INTERACTIVE LEARNING MEDIA DEVELOPMENT LATHE MACHINING TECHNIQUES FOR SMK

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ABSTRACT

Lathe Machining Techniques learning in SMK Prakarya Internasional Bandung has several problems. Based on the interview with Mr. Toto Sukmanto M.Pd as teacher lathe machining techniques in SMK stated that in SMK Prakarya Internasional Bandung has one garage and one computer lab for the Department of machining techniques, but existing facilities in the workshop lathe machining techniques incomplete because the expensive tool -tool required for practical activities to students, besides teaching are still very limited and at the time of this practice students take turns to do the practice activities, not conducted simultaneously together because the props are inadequate. The time available is also limited and any practice activities are divided into two sessions.

In this study will be made an interactive learning media for matapelajaran lathe machining techniques for the purpose of assisting vocational teachers in delivering the material to the students by way of theory, simulation, and evaluation. And as a learning tool prior to conducting student dibengkel practice. The method used for the manufacture of this media is a waterfall with a structured approach and using the tools of Data Flow Diagrams (DFD). System testing done of black-box testing.

Based on the results of tests consisting of a black-box testing and beta, it can be concluded that the instructional media Lathe Machining Techniques For class XI SMK using this simulation can help students in practical activities lathe machining techniques.

Keywords: Media Education, Engineering Lathe Machining, Structured

1. PREFACE

Mechanical machining is one of the programs existing expertise in vocational schools (SMK), which opens on the machining department. SMK Prakarya Internasional Bandung is a school that will be the object of this study because SMK Prakarya Internasional Bandung is one of the schools that opened the expertise on the field of machining programs, in SMK Prakarya Internasional Bandung there are six departments of: Light Vehicle Engineering, Mechanical Machining, Engineering Exploitation of Electricity , Electronics Engineering, Computer Engineering and Networks, Management and Business.The research is done only on one area of expertise is the field of expertise Mechanical Machining.

Based on interviews with teachers machining techniques in SMK Prakarya Internasional Bandung stated that in the school has one garage and has one computer lab for the Department of Mechanical Machining, but the existing facilities in the workshop Mechanical Machining incomplete because expensive equipment necessary for practical activities of students, besides teaching aids is still very limited example: lathe is available only 3 pieces of the machine, while each class has 40 students, it is not ideal because ideally 1 piece of lathe used by 4 to 5 people but the reality at present 1 piece lathe is used by 8 to 9 people, so the practical activities undertaken to be obstructed and material submitted by teachers not fully conveyed to students. Delivery of material that exist in schools today, the teacher explains the material to be taught and the students pay attention and write what the teacher explained, after the teacher explains the material presented students undertake practical activities. At the time of this practice students take turns to do the practice activities, not conducted simultaneously together because the props are inadequate and after conducting practice students must make a report to be submitted to the teacher. The time available is also limited (two meetings in a week and one meeting only two hours and every practice activities are divided into two sessions). Therefore, the time available can not be used optimally.

It is necessary developments of alternative means of learning media that can help students understand the material Lathe Machining Techniques. Based on these problems then be made computer-assisted learning media (PBK). PBK itself is a computer application as an integral part of the learning system for teaching and learning process that aims to help

students in their learning through a pattern can be two-way interaction via computer terminals would also multidirectional expanded over a computer network (either locally like any global) and also Expanded functionality through an interface (interface) whereas multimedia learning media can be defined as a physical tool used to convey the contents of teaching materials such as books, tape-recorder, tapes, films, videos, slides and others. An interactive section on this application is when students pair of iron or cutting tool on a lathe. To fix these problems through the medium of learning made the title "Development of Interactive Learning Media Lathe Machining Techniques For SMK (case studies SMK Prakarya Internasional Bandung)".

2. CONTENT OF RESEARCH

2.1 Analysis System

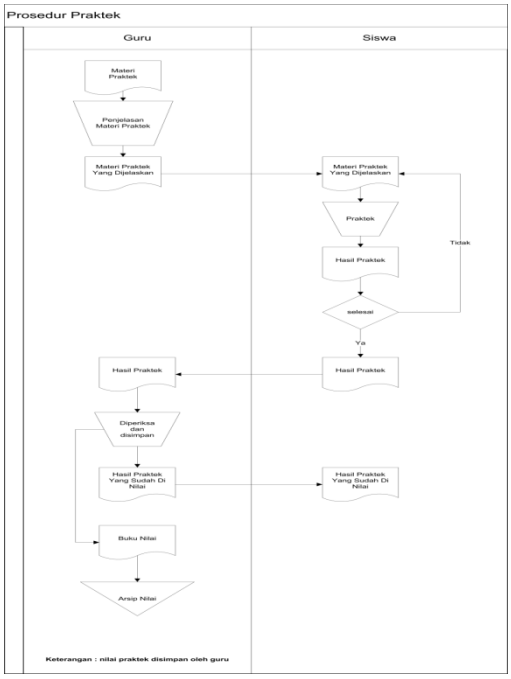
The analysis system can be defined as the decomposition of a whole system into its component parts with a view to identify and evaluate the needs that are expected to be proposed repairs.

2.2 The Analysis Procedure that is Currently Running

The analysis procedure is a procedure to analyze activity - working procedures that occur on the running system. Results of this analysis the activities of a real picture of the sequence of the activities of the learning process carried out by teachers and students in the practice of lathe machining techniques in SMK International craft Bandung.

Flowmap practice activities lathe machining techniques can be seen in Figure 1, while the flow of the procedure is as follows:

a. The teacher explains the contents of practice material to the students.
b. Students receive practice material described by the teacher.
c. Students practice.
d. If the student has finished the practice and the result is correct, then the results of the practice given to teachers for the next rated and allowed to practice menlanjutan material to the next. If students are wrong in practice, the practice resumed next week and should not proceed to the next practice material



2.3 Analysis of a Problem

Analysis of this issue has been presented in the first chapter that incomplete props dijurusan Mechanical Machining make delivery of material to the students is not delivered properly and make students understand less about the material given by the teacher.

2.4 Media Analysis Learning Using a Simulation Built

Instructional media using simulations is a medium of learning that includes learning materials regarding the operation of lathes therein. Learning media is intended for vocational high school students. The main purpose of this is to produce instructional media learning media that can assist teachers in presenting the material and help students in mastering and understanding the material practices lathe machining techniques that can improve student learning outcomes in subjects lathe machining engineering practice.

2.5 Description Media Interactive Learning Lathe Machining Techniques

Interactive learning media lathe machining technique is a desktop-based instructional media, which includes practice material berisis lathe machining techniques. The material presented in this learning media is a major part of the material introduction lathe, mounting cutting tools, turning time based on rpm, and the way the operation lathe equipped with a 2D graphics, interactive simulations so that students can play an active role in the process so as to better understand pembelajran diperlajari material. Instructional media to be built has two main menu, namely the material menu, simulation and evaluation menu containing the questions of the whole chapter.

2.6 Analysis of Material

The use of simulation in teaching media lathe machining technique will be described based on each matter that is the main part of the material introduction, installation of cutting tools, a lathe turning and operation. Analysis of the material to be built can be seen in Table 1.

Table 1 Analysis of Material

Tabel 3.1 Analisis Materi

Bab	Materi	Kegiatan Siswa	Hasil Akhir	Hasil Akhir (Aplikasi)
1	Pengenalan bagian – bagian utama pada mesin bubut	1. Siswa memilih bagian-bagian yang terdapat di mesin bubut	1. Siswa mengetahui bagian-bagian pada mesin bubut 2. Siswa mengetahui fungsi-fungsi pada bagian mesin bubut	1. Aplikasi menampilkan dan menjelaskan bagian-bagian yang di pilih oleh siswa
2	Pemasangan alat pemotong pada mesin bubut	1. Siswa memasangkan bahan (Besi) pada spindel 2. Siswa memilih alat potong 3. Siswa memasangkan alat potong yang sudah dipilih pada chuck 4. Siswa mengatur derajat kemiringan dengan paramater 0°-90° 5. Siswa mengatur kecepatan spindel dengan cara menginputan angka dengan parameter 0-900Rpm 6. Siswa mengatur ketebalan besi yang akan di bubut dengan parameter 0-6mm	1. Siswa mampu memasangkan alat potong dengan baik pada mesin bubut 2. Siswa mengetahui cara kerja mesin bubut pada bagian alat potong dengan baik. 3. Siswa mampu memilih alat potong yang sesuai yang akan digunakan berdasarkan benda yang akan di potong 4. Siswa mampu mengoprasikan alat potong yang ada pada mesin bubut dengan baik.	1. Aplikasi menampilkan Waktu pembubutan yang dihasilkan 2. Aplikasi memberikan informasi tentang alat potong yang digunakan pada saat melakukan pembubutan
3	Waktu pembubutan berdasarkan kecepatan	1. Siswa memasangkan besi pada spindel 2. Siswa memasukan angka kecepatan dengan parameter 0-900Rpm 3. Siswa memasukan angka ketebalan dengan	1. Siswa mampu menghitung kecepatan Rmp yang di butuhkan dalam melakukan	1. Aplikasi menampilkan waktu hasil pembubutan 2. Aplikasi menampilkan rumus waktu pembubutan

Table 2 Analysis of Material (Advanced)

		parameter 0-6mm	pembubutan berdasarkan ketebalan benda yang akan dibubut	beserta keterangannya
4	Cara pengoperasian mesin bubut	1. Siswa memasangkan besi pada spindel 2. Siswa mengatur derajat kemiringan dengan paramater 0°-90° 3. Siswa mengatur kecepatan spindel dengan cara menginputan angka dengan parameter 0-900Rpm 4. Siswa mengatur ketebalan besi yang akan di bubut dengan parameter 0-6mm	1. Siswa mampu meletakan bahan yang akan di bubut pada mesin bubut dengan baik. 2. Siswa mampu mengoperasikan mesin bubut dengan baik. 3. Siswa mampu mengetahui hasil pembubutan berdasarkan derajat kemiringan 4. Siswa menghitung kecepatan Rpm berdasarkan benda yang akan dibubut	1. Aplikasi menampilkan kinerja sistem bubut sesuai prosedur
5	Evaluasi	1. Siswa memasukan nama 2. Siswa memilih Jawaban PG	1. Siswa memahami seluruh materi yang diajarkan pada kegiatan praktek mesin bubut	1. Aplikasi menampilkan nama siswa dan nilai yang diperoleh siswa

2.7 Specification Software Needs

System and software design involves the identification and description of abstarksi basic software systems and relationships. Functional design stage, and the non-functional design. Based on business rules, the software requirements specification of the system to be built are described in Table 2 :

Table 2 Specification Software Needs

No	Kode	Deskripsi Kebutuhan
1	SKPL-F-01	Sistem dapat menampilkan materi praktek tenik otomotif per bab
2	SKPL-F-02	Sistem dapat menampilkan simulasi materi praktek teknik bodi otomotif
3	SKPL-F-03	Sistem dapat menampilkan evaluasi materi berupa soal-soal pengujian dari keseluruhan bab.
4	SKPL-F-04	Sistem dapat melakukan pengisian jawaban evaluasi
5	SKPL-F-05	Sistem dapat menampilkan nilai pada akhir evaluasi
6	SKPL-F-06	Sistem yang dibangun berbasis *desktop*
7	SKPL-F-07	Antarmuka dengan menggunakan Bahasa Indonesia
8	SKPL-F-08	Untuk menjalankan sistem yang dibangun maka dibutuhkan *Flash Compiler*.

2.8 Analysis Non Functional Needs

Non-functional analysis is the analysis needed to determine the system requirements specification. This specification also includes elements or components of what is needed for the system to be built until the system is implemented. The needs analysis also determines the input specifications.

The required system output to be produced by the system and processes needed to process inputs to produce a desired output. In the analysis of non-functional system requirements are described analysis software requirements, hardware requirements analysis and user analysis.

2.8.1 Analysis Hardware Needs

Hardware contained in SMK Prakarya Internasional Bandung can be seen in Table 3 and the hardware needed to run the application can be seen in Table 4.

Tabel 3 Specification Avaliable Hardware in SMK Prakarya Internasional Bandung

No	Perangkat Keras	Spesifikasi
1	Processor	Processor dengan kecepatan 3.00 GHz
2	Memory	RAM 2 GB
2	Monitor	Monitor dengan resolusi 1024 x 768 pixel
3	Graphic Card	VGA I GB
4	Harddisk	500 GB
6	Peranti Pendukung	Papan ketik (*keyboard*) , tetikus (*mouse*), dan speaker

Tabel 4 Specification Hardware needs

No	Perangkat Keras	Spesifikasi
1	Processor	Processor dengan kecepatan 1.4 GHz
2	Memory	RAM 1 GB
2	Monitor	Monitor dengan resolusi 1024 x 768 pixel
3	Graphic Card	VGA 512 MB
4	Harddisk	5 GB
6	Peranti Pendukung	Papan ketik (*keyboard*) , tetikus (*mouse*), dan speaker

2.8.2 Analysis Software Needs

Avaliable software ini SMK Prakarya Internasional Bandung can see in table 5 and software needs for running for this application can see in table 6

Tabel 5 Specification Avaliable Software In SMK Prakarya Internasional Bandung

No	Perangkat Lunak	Spesifikasi
1	Sistem Operasi	Windows 7
2	*Tools Compiler*	.....

Table 6 Sofware Requirement

2.9 Analysis Requirement User

No	Perangkat Lunak	Spesifikasi
1	Sistem Operasi	Microsoft Windows XP, Windows 7, Windows 8
2	*Tools Compiler*	Adobe Flash CS3

User analysis is an analysis of the users who will use the applications that have been built. The users of this application is a student majoring in Mechanical Machining in SMK Prakarya Internasional Bandung, the students who will use this application are given training or guidance on the procedure for using instructional media applications lathe machining techniques so that students can run this application properly.

2.10 Analysis Of The Function

Analysis of functional requirements describe the process of activities to be implemented in a system and describes the system requirements necessary for the system to run smoothly and according to need. System modeling modeled using Data Flow Diagrams (DFD) and Data Dictionary.

2.11 DFD (Data Flow Diagram)

Data Flow Diagram is the media that is used to describe the flow of data that flows on an information system. In the Data Flow Diagrams (DFD) consist of external entities, data flow, and data storage processes. Here is the DFD of interactive learning media lathe machining techniques for SMK. Besides DFD context diagram used also tools, context diagram itself is a diagram illustrating the input, process and output of the software system to be built. The following diagram context of instructional media lathe machining techniques, can be seen in Figure 1.

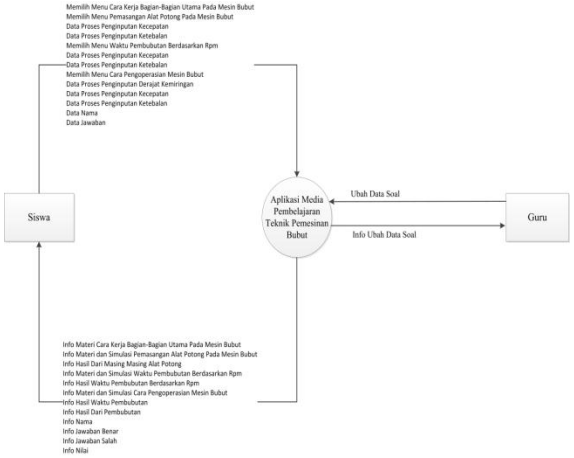


Figure 1 Diagram Konteks

2.11.1 DFD Level 1

DFD Level 1 describes the entire functionality that can be performed on media interactive learning lathe machining techniques for SMK, which can be seen in Figure 2.

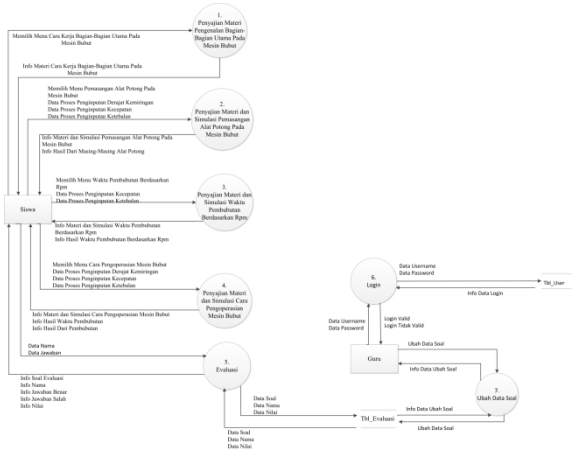


Figure 2 DFD Level 1

2.12 System Design

The design is a part of the methodology development of a software development carried out after the stage to give a detailed description, after going through the stages of analysis. To be able to design the system then do some steps are as follows:

1. Table Structure
2. Relation Diagram Design
3. Structure Menu Design
4. Interface Design
5. Semantic Network
6. Procedural Design

2.12.1 Table Structure

The structure of column table is contained in the table or also called attributes or fields and are based on the Entity Relationship Diagram (ERD) that have been designed previously. Table structure of instructional media applications and lathe machining simulation techniques in SMK Prakarya Internasional Bandung can be seen in Table 7.

Tabel 3.12 Struktur Tabel Evaluasi

Field	Type	Panjang	Keterangan
Id_soal	Num	11	*Primary Key*
User_id	Int	11	*ForeignKey references* tbl_user(user_id)
Pertanyaan	Varchar	300	
PilihA	Varchar	300	
PilihB	Varchar	300	
PilihC	Varchar	300	
PilihD	Varchar	300	
Kunci jawaban	Varchar	5	

Tabel 3.13 Struktur Tabel User

Field	Type	Panjang	Keterangan
User_id	Int	11	*Primary Key*
User_name	Varchar	50	
User_pass	Varchar	50	

Table 7 Structure Table

2.12.2 Relations Diagram Design

Relations diagram is a model that describes the relationship between the data contained in a database based on the data base objects that have relations between relations. Relationship diagrams from the application of instructional media and lathe machining simulation techniques in SMK Prakarya Internasional Bandung can be seen in Figure 3.

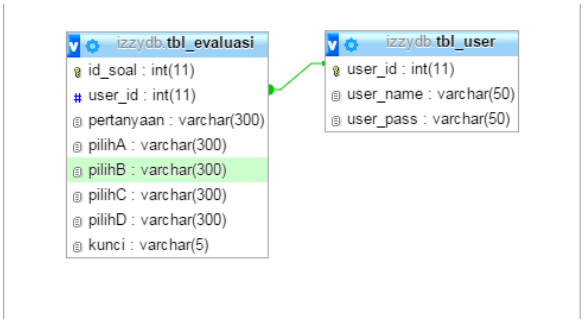
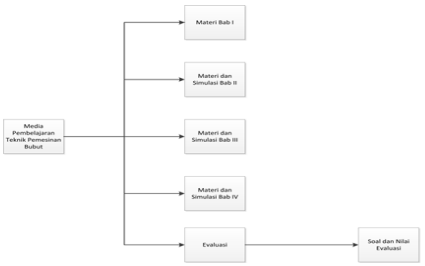


Figure 3 Relations Diagram

2.12.3 Structure Menu Design

The design of the structure of the menu is a picture track application usage so the application is easy to understand and easy to use. The design of the menu structure of instructional media applications and simulation lathe machining techniques in SMK Prakarya Internasional Bandung can be seen in Figure 4.



Gambar 3.6 Perancangan Struktur Menu Siswa



Gambar 3.7 Perancangan Struktur Menu Guru

Figure 4 Structure Menu

2.12.4 Interface Design

Interface design aims to provide an overview of the application to be built. So it will be easier to implement applications. This design is implemented into a program that is intact and can be used by users of the system.

The design of the application interface instructional media lathe machining techniques in SMK Prakarya Internasional Bandung is as follows:

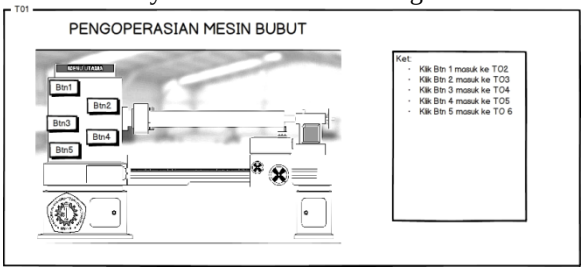


Figure 5 Interface Design

2.12.5 Semantic Networks

The structure of the application is described in detail with made into small modules that are easy to make, easy to be tested, and easily modified. In. Making these applications using the assistance of the structural chart is also called semantic networks. Semantic network describing the structure in this application is described in Figure 6.

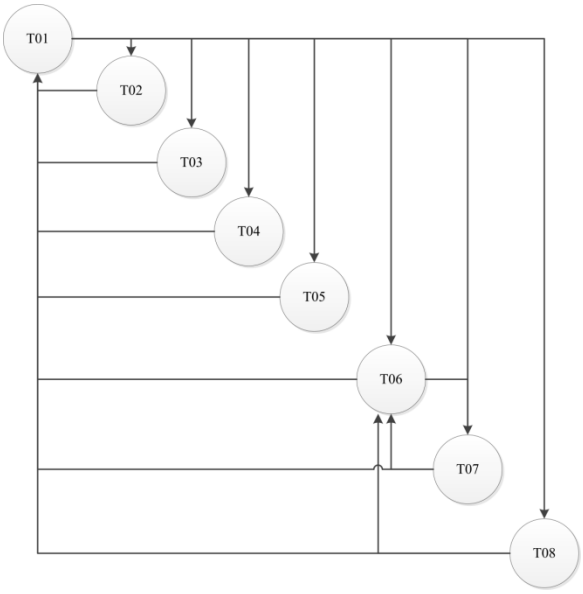


Figure 6 Semantic Networks

2.12.6 Procedural Design

The design is used to describe the procedural steps or grooves of each process on the system. Here is a procedural design of the application to be built.

2.12.6.1 Procedural Design For Major Part For Lathe Machine

Procedural design for the introduction of the main parts on a lathe can be seen in Figure 7.

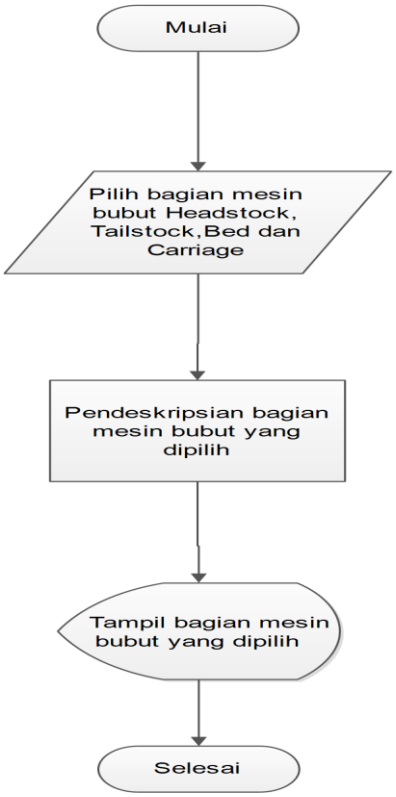


Figure 7 Flowchart For Major Part Lathe Machine

2.12.6.2 Procedural Design For Evaluation

Procedural design for evaluation of instructional media for vocational lathe machining techniques can be seen in Figure 8

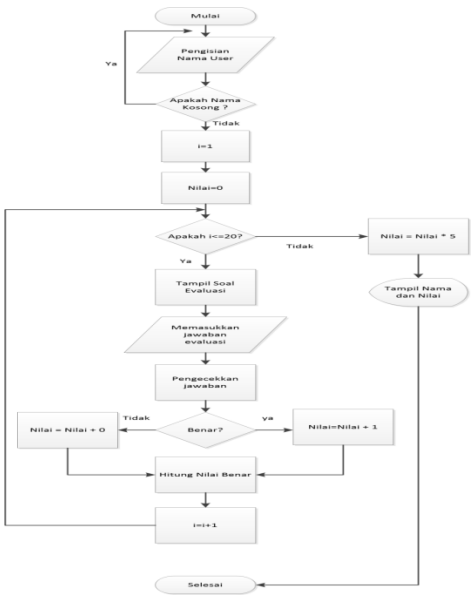


Figure 8 Flowchart For Evaluation

2.13 Implementation

Implementation of the system is a translation stage design based on the results of the analysis into a particular programming language and application software that is built on a real environment. The goal is to confirm the implementation of the program which has been designed on the perpetrators of the system so that the user can provide input to the system developers. Implementation of this system will explain the hardware requirements and software is used.

2.13.1 Implementation Application

Media Applications Interactive Learning Lathe Machining technique consists of training and testing in the subject matter Lathe Machining Techniques. This application does not need to be installed, simply double-click on this application (executable). With conditions on the Windows operating system must be installed Adobe Flash Player 15 and Adobe Flash CS3 Learning Media in order for this application can be played. If Adobe Flash Player 15 and Adobe Flash CS3 has not been installed, then the Learning Media can not be executed because the file on this application .swf and .exe extension that will be able to walk with support for Adobe Flash Player 15 and Adobe Flash CS3.

2.14 System Test

This system test is the most important stages conducted to find flaws or errors in the software being tested. Testing intended to determine the software that is made already meet the appropriate criteria. Tests were carried out namely Black box testing and Beta Testing.

2.14.1 Black Box Testing

In the functional testing phase used is intended to test the new system is to use black box testing. Black box testing focuses on functional requirements of software consisting of test plans and test case results.

2.15 Beta Testing

Beta testing is testing conducted objectively. Beta testing is done by testing directly in the research conducted within SMK Prakarya Internasional Bandung aims to determine the extent to which the system is built to be an alternative medium of learning. Beta testing is done by giving questionnaires to 35 students of class XI SMK majoring in Mechanical Machining and interviews with Master Mechanical Machining,Mr.Toto Sukmanto M.Pd. Testing techniques used in this beta testing is a technique Likert scale.

For every single question on the questioner will get a different valuation point. The following table point assessment can be seen in Table 7.

Tabel 7 Point Assessment

Jawaban	Point Penilaian
Sangat Setuju	5
Setuju	4
Ragu-Ragu	3
Tidak Setuju	2
Sangat Tidak Sejutu	1

3 CLOSING

3.1 Conclusion

Based on the results of the implementation and testing that has been done, then the conclusion of the final project entitled "Development of Interactive Learning Media Lathe Machining Techniques For SMK" is as follows:

Based on the results of this application can be used as a medium of learning, and learning media can assist teachers in presenting the material by way of theory, simulation and evaluation. Interactive learning media applications lathe machining techniques that have been built can help students before conducting the practice in the workshop.

3.2 Suggestion

In the construction of Using Simulation Learning Media is certainly still far from perfect and still has shortcomings. Therefore, it is necessary to do further development and refinement in order to meet the needs of the users are increasing. The suggestions for the development of instructional media, namely:

1. Looks to 3D (three-dimensional) to make it look more real and more attract students.
2. On the evaluation is built into the network so that the teacher is easy to see the value of the final evaluation.

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