



THE ANALYSIS OF SPOT REPAIR JOB IN AUTOMOTIVE BODY REPAIR INDUSTRIES

Afri Yudiantoko¹

¹Automotive Engineering Education, Faculty of Engineering,
Universitas Negeri Yogyakarta
Kampus Karangmalang, Sleman, DI. Yogyakarta 55281
afri_yudiantoko@uny.ac.id

Accepted: 12 September 2019. Approved: 05 October 2019. Published: 31 December 2019

ABSTRACT

The aim of this study are to formulate several facts in the automotive body repair industries regarding: (1) the competency profile of spot repair job and (2) the equipment and materials needed in each spot repair job profile. This research is a descriptive quantitative study with survey research methods. Data collection techniques in this study used a closed-open combination questionnaire. This study involved 56 respondents (mechanics, foremen, and service advisors) from the automotive body repair industries at Honda, Toyota and Nissan official workshops. The results showed that; (1) there are 16 points of competency profile of spot repair job needed in order to complete the work and supplemented by 3 additional points of competence suggested and, (2) there are 45 items of equipment and 19 items of materials that are overall needed in completing all stages of spot repair job on automotive body repairs.

Keywords: Body Repair, Spot Repair Job, Competence, Equipment, Materials

INTRODUCTION

Education plays a very vital role in the sustainable development in a country. A country will not be able to carry out sustainable development, especially in the economic field without any effort to build qualified human resources (Ozturk, I., 2008). The existence of human development through education will encourage the creation of a productive society and a society who capable of overcoming all the problems encountered in their lives. This is a challenge for the world of education to be able to change human civilization to make human life more prosperous.

One of the most important challenges for educational practitioners to consider is the industrial revolution 4.0. This revolution marks the very rapid development of science and technology used in the industrial world. One of the characteristics of the industrial revolution 4.0 is marked by the implementation of the Internet of Think (IOT) in all fields and industrial environments (Rojko, A., 2017). This IoT application makes it more effective and efficient at every stage of work in the industrial world. However, for the world of education, this is a challenge that needs to get serious attention about how to prepare people who are able to deal with the challenges of the industrial revolution 4.0.

In addition to the challenges of the industrial revolution 4.0, the world of education is also very important to pay

attention to the challenges of the ASEAN Economic Community (AEC). The AEC is an agreement from countries in the Southeast Asia region including Indonesia. One of the characteristics of the AEC is the existence of a single market that allows for free circulation of goods, services, investments, and even educated workers (Petri, P. A., Plummer, M. G., & Zhai, F., 2012). The free circulation of some of these things has a consequential impact on each country in order to improve the quality of its products, services and human resources to be able to compete and be a winner in the global market.

Indonesia as one of the countries in the Southeast Asia region must be able to answer the various challenges that exist by continuously improving the quality of its human resources through education. At present, when we viewed from the quality of Indonesia's human resources, according to the Human Development Indices and Indicators (United Nations Development Program, 2018), Indonesia ranks 116th out of 189 countries in the world with medium ranking position. This data illustrates that the quality of Indonesian human resources compared to other countries still needs to be improved. In addition, data from the Badan Pusat Statistik (2018) states that as of August 2018 there were more than 7 million people in Indonesia who were unemployed, 4.6 million or around 66% of them were educated unemployed who had educational

qualifications above High School level. These data illustrate that the Indonesian government needs to be very focused on improving the quality of human resources, one of which is through improving the quality of education.

One type of education that is very focused on the developing the quality of human resources is vocational education. This is because vocational education organizes educational programs in order to equip students with the competencies needed by the world of work. Therefore, students who have completed vocational education are expected to be able to get jobs or even create jobs. With the quality of vocational education, a country will be able to compete in facing the challenges of globalization (Mouzakitis, G. S., 2010). Therefore, improving the quality of the implementation of vocational education is very important to get the attention from various parties so that efforts to improve the quality of human resources become more effective.

One type of vocational education institutions is Sekolah Menengah Kejuruan (SMK). At present, there are 14,247 SMK in Indonesia consisting of various skills study programs (Ditpsmk, 2019). One of the study programs that is very widely held in SMK is the field of automotive engineering expertise. Recorded in 2015 data, there are 4,177 SMK in Indonesia that hold automotive engineering expertise study

programs (Ditpsmk, 2014). The data illustrates that efforts to improve the quality of vocational education in the automotive sector will have a broad effect on Indonesian human resources. This is coupled with the potential for very broad employment in the automotive industries in Indonesia with many motorized vehicles as a means of transportation in Indonesia. BPS noted, in 2017, there were 15,493,068 passenger cars, 2,509,258 passenger buses, 7,523,550 freight vehicles, and 138,556,669 motorbikes (Badan Pusat Statistik, 2017a). These data provide information that the automotive sector provides enormous employment opportunities in order to reduce unemployment in Indonesia.

The automotive field in SMK is divided into several more specific competencies including; vehicle engineering, autotronic engineering, motorcycle engineering, heavy equipment engineering, automotive body engineering, and several other skills competencies (Ditpsmk, 2019). From some of these fields, automotive body engineering is one of the fields that are currently much needed by the world of work. This is marked by the development of the automotive body repair industries both in authorized workshops or in public workshops. In addition, data from various sources state that at this time with so many vehicles, there are many accidents that result in vehicle body damage. BPS as one of the data center bodies in Indonesia noted

that in 2016 there were 106,644 accidents and in 2017 there were 103,228 accidents (Badan Pusat Statistik, 2017b). The data is recorded data, not including other accident data that may not have been recorded. From this data, the automotive body repair industry is one of the industries that is currently highly developed.

One of the jobs that is mostly done by the automotive body repair industries is spot repair or repairing minor damage to vehicle body damage. Minor damage to the automotive body referred to in this case is damage that does not change the dimensions of the vehicle body and does not have a very deep deformation so that it can be repaired enough using a hammer and dolly or even does not require a deformation repair step so that it is directly at the putty application step. Therefore, these jobs become the most basic competencies to be mastered in order to run the automotive body repair industries.

SMK as one of the vocational education institutions that aim to prepare workers must be able to analyze the needs of the world of work so that the competencies of their graduates produced will be meet with the needs of the world of work. Therefore, collaboration between SMK and the world of work is a very important thing in order to bridge the gap that occurs (Raihan, Dr., 2014). SMK's teachers in this case have a very important role in order to develop the quality of learning and improve

the relevance of vocational schools so that they are able to answer the challenges of the needs of the workforce. Therefore, the preparation of prospective SMK's teachers becomes very important in order to overcome the problems that occur including unemployment.

Universitas Negeri Yogyakarta (UNY) as one of the universities organizing education for prospective teachers must be able to produce quality graduates in order to improve the quality of education in Indonesia. The UNY Faculty of Engineering is an educational institution for vocational teacher candidates consisting of several fields of expertise, one of which is the automotive field. In order to produce qualified SMK's teacher candidates, one of the steps that must be taken is to conduct research related to the world of work so that the needs that exist in the world of work can be constantly updated by the world of education as a basis for implementing and developing learning. Research on the analysis of spot repair work in the automotive repair and painting body industry is basic research in order to develop practical learning as well as facilities and infrastructure that are in line with the needs of the world of work, especially in the field of automotive body repair.

RESEARCH METHOD

This type of research is a survey research with quantitative descriptive

research approach. This survey research is a field study that involves collecting data through the use of questionnaires (Visser, P. S., Krosnick, J. A., & Lavrakas, P. J., 2000). This study involved several practitioners that working in the automotive body repair industries as mechanics, foremen (leader of mechanics) and service advisors. The following is a classification table of the research subjects involved.

Table 1. Research Subjects

Workshop Name	Mechanic	Foreman	Service Advisor	Total
Toyota	17	12	1	30
Honda	2	9	5	16
Nissan	4	4	2	10
Total Number				56

This study uses a closed-open combination model questionnaire. This questionnaire model makes it possible to uncover more facts beyond the closed questions that have been designed. The questionnaire questions on this questionnaire were adopted and developed based on the results of the research from Afri Yudiantoko and Zainal Arifin (2016). The grid is then made into several questions with four choices (4) Likert scale namely; not needed, needed enough, needed, and very needed.

This study uses quantitative descriptive statistical data analysis techniques. The data will be presented regarding the percentage score of each instrument item, and the determination of the item whether it is accepted or rejected in order to obtain the competency profile of spot repair work and the profile of equipment and materials needed for spot repair job. Determination of

an item is accepted into a profile or rejected based on the categorization table which are high, medium, and low. Instrument items that are categorized as "high" are items that are accepted and entered into a profile. The following table is the categorization analysis used (Saifuddin Azwar, 2015).

Table 2. Percentage Conversion Guidelines for 3 Categorizations.

No	Interval	Category
1	66,67% $\leq x \leq$ 100%	High
2	33,33% $\leq x <$ 66,67%	Medium
3	0% $\leq x <$ 33,33%	Low

RESULT AND DISCUSSION

Result

The results of this study consist of two; job competency profile and equipment and materials profiles needed in spot repair job in the automotive body repair industries.

Competency profile of spot repair work

This section is divided into four parts. The first part is the competency profile of spot repair work at the preparation stage. In this section, there are two job competencies required and one additional competency for suggestions submitted by respondents.

Table 3. Work Profile of Preparation Stage.

No	Job Competency Item	Percentage
1	Competence in carrying out procedures for identifying vehicle body panel damage	88.84%
2	Competence in carrying out procedures for the removal of electrical components and vehicle body	76.34%
Additional Competency Suggestion Items		
1	Competence in estimating and regulating the length of time it takes to work	

The second part is the competency profile of spot repair work at the surface preparation stage. In this section there are six required job competencies and one additional

competency for suggestions submitted by respondents.

Table 4. Work Profile of Surface Preparation Stage.

No	Job Competency Item	Percentage
1	Competence in carrying out application procedures for featheredging	82.59%
2	Competence in carrying out under coat or basic paint application procedures	83.48%
3	Competence in carrying out the application procedure for putty	85.27%
4	Competence in carrying out procedures of putty results assessment	83.48%
5	Competence in carrying out surfacer application procedures	82.14%
6	Competence in carrying out putty post surfacer application procedure	73.66%
Additional Competency Suggestion Items		
1	Competence in carrying out small/light repair procedures on body panels	

The third part is the competency profile of spot repair work at the body panel painting stage. In this section there are five job competencies needed.

Table 5. Work Profile of Painting Body Stage.

No	Job Competency Item	Percentage
1	Competence in implementing masking application procedures	84.38%
2	Competence in implementing color matching application procedures	82.14%
3	Competence in carrying out painting application procedures	87.05%
4	Competence in carrying out procedures for evaluating painting results	83.93%
5	Competence in carrying out polishing application procedures	83.48%

The last part is the competency profile of spot repair job at the final completion stage. There are three required job competencies and one additional competency.

Table 6. Work Profile of Final Completion Stage.

No	Job Competency Item	Percentage
1	Competence in carrying out application procedures for installation of vehicle body components	79.46%
2	Competence in carrying out application procedures for adjusting vehicle body components	80.36%
3	Competence in carrying out procedures for communicating work results to customers	83.48%
Additional Competency Suggestion Items		
1	Competence in carrying out procedures for checking vehicle cleanliness both inside and outside	

Profile of required equipment and materials

The profile results in this section are classified according to the type of stages of spot repair work. There are 45 types of equipment and 19 types of materials needed in the process of repairing automotive body spot repair. The tables of the need for tools and materials for spot repair job on automotive body repair will be presented on this paper's attachment.

Discussion

The most fundamental thing in developing vocational education is to identify what work is needed and what is needed in doing the work (Putu Sudira, 2012). This is very fundamental because with the results of the identification, some development will be carried out among them; developing curriculum, developing textbooks, developing learning media, and developing competency assessment instruments. On the other hand, science and technology are very influential on the development of work and competencies needed by the world of work. Therefore, research on identifying the needs of the world of work is very important to be done regularly.

Competency profile of spot repair work

Spot repair job are divided into 4 stages of work; preparation stage, surface preparation stage, panel painting stage, and final finishing stages. The preparation phase of the spot repair work is the work carried out in order to start the core work of repairing the body. Initial works contained in this stage are the identification of damage that occurs and the removal of components both electrical and vehicle body panels related to the repair process. This is done in order to determine and take the initial steps regarding the repair techniques that will be carried out. In the results of this study, in addition to the two jobs, there are additional jobs at this stage, namely estimating the length of time for work. Estimating this work is very important for both customers and body repair workers (Duffy, James E., 2009). Basically, this estimation is not done by a mechanic or technician directly, but this is done by the foreman and service advisor as people who meet directly with customers.

In the next stage, the surface preparation stage, there are 6 jobs; featheredging applications, under coat or basic paint applications, putty applications, putty results assessment applications, surfacer applications, and post surfacer putty applications. Some of these stages are carried out in order to shape the vehicle body panel surface in accordance with the original that is in accordance with the shape before damage occurs. Although spot repair is a minor

damage to the vehicle body panel, it does not rule out the possibility that there will be some business beyond the six jobs described above. Therefore, this study recommends that there is one more work at this stage, namely minor repairs to the vehicle body panels. This is usually done using hammer and dolly equipment (Toyota, 1999).

Stages of vehicle body painting are stages of body staining to match the body color of the vehicle. At this stage, there are 5 jobs; application of masking, color matching, spraying, assessment of painting results, and polishing applications. The masking application functions to cover parts of the vehicle that are not desired to be exposed to paint spray. While the color matching application is a work in the framework of mixing the colors of the paint to obtain a color that matches the color of the vehicle's body before it is applied to the spraying process. Polishing application is the last step in this stage of work in order to smooth the paint surface so that the expected color can appear perfectly.

The last stage of spot repair work is finishing. This stage includes the process of installing removable components, making installation adjustments, and communicating the work that has been done to the customers. This research suggests that there is one additional job, namely cleaning the vehicle both inside and outside. This is very important because in the process of doing spot repair work it is possible to produce

dust and other impurities that can pollute the vehicle.

Profile of required equipment and materials

Every job requires equipment and materials included in this spot repair job. In total, this work requires 45 items of equipment and 19 items of material. In the attachment, the need for tools and materials has been broken down at each stage of the spot repair work. From this description, there is an equipment and a material that is not needed in a work process. The equipment and materials are brushes and degreaser because they have low percentage which are 46,4% and 64,3% respectively.

The work of removing the electricity and the body of the vehicle at the preparation stage does not require degreaser. This material is a liquid commonly used to clean vehicle panel surfaces from dust and adhesives. In reality in the field, this material is not used in the process of removing electrical components or vehicle bodies. In addition, brushes in real-time paint application work are also not needed. This contradicts some references which state that in the application of priming on the vehicle body panels that have been damaged, brushes are used to apply the primers (Toyota, 1999).

Besides there are two equipment and materials that are not actually needed in a particular job above, there are two equipment that appear in the results of this study which are rarely found in some references. The two devices are kimtech rags and cloth tack rags. Kimtech rags is a type of washcloth that can

absorb oil or oil content (Majjatra Eizoku, 2019). This cloth is used in almost all spot repair jobs that involve the removal of the oil layer, including the application of primers, surfaces, surfacers, post surfacers, and on the vehicle body panel painting. While tack cloth is used to remove small particles of dust that stick to the vehicle body panels (Bandalos, Tony, 2017). This washcloth is used at the time before the application of spraying both in the under coat paint application, surfacer, and in the top coat application.

CONCLUSION

Identifying the work and equipment and materials needed are very basic things that must be done in the context of developing vocational education. The results of this study in the form of 16 items of work competence, 45 items of equipment, and 19 items of material can be used in several developments in the world of education, namely curriculum development, development of practical workshops, development of teaching materials, development of instructional media, and development of competency achievement assessment instruments.

REFERENCE

- Afri Yudiantoko dan Zainal Arifin. (2016). *Profil kompetensi dunia kerja bidang perbaikan bodi otomotif dan tingkat relevansinya dengan dunia pendidikan*. Jurnal Pendidikan Vokasi, [S.l.], v. 6, n. 2, p. 127-142, aug. 2016. ISSN 2476-940
- Badan Pusat Statistik. (2017a). *Perkembangan Jumlah Kendaraan Bermotor Menurut Jenis, 1949 – 2017*. Taken from <https://www.bps.go.id/linkTableDinamis/view/id/1133> on 7 August 2019.
- Badan Pusat Statistik. (2017b). *Jumlah Kecelakaan, Koban Mati, Luka Berat, Luka Ringan, dan Kerugian Materi yang Diderita Tahun 1992-2017*. Taken from <https://www.bps.go.id/linkTableDinamis/view/id/1134> on 7 August 2019.
- Badan Pusat Statistik. (2018). *Pengangguran Terbuka Menurut Pendidikan Tertinggi yang Ditamatkan 1986 – 2018*. Taken from <https://www.bps.go.id/statictable/2009/04/16/972/pengangguran-terbuka-menurut-pendidikan-tertinggi-yang-ditamatkan-1986---2018.html> on 7 August 2019.
- Bandalos, Tony. (2017). What is a Tack Cloth? – How To Use a Tack Cloth (as known as a Tack Rag). Taken from <https://www.learnautobodyandpaint.com/what-is-a-tack-cloth-how-to-use-a-tack-cloth-aka-a-tack-rag/> on 21 August 2019.
- Ditpsmk. (2014). *Data pokok SMK*. Taken from <http://datapokok.ditpsmk.net/> on 15 May 2016.
- Ditpsmk. (2019). *Data Pokok SMK*. Taken from <http://datapokok.ditpsmk.net> on 2 august 2019.
- Duffy, James E. (2009). *Automotive Body Repair Technology*. United State of America: Delmar Cengage Learning.
- Majjatra Eizoku. (2019). *Kain lap minyak Kimtech Blue 33560/Kain Spunbond / Non Woven*. Taken from <http://www.majjatra.co.id/product/kimtech-blue-33560-p278784.aspx> on 21 August 2019.
- Mouzakitis, G. S. (2010). *The role of vocational education and training curricula in economic development*. Procedia - Social and Behavioral Sciences, 2(2), 3914–3920. doi:10.1016/j.sbspro.2010.03.616.
- Ozturk, I. (2008). *The Role of Education in Economic Development: A Theoretical Perspective*. SSRN Electronic Journal. doi:10.2139/ssrn.1137541.
- Petri, P. A., Plummer, M. G., & Zhai, F. (2012). *ASEAN Economic Community: A General Equilibrium Analysis**. Asian Economic Journal, 26(2), 93–118. doi:10.1111/j.1467-8381.2012.02079.x.
- Putu Sudira. (2012). *Filosofi dan Teori Pendidikan Vokasi dan Kejuruan*. Yogyakarta: UNY Press.
- Raihan, Dr. (2014). *Collaboration between TVET Institutions and Industries in Bangladesh to Enhance Employability Skills*. International Journal of Engineering and Technical Research (IJETR) Volume 2. 50-55.
- Rojko, A. (2017). *Industry 4.0 Concept: Background and Overview*. International Journal of Interactive Mobile Technologies (ijim), 11(5), 77. doi:10.3991/ijim.v11i5.7072.
- Saifuddin Azwar. (2015). *Skala Psikologi*. Yogyakarta: Pustaka Pelajar.

- Toyota. (1999). *Pedoman Pelatihan Pengecatan (Painting Training Manual)*. Jakarta: PT. Toyota Astra Motor.
- United Nations Development Programme. (2018). *Human Development Indices and Indicators*. New York: 1 UN Plaza.
- Visser, P. S., Krosnick, J. A., & Lavrakas, P. J. (2000). *Survey research*. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 223-252). New York, NY, US: Cambridge University Press.

ATTACHMENT

Table 7. Needs in the work of identification of damage to vehicle body panels.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Straightedge	89.3%	-	
2	Gloves	87.5%		
3	Markers	82.1%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Thread		Degreaser	
2	Chamois Cloth		Thinner	
3	Rags		Compound	
4	Lights or Flashlights			
5	Camera			

Table 8. Needs in the work of removing electrical components and vehicle bodies.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Wrench Set	98.2%	Degreaser	64.3%
2	Pliers Set	94.6%		
3	Screwdriver Set	87.5%		
4	Screwdriver Pry (SST)	96.4%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Thread		Masking Tape	
2	Spatulas			
3	Hammer			
4	Air Impact			
5	Car Lifter			
6	Lights or Flashlights			
7	Spare Part Storage Boxes			

Table 9. Needs in featheredging application work.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Sander	96.4%	Sand Paper	98.2%
2	Air Duster Gun	96.4%		
3	Compressor	96.4%		
4	Compressor Hose	96.4%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Kimtech Rags		Degreaser	
2	Gloves			

Table 10. Needs in under coat or basic paint application jobs.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Spray Gun	98.2%	Primers/under coat	98.2%
2	Brush	46.4%	Thinner	94.6%
3	Compressor	96.4%		
4	Compressor Hose	96.4%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Spray Booth		Degreaser	

2	Kimtech Rags	Masking Paper
3	Tack Cloth	
4	Washcloth	

Table 11. Needs in the putty application procedure.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Spatulas	100%	Putty	98.2%
2	Straightedge	94.6%	Hardener	94.6%
3	Sander	94.6%	Sand Paper	96.4%
4	Air Duster Gun	91.1%		
5	Hand Block	96.4%		
6	Infrared Lights	92.9%		
7	Compressor	92.9%		
8	Compressor Hose	91.1%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Gloves		Degreaser	
2	Kimtech Rags		Thinner	
3	Washcloth		Masking Tape	

Table 12. Needs in assessment of putty application.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Straightedge	91.1%	-	
2	Gloves	89.3%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Markers		Degreaser	
2	Washcloth			
3	Lights or Flashlight			

Table 13. Needs in surfacer application work.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Spray Gun	98.2%	Surfacer	100%
2	Air Duster Gun	89.3%	Hardener	92.9%
3	Compressor	98.2%	Thinner	92.9%
4	Compressor Hose	98.2%	Degreaser	91.1%
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Brush		Masking Paper	
2	Kimtech Rags		Masking Tape	
3	Tack Cloth			

Table 14. Needs in the work of putty application after surfacer.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Spatulas	96.4%	Touch Up Putty	92.9%
2	Hand Block	91.1%	Sand Paper	98.2%
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Lights or Flashlight		Degreaser	
2	Kimtech Rags		Thinner	
			Putty 2 components	

Table 15. Needs in the work of masking application.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Cutter	98.2%	Masking Paper	100%
2			Masking Tape	98.2%
3			Degreaser	85.7%
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Lights or Flashlight		-	
2	Air Duster Gun			

Table 16. Needs in the work of color matching application.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Digital Scale	98.2%	Coloured Paint	98.2%
2	Computers	89.3%	Thinner	96.4%
3	Colour Formula	96.4%		
4	Paint Mixer Machine	94.6%		
5	Color Matching Lamp	96.4%		
6	Ovens	89.3%		
7	Spray Gun	96.4%		
8	Compressor	96.4%		
9	Compressor Hose	96.4%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Test Piece		-	
2	Mini Spray Booth			
3	Calculator			

Table 17. Needs in the work of topcoat application.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Spray Gun	98.2%	Coloured Paint	98.2%
2	Spray Booth	98.2%	Thinner	98.2%
3	Compressor	98.2%	Clear	98.2%
4	Compressor Hose	98.2%	Degreaser	94.6%
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Tack Cloth		-	
2	Kimtech Rags			
3	Washcloth			
4	Air Duster Gun			

Table 18. Needs in the work of assessment in painting results.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Markers	100%	-	
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Lights or Flashlight		-	
2	Glass Pencils			
3	Camera			

Table 19. Needs in polishing application.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Hand Block	85.7%	Sand Paper	98.2%
2	Polisher	100%	Compound	98.2%
3	Compressor	92.2%		
4	Compressor Hose	92.2%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Lights or Flashlight		Water	
2	Chamois Cloth		Wax	
3	Water Sprayer		Buffer	
4	Washcloth			

Table 20. Needs in the application of the installation of vehicle body components.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Wrench Set	98.2%	-	
2	Pliers Set	100%		
3	Screwdriver Set	92.9%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Sealer Gun		Double Tape	
2	Air Impact		Masking Tape	
3	Lights or Flashlight			

Table 21. Needs in the application work of adjusting vehicle body components.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Wrench Set	96.4%	-	
2	Pliers Set	98.2%		
3	Screwdriver Set	89.3%		
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Ruler		Masking Tape	
2	Hammer			
3	Wire			

Table 22. Needs on the job communication of work results to customers.

No	Equipment Needs	Percentage	Material Needs	Percentage
1	Stationery	100%	-	
Additional Equipment and Material Suggestions				
	Equipment Needs		Material Needs	
1	Camera		-	