

ABSTRACT OF THESIS

THE NEED FOR PATTERN-MAKING APPRENTICES
IN THE MILWAUKEE, WISCONSIN, AREA

submitted by

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In partial fulfillment of the requirements
for the Degree of Master of Education
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the purpose of finding out why there was an insufficient number of pattern-making apprentices in the local area. The initial effort of this investigation resulted in the more formal statement of the problem, which follows:

What is the need for pattern-making apprentices in the Milwaukee, Wisconsin area?

The problem analysis developed the following minor questions:

1. What is the present status of the pattern maker in the Milwaukee area?
 - (a). How many journeymen pattern makers have been employed in this area each year during the past five years?
 - (b). What are the ages of present journeymen employed at the trade?
 - (c). What are the job limitations which cause drop-outs in the trade?
2. How many apprentices have been indentured each year and how many have completed their indenture in this area during the past five years?
3. What factors should be considered in determining how many apprentices should be in training each year in the Milwaukee area?
4. What industrial changes, now developing, may affect the future of pattern making, and, therefore, the training program of apprentices?

A review of literature revealed several studies

which dealt with the need for journeymen and apprentices in certain industries. None of these studies has indicated any method that could be used in any direct way to determine how many pattern-making apprentices should be in training. Thus, it was necessary to secure original data direct from the industry, in order to answer the major problem.

The pattern-making industry is divided into two divisions according to types of shops: the corporation shops and the job shops. Each type of shop produces pattern equipment; the first, making patterns primarily for use within its own plant, and the second producing pattern equipment for concerns which do not have pattern-making facilities of their own.

Methods and materials

By going directly to the operators of two types of pattern shops, a survey was made of the trade for the purpose of collecting original data which would assist in solving the problem. Particular sources of data were 22 job pattern shops, five corporation shops, the records of the Industrial Commission and the records of the Pattern Maker's Association in Milwaukee.

The device used for collecting original data was a questionnaire. Tentative questions for the survey were formulated at the time of the problem analysis. After further study and revision, the device was submitted to colleagues in the West Allis School of Vocational and

Adult Education, for suggestions and criticism. After minor changes were made, the questionnaire was duplicated for survey use.

The questionnaire was personally submitted to the 36 job shop operators in this area. The purpose of the survey was explained to the operators and questions about some of the statements were answered. Since the corporation shops were closed on Saturdays, making it impossible to distribute the questionnaire personally, it was necessary to contact the 15 corporation shops through the mail. Follow-up letters were sent to those operators from whom replies had not been received. Finally replies were received from 22 out of the 36 job shops contacted and from five of the 15 corporation shops. This gave a return of 61 per cent from the job shops and 33 per cent from the corporation shops. In order to give a clear picture of how much of the industry is included in this study, it can be stated that a complete coverage of the trade was attempted but only a partial survey was obtained. Sufficient returns were received from both types of shops, however, so that the data used as evidence can be considered authentic and sufficiently valid to represent a fair cross-section of the trade.

Findings

The present status of the journeymen: The pattern-making industry had 565 pattern makers in Wisconsin as reported by the 1940 Census. The survey included

a total of 324 journeymen employed in 27 shops located in the Milwaukee area. The employment of wood pattern makers in the job shops increased by 28 men during the years from 1941 to 1945. Some of the additional employees in the job shops probably transferred from the corporation shops where a decrease of 15 men was reported. The other men, included in this increase, probably were migratory workers who took employment in the job shops in this area. As stated before, the number of journeymen in the corporation shops decreased by 15 wood pattern makers during the five-year period. There is no evidence at hand to indicate what became of these men. The number of metal pattern makers in the job shops never exceeded 11 men, while the corporation shops never employed more than 18 of such men during this time.

The distribution of present ages of the journeymen employed in pattern making compares closely with the national average of all workers, as reported by the 1940 Census. The slight differences in the comparable age groupings were insignificant, in-so-far as they affect the apprentice training program. Only a small number of men over 65 years of age were still employed in the corporation shops. (who will probably leave the trade very shortly.)

In order to estimate the number of apprentices to be trained for replacement, some consideration should be given to the factors which, in addition to age, cause

men to terminate their employment. The industry generally accepts a five per cent annual loss of employees due to change of occupations, promotion, and superannuation. On the basis of 324 journeymen employed in the shops, included in this study, a loss of five per cent due to causes mentioned would eliminate approximately 16 men each year.

Since the period covered by this study included war years, drop-outs due to military service occurred most frequently, in both job and corporation shops. Transfer ranked second in frequency of occurrence in the job shops. Transfer in the job shops means a change of employment from one shop to another. Since incompetence ranked third, it is assumed that transfers due to incompetence probably caused men to move from shop to shop. Unemployment as a cause for drop-outs did not create any significant difficulty, since there was sufficient work for those who desired employment.

Apprentices indentured in pattern making over the five-year period

Pattern making is a highly skilled trade. The Pattern Maker's Association recognizes five years as the length of time an apprentice should serve at the trade. Data showing the number of apprentices indentured were collected from 22 job shops, five corporation shops, the records of the Industrial Commission, and from the records of the Pattern Maker's Association. All the

sources mentioned provided comparable data, except that of the Pattern Maker's Association, whose figures, it is believed, included data outside of the Milwaukee area.

There were 30 apprentices indentured in the job shops during the period from 1941 to 1945, and eight apprentices who completed their training during the same period. The corporation shops indentured 83 apprentices and graduated six during 1941-1945. The records of the Industrial Commission list 96 indentures and 44 completions for the same period. These records included the whole industry in the Milwaukee area, thus they may be somewhat higher than the figures derived from the survey.

The data compiled from the records of the Industrial Commission revealed that one of every three pattern-making apprentices indentured canceled his contract.

There were not enough apprentices in training in the job shops during 1941 to 1945 to insure sufficient trained journeymen for the trade. There were 19 apprentices indentured from 1942 to 1945 inclusive. Since approximately one of every three apprentices quit his indenture before completing his time, it appears that six were lost to the trade due to drop-outs. This would leave 13 active trainees in 22 job shops. The union allows one apprentice for every shop; therefore, 22 apprentices could be indentured according to this arrangement. Since there were only 13 active trainees,

an additional nine could have been indentured to supply one for every shop. The union regulations also allow one apprentice for every eight journeymen. With 143 journeymen employed in the job shops from 1941 to 1945, an application of the union ratio would allow another additional 18 apprentices to be trained. When these two factors are combined, a total of 27 additional apprentices could be trained. This total, however, is a misleading estimate of the number that can be indentured. In the case where seven journeymen are employed in one shop, according to union regulations, only one apprentice for the shop can be employed and none additional for the journeymen. Similar situations throughout the industry would upset all calculations based on union ratio. Thus it can be seen that no definite figure can be established as representing the number of apprentices that can be trained in job shops.

The training program in the corporation shops presents a situation where there were 83 trainees employed for the period from 1942 to 1945, inclusive. After deducting the number who may be expected to drop out, 55 would remain in active training. The five corporation shops employed 181 journeymen, thus according to the one-to-eight ratio, 22 apprentices could be trained. By subtracting the number that could be indentured from the number already in training, it was found that the corp-

oration shops were training 23 more apprentices than the union ratio allowed. Thus it is evident that there were probably more than enough apprentices already in training in the corporation shops.

Military service was the most important cause for the interruption of the apprentice training throughout the industry. This is substantiated by the small number of trainees who were able to complete their indenture. A total of 14 apprentices were able to finish their indenture during the five-year period in the job and corporation shops. The Industrial Commission data showed that 26 pattern-making apprentices had their contracts temporarily suspended for military service. It is assumed that these veterans will again take up their training and serve the remainder of their indenture. It is also assumed that additional veterans will enter new agreements in order to take advantage of the benefits derived from the Public Law 346, the veterans "GI" bill of rights. With this influx of old and new indentures to the field of pattern making there will, in all probability, be sufficient apprentices in training to supply the needs of the trade.

Business trends as they affect the apprentice program: The volume of business in the job shops showed a steady increase during the years from 1941 to 1945. The increase was 38 per cent higher in 1945 than in 1941. The number of employees in these shops increased 23.3

per cent during this time; thus it appears that the job shops turned out more work with less men. The use of materials increased in proportion with the volume of business. The concensus of opinion of the operators was that the outlook for future prosperity of the business was very favorable. New demands coming out of the re-conversion program are expected to surpass the volume of work lost from government spending for defense purposes.

Implications

The problem of the present study had been to determine the need for pattern-making apprentices in the Milwaukee area. The findings of the survey showed the following answers to the problem.

1. Additional apprentices should be in training in the job shops to provide sufficient journeymen for the following needs,-

(a). To replace losses due to superannuation, promotion, change of occupation and other similar causes.

(b). To bring the training program up to the regulations set by the Pattern Maker's Association.

2. The corporation shops are evidently training more apprentices than they will need for their own replacements.

In view of all the variable factors involved and with limited data available, definite figures were diffi-

cult to establish as representing the present need for apprentices in the Milwaukee area.

To the operators, the trends in the industry point to several years of prosperous business activity. It is expected that new developments confronting the industry will be incorporated into and adjusted to shop practices, so that no unusual hardship will be experienced by the industry from this source.

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T H E S I S

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COLORADO AGRICULTURAL AND MECHANICAL COLLEGE

SEPTEMBER 1946

I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY ARNOLD JOHN DIETRICH ENTITLED THE NEED FOR PATTERN-MAKING APPRENTICES IN THE MILWAUKEE, WISCONSIN AREA

BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION

MAJORING IN TRADE AND INDUSTRIAL EDUCATION

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Chapter I
INTRODUCTION

The trend of business activity in the late '30s was a gradual recovery from the depression, with no unusual demands for skilled labor. The turn of events in Europe, however, soon shook the country out of its industrial complacency. The United States, anticipating the possibility of becoming involved in another world war began making preparations to face a great national emergency. In the Milwaukee, Wisconsin, area, as well as in the nation, the threat of war brought about the need for trained workers in all lines of industrial and economic activities. The pattern-making industry was one of the first to be affected by the shortage of skilled journeymen, because patterns were necessary before any of the other manufacturing processes could begin. The city of Milwaukee, together with West Allis, one of its suburbs, contains about 80 per cent of all the pattern shops in the state.

The pattern industry is divided into two kinds of shops: the job shop, which is an individual unit engaged in the manufacture of patterns and the corporation shop, which is a department of a concern maintained for

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the purpose of producing the patterns used within the company.

The Milwaukee area has over a million population and covers approximately 35 square miles. It is the seventh largest industrial center in the country and ranks among the first in the manufacture of heavy machinery.

A defense training program was started at the West Allis School of Vocational and Adult Education during the summer of 1940. This program, identified as Vocational Education for National Defense, offered courses designed to aid the war effort. Due to the great need for pattern makers in the local area, an intensified training program for this craft was organized in the West Allis school at this time. The first trainees to be enrolled were taken from the Works Progress Administration ranks, selected because of their previous background in pattern making and woodworking. Later, the United States Employment Service assigned unemployed persons to this training without regard to those previous experiences or qualifications of trainees which are considered essential to training in pattern making. In view of the type and the caliber of the trainees on the Vocational Education for Defense program and the subsequent placement record of those trained, it soon became apparent both to school and industry that pattern makers could not be adequately trained in an accelerated program. Attention then swung

toward the apprenticeship program, which, after all, was intended to be the established means for providing trained craftsmen.

This situation brought into focus the following points which prompted this study.

1. Had the apprenticeship program indentured a sufficient number of trainees during the previous years?

2. Was the pattern-making trade cognizant of its responsibility in the matter of training replacements?

3. How could the local school be of aid in overcoming the apparent deficiency?

This study itself has as its objective the solution of the following problem as it relates to the training of apprentices under the Wisconsin Apprenticeship Plan.

The problem

What is the need for pattern making apprentices in the Milwaukee area?

Analysis of the problem. - - Answers to the following minor questions have been sought in order to reach a final conclusion relative to the need for pattern making apprentices.

1. What is the present status of the pattern maker in the Milwaukee area?

(a). How many journeymen pattern makers have

been employed in this area each year during the past five years?

(b). What are the ages of present journeymen employed at the trade?

(c). What are the job limitations which cause drop-outs in the trade?

2. How many apprentices have been indentured each year, and how many have completed their indenture in this area during the past five years?

3. What factors should be considered in determining how many apprentices should be in training each year in the Milwaukee area?

4. What industrial changes now developing may affect the future of pattern making and, therefore, the training program of apprentices?

It is assumed, that if this study reveals a need for pattern-making apprentices, the schools in this area will cooperate with industry in a pre-apprenticeship training program so as to prepare a better type of pattern-making apprentice applicant.

Partial answers to some of the minor questions given above are to be found in the review of literature which follows in the succeeding chapter.

Chapter II

REVIEW OF LITERATURE

An examination of the literature has failed to show any study of training needs for pattern making, even for a single industrial area. Nor has it indicated any methods that could be used in any direct way to determine how many pattern-making apprentices should be in training. Various reports have, however, considered training needs in connection with other trades, or of apprentice training in general. These were reviewed.

Relative to the need for training apprentices, Land (4), in 1931, in his study, Trade Associations, Their Services to Education, made recommendations centered around the responsibilities and activities of the National Trade Association of Heating and Piping Contractors, for whom he conducted the survey reported in his study.

He established an average ratio of apprentices employed in six principal building trades as 17.5 per 1,000 journeymen. New men needed in 12 building trades as replacements due to death, retirement, and increase in population required an average of 31.3 men for each 1,000 population. Land found that 22.6 per cent of the

apprentices dropped out of the program. His study substantiated the need for increased apprenticeship activities in order to supply the needs of the craft.

Maeder (5), in his study, Plumbing Apprenticeship and its Relation to Itinerant Instruction in Thirteen Wisconsin Cities For the Years 1925 to 1930, compiled data whereby he was able to show, together with additional evidence from several census reports, the number of people who could be served by one plumber in the state of Wisconsin. He found that one plumber could take care of the needs of 660.5 people.

A survey blank perfected by the Wisconsin State Department for statistical purposes, with modifications, was adopted by Maeder in tabulating trade and population data collected through personal contacts and contacts made for him by other circuit teachers in other districts. Certain findings may be considered important to the present study.

1. The yearly mortality rate in the plumbing trade was 11.8 per 1,000 population.

2. The rate of population increase in West Allis was 60 per cent during the ten year period from 1920 to 1930.

3. There were 13 apprentices in plumbing being trained in West Allis in 1933. The complete finding for West Allis showed that the trade was already overmanned by 3.33 men in 1933. (5:61-2)

It is to be noticed that this study which dealt specifically with apprenticeship training under Wisconsin conditions has much to commend it as an approach

to training needs in trades other than plumbing. Yet it must be recognized that a trade like plumbing, closely associated with home construction and repair, and therefore sensitive to population changes, is on a different trade basis than is pattern making which has no direct relation to building industries.

It should also be noted that Maeder found the mortality rate of his trade but did not take into consideration losses to the trade due to other causes.

Frazier (1), in his study, Techniques for Measuring the Need for Vocational Education in a Community, in 1936, by means of a formal vocational survey, through the use of authentic published data, was able to establish a journeymen-population ratio for the basic building trades for the United States for any year.

The author started with the population trends for the United States, from which to predict his local demands. His method takes into consideration the losses due to death, retirement, and replacement. Replacements, such as immigrants and apprentices, entered into his calculations in order to determine the number of students required to fulfill the demand. The number of students who fail to complete their training must be added to the number of students required. Frazier concluded with a summary in which he set down the essentials of his technique.

1. Establish a journeyman-population ratio for the

United States.

- A. Predict the estimated population of the United States for the specific year.
 - B. Predict the total number of journeymen needed in each of the five basic building trades for that year.
 - C. Divide the total population by the total number of journeymen.
2. Predict the total number of journeymen needed in each of the five basic building trades in a given community for that year.
 - A. Predict the total estimated population of the given community for that year.
 - B. Divide the population of the community for the year under consideration by the journeymen-population ratio for that year for each trade.
 3. Predict the journeymen losses to each trade due to each of the following causes.
 - A. Death
 - B. Retirement
 - C. Transfer
 4. Predict the number of trained workers received from
 - A. Immigration
 - B. Apprentices
 5. Predict the training losses, during
 - A. School period
 - B. Apprenticeship period.

This study provides techniques which can be used to determine the number of employed journeymen for the past five years and also to make a prediction of the future requirements for replacement. Since it relates to the basic building trades only, the proposed techniques would require considerable modification when applied to the pattern-making trade.

Kimball (3), in his research study, Changes in the Occupational Pattern of New York State, made for the Educational Research Division of the New York

Educational Department, in 1937, undertook a comprehensive study which presented the picture as to occupational trends and their future relations to the program of education for the state of New York.

By means of a comparative analysis, for the same occupational group (manufacturing and mechanical industries), two sets of percentages were calculated. The first set gave the percentage of all gainfully-employed persons engaged in the manufacturing and mechanics industries in the United States. The second set gave the percentage increase (or decrease) of the same occupational group.

By comparing the percentage increases (or decreases) of the United States with the percentage increase (or decreases) of all gainfully-employed persons of the state of New York over the same period of time, the true significance of the occupational change under consideration was made evident.

He found that there was a consistent decline in late years (1930) of the proportion of gainfully-employed persons engaged in the manufacturing industries. These findings, which apply generally throughout the United States, substantiated the belief that the future of the pattern-making trade also will show a decline due to general occupational trends.

Kimball's conclusions might be summed up in his statement:

Strictly, from the point of view of an exact science, it is fruitless and vain to predict. There are too many factors which cannot be gauged scientifically to enable one to make hard and fast prophecies as to the future occupational set-up. (3:165)

Rossow (9), in his study, The Responsibilities of the Wisconsin Part-time School Relative to the Provision for Extension Education for Apprentices, submitted in 1938, found through a survey of local industries that management was becoming aware of the fact that a sufficient number of trained men would no longer be available to fill the demand. Rossow's findings showed that the need for skilled workmen was acute in Wisconsin in 1938.

Rossow made two surveys, one showing the distribution of apprentices among the various metal trades and the other showing the distribution of apprentices among the several building trades. Among other things, he found that there were 131 active apprentices from 13 metal trades attending the West Allis Vocational School. He also found that there were 387 apprentices employed in eight of the 46 West Allis industrial plants.

Rossow compiled lists giving the names of the metal-working plants in West Allis and those of metal-working concerns outside West Allis which seek apprentices from the West Allis Vocational School.

This study showed the need for extending the

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apprenticeship program and gave the distribution of apprentices. In 1938, there were five pattern-making apprentices (of whom three dropped out), attending the West Allis Vocational School.

Stead (10), in his study entitled Data for Forecasting Occupational Demand, in 1939, set up the mechanics by which demand may be forecast. These forecasts were made by the use of the following methods:

1. Indirectly, by canvassing the working population in order to find the demand in various occupations.
2. Directly, by compiling the records of employment and production agencies.

He concluded that an analysis of data of employment gathered directly would be more reliable in interpreting occupational demand than data gathered indirectly. Comparing the employment of occupations with similar employment of industries, a relationship between the two could be shown by indices or estimates.

This information can be obtained through actual survey or through data compiled by the United States Bureau of Labor Statistics, the United States Employment Service, or the Social Security Board. The author concluded that any forecast would require frequent revisions, under expert attention, and stated further that there was much needed research still to be done. Stead's study does not bear directly on any of the questions of the present study, but it gave sources for data and threw some light on the practical application of occupational

forecasts.

Hodgson (2) in his study, How Many Carpenter Apprentices Should Be in Training in the Lincoln, Illinois Area, submitted in 1941, found by means of a survey of the Lincoln, Illinois area that 30 additional carpenter apprentices should be indentured to fill the quota for the carpenter trade.

Data from which he drew conclusions were derived from Census reports on population, building permits from building inspectors of the various cities, number of carpenters and apprentices from Union records, interviews with contractors, and cost of construction from city records.

Hodgson made use of Frazier's formula for predicting future demands of journeymen carpenters and used these figures to check against local union ratios for determining the number of apprentices to be trained.

He found that building construction was on a marked increase and, therefore, required additional carpenters as well as apprentices. A recommendation was made relative to a central training school for the purpose of training apprentices.

This study showed an application of a formula to predict future needs of craftsmen, but, since it included population trends, it cannot be used in this study.

The review of literature revealed that occupational activity follows trends. In order to con-

jecture the future of any trade, it is necessary to make a thorough study of all the factors which gradually converge into trends. Due to the constantly changing aspects of industrial activity, it is necessary to make a survey in order to get firsthand, up-to-date information relative to pending industrial changes.

In regard to the number of journeymen required to man an industry, certain studies made use of a formula for predicting the number of journeymen needed.

None of the studies reviewed gave a direct answer to the problem of determining the need for apprentices. Some of the studies pointed to sources of information which were helpful in securing other data more applicable to the problem. New data secured are presented in a later chapter.

Chapter III

MATERIALS AND METHODS

The problem of determining the need for apprentices in the Milwaukee area assumed two divisions. One part involved the status of apprenticeship in job pattern shops, while the other part was concerned with the status of apprenticeship as found in corporation pattern shops. Both divisions of the industry were approached for assistance to secure data that would solve the major problem of this study.

Additional information was needed concerning current industrial changes, insofar as they would affect the future of pattern making. It was necessary to know how many journeymen had been employed in this area during the past five years. Data were required covering the present ages of journeymen and the reasons why pattern makers quit the trade. It was also necessary to know how many apprentices were in training.

Sources

The records of the Wisconsin Industrial Commission were a source for data concerning indentured pattern-making apprentices. The Pattern Maker's Association furnished information pertaining to its mem-

bership. The operators of job shops were sources of information relative to their own shops. 1/ The executives of corporation pattern shops were sources of information pertaining to their pattern departments. 2/

The library card catalogs and indices at the Milwaukee Public Library, the Denver, Colorado, Public Library, and the Colorado Agricultural and Mechanical College Library were sources of information. Back issues of trade magazines offered articles that were helpful in solving the problem.

All the previously mentioned sources are considered the most reliable sources available. Through cooperation of the individuals mentioned, data were provided which gave a good cross-section of the industry.

Method

In order to secure the required information, it was necessary to contact the operators of the industry. Personal visits were made to the job shops in the area, while the corporation shops were contacted through the mail. A questionnaire was used as a device for gathering information, and in the case of the job shops, it was delivered personally. This questionnaire contained 15 questions, set-up and tentatively approved at the

1/ See Appendix A

2/ See Appendix B

time the problem was undertaken. The 15 questions and statements were designed to cover the major elements of the industry and secure data that would apply to the sub-questions of the main problem. Information was required to show the status of the personnel of the trade; thus four questions were given to an investigation of matters pertaining to journeymen, while five inquiries sought to clarify the apprentice situation. The other six questions were intended to secure data about the various phases of the industry upon which the probable future of the trade could be predicted. The questionnaire was submitted to two teachers in the West Allis school who had had previous survey experiences. As a result of their suggestions and criticism, several minor changes were made, and the final form was then duplicated. 3/

In order to give a clear picture of how much of the industry is included in this study, it is necessary to state that a complete survey of the trade was attempted, but only a partial coverage was obtained. However, sufficient returns were received from both types of shops, so that the data used as evidence can be considered authentic and sufficiently valid to represent a fair cross-section of the trade. In conducting the survey, 36 job shops were visited for the purpose of dis-

3/ See Appendix C

tributing and explaining the questionnaire. An attempt was made to contact all job pattern shops. It was impossible to leave a questionnaire with four of them. On two occasions an attempt was made to contact the owner of one shop. Another operator flatly refused to cooperate in any kind of a survey. One shop had moved from the old address and the new address could not be located. The other shop was closed with a "For Sale" sign on the building. Returns were received from 22 job shop operators. The number of responses representing 55 per cent of the total number of job shops.

Out of a total of 21 shops, 15 corporation shops were contacted by mail. Of these, only five shops returned the questionnaire, giving a coverage of 23.8 per cent for this division of the industry. In addition to the contacts by mail, several personal interviews took place with executives of one of the corporation shops. The comment was made that the pattern industry needs better trained pattern makers in the years to come than it ever had in the years past. The coverage of 23.8 per cent of the corporation shops may seem inadequate to be considered representative of this division of the trade. Yet when the total number of men employed is considered, it was found that an average of 190.4 men were employed in the five shops included in this study. Three concerns, upon receipt of the questionnaire, replied with a letter stating their in-

ability to furnish accurate data of their pattern-making activities. While checking through the records of the Industrial Commission, the names of six concerns, not included in the original list of corporation shops, were found recorded as employing apprentices. It is assumed that these six concerns had pattern departments in which apprentices could be trained. These six shops were not contacted because the omission was not discovered in time to include them in the survey. The portion of the industry covered by this survey is shown in table 1.

Table 1. NUMBER AND STATUS OF COVERAGE OF PATTERN SHOPS IN THE MILWAUKEE AREA

	Job Shops	Corp. Shops
Total number of shops	40	21
Total number of shops contacted	36	15
Total number of returns	22	5
Per cent of coverage	55	23.8

The making of personal contacts with the various job shops and talking with the operators were advantageous to the writer as a teacher of woodworking subjects. In many instances, the operators contacted expressed themselves as very much in favor of the survey that was being made at this time. The difficulties experienced by the operators in securing trained help had left many of them disgruntled with the labor situation, and they stated that a survey of the trade might be a timely undertaking in order to clarify some of the

problems that confronted them. In most cases the owners were actively engaged in the manufacture of patterns or the supervision of such work. Only union labor was involved in these particular shops, with minor exceptions.

The method used in securing data relative to indentured apprentices was transcribing figures from the records of the Wisconsin Industrial Commission. One of the primary functions of the Commission is to supervise the training program of indentures in all types of trades. The Milwaukee office confines its activities to the city and its surrounding suburbs. A letter of inquiry addressed to the Commission, relative to the availability of data on indentures, brought the reply that any data on hand in their office would be accessible at any time. By segregating the section on pattern-making apprentices, data, as far back as 1936 and through the first six months of 1945, were transcribed as found on the Commission records.

Through the cooperation of the business agent of the Pattern Maker's Association, further data were obtained regarding the pattern-making situation. The Association's booklet, entitled "Laws of the Pattern Maker's League of North America," gave the journeymen-apprentice ratio used in computing the number of apprentices allowed for shops and journeymen.

One of the duties of the business agent of the Association is to compile a list giving the names and

addresses of all firms employing pattern makers operating within the jurisdiction of the association, and beyond that limit when decided advisable. He shall also compile a list giving names of all pattern makers and foremen employed in various shops, stating who are and who are not union men. It is evident, then, that data obtained from this source are both reliable and up-to-date.

Data obtained by the methods described are summarized, analyzed, and interpreted in the following chapter.

Chapter IV

FINDINGS

The preceding chapter dealt with the materials and methods used for collecting data. The present chapter will present for analysis and interpretation, the data gathered about the pattern-making industry and the personnel of the craft in the Milwaukee area.

Over 80 per cent of the pattern-making industry of the state is located in this area. Of a total of 61 pattern shops, 53 are located in the city proper and the other eight in the surrounding suburbs. The pattern-making industry carried on in these shops furnishes employment to 565 pattern makers, according to the United States Census report of 1940. Since 1940 the number has increased, as may be judged by figures included at a later point in the present study, the number in 1945 was probably in excess of 600 men.

Data taken from the returns of the survey included a total of 16 wood pattern shops in the Milwaukee area in 1941. This number had increased to 21 shops in 1945. There was only one metal shop in this area in 1941, included in the study, which continued to exist in 1945. Returns were received from two combination wood

and metal shops in the Milwaukee area. The data indicated that no additional shops of this type had opened in 1945. These data are presented in table 2.

Table 2. -- NUMBER AND KINDS OF JOB PATTERN SHOPS IN THE MILWAUKEE AREA, INCLUDED IN THIS STUDY.

	1941	1942	1943	1944	1945
Number of wood pattern shops - - - - -	16	16	19	20	21
Number of metal pattern shops - - - - -	1	1	1	1	1
Number of combination wood and metal pattern shops - - - - -	2	2	2	2	2

The present chapter seeks to present the result of a study of the pattern-making trade, first, in the job shops, and second, in the corporation shops.

Personnel in the job shops

A job pattern shop is defined as a form of independent unit organized to do business as a company engaged solely in the production of patterns. Such shops are scattered throughout the Milwaukee area, although most of them are located near the center of the manufacturing district. These shops secure their work by bidding on the pattern requirements of plants which sublet this part of their manufacturing process. Within the industry there are two types of pattern work, wood pattern making and metal pattern making. The shops devoted exclusively to the manufacture of wood patterns

greatly out-numbered the shops which do metal pattern making exclusively.

Pattern makers are classified in the trade as wood pattern makers and metal pattern makers. For the job shops, the relative distribution between these two phases of work, as shown in table 3, indicates that throughout the five-year period from 1941-1945 there were approximately 12 times as many wood pattern makers as metal pattern makers. While the former increased in number from 104 to 133 during this period, the second remained virtually stationary with 11 employees for the first four years and 10 employees for 1945. The total number of pattern makers employed in job shops was 115 in 1941 and 143 in 1945. The peak year was 1945 when 143 individuals were engaged in this trade. The yearly employment average during the five-year period was 131.

Table 3. -- JOURNEYMEN PATTERN MAKERS EMPLOYED IN JOB SHOPS IN THE MILWAUKEE AREA, INCLUDED IN THIS STUDY.

	1941	1942	1943	1944	1945
Number of wood pattern makers - - - - -	104	110	126	128	133
Number of metal pattern makers - - - - -	11	11	11	11	10
Total by years - - - - -	115	121	137	139	143
Average for 5-year period - - - - -					131

The age distribution for the 124 pattern makers employed by 19 job shops which reported in 1945 is quite

similar to the national average for all workers, as indicated by the 1940 United States Census. It was found that 69.3 per cent of the pattern makers were in the 18 to 45 age group, as compared with 66 per cent of all workers in the United States in that age group. In the job shops there was but one individual over 65 years of age, while approximately three out of every 10 were between 45 and 65 years of age. These data are given in table 4.

Table 4. -- DISTRIBUTION, BY AGE GROUPS, OF PATTERN-MAKING JOURNEYMEN IN JOB SHOPS INCLUDED IN THIS STUDY (1945), AS COMPARED WITH THE NATIONAL DISTRIBUTION FOR ALL WORKERS (1940)

Age range	1945 Survey Milwaukee area Job Shops		1940 ^{1/} Census National average of all workers	
	Number	Per cent	group per cent	group per cent
10-15				1.2
16-25	7	5.7		
26-30	16	12.9		
31-35	21	16.9		
36-40	15	12.1	69.3	66.0
41-45	27	21.7		
46-50	8	6.4		
51-55	16	12.9		
56-60	9	7.2	29.7	27.6
61-65	4	3.2		
65	1	.8	.8	5.1

Labor turn over in the job shops was considered a serious problem by seven of the operators. The other 11 shop operators, of the 17 which reported, had no

^{1/} Calculated from United States Census, 1940 (11:19)

labor troubles important enough to mention. Military service, as a reason for drop-outs, was reported more frequently than were other causes, with transfer, incompetence, and personal traits following in the order given. Yet, for the shops as a whole, there was a labor increase in the five-year period as was shown in table 3.

As shown later, the pattern makers in the corporation shops decreased in number during the same period; therefore, it may be assumed that the corporation shop workers moved over to the job shops. To show the status of the job shops, data were collected and are presented in table 5.

Table 5. -- CAUSES FOR DROP-OUTS IN JOB SHOPS FOR THE YEARS 1941-1945, ARRANGED IN ORDER OF FREQUENCY

Causes	Order of frequency
Military service - - - - -	1
Transfer - - - - -	2
Incompetence - - - - -	3
Personal traits - - - - -	4
Retirement - - - - -	5
Unemployment - - - - -	6
Death - - - - -	7

Unemployment, due to lack of work, was non-existent in the job shops during the years 1941-1945. Union rules discouraged all overtime work; so, in order to get out the patterns, every journeyman who desired work could find steady employment.

The apprentice training program in job shops during the years 1941-1945, presented a very unsatis-

factory situation. The call-to-arms played havoc with the regularly established training program. During the above-mentioned period a total of 30 individuals was indentured, and only eight were able to advance to journeyman standing. Over the five-year period, an average of only six apprentices per year was indentured, and an average of only 1.3 per year was able to finish training. These data are shown in table 6.

In 1941, 115 journeymen were working in these shops. This number increased steadily until 1945 when the total had reached 143. The average for the period was 131.1 per year. The increase in the number of journeymen was not caused by an influx of trainees who had just finished their indenture, but rather by a shift of journeymen within the trade. These data are presented in table 6.

Table 6. -- NUMBER OF APPRENTICES INDENTURED AND NUMBER WHO COMPLETED THEIR TRAINING IN PATTERN MAKING IN JOB SHOPS, INCLUDED IN THIS STUDY

	1941	1942	1943	1944	1945
Started indenture - - -	11	5	4	3	7
Completed indenture - -	0	1	4	0	3
Number of journeymen represented - - - - -	115	121	137	139	143

Many of the job shop operators expressed the opinion that an insufficient number of apprentices was being trained. In order to get the verbal expression of opinion on paper, the following question was included in

the questionnaire: "Do you think that the present number of apprentices in training will meet the future demands of the trade? Yes or No."

Responses were received from 20 job shop operators. Of this group, three were of the opinion that there were enough individuals in training, and the other 17 were of the opinion that more apprentices should be in training. These data substantiate verbal comments made by job shop operators in which a majority was in favor of training more apprentices.

In view of the majority opinion advocating an increase in the number of trainees, the following question was used as a check on the sincerity of the job shop operators to determine if they would cooperate in a training program: "If you could increase the number of apprentices in your shop, would you do so if suitable candidates were available? Yes or No."

Of the 19 answering this question, 11 answered yes and eight, no.

The answers to this question and the previous one indicate quite clearly that the job shop operators were fully aware of the fact that in order to get competent pattern makers it would be up to the industry to train them. The majority seem ready to indenture trainees if suitable individuals are available.

Personnel in the
corporation shops

The survey of the corporation shops revealed that previous to victory in Japan, most incorporated plants disregarded the 40-hour week and encouraged their employees to work overtime, if they cared to do so. Promptly after victory in Japan, the 40-hour week was re-established.

Journeyman pattern makers, employed in corporation pattern shops, work under conditions somewhat different from those which prevail in job shops. Since the pattern shop is a department of a concern, it is under the jurisdiction of the labor organization which has the bargaining rights of that particular plant. In some corporation shops, seniority of employment takes precedence over ability as a craftsman. Likewise, the wage scale in corporation shops may or may not conform to the prevailing wage scale paid union pattern makers. The corporations, which have pattern departments, can offer their employees many types of services, such as health and accident benefits, low-cost insurance rates, and cooperative loan and finance propositions. The general practice in the job shops is not to offer many of these services to employees. The benefits available to employees of corporation shops, together with reasonable tenure of employment, keep many pattern makers from terminating their employment.

Two plants have within their pattern departments, both wood and metal pattern-making divisions.

A total of 18 metal pattern makers was employed in these two plants.

There was a gradual decline in employment for wood pattern makers during the five-year period from 1941-1945. The corporation shops suffered a loss of 15 wood pattern makers during these years. The metal pattern-making division of the corporation shops had 16 employees in 1941 and maintained a steady force of 18 men for the other years of this period. An average of 190 men in both classifications was maintained during the five-year period by the shops which reported. These data are presented in table 7.

Table 7. -- NUMBER AND KINDS OF JOURNEYMEN PATTERN MAKERS EMPLOYED IN CORPORATION SHOPS IN THE MILWAUKEE AREA, INCLUDED IN THIS STUDY.

	1941	1942	1943	1944	1945
Wood pattern makers - - -	178	177	174	170	163
Metal pattern makers - - -	16	18	18	18	18
Total - - - - -	194	195	192	188	181
Average for the five years - - - - -					190

For the present survey further knowledge of the personnel of the trade was desired, such as whether the trade is made up of young or old workers. The survey revealed that 62.5 per cent of the pattern makers employed by the corporation shops included in this study were in the 18 to 45 age group. The Census reports for 1940 showed that 66 per cent of all workers in the United

States were in the 18 to 45 age group. By making the the same comparison for the 46 to 65 age group it was found that 31.4 per cent of the pattern makers employed in these shops were in this age group while only 27.6 per cent of all workers in the United States were in the 46 to 65 age group. Both of these comparisons indicate that the pattern makers employed in the corporation shops were older than the national average for all workers. In comparing the present ages of pattern making journeymen with the national average of all workers, it is to be pointed out that the group represented by the 1940 Census includes workers in all occupations, whereas the comparable group includes only workers who are highly skilled. The training of an apprentice mechanic requires four years and when the trade is mastered it is very likely that the trained individual will remain in the craft, thus supporting the supposition that pattern makers are older than the national average. The ages of present journeymen, as compared to Census reports showing the national average of all workers is shown in table 8.

Labor turnover, in the general sense, as it applied to corporation shops, was definitely no major problem, insofar as it affected the loss of employees in the pattern shops. Four out of five corporation shops concurred in the belief that drop-outs due to military service were the most frequent causes for employees

quitting their jobs. Incompetence, causing men to lose their jobs, was second in rank of frequency of occurrence. Death, likewise, ranked second, paralleling incompetence. Retirement was not a serious cause for drop-out during the years 1941-45. Since these years cover the war period, it was considered a patriotic obligation to work. Many skilled mechanics interrupted their retirement and returned to their trade because of the manpower shortage and also because the earnings were above average.

Table 8. -- COMPARING PRESENT AGES OF PATTERN MAKING JOURNEYMEN EMPLOYED IN CORPORATION SHOPS INCLUDED IN THIS STUDY WITH CENSUS STATISTICS OF 1940

Age range	1945 Survey Milwaukee area Corporation Shops		1940 Census National Average of all workers	
	Number	Per cent	group per cent	group per cent
10-15				1.2
16-25	4	21.4		
26-30	10	6.2		
31-35	19	11.7	62.5	66.0
36-40	35	21.7		
41-45	33	20.5		
46-50	23	14.2		
51-55	12	7.4		
56-60	7	4.3	31.4	27.6
61-65	9	5.5		
66	9	5.5	5.5	5.1

Transfer, in corporation shops, usually means a change of jobs to another department. Employees usually were transferred a number of times before their cases became a problem that warranted dismissal.

During the years 1941-1945, there were no causes for unemployment due to lack of work, and since this situation was so obvious, it was accepted by unanimous agreement by the shops which reported. These findings are based on answers received on a survey questionnaire and are summarized in table 9.

Table 9.-- CAUSES FOR DROP-OUTS IN CORPORATION SHOPS FOR THE YEARS 1941-45, IN ORDER OF FREQUENCY

Causes	Order of frequency
Military service - - - - -	1
Incompetence - - - - -	2
Death - - - - -	-2
Personal traits - - - - -	3
Retirement - - - - -	4
Transfer - - - - -	5
Unemployment - - - - -	6

The apprentice-training program in the corporation shops, as well as in the job shops dropped to a low lever during the years 1941-1945, probably due to the war effort. Practically all the indentured people were at the age where either enlistment or induction into the service was almost inevitable.

Entrance into the pattern-making trade is invariably through apprenticeship. This method of becoming a journeyman is the main avenue of entry to the trade as recognized by the Pattern Maker's Association, which is affiliated with the American Federation of Labor.

During the period covered by this survey, the corporation shops, included in this study, indentured 104 trainees as a group effort. These figures reduces to an average for the period under consideration, show an average of 20.8 trainees per year indentured by the corporation shops. The number of apprentices who completed their training dropped to the low total of six completions for the five-year period.

The number of journeymen employed in corporation shops was 194 employees in 1941, with a gradual decline distributed over the following years, ending with 181 men in 1945. Thus a loss of 13 men was incurred for the above period.

The decline in the number of journeymen employed in corporation shops during the five-year period and the low number of apprentices who were able to finish their contract, present a situation which might be viewed with some apprehension. Since the journeymen ranks can be replenished only by trainees who come up through an apprenticeship, there is a possibility that the shortage of skilled pattern makers may continue during the next few years. The interruption of training and dislocation of indentured trainees will, in all probability, leave its mark on the supply of available pattern makers in the immediate future. Data collected through the survey of the corporation shops are summarized in table 10.

Table 10. -- NUMBER OF APPRENTICES INDENTURED AND NUMBER WHO COMPLETED THEIR TRAINING IN PATTERN MAKING IN CORPORATION SHOPS INCLUDED IN THIS STUDY

	1941	1942	1943	1944	1945
Started indenture - - - -	21	22	22	16	23
Completed indenture - - -	5	1	0	0	0
Number of journeymen represented - - - - -	194	195	192	188	181

A difference of opinion, relative to the question of whether enough apprentices are in training, existed between the corporation shops and job shops. Four of the corporation shops stated that there were sufficient trainees indentured to meet replacement needs. This belief was based on the number of apprentices who were in training, plus a large number of individuals whose training agreement had been temporarily suspended while they were in service. The operators of four shops, knowing that they had entered into an agreement to train these men, feel that they will be training more individuals than established ratios would allow. However, three corporation shops agree with the general opinion held by operators of job shops; namely, that more trainees should be indentured.

The survey revealed that executives of three corporation shops expressed a willingness to increase the number of apprentices in their shops, provided suitable candidates were available. The executives of two of the corporation shops stated they would not in-

crease the number of apprentices in their shops.

Data compiled by the industrial
commission

All indentured apprenticeships in Wisconsin, whether they are found in job shops or in the corporation shops, are directly under the supervision of the Wisconsin Industrial Commission. The Commission has its office in Milwaukee and handles all the clerical work required to indenture a youth to an employer. The indenture contract specifies the duration of the indenture, the rate of wages with progressive increases to be paid the trainee, and includes a schedule of work to be covered during the training period. The records of this Commission, as pertains to apprentice indentures, are the most complete and authentic of any records available. The records for 1945 are incomplete since figures were posted for only the first six months. The records of the Industrial Commission, as of 1945, are a continuation of a detailed series of records kept by the former Secretary of the Milwaukee Metal Trade and Foundry Association, a man, now more than 80 years of age, who has devoted over 40 years of his life to the cause of apprenticeship in Wisconsin. Keeping statistical data was a hobby with him, and when the value and significance of his hobby was recognized by the Commission, it was made a part of the regular routine of office procedure.

The Industrial Commission data show that the number of new indentures has varied considerably from year to year. The data obtained from the Industrial Commission cover the whole Milwaukee area, whereas the survey covered only a portion of the industry. Thus, it follows that the data of the commission relative to pattern-making apprentices were somewhat in excess of data compiled from the survey. New indentures showed a gradual decline since 1943, dropping to 16 indentures in 1944 and to 12 for the first six months in 1945. It is very probable that the number of new indentures for 1945 will be considerably higher than the records of the first six months of the year would indicate. Drop-outs reached a high point in 1942 with a total loss of 28 indentures over the period from 1941 to 1945, in which case one out of every three indentured apprentices in pattern making cancelled his contract. Suspensions, apparently for military service, reached a peak in 1944 with a total of 43 trainees temporarily released during this same period. It is to be noted that 44 apprentices completed their indenture in pattern making from 1941 to 1945 or an average of 8.8 per year. These data are shown in table 11.

The Status of the pattern industry

As stated previously, the pattern-making industry is divided into two divisions according to types of shops, the corporation shop and the job shop.

It was impossible for the corporation pattern departments to segregate figures showing the volume of business done and amounts of material used. Job shops operating as independent units submitted data pertaining to their businesses.

Table 11. -- STATUS OF APPRENTICES INDENTURED IN PATTERN MAKING IN THE MILWAUKEE AREA, ACCORDING TO INDUSTRIAL COMMISSION RECORDS

	1941	1942	1943	1944	1945
Number started indenture	20	26	22	16	12
Total for 5 yr. period -	96				
Average for 5 yr. period	19.2				
Number drop-outs	2	11	8	4	3
Total for 5 yr. period -	28				
Average for 5 yr. period	5.6				
Number of suspensions	1	10	11	18	3
Total for 5 yr. period -	43				
Average for 5 yr. period	8.6				
Number completed indenture	19	4	8	4	9
Total for 5 yr. period -	44				
Average for 5 yr. period	8.8				

The job pattern-making shops under consideration, had more work than they could handle; in fact, some local work had to be produced elsewhere. The urgent need for patterns placed a strain on the job shops in their endeavor to produce the pattern equipment. In 1941 the volume amounted to \$265,200. This amount gradually increased to \$422,500 for the year 1945. This was an increase of \$157,300, or 38 per cent over the year 1941. These data are summarized in table 12.

Table 12. -- VOLUME OF JOB SHOP PATTERN BUSINESS
DURING 1941-1945, INCLUDED IN THIS STUDY

	1941	1942	1943	1944	1945
Volume	\$265,200	\$295,100	\$368,200	\$394,600	\$422,500

The amounts of material used by pattern makers in the construction of patterns offer an indication of the amount of work done. The lumber used in 1945 amounted to 86,370 board feet more than that used in 1941. This was the equivalent of four additional car-loads of lumber. The use of aluminum increased by 9,433 pounds, or more than double the amount used in 1941. The use of brass increased only slightly, while the use of steel increased by 2,000 pounds.

All the material used for making patterns were available only on high priority, but, since most of the patterns were for defense, they carried a sufficiently high rating. These data are shown in table 13.

Table 13. -- AMOUNTS OF MATERIAL USED BY JOB SHOPS
DURING 1941-1945, INCLUDED IN THIS STUDY

	1941	1942	1943	1944	1945
Lumber bd.ft	303,746	307,977	339,629	353,716	390,136
Aluminum lb.	7,789	9,214	12,390	14,117	17,222
Brass lb.	1,630	1,680	1,840	1,900	1,800
Steel lb.	2,000	2,000	3,000	4,000	4,000

The data presented in the present chapter on findings are discussed in the chapter that follows.

Chapter V

DISCUSSION

In the previous chapter data were presented as to the present status of the personnel of the pattern-making trade and the general situation of the industry. The data secured from the job shops were kept separate from those of the corporation shops, and those, in turn, from the records of the Industrial Commission. This was done, primarily, to make it possible to study each factor of the whole, as well as each one separately.

The present chapter seeks to determine, from the data so presented and from additional information secured from current literature, an answer as to whether sufficient pattern-making apprentices were in training during 1941 to 1945.

It would seem easy to determine the number of apprentices who should be in training in pattern making in any industrial area, such as that of Milwaukee. The application of the established ratio for determining the number of apprentices, as set up by the Pattern Maker's Association, would involve the use of simple arithmetic, in order to determine the number of apprentices required. In view of the other factors which must

be taken into consideration, it is necessary to analyze the data for all facts that would point to a solution of the problem.

Information regarding the Milwaukee area was presented in the previous chapter. The reason for the interest in this particular area is the fact that Milwaukee and its surrounding suburbs encompass all the pattern-making industry under consideration in this study

The personnel of the trade

In the discussion of this problem special emphasis is directed toward the personnel of the trade. Interest is particularly focused on the need for apprentices to supply the replacements for the future.

The first topic to be discussed is based on data pertaining to the number of journeymen employed in job shops during 1941 to 1945. The employment of wood pattern makers showed a steady increase for the years under consideration. The increase amounted to 28 journeymen out of a total of 115, an increase of 23.2 per cent. The question arises, Where did the job shops get these additional men? Upon examining the data for apprentices who completed their indentures, as shown in table 6 and table 10, it appeared that there were three apprentices who completed their training during the year 1944 to 1945; therefore, only a few additional pattern makers came from that source. The corporation shops lost 15 wood pattern makers during this same

period. Therefore, it is assumed that these men may have transferred their employment to the job shops. This is a logical assumption since it is generally known that the union wage scale paid by most job shops is higher than the wage scale paid to pattern makers employed in corporation shops. Data did not indicate where the job shops secured the other 13 men.

Pattern makers are a migratory type of workmen. During the early years of the war, the pattern shops in the east were taxed beyond their capacity with work for defense purposes. This was probably an inducement for pattern makers from the Milwaukee area to move eastward. As the war progressed, the demand for patterns shifted to the middle-west, thus creating a pronounced increase in volume of business for the Milwaukee shops. It is possible that some pattern makers, formerly employed in the local area, returned and resumed employment in Milwaukee.

The total employment of pattern makers, both wood and metal, in the corporation shops remained fairly steady, when compared to the average employment, for the five-year period. The corporation shops, however, lost 15 wood pattern makers in 1945, for some reason, and as stated previously, probably these men took up employment in job shops. Since the number of metal pattern makers in the area amounted to only 18 men, it is natural to assume that their services were in

steady demand and that their employment remained fairly constant.

The present ages of journeymen employed in pattern making must be taken into consideration, in relation to the training program of apprentices for replacements.

According to the age groupings of the labor statistics of the United States Census, a worker's span of years is divided into four stages. The first stops at 18 years; the second includes the years from 18 to 45; the third ranges from 45 to 65; and the fourth includes those years over 65.

The percentage of journeymen employed in job shops was higher than the percentage of workers in the same age brackets as shown by the national average of all workers, according to the United States Census. In the 18 to 45 age bracket, the percentage of pattern makers was 3.3 per cent higher than the national average. For the 46 to 65 age bracket the comparable data again showed that the percentage of job shop employees was somewhat higher than the percentage of the national average; in this instance by 2.1 per cent. The job shops that participated in this survey had only one employee over 65 years of age. Probably, due to keen competition within the industry, it is common practice to employ the most productive workers. Since all pattern making is on time and material basis, it follows that in a competitive

industry, it is very likely that pattern makers over 65 years of age do not find ready employment.

On the other hand, an analysis of the data regarding the present age of journeymen employed in corporation shops indicated that these workers were older than the national average for all workers. Of all journeymen employed in the corporation shops 62.5 per cent were in the 18 to 45 age bracket while this age bracket for all workers in the United States included 66 per cent. In the 46 to 65 age bracket the journeymen in the corporation shops included 31.4 per cent of all workers and the national average for this age bracket was composed of only 27.6 per cent.

These comparisons substantiate the assumption that pattern makers in corporation shops remain in their places of employment longer because of benefits other than mere steady employment. Perhaps the greatest motivating factors which cause men to keep their jobs are seniority and a reasonable assurance of employment. Job shops, due to the nature of their business, are usually not in a position to lay much emphasis on continued employment or seniority rights. These factors tended to keep men who were over 65 years of age employed. The corporation shops, which assisted in this study, showed nine employees over 65 on their pay rolls.

The above may be summarized briefly by stating that the percentage of job shop journeymen was approxi-

mately three per cent higher than the percentage of the national average of all workers, while the percentage of the corporation shop journeymen was approximately three per cent lower than the percentage of the national average in the 18 to 45 age bracket and approximately four per cent higher in the 46 to 65 age bracket.

Every period of employment has a beginning and an ending. Men start a job and quit the job. It is essential to know how many journeymen quit their jobs and the causes for quitting their employment. Terminating a job usually creates a new opening for a replacement. Therefore, in order to estimate how many apprentices ought to be trained for replacements, it is desirable to predict, rather accurately, how many men would be expected to leave their employment.

In this connection, according to a statement by Reid, President of the Detroit Pattern Works, it is estimated that five per cent of the pattern makers drop-out for causes such as promotion, new occupations, and superannuations.

For the years 1941 to 1945, drop-outs in pattern making in the Milwaukee area were primarily due to military service. This situation was true in both job shops and corporation shops. Since military service included those individuals between the ages of 18 and 38, it also included those individuals who were at an age considered desirable for apprentice training and re-

placement purposes. Consequently, employees lost from the trade due to military service naturally left openings but it also depleted the ranks of those who might have been candidates for replacement.

In the job shops the matter of terminating employment due to transfer was the second item which occurred most frequently. The term, transfer, as it is applied to job shops, implies a change of employment from one shop to another. In an incorporated concern this term usually means a change of jobs within the plant to another department.

In the job pattern shops, transfer of employment is usually negotiated through the business agent of the union. There are two probable causes for transfers, one in which the operator wishes to terminate the employment of an employee and the other where the employee wishes to quit the job. In either case, the business agent of the union recommends a new employment in another shop. From these statements, it may be assumed, since transfer ranked second, that security of employment does not rate very high in job shops.

Incompetence ranked third in frequency of occurrence. Since incompetence and transfer, as causes for drop-out, follow each other so closely, suspicion is aroused as to the likelihood of a connection between these two causes for drop-outs. It is not unreasonable to assume that incompetence could cause transfer of em-

ployment. Since incompetence also ranked second as a cause for drop-outs in the corporation shops, it leaves the inference that the industry cannot use semi-skilled pattern makers, and, furthermore, supports the contention by Reid (8), "The pattern making trade requires the highest mechanical skill."

Death as a cause for drop-out ranked seventh in frequency of occurrence in the job shop, and second with the corporation shops. Job shops hesitated to employ old pattern makers, therefore, it is only natural that drop-outs due to death is the least of their troubles. On the other hand, the number of old employees in the corporation shops ran higher than in job shops, so again it follows that loss of employees due to death reached a high point in the rating scale. It seems that drop-outs due to retirement and personal traits in both divisions of the industry hold a rank about midway between the high and low on the scale of frequency of occurrence. Drop-outs due to unemployment were practically non-existent, since there was more work to be done than the industry could handle.

Pattern making is a highly skilled trade. To be classed as a competent workman one must serve a regular apprenticeship at pattern making. The Pattern Maker's Association recognizes five years as the length of time an apprentice should serve at the trade. The Wisconsin Industrial Commission (13), on its form en-

titled Apprentice Indentures defines an apprentice as follows:

The term apprentice shall mean any person 16 years of age or over, who shall enter any contract of service, expressed or implied, whereby he is to receive from or through his employer, in consideration for his services in whole or in part, instruction in any trade, craft or business. (13:13)

The Federal Committee on Apprenticeship (12), adds the following hourly schedule to the above definition:

---the apprentice agreement provides for not less than 4,000 hours of reasonably continuous employment and for at least 144 hours per year of related supplementary instruction. (12:VI)

Status of apprentices

Data showing the number of apprentices indentured in the industry were collected from four sources. The returns from job shops presented figures representative of the number of shops that responded. In the same manner, the response from the corporation shops furnished data in keeping with the number of shops which returned the questionnaire. The records of the Industrial Commission furnished data inclusive of all indentures in pattern making in the Milwaukee area. The Pattern Maker's Association records of indentured apprentices were a fourth source, but due to the probability that these records included indentures outside of the Milwaukee area, it was difficult to compare them with data of the area under investigation.

The number of apprentices indentured can best be stated in terms of averages for the five-year period. Thus, the job shops included in this study showed an average of six apprentices indentured during 1941 to 45 as shown in table 6. For the same period the corporation shops listed an average of 20.8 indentures per year, table 10. The Industrial Commission records showed 19.2 indentures for the Milwaukee area for the same period of years as shown by table 11. Since the Commission records include all indentures, there seems to be a discrepancy, since the combined indentures of the job and corporation shops exceed by 7.6 apprentices the figures shown by the Industrial Commission. Part of this deviation can be accounted for by the fact that the records of the Commission were only posted for the first six months of 1945. The incomplete records for 1945 of the Industrial Commission do not, however, compensate for the total deviation, such as the figures showed. It is felt that the records of the apprentice division of the Industrial Commission bear a higher degree of accuracy than do the records of the industry, especially the records of the job shops, which it is presumed are largely based on the memory of the operators. Another approach to the problem of the apparent discrepancy lies in the assumption that the industry failed to deduct the indentures which were temporarily suspended for military service, still listing them as indentured

apprentices, while the Commission deducted all suspensions, thus showing a total of active apprentices. Furthermore, it is felt that as the records recede in years, the degree of accuracy of these records also recedes.

Business trends

Figures that bear any resemblance of being accurate cannot be obtained to show the volume of business of the pattern-making trade, for the past five years. Only the job shop portion of the trade is in a position to know how much business was done in the process of manufacturing patterns. The production of patterns was the sole activity of the job shops and because of this these shops knew definitely how much business was done each year. Corporation pattern shops, on the other hand, do not exist because of the volume of business they do, but rather for the service they render to the other departments of the whole organization. In most cases, corporation pattern departments cannot segregate their volume of business from that of the total volume of the concern. In response to the questionnaire several concerns replied with a letter stating their difficulty in supplying the data requested. The question relating to the volume of business done during the past five years had a rather inquisitive and personal approach to a situation which caused many of the operators to hesitate in participating in the survey. None of the

operators cared particularly to reveal their financial affairs to their competitors, as such matters are considered business secrets.

Twelve job shop operators supplied data showing the volume of business that was done during the years 1941 to 1945. The volume showed a steady increase from year to year, ending in 1945 with a total volume 38 per cent higher than in 1941, as shown by table 12. In view of the increase in volume of business, it is only natural to examine data showing the number of workers employed in the job shops, to see if the increase had been in proportion. It was found that the number of employees had increased by 24.4 per cent in 1945 over 1941, as shown by table 3. This left a margin of about 13.6 per cent, which would tend to indicate that the job shops were turning out more work with less men. This, in turn, lead to the assumption that the pattern business had every indication of having been profitable to the operators during the past five years. The job pattern shops, generally were busy, producing patterns, and when that is the case, they are usually prosperous. The fact that the job shops did 38 per cent more business with only 24.4 per cent more men leads to the belief that the employees were hurried and production was increased through greater effort on the part of the worker. It is also believed that the increased use of small portable machines tended to save labor and increased production.

Data showed that there were very few apprentices in training in the job shops, according to table 6, so practically all the employees must have been journeymen, which again supports a condition where high production was possible, because the journeymen did not lose much time in training apprentices.

The increased use of material was another indication of business prosperity. These data are shown in table 13. The use of lumber in 1945 increased 28.4 per cent over the amount used in 1941. The increased use of aluminum took a jump of 121 per cent in 1945 over 1941. The use of brass increased slightly during this period, while the use of steel showed an increase of 100 per cent for the same period. The increase in volume of business and the increased use of materials supported by the optimistic opinions of the operators about business generally, were a fair indication that business was good during this period.

Future trends

Relative to the future trends which the pattern business will take, there seems to be general agreement that business will maintain the present level for the next few years, at least. The present high volume was due almost entirely to government spending for war purposes, and now, since this source of business has stopped, many operators are of the opinion that the recon-

version demands for new consumer goods will keep the pattern shops busy for the immediate future. The trade seems to have a very optimistic outlook for the future with very little opinion to the contrary.

In line with this thought, data from the questionnaire were compiled for a statement of opinion. The question was as follows, "What do you think will be the future trends of the pattern making trade? better; worse; or present status?" Upon examination of the replies, it was evident that the operators of corporation shops are convinced that they face a brighter outlook of business prosperity than do the operators of job shops. At any rate, the concensus of opinion indicated that the industry has every reason to believe that business conditions will continue at its present level and in many cases will be even better.

Number of apprentices needed

The number of apprentices to be trained each year to supply the need is determined by a ratio of apprentices to journeymen. Ratios are established by labor organizations and vary for practically every trade. The ratio even varies within the same trade, depending upon which labor organization sets the ratio.

The ratio which is applicable to an estimated 70 per cent of the trade is the one set up by the Pattern Maker's Association, which allows one apprentice for the

shop and one for every eight journeymen.

Through a personal interview with the personnel manager of one of the local concerns, it was found that the Committee for Industrial Organization (C. I. O.) disregards the craft and recognizes only workers. Where this organization holds the bargaining rights for the plant, skilled mechanics may gain entrance to the pattern shops even if they have not come up to journeymen standing, via an apprenticeship. This organization sets a higher ratio of apprentices to journeymen, one to nine, based on the number of employees within the department.

In order to make an application of the American Federation of Labor ratio, in the case of the job shops, figures showing the average number of journeymen employed during the five-year period and the number of apprentices indentured during the past four years must be examined. It was found that an average of 131 journeymen per year was employed during 1941 to 1945, as shown by table 3. During the years 1942 to 1945 inclusive, 19 apprentices were indentured. The Industrial Commission records showed that one out of every three apprentices indentured dropped out; thus by applying the drop-out loss to the total number of indentures, a total of 12.7 apprentices would be in training. By applying the one-to-eight ratio to 131 journeymen, it was found that 16.3 apprentices could be employed along

with the above number of journeymen. This is purely a mathematical estimate, and in view of the other factors which must be taken into consideration, the above figures merely represent a trend. One other angle which enters into a consideration of number of apprentices to be indentured is the union regulation which allows one apprentice for a shop. Regardless of what other condition prevails, if each of the 22 shops that responded to the survey was to indenture one apprentice for the shop, 22 apprentices would be required to supply one apprentice for each shop. In terms of the one-to-eight ratio these 22 trainees would be enough apprentices to offset 176 journeymen. Since the 22 shops which reported showed an average of 131 men employed, there seem to be an indication that the job shop operators failed to assume their responsibility of training future skilled pattern makers. This contention is supported by a vote of the job shop operators in which 17 out of 20 were of the opinion that not enough apprentices were being trained. In view of all the variable factors that must be considered, and with the data available bearing on the situation in the area, it would be difficult to state the number of apprentices that should be trained.

The apprentice situation in the corporation pattern shops requires close examination in order to arrive at a solution of the problem which is based on the following minor question, "How many apprentices

should be in training each year to supply the needs in the Milwaukee area?" For the years 1942 to 1945, inclusive, the corporation shops showed a total of 83 apprentices indentured during that time. Applying the drop-out ratio of one to three, this would leave 55.3 active apprentices. The corporation shops showed an average employment for the five-year period of 190.4 journeymen per year. By applying the American Federation of Labor ratio of one to eight, the results indicated that the corporation shops were training 31.5 apprentices more than were necessary. These figures, again, merely represent calculations and are not presented as a true statement of fact. However, the figures do support the assumption that the corporation shops are performing their duty in the matter of training future craftsmen. The corporation executives, as well as the business agent of the American Federation of Labor union, are of the opinion that there are sufficient apprentices in training. This contention is further supported by the assumption that corporation pattern shops are in a better position to train apprentices than are the small, one-or two-man job shops.

In answer to the question of how many apprentices should be in training each year to supply the need in the Milwaukee area, it seems impossible for anyone to present data showing the exact number of apprentices that need to be trained each year to supply

the need. There are several factors involved which make it difficult to arrive at a number which would indicate the need for apprentices.

1. The pattern-making trade is a small part of the total metal working industry. The data covering various phases of the pattern trade are limited; therefore, conclusions based on these data, since it is small, run the risk of being distorted.

2. The job shops do business as individual units; they are immediately occupied in the problems of their production, and they are in competition with each other.

3. The job shops are in business to make money and not in the training business. The training of an apprentice involves an expenditure that exceeds the future benefits.

Therefore, the general statement expressed by corporation shop executives in regard to the program of training apprentices, "we train them and the job shops hire them," might sum up the situation generally. It is assumed that no one, even the most closely connected with the trade, can offer figures which are accurate to the actual status of the trade.

Summary

After a careful analysis of the data collected by this study the following deductions resulted:

1. The number of journeymen employed in the 27 shops included in this study totaled 324 men in 1945.

2. In the job shops 69.3 per cent of the journeymen were in the 18 to 45 age bracket and 29.7 per cent were in the 46 to 65 bracket. In the corporation shops 62.5 per cent of the journeymen were in the 18 to 45 bracket and 31.4 per cent were in the 46 to 65 age bracket. The national average for all workers was 66 per cent for the 18 to 45 age bracket and 27.6 per cent for the 46 to 65 bracket.

3. The principal causes for drop-outs in the trade ranked in descending order were, military service, incompetence, death, and transfer.

4. The number of apprentices in training each year were, 1941, 32; 1942, 27; 1943, 26; 1944, 19; 1945, 30.

5. Industrial changes have not created any unusual effects upon the trade. Work lost due to the development of new techniques and materials have been more than replaced by the need for patterns required by the reconversion program.

6. The number of apprentices needed for replacements cannot be established with any degree of certainty. It is probable that there are sufficient trainees indentured at this time to take care of the future needs. All apprentices, whose training was suspended for military service during the past five years,

will in all probability return to the place of their indenture and complete their training.

It is believed at this time (1946) that with the returning veterans seeking indentures in conjunction with the training benefits offered by the Veterans Bill of Rights, the quota for apprentices pattern makers is adequate, if not ample.

Chapter VI

SUMMARY

The major problem in this study is, What is the need for pattern making apprentices in the Milwaukee area?

Information was secured in partial answer to this problem through a review of literature relative to this particular field. Original data were obtained by going directly to the operators of pattern shops in the Milwaukee area. These data were collected through a survey in which a questionnaire form was used. A total of 22 job pattern shops, five corporation pattern shops, the Industrial Commission, and the Pattern Maker's Association in Milwaukee were surveyed through personal contacts and by questionnaire.

The data revealed that there were 565 pattern makers employed in this industry in Wisconsin, in 1940. Developments during the past five years lead to the belief that this number has shown some increase since 1940. There were 40 job shops and 21 corporation pattern shops in the Milwaukee area in 1945. This study includes 21 job shops. Of this number, 16 were in operation in 1941 and five opened during the period between 1941 to 1945.

The study revealed that most pattern shops did wood pattern making exclusively, and only two or three shops produced metal patterns. This is shown further by the fact that the survey included a total of 324 journeymen of whom only 28 were metal pattern makers.

The employees of the job shops showed a gradual increase in number during the five-year period. There were 115 wood and metal pattern makers employed in 1941, while in 1945 this number had increased to 143. This increase of 28 men, or 24.3 per cent, represents the portion of the trade covered by this study. Employment in the corporation shops, covered by this study, declined during the years from 1941 to 1945. In 1941, the data showed that 194 wood and metal pattern makers were employed, while in 1945 the number of employees had decreased to 181 men, or a loss of 7.1 per cent.

In the job shops 69.3 per cent of the journeymen were in the 18 to 45 age bracket and 29.7 per cent were in the 46 to 65 bracket. In the corporation shops 62.5 per cent of the journeymen were in the 18 to 45 bracket and 31.4 per cent were in the 46 to 65 age bracket. The national average for all workers was 66 per cent for the 18 to 45 age bracket and 27.6 per cent for the 46 to 65 bracket.

Labor drop-outs in the pattern making trade were caused primarily by; military service, incompetence, death, and transfer.

There were 30 apprentices indentured in job shops during the period from 1941 to 1945, and eight completed their training during the same year. The corporation shops indentured 104 apprentices and graduated six during the period from 1941 to 1945. Data compiled by the Industrial Commission revealed that one of every three pattern-making apprentices indentured terminated his contract prior to completion.

According to data secured from the survey, it appears that there was an insufficient number of apprentices in training in the job shops during 1941 to 1945. It is also shown by the data that there is no apparent need for additional apprentices in the corporation shops, included in this study. Both of these deductions are based on the application of the union ratio of one apprentice to every eight journeymen and the drop-out experiences of apprentices in which one of every three terminates his contract.

The years included in this survey were war years. Military service was the most important cause for the dislocation of the apprentice training program. This interruption of training is reflected by the small number of trainees who were able to complete their indenture. The corporation shops were able to train six while the job shops trained eight individuals, or a total of 14 who finished during the five-year period. Of the indentured apprentices 26 were suspended for military

service according to the records of the Industrial Commission. It is assumed that these veterans will resume their training under their indenture agreement. It is also assumed that additional veterans will enter new indentures supported by the benefits derived from public Law 346, the Veteran's Bill of Rights. With this influx of old and new indentures to the field of pattern making, there will probably be a sufficient number of apprentices in training to supply the need of the trade.

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APPENDIX A

LIST OF THE JOB PATTERN SHOPS IN THE MILWAUKEE AREA

Shops	Address
A. K. Pattern Works,	Milwaukee, Wis.
*Apex Pattern Works,	" "
Art Pattern Works, Inc.,	" "
*Badger Pattern Works,	" "
*Daehling, Paul W.,	West Allis, "
Deutsch, S. Pattern Works,	Milwaukee, "
*F. & W. Pattern Works,	" "
Feuerpfeil, H.C. & Sons,	" "
*C. & O. Pattern Works,	" "
*Gregerson Mfg. Co.	" "
*Hansen Pattern Shop,	" "
Hoye, F. Pattern Shop,	West Allis, "
Industrial Pattern Works,	Milwaukee, "
*Interstate Pattern Co.,	" "
*Jurack Chas. Co.,	" "
*Kilbourn Pattern Co.,	" "
*Koch Pattern Works,	" "
*Kohver Pattern Co.,	" "
*Kollmorgen Pattern Works,	" "
Kornburger, Aug.	" "
Layton Park Pattern Works,	" "
*Marvel Pattern Works,	Wauwatosa, "
*Midwest Pattern Co.,	Milwaukee, "
Modern Pattern Co.,	" "
National Pattern Works,	" "
Nelson Pattern Co.,	" "
Northside Pattern Works,	" "
*Peerless Pattern Corp.,	" "
Poppert, H. A.,	" "
*Production Pattern Co.,	" "
*Quality Pattern Shop,	" "
*Schneider, J. Pattern Works,	" "
*Schoop Pattern Works,	West Allis, "
Siebers & Raisch Pattern Works,	Milwaukee, "
*State Pattern Works,	" "
Wegner, Carl,	" "
*W. Milwaukee Pattern Works,	W. Milwaukee, "
*Wisconsin Pattern Works,	" "

* Shops included in Survey

APPENDIX B

LIST OF CORPORATION PATTERN SHOPS IN THE MILWAUKEE AREA

Shops	Address
*Allis-Chalmers Mfg. Co.,	West Allis, Wis.
*Harnishfeger Corp.,	Milwaukee, "
Nordberg Mfg. Co.,	" "
Lippmann Engineering Works,	" "
Vilter Mfg. Co.,	" "
*Filer & Stowell Co.,	" "
Falk Corp.,	" "
Sivyer Steel Casting Co.,	" "
*Maynard Electric Steel Casting Co.,	" "
International Harvester Co.,	" "
Ampco Metal Co.,	" "
*Chain Belt Co.,	" "
Cutler-Hammer Inc.,	" "
Delta Mfg. Co.,	" "
Wehr Steel Co.,	" "
Bucyrus-Erie Co.,	" "
C. M. & St. Paul P. R. R.,	" "
Heil Co.,	" "
Kearney & Trecker Co.,	West Allis, "
Geo. J. Meyer Mfg. Co.,	Cudahy, "
Smith Steel Foundry Co.,	Milwaukee, "

* Shops included in Survey

A THESIS PROBLEM

as partial requirement for a

MASTER'S DEGREE

in

Trade and industrial Education

undertaken by

A. J. Dietrich,-- Instructor of Woodworking
West Allis School of Vocational and Adult Education.

TITLE

The need for pattern-making apprentices in the Milwaukee area.

The attached questionnaire has been set up for the purpose of securing data from which evidence can be compiled in partial answer to the above question.

Your assistance in supplying the necessary data is greatly appreciated. Your contribution to this study will be kept in strict confidence.

If you are interested in knowing the results of this study, when completed, please check ().

INTERVIEW GUIDE--form "A"

Date _____

Concern No. _____

1. How many journeymen have been employed in your concern, for each of the past five years ?

	1941	1942	1943	1944	1945
in wood pattern-making	_____	_____	_____	_____	_____
in metal pattern-making	_____	_____	_____	_____	_____

2. Approximately how much of the following materials did you use during each of the past five years

	1941	1942	1943	1944	1945
lumber (bd ft)	_____	_____	_____	_____	_____
aluminium (lbs)	_____	_____	_____	_____	_____
brass (lbs)	_____	_____	_____	_____	_____
other materials { }	_____	_____	_____	_____	_____
{ }	_____	_____	_____	_____	_____
{ }	_____	_____	_____	_____	_____

3. What was the approximate volume of your pattern-making business during the past five years ?

	1941	1942	1943	1944	1945
Volume	_____	_____	_____	_____	_____

4. List the reasons for the increase or decrease in the total volume of business over the past five years.

Increase		Decrease	
a	_____	a	_____
b	_____	b	_____
c	_____	c	_____

5. To what extent have the following industrial processes affected the volume of your pattern-making business for the past five years ?

(use number code)		1941	1942	1943	1944	1945
STAGMS	:plastics	_____	_____	_____	_____	_____
0-- none	:welding	_____	_____	_____	_____	_____
1-- slightly noticeable	:die-casting	_____	_____	_____	_____	_____
2-- noticeable	:metal stamping ...	_____	_____	_____	_____	_____
3-- very noticeable	:metal spinning ...	_____	_____	_____	_____	_____
	:new metal cutting equipment	_____	_____	_____	_____	_____

6. What are the ages of present journeymen employed by you ?

Ages	18-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	over
No.	:	:	:	:	:	:	:	:	:	:

7. Arrange, according to frequency of occurrence, the following items, which caused men to quit your employment during the last five years.

(Use the numbers from 1 to 7, to indicate the scale of frequency)

- | | |
|------------------|----------------------|
| () death | { } personal traits |
| { } transfer | { } military service |
| { } retirement | { } unemployment |
| { } incompetence | |

8. Is labor turnover a serious problem in your shop ? Check Yes ___ No ___

9. Has your experience with the "Wisconsin Plan of Indentured Apprenticeship" been satisfactory ?

Comments:--

10. How many apprentices have been employed in your shop during the past five years?

	1941	1942	1943	1944	1945
No. started	_____	_____	_____	_____	_____
No. became journeymen	_____	_____	_____	_____	_____

g

11. Do you think that the present number of apprentices in training will meet the future demands of the trade? Check Yes ___ No ___

12. If you could increase the number of apprentices in your shop, would you do so if suitable candidates were available? Check Yes ___ No ___

13. What do you think will be the future trends of the pattern-making trade?
 Check:- better () present status () worse ()
 Comments :-

14. In your opinion, is there anything in the offing at this time, which will tend to increase the demand for pattern work?
 Comments:-

15. Place your evaluation on the following qualities of an apprentice applicant.

CIRCLE ONE

Age 14yrs--16yrs--18yrs--20yrs--over

Weight 130#-- 140#--150#--160#--170#--180#

Height 5'2"--5'4"--5'6"--5'8"--5'10"--6'0"

Education, grad. of 8th gr. 10th gr. 12th gr. 2yr college, 4yr college

Previous training, Work--trade sch. --military tr. vocational sch.

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