

MOTOR MANUFACTURING 101 - SHORT COURSE

While the basic process for assembling small motor stators has changed little over the past 30 years, increased international competition has driven manufacturers to seek significant process improvements in their facilities. Although many subtle improvements in assembly processes are ongoing (i.e. Lean Manufacturing), equipment modernization also needs to be implemented in order to achieve maximum product quality and minimize labor costs. In addition, drastic changes in motor control technology, coupled with the reduction in the cost of microprocessors, has given birth to an entire range of variable speed motors which were not available 10 to 15 years ago.

This paper will discuss the steps involved with assembling a stator for a small electric motor. It will also cover some of the recent advancements in technology implemented in many facilities that improved stator quality while minimizing labor, production and material costs.

STATOR CORE ASSEMBLY

Lamination Selection

Lamination stacking is either performed by hand selecting (by weight or height) or by automatic stack selection. Although automatic stack selection minimizes operator intervention with the core build process, most machines still require frequent operator attention. If the lamination process is inconsistent, automatic selection holds little benefit over hand selecting.

Manual stack selection still remains the most popular method, since an operator can easily compensate when selecting laminations with problems like adhering laminations from heavy burrs, oil or annealing oxidation. To assure stack height accuracy with manually selected laminations, motor manufacturers are using electronic gauges mounted to the core securing machine.

Welding

Welding is a popular and widespread method for securing stator cores. New welding machines offer flexibility and reliability since many have eliminated the need for hydraulic operation.

Despite recent advancements in machine design, welding has a number of drawbacks since a welding machine requires manual loading of the laminations and a high level of maintenance. This maintenance activity (including torch tip adjustments, the monitoring of argon and the sharpening of torch rods) usually requires the attention of a skilled operator or technician. This is an additional concern to the electric motor design since stator core loss could occur by welding across the laminations.

Cleating



This process "V" rolls and then flattens a strip of soft steel down a dovetail slot on the O.D. of the stator laminations. The cleating strip steel is low cost and the process is fast. Cleating machines are extremely flexible and require little setup. Unlike welding, cleating still leaves the stator with

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**United States. Federal Trade
Commission**



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Catalog Oklahoma State University,1937 **Industrial Education** ,1990 **Vocational-technical Training for Industrial Occupations** United States. Office of Education. Consulting Committee on Vocational-Technical Training,1944

Vocational Training for War Production Workers W. Daniel Musser,1946 *Vocational Division Bulletin* ,1942

Vocational Division Bulletin United States. Division of Vocational Education,1944 **Biofuels** Wim Soetaert,Erick J. Vandamme,2011-08-10 Biofuels Biofuels The use of biofuels is rapidly gaining momentum all over the world and can be expected to have an ever increasing impact on the energy and agricultural sector in particular Biofuels covers the use and conversion technologies of biomass as a renewable resource to produce bioenergy in a sustainable way mainly in the form of liquid and gaseous biofuels It gives a broad overview of biofuel developments from both a technical and an economical angle The different production technologies for biofuels that exist or are under development are extensively covered in depth dealing with both first generation as well as second generation technologies Market developments in the sector including trends on prices markets and growth are also discussed The link between the technical and economical developments are indicated throughout the text The interactions between the technical economical and ecological aspects are clearly expressed in this volume and are actually covered here for the first time in a single comprehensive volume This comprehensive text will prove useful for chemists biologists and engineers working in the emerging biofuels industry for researchers and academics interested in the field as well as for those active in conventional fuel companies The book is also relevant to people active in policy or financing either within the government industry or academia This volume offers an excellent source of useful information and allows reflection about the bio based economy in general Topics covered include Process Technologies for Bio ethanol Production Process Technologies for Biodiesel Production Bio based Fischer Tropsch Diesel Production Biomass Digestion to Methane Biological Hydrogen Production Feedstocks for Biorefineries Sustainability of Biofuels

Treatise on Process Metallurgy Alexander McLean,Roderick Guthrie,Sridhar Seetharaman,H. Y. Sohn,2024-08-23 Treatise on Process Metallurgy Volume Four Industrial Production provides academics with the fundamentals of the manufacturing of metallic materials from raw materials into finished parts or products In these fully updated volumes coverage is expanded into four volumes including Process Fundamentals encompassing process fundamentals structure and properties of matter thermodynamic aspects of process metallurgy and rate phenomena in process metallurgy Processing Phenomena encompassing interfacial phenomena in high temperature metallurgy metallurgical process phenomena and metallurgical process technology Metallurgical Processes encompassing mineral processing aqueous processing electrochemical material and energy processes and iron and steel technology non ferrous process principles and production technologies and more The work distills the combined academic experience from the principal editor and the multidisciplinary four member editorial board Provides the entire breadth of process metallurgy in a single work Includes in

depth knowledge in all key areas of process metallurgy Approaches the topic from an interdisciplinary perspective providing broad range coverage on topics *Bulletin of Michigan State College of Agriculture and Applied Science* Michigan State College,1941 **Resources in Vocational Education** ,1980 **Survey of Current Business** ,1964 Daily Consular and Trade Reports ,1926 **Annual Report of the Commissioner of Labor** United States. Bureau of Labor,1911

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