

PALLET PART GRADING TRAINER

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A computerized pallet grading training system was developed to facilitate the production of higher quality pallets. Higher quality pallets would be more durable and could be re-used many times, resulting in long-term savings. Schmoltdt et al. (1993) evaluated the economic impact of grading and sorting pallet parts. They determined that higher quality pallets produced by grading and sorting pallet parts would be attractive to both manufacturers and their clients. Consequently, a computerized pallet part grading training system was developed to enable manufacturers to train employees to accurately grade pallet parts.

The computerized training system was developed using Microsoft's Visual Basic programming language. Visual Basic is an object-oriented programming language, as opposed to the more traditional procedural programming languages, such as FORTRAN, COBOL, and Pascal. Microsoft refers to Visual Basic as an event-driven programming language, that has many elements of an object-oriented language such as Java. Visual Basic allows the programmer to work with objects that have properties and methods. The Visual Basic programming language facilitated the development of our Windows-based program, the Pallet Part Grading Training System.

PALLET PART GRADING TRAINING SYSTEM

Our primary goal was to develop a training system that would be user-friendly and provide valuable practice exercises for pallet part graders. A Windows-based system was selected for development because of the widespread use of the Windows operating system.

The training system consists of a **Pallet Part Grading Tutorial** and **Pallet Part Grading Exercises** (Figure 1). The **Pallet Part Grading Tutorial** explains the grading criteria, which are based on the Pallet Exchange Program guidelines developed by Wallin and Frost (1973) (Tables 1 and 2). The **Pallet Part Grading Tutorial** also describes and provides photographs of defects. The **Pallet Part Grading Exercises** provide a graphic depiction of boards with various types of defects and allow the user to grade the pallet part.

The **Pallet Part Grading Tutorial** provides detailed information and photographs of pallet part defects. The defects included are knots, splits, checks, cross grain, shake, wane, and decay (Figure 2). Defect description pages (Figures 3 and 4) are included as well as photographs (Figure 5).

The **Pallet Part Grading Exercises** allow practice grading of pallet parts. A group of pallet parts are available for grading (Figure 6). The individual pallet part is displayed, along with links for reviewing the grading criteria, a legend that describes the defects on the part, and an option box for the user to input his or her grade of the

part (Figure 7). Also, the user, using the mouse, can locate the cursor over a defect on the pallet part and the system will identify the type of defect (Figure 8). Once the user enters the part grade in the option box, the system will respond to the grade entered with “Correct. This part is Grade 2_BTR.” (Figure 9) or with “Incorrect Grade. Please Try Again.” (Figure 10).

Table 1. Abbreviated list of grading criteria employed for stringers from PEP Study Report.^a

Defect	Description	2&BTR		
Sound knots ^b	Maximum portion of cross section affected	1/4 of cross section	1/3 of cross section	1/2 of cross section
Location of knots ^b	Over notch or in end 6 in. of the stringer	1/2-in. max. diameter	1/4 of cross section	1/3 of cross section
Unsound knots ^b /holes	Knot holes, unsound or loose knots, and holes	1/8 of cross section	1/6 of cross section	1/4 of cross section
Cross grain	Slope of general cross grain Max. dimension of local cross grain	1 in. in 10 in. 1/4 cross section	1 in. in 8 in. 1/3 cross section	1 in. in 6 in. 1/2 cross section
Splits, checks, and shake	Max. length singly or in combination Defects 3 in. or less are ignored	1/4 of length of part	1/2 of length of part	3/4 of length of part
Wane	Max. portion of cross section Portion of nail face width	1/16 of cross section 3/16 of face	1/8 of cross section 1/4 of face	3/16 of cross section 5/16 of face

^a Wallin and Frost 1973.

^b Clusters of knots-knots over 1/2 inch in diameter spaced 3 inches or less apart are measured as one defect and treated as sound or unsound knots.

Table 2. Abbreviated list of grading criteria employed for deckboards from PEP Study Report.^a

Defect	Description	2&BTR	3	4
Sound knots ^b	Maximum dimension across width of the board	1/4 of board width	1/3 of board width	1/2 of board width
Location of knots ^b	Knots in the edges and end 3 in. of the boards	1/2-in. diameter	1/4 of board width	1/3 of board width
Unsound knots ^b /holes	Knot holes, unsound or loose knots, and holes	1/8 of board width	1/6 of board width	1/4 of board width
Cross grain	Slope of general cross grain Max. dimension of local cross grain	1 in. in 10 in. 1/4 board width	1 in. in 8 in. 1/3 board width	1 in. in 6 in. 1/2 board width
Splits, checks, and shake	Max. length singly or in combination Defects 3 in. or less are ignored	1/4 of board length	1/2 of board length	3/4 of board length
Wane	Max. portion of cross section affected at point of deepest penetration	1/16 of cross section	1/8 of cross section	3/16 of cross section

^a Wallin and Frost 1973.

^b Clusters of knots-knots over 1/2 inch in diameter spaced 3 inches or less apart are measured as one defect and treated as sound or unsound knots.

The pallet part grading system allows a user to practice grading pallet parts, while providing easy access to the grading criteria and descriptions and photographs of defects. The system can be utilized to train operators as a part of a company's effort to grade and sort parts to manufacture high quality pallets.

REFERENCES

Schmoldt, D.L. , J.A. McLeod and PA. Araman. 1993. Economics of grading and sorting pallet parts. *Forest Products Journal* 43(11/12)19-23.

Wallin, W.B. and R.E. Frost. 1973. Government Industry Task Force Report/National Pallet Exchange Program. Part 10. Hardwood, Softwood, Plywood Use Grades and Utilization Factors. USDA Forestry Sci. Lab., Princeton, WV. 1,200 pp.

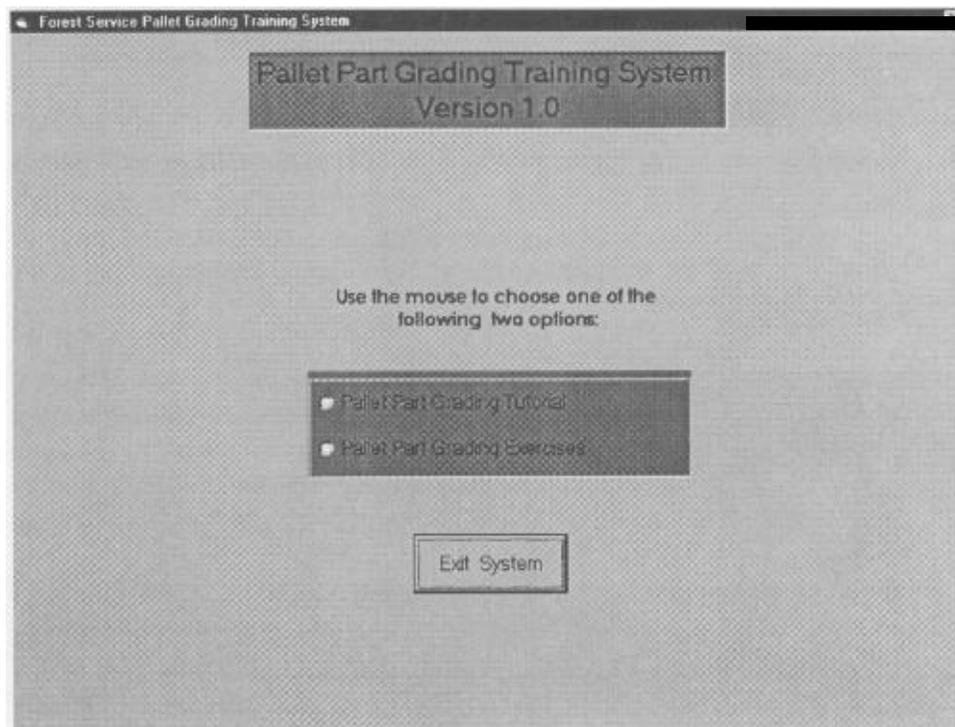


Figure 1. Pallet part grading system introduction screen.

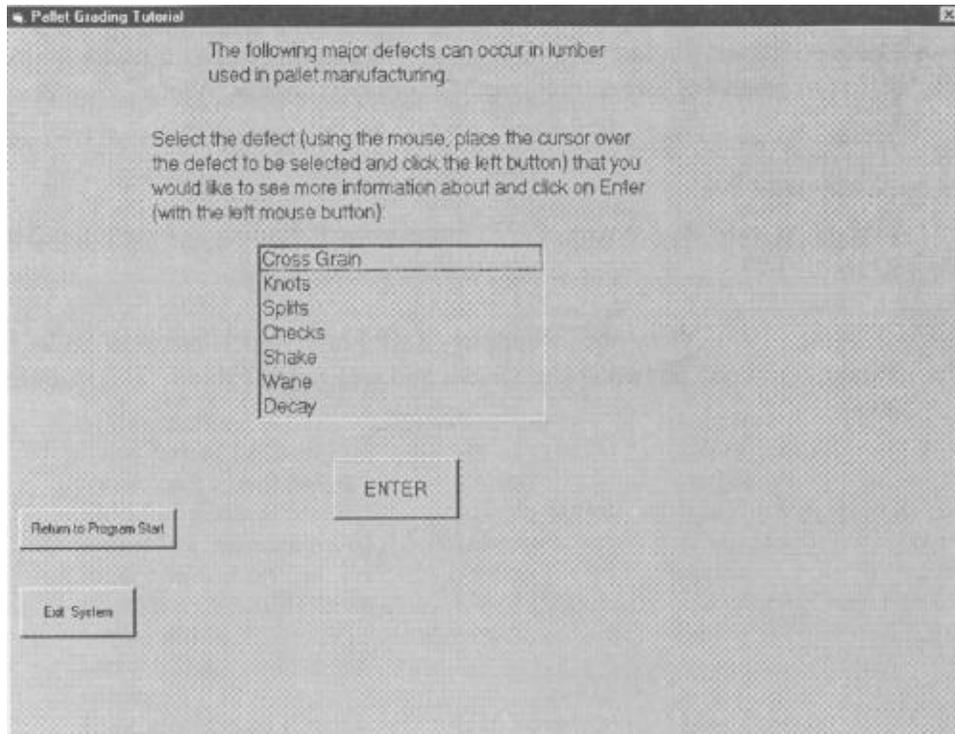


Figure 2. Introduction screen for Pallet Part Grading Tutorial.

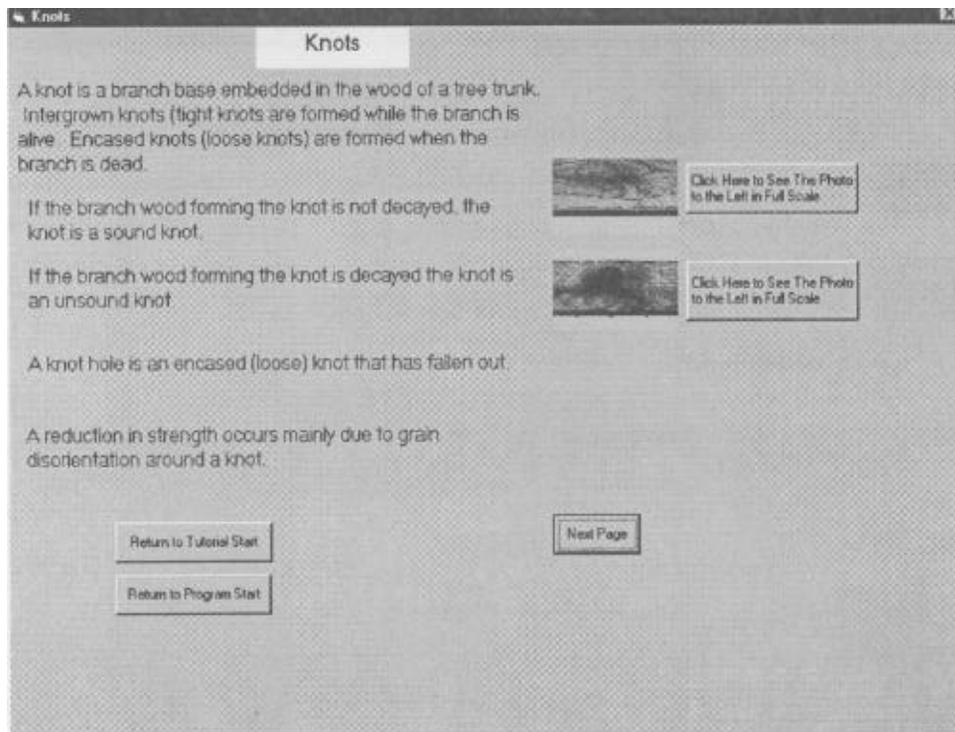


Figure 3. Pallet Part Grading Tutorial System description of grading criteria for knots.

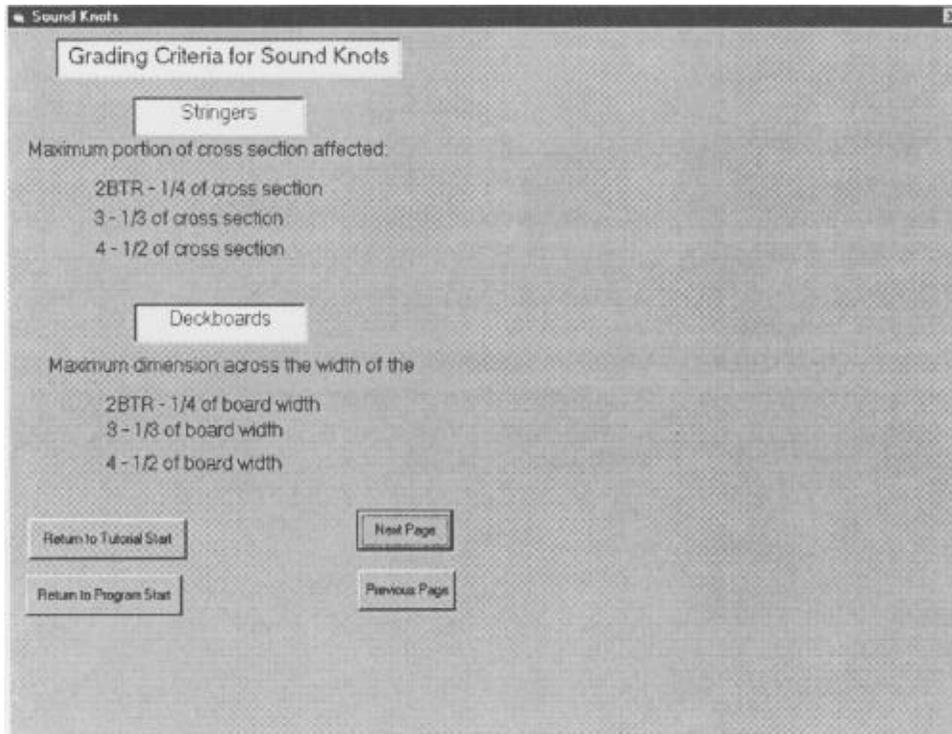


Figure 4. Second page of knot defect description.

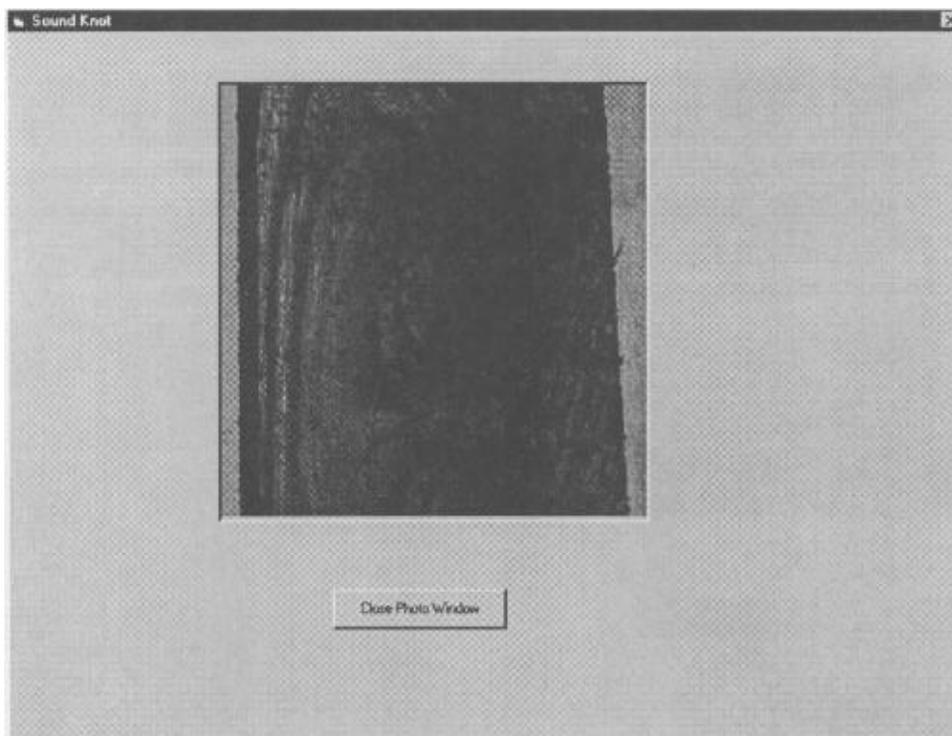


Figure 5. Photo of knot defect.

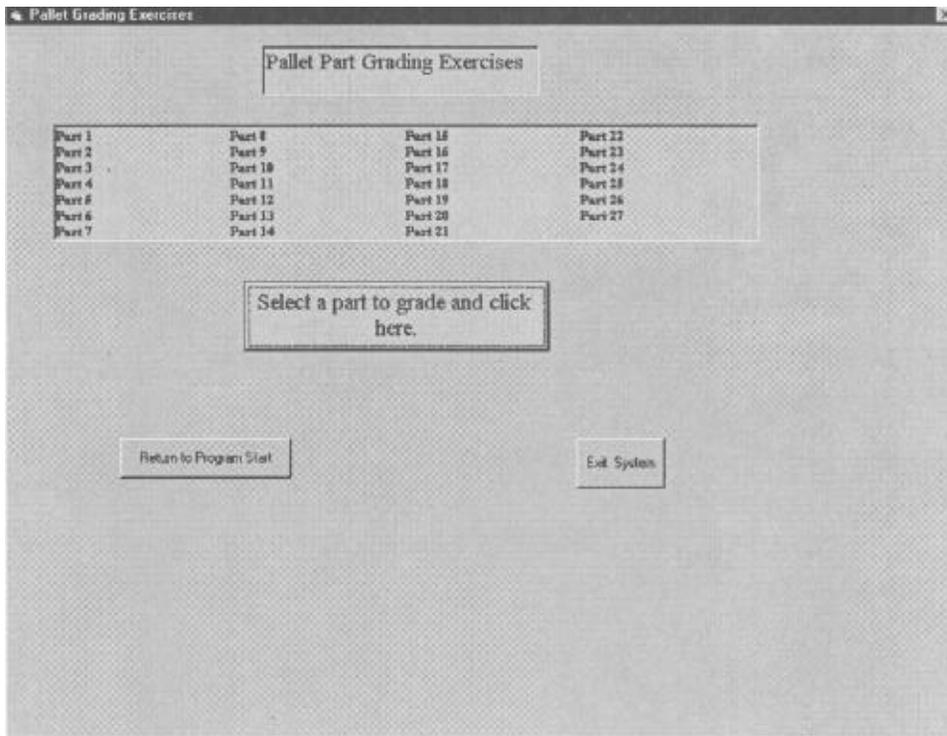


Figure 6. Pallet Part Grading introduction page.

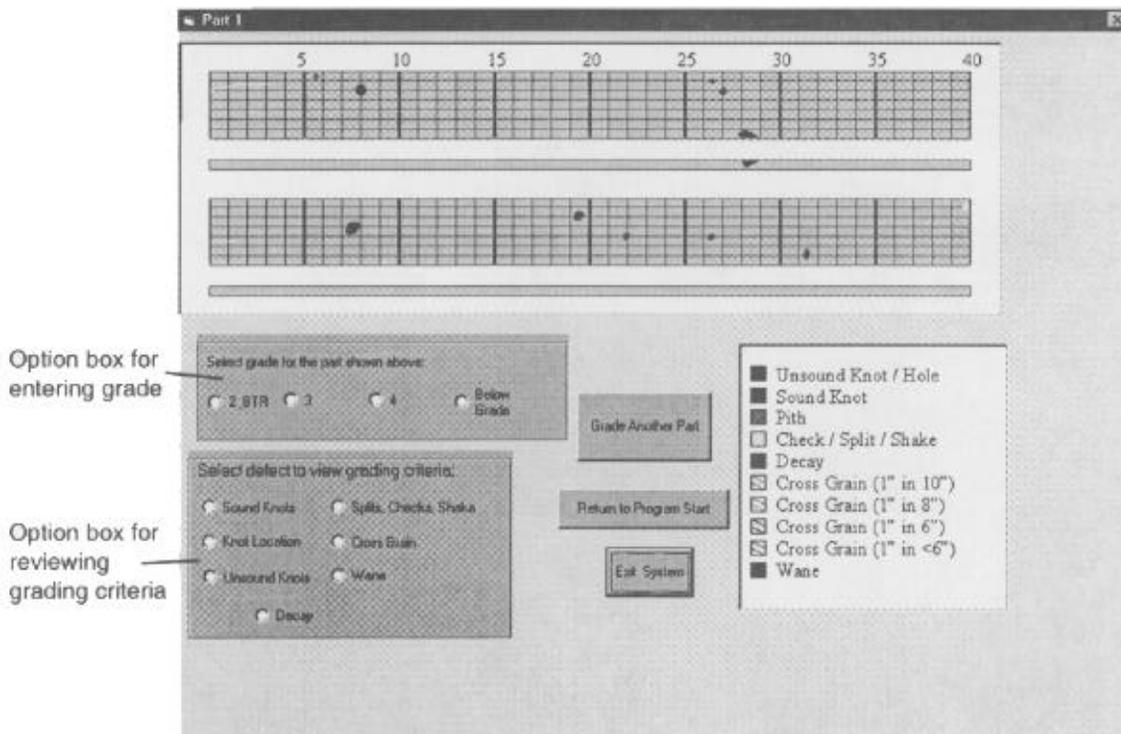


Figure 7. Pallet part grading exercise for Board 1.

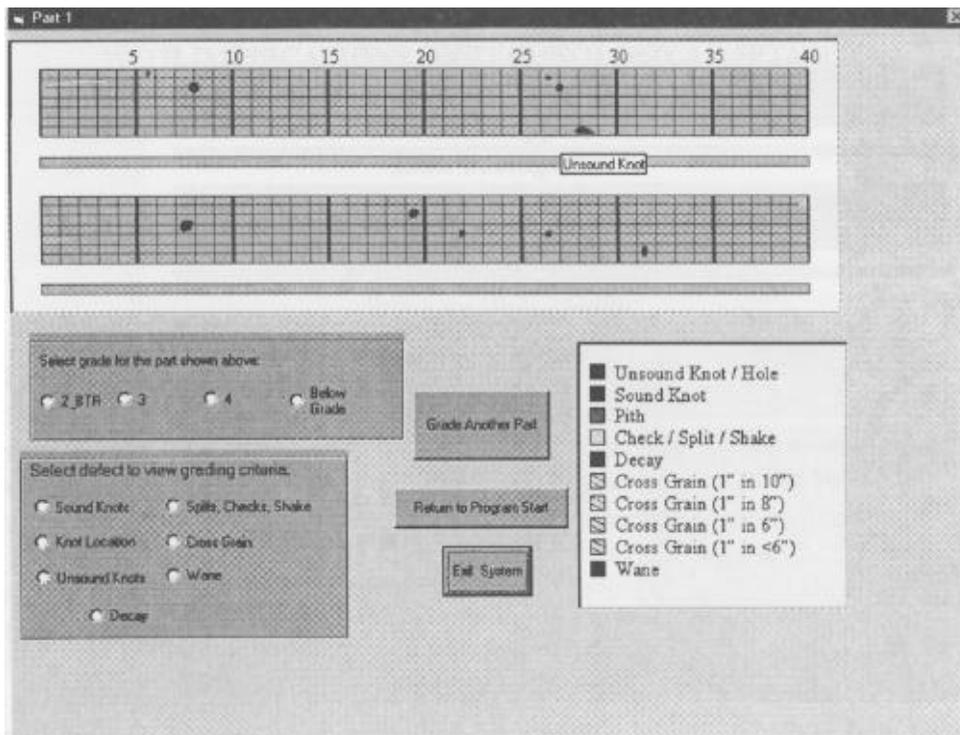


Figure 8. Defect identification on pallet part.

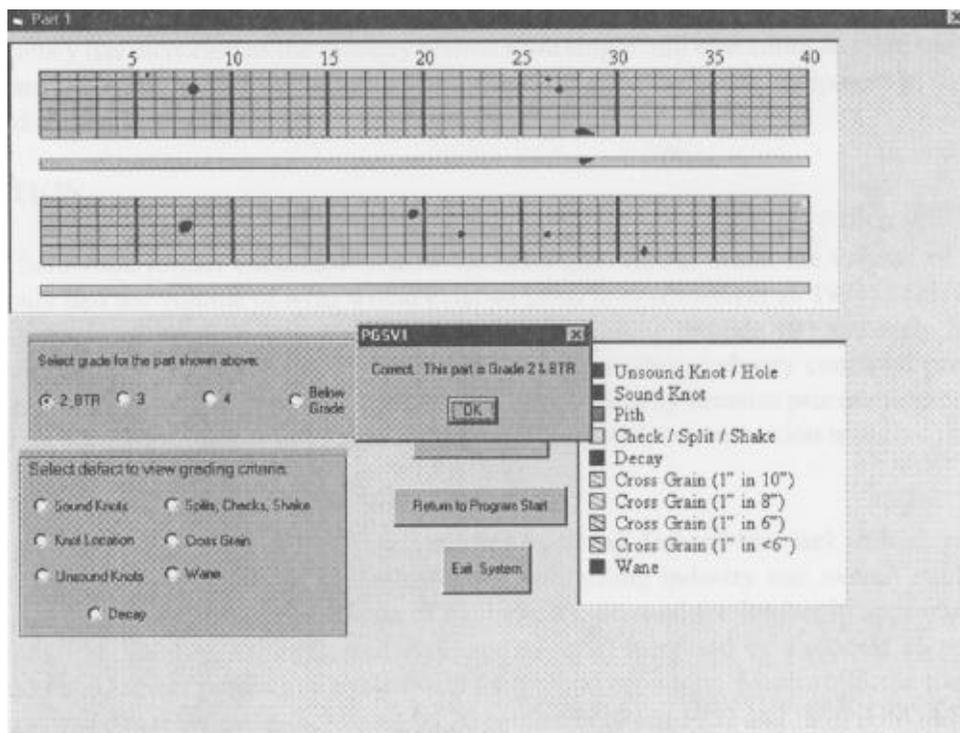


Figure 9. Grading page for Part 1 after user has selected the correct grade of 2_BTR in the option box.

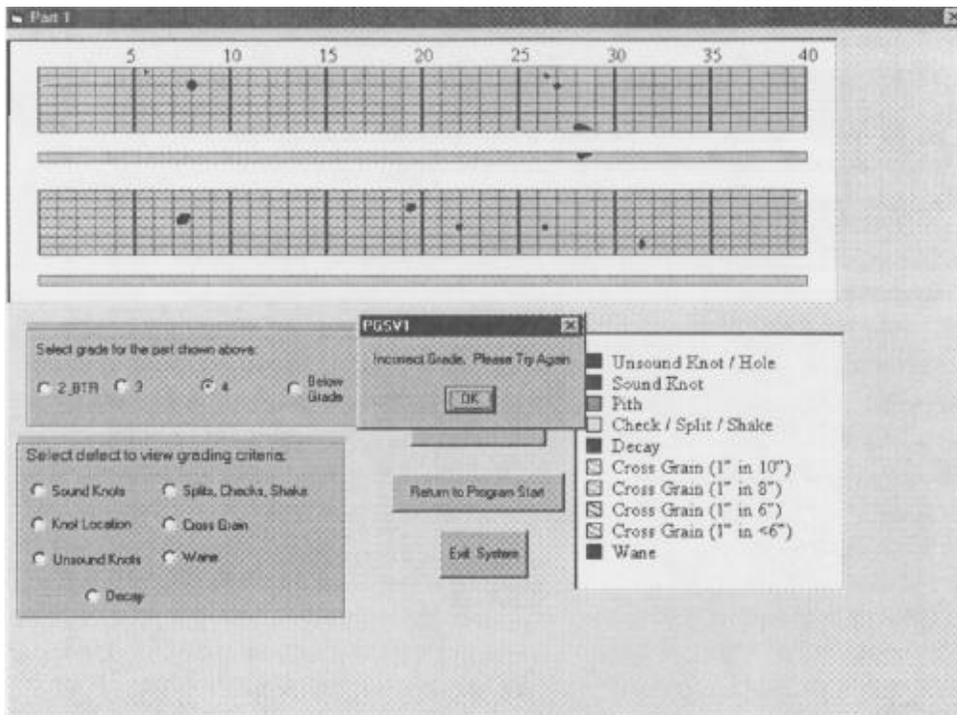


Figure 10. Grading page for Part 1 after user has selected the incorrect grade of 4 in the option box.

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