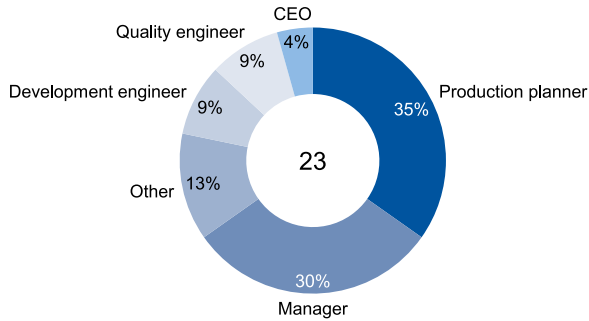


Fig. 2. Profession of the participants.

3. Where does your company find itself in the automotive production chain?

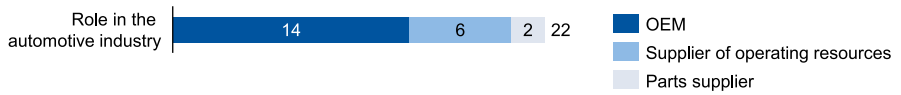


Fig. 3. Role of the company of the participants.

4. What size is your company?

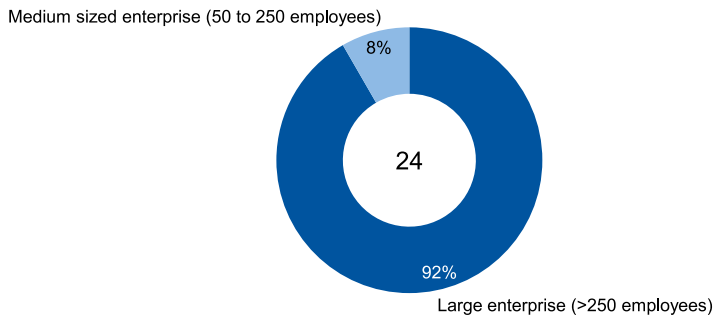


Fig. 4. Size of the company of the participants.

5. What kind of presses is mainly used in your company / from your experience in the production of body shell parts?

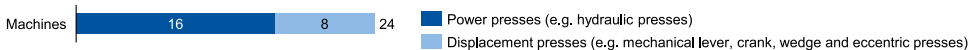


Fig. 5. Types of presses in the press shops.

6. Which of the following age specifications best apply to the press systems for bodywork components in your company / from your experience in the press shop?



Fig. 6. Machine age of the presses in the press shop.

7. In which form is the raw material (steel / aluminium) for the production of body shell parts delivered to press shops in your company / from your experience?

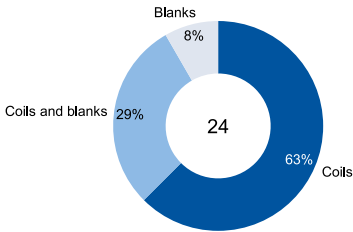


Fig. 7. Form of delivery of the raw material.

8. Which of the automation terms best describes the components of the area "material delivery" in the automotive press shop in your company / from your experience?

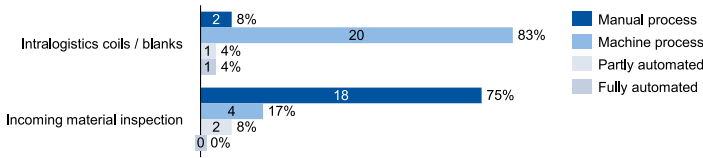


Fig. 8. Form of automation in the material delivery area.

9. Which of the automation terms best describes for you the components of the area "strip cutting system" in the automotive press shop in your company / from your experience?

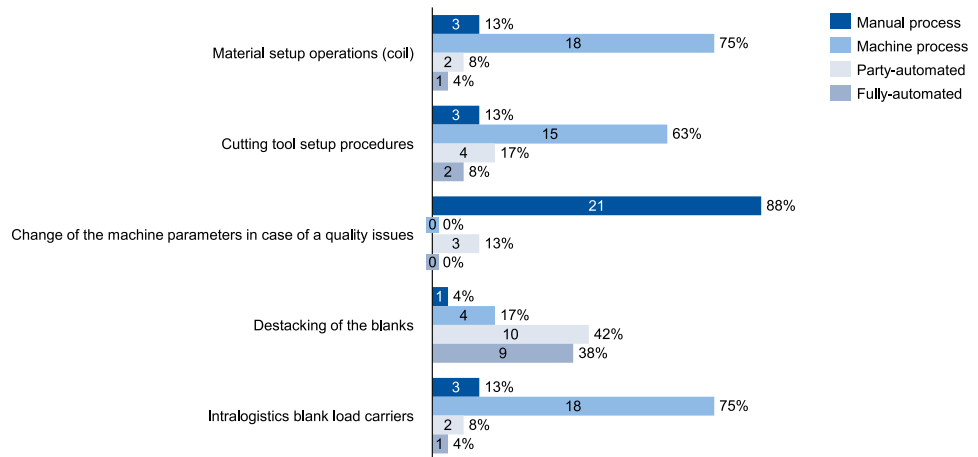


Fig. 9. Form of automation in the strip cutting system.

2. Experimental Design, Materials and Methods

To collect empirical data on the characteristics of the production processes and to identify deficits in data acquisition and transmission of information in the press shop, a survey is carried out. The survey should provide an overview of the current characteristics of the production processes in automotive press shops and is performed by using an online questionnaire. The collection of data in a survey is a frequently used method aiming to falsify or confirm hypotheses in empirical research [1]. The instrument used in this method is a scientific questionnaire,

10. Which of the automation terms best describes the components of the area "press machine" in the automotive press shop in your company / from your experience?

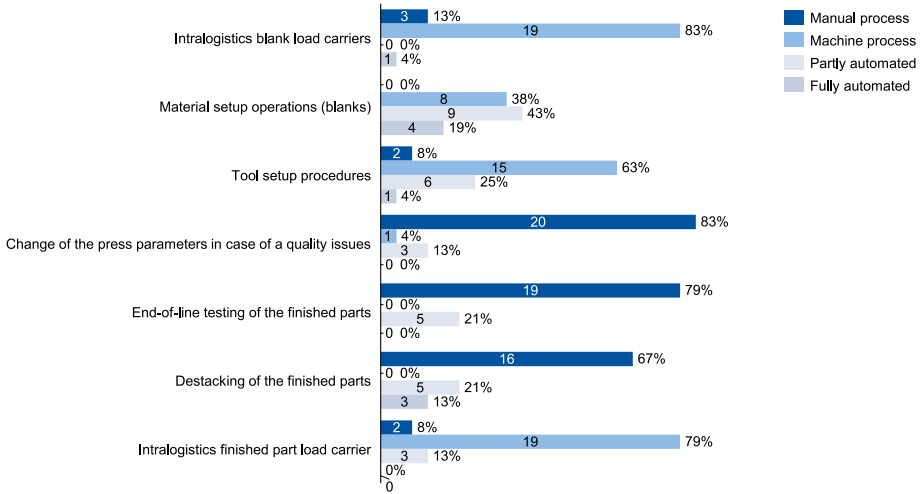


Fig. 10. Form of automation in the press machine.

11. Which of the automation terms best describes the components of the area "finished parts storage" in the automotive press shop in your company / from your experience?

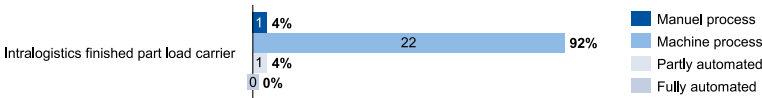


Fig. 11. Form of automation of the finished parts storage.

12. Does an automated data exchange take place in the press shop between the machine systems in your company / from your experience between the production area "press machine" and the production area "strip cutting machine"?

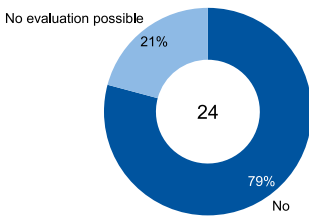


Fig. 12. Process of data exchange between the press machine and cutting machine.

answered independently by the respondents. The methodology used in this paper is described using the criteria shown in Table 1. The development of the questions for the questionnaire took place in the course of workshops and interviews with production engineering scientists and industry representatives, especially from the automotive industry and factory planning.

Since the survey pursues the goal of obtaining an up-to-date picture of the data collection and the transmission of information in press shops, a quantitative questionnaire is used. A fully standardised questionnaire with closed questions allows the respondents to select multiple-choice answers that they consider to be appropriate. Within the framework of this study, the survey is designed to question individuals. The questionnaire is implemented as an electronic version, which is sent out by email.

13. How do you evaluate the potential benefit of increasing the degree of automation in the various areas of the press shop process chain in your company / from your experience?

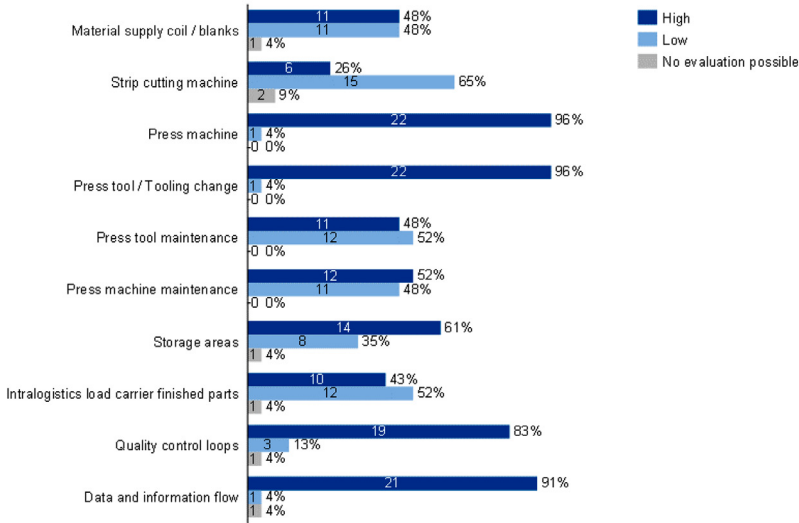


Fig. 13. Evaluation of the potential benefit of an increase of automation in the press shop.

14. In case of a process defects (e.g. crack in finished part) on the press machine, how does the information transfer between the end-of-line inspection and the machine operator in your company / from your experience happen?

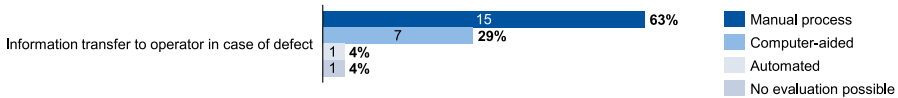


Fig. 14. Process of information transfer between end-of-line inspection and machine operator in case of a defect.

15. Is there a central data storage of material properties and production parameters in the press shop in your company / from your experience, so that different production areas can access them?

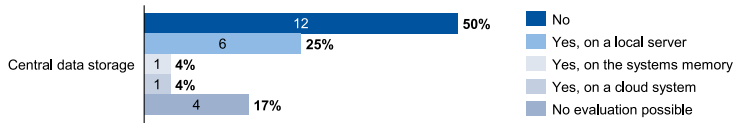


Fig. 15. Accessibility of data in different production areas.

16. How do you rate the current duration of the defect-cause determination process in your company / from your experience in the press shop, if the quality inspection at the end-of-line of the press reveals a surface defect in the component?

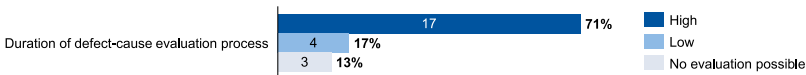


Fig. 16. Duration of defect-cause evaluation process.

17. How is the cause of a defect found in your company / from your experience in the press shop if the quality inspection at the end-of-line of the press reveals a surface defect (e.g. tearing) in the component?



Fig. 17. Type of defect detection in the end-of-line area.

18. Does a part-related, clear labelling of blanks take place in your company / from your experience in the production of body shell parts?



Fig. 18. Usage of part related labelling of blanks.

19. Is blank-specific information (e.g. continuous sheet thickness, lubrication film measurement, etc.) currently used in the press shop in your company / from your experience to adjust the system parameters of the forming process?

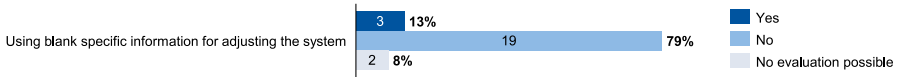


Fig. 19. Usage of blank-specific information to adjust the manufacturing system parameters.

20. In which level of detail is a traceability of material parameters (e.g. sheet thickness, lubricant quantity etc.) in your company / from your experience currently possible?

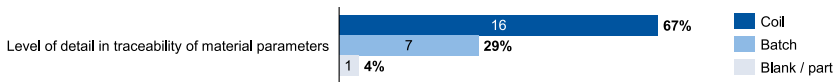
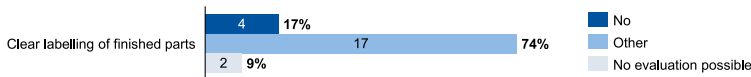


Fig. 20. Traceability level of detail of material parameters.

21. Does your company/ from your experience in the production of body shell parts carry out a part-related, clear labelling of the finished parts?



Answers in text box („other“):

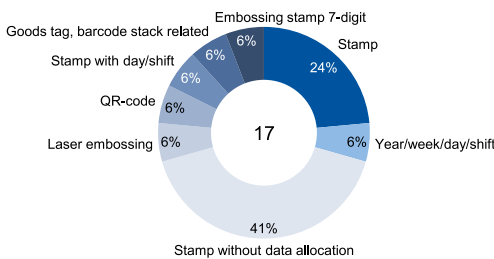


Fig. 21. Usage of part-related labelling of finished parts.

22 How do you evaluate the benefit potential of an automated data allocation of the machine parameters with the quality characteristics of the finished parts in the press shop in your company / from your experience?

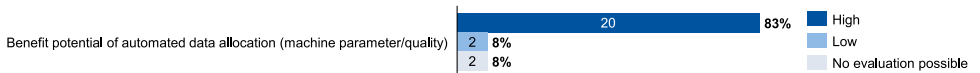


Fig. 22. Benefit potential of automated data allocation of machine parameter and quality characteristics of finished parts.

The questionnaire is addressed to experts. In this context, experts are defined as persons who have access to relevant knowledge, decision-making processes, or groups of persons [2]. In terms to this paper, the status of an expert is therefore based on expertise in the area of the press shop in the automotive industry, as well as on experience in forming technology and data networking. Particular attention is given to the fact that the respondents are either experts in

23. Using Track & Trace technologies at blank / finished part level, would it be possible in the press shop in your company / from your experience to...

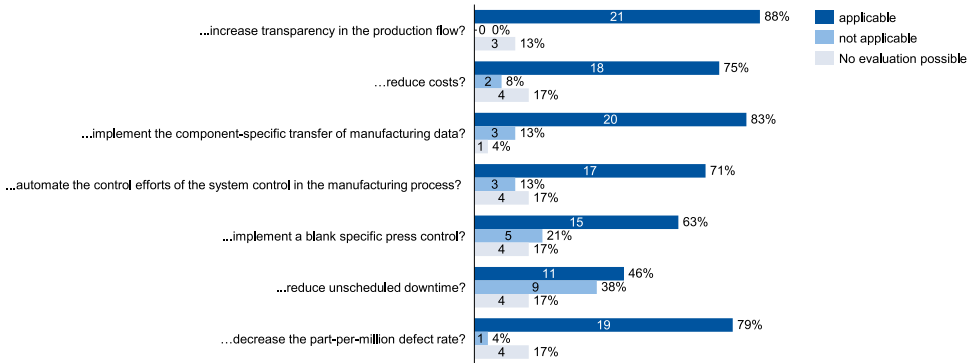


Fig. 23. Evaluation of the potential benefits of using track & trace technology at blank and finished part level.

24. Which of the following statements is the biggest challenge when implementing a blank/part related Track & Trace system? Please arrange the statements in order.

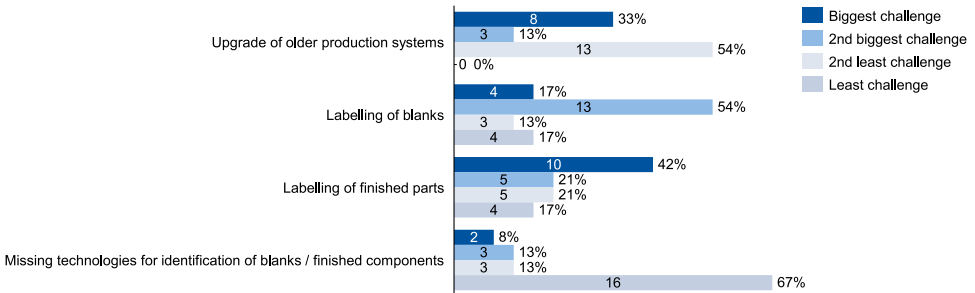


Fig. 24. Evaluation of the challenges of implementing a blank or part related track & trace system.

Table 1
Survey criteria.

Paradigm of the survey	Quantitative		Qualitative	
Degree of structure	Non-standardised	Semi-standardised	Fully standardised	
Mode of the survey	Paper pencil Questionnaire		Electronic Questionnaire	
Dissemination of the survey	Postal	Online	Mobile	Sampling
Type of respondents	Involved people		Experts	
Scope of the survey	Single person		Group	

the field of forming technology or occupy a position in a subject area covered by the survey. This is verified in the survey by answering introductory questions on the background of the person completing the form, whereby no personal information is requested. The survey was distributed to the experts through various newsletters of the Laboratory for Machine Tools and Production Engineering of RWTH Aachen. By using the network of the department leader of forming processes a broad number of experts could be reached. Overall, 24 respondents took part in the survey, however not all of them answered all questions. Furthermore, the answers of the participants do not represent the whole industry branch, therefore the survey does not claim to be representative. Nevertheless, it gives an indication of the state of digitisation in automotive press shops. As shown in the Figs. 1 and 2, most respondents work for car manufactures in Germany. Considering the fact, that there are only a few press shops experts in the automotive industry,

the indication be useful to motivate more research and development in the digitisation of press shops as mentioned in the section “value of the data”.

Ethics Statement

In the authors' understanding, the work complies with the ethical requirements for publication in *Data in Brief*. All participants were informed that the survey results will be published. Thereby they gave their consent to participate in the survey and agreed to the publication.

CRediT Author Statement

Marius Groß: Methodology Investigation; Writing - Original Draft; Writing - Review & Editing; **Kolja Lichtenthäler:** Methodology Investigation; Writing - Original Draft; Writing - Review & Editing; **Georg Bergweiler:** Writing - Review & Editing; **Peter Burggräf:** Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships, which have, or could be perceived to have, influenced the work reported in this article.

Acknowledgments

We would like to thank you all participants for filling out the survey. We also thank Dr.-Ing. Andreas Feuerhack, leader of the department of forming processes at WZL of RWTH Aachen University, for distributing the surveys in his network.

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.dib.2021.106880](https://doi.org/10.1016/j.dib.2021.106880).

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