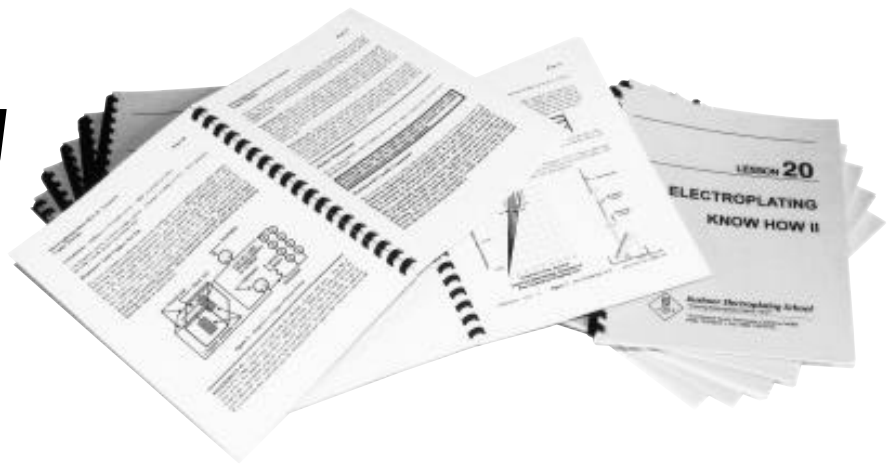


# Electroplating Know How II



## ***What is Electroplating Know How II?***

Electroplating Know How II is a unique, comprehensive home study training program in modern electroplating designed to improve and upgrade your skills. It is designed to improve results and increase efficiency in your plating shop.

## ***Who Can Profit From This Training?***

Anyone in the plating industry or anyone desiring to enter the plating industry will profit from Electroplating Know How II. A high school education is all that is needed to start the program (college graduates also use Electroplating Know How II). The course is presented in a clear, easy to understand manner allowing an individual to master a large amount of technical information in a short period of time. Electroplating Know How II takes you from the basics of plating through the advanced techniques quickly and easily. No matter what your previous training and background, you will gain remarkable insight into plating matters, be able to advance professionally, improve plating quality and reduce rejects and waste in your plating operations. The unsolicited comments of operators, foremen, supervisors, executives, chemists and engineers that are found inside this brochure are positive proof of this.

## ***What Does It Consist Of?***

This unique training program consists of over 1,200 pages of printed material and illustrations in 20 lessons. The lessons are revised and edited each time a new printing is required. Some of the books are pictured above. The volumes contain both the lectures and the text. *No other books are required.* The complete set of books constitute a *life-time* reference library in metal finishing for your use. At the end of each lesson is an examination paper which is returned to Dr. Kushner for grading and discussion. On the inside you will find a brief outline of Electroplating Know How II.

## ***What Is The History of Our Training Program?***

Dr. Joseph B. Kushner recognized in the late 1930's that there was a need for formal, organized training in the principles of electroplating. In 1947 Dr. Kushner was first able to convert this need into a written, well-organized,

home study program. This first home study training program (the first of its kind in the world) was known as **Electroplating Know How**. The entire program was completely rewritten in the late 1970's and was renamed **Electroplating Know How II**. Dr. Arthur Kushner, the founder's son, became the director of the Kushner Electroplating School in 1978. Dr. Kushner constantly revises and updates the written material as dictated by changes in technology and plating practices.

## ***How Long Will The Training Program Take To Complete?***

If you spend three to five hours each week on the training program you can easily complete it in nine months. You are given 15 months to complete the training program. Upon request, extensions beyond 15 months will be given.

## ***Will I Receive A Certificate?***

Upon the successful completion of the program, you will receive a certificate with the title *Metal Finishing Technician*.

## ***What Kind of Personal Instruction Will I Receive?***

When you enroll in Electroplating Know How II you are not handled in a routine manner. Your papers are always graded *personally* by Dr. Kushner. You get the benefit of Dr. Kushner's many years of industrial and teaching experience. Dr. Kushner is always available to advise you and help you with problems you may encounter as you study the course material.

## ***What Kind of Company Training Programs Are Available?***

Organizations wishing to train three or more individuals receive a 15% discount from the total tuition and registration fees. Periodic progress reports are sent to the training director or other designated individual. In addition custom designed training programs are available for individuals and groups. Please call, fax or e-mail for more information on these programs.

## What Students Say About Electroplating Know How II

### Quality Control Chemist

*"I find your course is one of the best things that has happened to me since entering the plating field."*

—J.B.

### Plating Engineer

*"I have enclosed my final examination paper. I can truthfully say that your course is the best training program I have ever taken. Your course is both interesting and practical. Now I can really enjoy electroplating."*

—G.G.

### General Foreman

*"I have seven employees that have completed your Electroplating Know How II course. The training has been very beneficial and has greatly increased the employees' technical knowledge of their jobs. The employees feel that their own time spent to complete the training was well spent."*

—D.A.B.

### Plater

*"I'm thoroughly enjoyed your course. The wealth of knowledge contained in its pages is phenomenal. The further I go in Electroplating Know How II, the more I realize that plating is much more than just an art."*

—K.M.

### Job Shop Owner

*"I should have started long ago with Electroplating Know How II. After reading your first lesson I now realize I am just learning. All of the other books I have read add up to a total zero compared to the first lesson of your course."*

—F.B.

### Sales Engineer

*"I have thoroughly enjoyed the written material. It is a unique approach. There are many appropriate examples which complement the technical material. I appreciate your sense of humor ... It takes the pain out of studying!"*

—T.N.M.

### Plating Chemist

*"I am impressed by the way the material is written so that it is understandable. I feel that I have been able to grasp concepts I could not understand when studying during my college career. I feel this is mostly due to your presentation and the practical analogies you use."*

—W.M.

### Plater

*"I have received a \$375-a-month increase in salary since I started taking your course. I can take on the jobs in the shop with the aid of my books with no problem at all."*

—C.M.S.

# COURSE OUTLINE

**1 The Basic Principles of Plating (1).** How to study Electroplating Know How II. Energy in all its manifestations. Electrical energy and electroplating. Simple electrical and chemical principles. Faraday's Law. The arithmetic of plating. Some simple experiments in plating. What happens in a plating bath. Atoms, ions and electricity. The glue that holds matter together. Electrolytic conduction. This lesson and the one that follows are the keystones of the course. It gives you a new view of the subject, actually teaching you to THINK plating. Presented in a stimulating, thought provoking way, it enables an individual to grasp basic scientific principles quickly and easily without benefit of advanced technical training.

**2 The Basic Principles of Plating (2).** Resistance and conductivity of plating baths. Acidity and pH. Immersion plating, current density, current efficiency, over-voltage, throwing power and metal distribution, covering power, microthrowing power. How the plate is built. Controlling deposit grain size. General techniques of electroplating. Formulation of plating baths. Automatic plating machines. Special plating techniques. General procedures of plating.

**3 Polishing and Buffing.** This is not a cookbook compilation of methods for plating various metals, though it does contain a series of copyrighted charts that greatly simplify the work of the polishing department. Rather, it teaches the principles behind polishing so that the student can actually work out his own polishing techniques and short cuts. It leads to a better understanding between those proverbial enemies, the polisher and the plater! Also covered are mechanical and automatic methods for polishing and buffing and surface roughness measurements.

**4 Cleaning and Pickling.** Complete instructions in the degreasing, cleaning and pickling and bright dipping of all the common metals before and after plating. Step-by-step directions in the preparation of cleaning, pickling and bright dipping solutions. Again the principles are artfully mixed with the practice so that an individual learns the WHY as well as the HOW of cleaning and pickling. Every modern development is covered including ultrasonic cleaning.

**5 Plating Bath Control (Chemical and Physical).** There are over 75 pages on this one subject alone. You learn the elements of control chemistry in an easy way. You learn the fundamentals underlying all control methods old and new so that you can really understand and operate them. You learn what makes a plating bath tick. A truly remarkable lesson worth the tuition fee by itself!

**6 The Plating Baths (1).** This lesson deals *practically* and comprehensively with **Copper**, **Cadmium** and **Chromium** plating. Trivalent **Chromium** plating is included. How to prepare, mix and operate the various solutions on a small or large scale. How to care for the baths and control them. How to troubleshoot and analyze them. Presented with this highly practical material are more advanced principles which the student gathers as he/she studies the lesson material. *Case histories* along with practical examples help the student.

**7 The Plating Baths (2).** The same practical and comprehensive detail on **Gold**, **Indium** and **Iron** plating. Preparation, mixing and operation. Control and troubleshooting. *Case histories*.

**8 The Plating Baths (3).** More of the same on **Lead**, **Nickel** and the **Platinum Metals**.

**9 The Plating Baths (4).** **Silver**, **Tin** and **Zinc** plating. All the information the student needs and more! Mixing, operation, control, troubleshooting. *Case histories!*

**10 The Alloy Plating Baths (1).** A lesson dealing with the practical aspects of **Brass**, **Bronze** and **Gold Alloy** plating. Mixing, operation and control. Troubleshooting. Anticipating and preventing trouble. *Case histories*. Theoretical considerations are painlessly included! You learn a lot.

**11 The Alloy Plating Baths (2).** **Lead-Tin**, **Nickel-Tin**, **Zinc-Tin** and other alloy plating baths. A continuation of the same practical material. *Case histories*, new ideas!

# COURSE OUTLINE

**12 Chemical Finishes, Chromating, Phosphating, Metal Coloring, Lacquering, Electropainting.** Here the student becomes acquainted with the fundamentals behind these too often neglected but vitally important metal finishing operations. Modern formulations and ideas will be found here and solutions to problems in stopping off and coloring are worked out by the student. Practical applications.

**13 Electroless Plating, Vacuum and Vapor Plating, Plating on Non-Conductors.** The fundamentals of electroless plating, practical operating formulations for nickel, copper, silver, etc. Control and maintenance. Vacuum plating principles. Vapor plating techniques. The section on plating on non-conductors gives the student a truly comprehensive background in this field of operation. The principles, the techniques of plating on plastics, circuit boards and other non-conductors such as baby shoes. All are explained in a crystal clear way along with practical production methods that may be followed.

**14 Testing of Plated Deposits, Specifications, Quality Control of Plating Operations.** Here the student learns about plate quality, the principles and methods used for testing thickness, ductility, hardness, residual stress and other basic properties of the metal deposit. This naturally tied in with specification plating, how it is performed and how and where government and industry specifications are obtained. Finally the student learns about quality control as applied to plating operations. An important and invaluable lesson.

**15 Anodic Processes. Corrosion, Anodizing, Electro-Polishing, Electrochemical Grinding & Machining, Chemical Milling, Chemical Polishing.** An outstanding and important lesson. The student learns the elements of corrosion processes, then studies in great detail the practical aspects of aluminum anodizing. Formulation, operation and troubleshooting of anodizing baths. Hard anodizing. Dyeing and sealing treatments. Case histories. Electropolishing formulations are given in practical detail. Other anodic processes such as electrochemical grinding and machining are also studied along with chemical polishing and milling. A wealth of information here!

**16 Special Plating Techniques (1).** This extremely interesting lesson gives the fundamentals on new and unusual plating techniques such as tribo plating, brush plating, foam plating, gel plating, layer plating, magnetic field plating, composite plating, peen plating, non-aqueous plating, molten salt plating, pattern plating, pulse plating, spray plating and applications of radiation plating. A literal gold mine of plating ideas!

**17 Special Plating Techniques (2): Plating of Difficult Metals, Electroforming.** The first section deals with methods and techniques (practical) for plating difficult metals such as aluminum and stainless steel to name just a few. The second part deals comprehensively with a process that is widely used: **Electroforming**. The student obtains the details and practical aspects for mastery of this skill along with theoretical ideas that will help him improve it.

**18 Special Plating Techniques (3): Electronic Circuit Board Plating, Magnetic Alloy Plating, Electric Flow Plating.** For the student who wishes to specialize in electronics plating and other exotic forms of metal finishing, this lesson is chock full of valuable information of a practical nature. The many references listed are invaluable sources for the student who wishes to concentrate on this field of metal finishing.

**19 Engineering Aspects of Electroplating.** A truly important lesson which gives the student a good knowledge of the engineering that goes into metal finishing. Plating room energy supply, plating tanks, heating and cooling of tanks. Filtration, piping ventilation. The plating plant floor. Equipment layout and space planning. **Plating Plant Safety, Water And Waste Treatment.** The systems engineering approach to plating.

**20 Business Aspects of Metal Finishing.** This remarkable lesson deals with the problems of human relationships in the plating room. It inspires an individual to work better with co-workers, teaches how to be a better plating executive or foreman. The plater learns to appreciate the whys and wherefores of plating plant operation. The individual learns to think "creatively" about improving efficiency and cutting costs in the plating plant. This lesson also deals with the art of estimating in bidding, value engineering, OSHA and EPA requirements.

## Meet The Founder

The late Dr. Joseph B. Kushner held a Ch.E. from Cooper Union Institute of Technology and a Ph.D. in Metallurgical Engineering from Lehigh University. He was known for his pioneering work in the areas of gold plating, dragout and rinsing, stress in electrodeposited metals and plating education. He worked industrially as a plater and electrochemist, and served as a senior electrochemical engineer on the Manhattan Project during World War II. He was the author of a number of chapters in various electroplating handbooks and the classic book, *Water and Waste Control for the Plating Shop* (now in its third edition). Dr. Kushner was the author of the first professional home study course in metal finishing, *Electroplating Know How*. He was Professor of Engineering at the University of Evansville as well as a Visiting Professor in the Department of Material Science at Stanford University.\*



\* The above biographical sketch is based on introductory remarks made on the occasion of Dr. Kushner receiving the Scientific Achievement Award of the American Electroplaters' Society in 1976, at the 64th meeting of the Society in Los Angeles, CA, June, 1977.

## Meet Your Teacher

Dr. Arthur S. Kushner, son of the founder, holds a B.A. in Chemistry/Mathematics from the University of Evansville, a Ph.D. in Chemistry from Pennsylvania State University and an M.B.A. in Management/Marketing from Cleveland State University. He has performed basic and applied research in corrosion inhibition, water treatment and chemical synthesis. He collaborated with his father in a number of areas pertaining to electroplating and metal finishing. Two such areas involved the measurement and characterization of stress in electrodeposited film and the development and characterization of novel electroplating baths. He is a major contributor to both the second and third editions of *Water and Waste Control for the Plating Shop*. He has been associated with the Kushner



Electroplating School for over 40 years. Dr. Kushner has many years of experience as a teacher, technical specialist and consultant. He has presented and published many technical papers. As Director of the Kushner Electroplating School, he constantly upgrades and improves the training materials and now offers all types of training programs and

consulting services to companies involved in the metal finishing industry. He has presented training programs and seminars in electroplating and metal finishing at many different companies and organizations. Among these companies and organizations are American Airlines, Hewlett-Packard Corporation, Molex Corporation, Tobyhanna Army Depot and the United States Mint.

# A Few of the Organizations Using Electroplating Know II

Acme Rustproof Co.	Coorstek Corp.	Ingersoll - Rand Co.	Naval Air TestCenter/ Maryland	Sommer Metalcraft Corp.
Aircap Industries	CTS Inc.	Johns Hopkins University/ Applied Physics Labs	Naval Research Labs/ Washington	Southeast Steel & Wire Co. Square D Co.
Allen-Bradley Corp.	Cybernex	Josten's Inc.	Naval Surface Weapons Cen- ter/Maryland	Stanley - Proto Industrial Tools
Allied Metal Finishing Corp.	Data General Corp.	Kieslow International Corp.	Naval Undersea Warfare Engineering Station/ Washington	Sterling Faucet Co.
American Airlines	Dearborn Brass	KohlerCo.	Penn State University/Applied Research Labs	Sunbeam Appliance Co.
American Plating & Manufacturing Co.	Deming Industries	Koppers Inc.	Pensacola Naval Air Station	Superior Metal Products Inc.
American Sterilizer Co.	Duo-Fast Corp.	L. G. Balfour Co./Canada	Pioneer Valley Plating Co.	Surface Mounted Technology Corp.
American Technical Ceramics	Eagle Metal Finishing Co.	Lawrence Livermore Labs	Precision Plating Co.	Teledyne-MEC
AmerockCorp.	Eaton Corp.	LECO Inc.	Price Pfister de Mexico	Texas Instruments
Ames Co.	Ebco Industries	Levin Fixture Corp.	Puget Sound Naval Shipyard	Thomas & Betts
Anoplate Corp.	El Paso Plating Works	M.W.Carr & Co.	Queens Plating Co.	Thomsan - CSF - France
Applied Materials	Electro-Spec Corp.	Magnetic Controls Co.	R. Seaman & Co.	Tinker Air Force Base
Arco Solar Inc.	Electrochemical Coatings	Manner Plating Co.	Raytheon Middle East Sys- tems	Tobyhanna Army Depot
Augusta Plating Co.	Electroplate - Rite Corp.	Marro Plating Co.	Robins Air Force Base	Towle Manufacturing Co./ Poole Silver Co.
Avon - Mirabella Inc.	Electrosound Group Inc.	Messier Services America	Rogers Corp.	Tracor Northern
Baldwin Hardware	Erie Plating Co.	Midland Ross Corp.	S. K. Williams Co.	TRW Inc.
Manufacturing Corp.	Federal Mogul Corp.	Midwest Plating Co.	San Diego Naval Shipyard	U. S. Department of Defense
Blue Ridge Plating Co.	Federal Pacific Electric Co.	MLI - Microlithography	Santa Clara Plating Co.	Union Carbide Corp.
Boeing Corp.	Fenwal Inc.	Modern Hard Chrome Service Co.	Sheaffer Eaton Textron	Union Tubular Products
Brass Craft Western Co.	General Defense Corp.	Molex Inc.		United States Mint
Buckeye Products Corp.	General Electric Co.	Monet Jewelers Inc.		Van der Horst Corp.
California Plating Co.	Gould, Inc.	Montana Silversmiths		VulcaniumCorp.
Cambridge Plating Co.	Great Lakes Plating Corp.	Morgan Advanced Ceramics		Watervliet Arsenal
Carvel Hall	GTE Lenkurt	Motorola, Inc.		Westinghouse/Puerto Rico
Cascade Plating Co.	GTE Sylvania	Nashua Brass Co.		
Charleston Naval Shipyard	Hewlett-Packard Corp.	Nashville Wire Products		
Control Data Corp.	Honeywell Inc.			
	Indiana Industrial Plating			

## Electroplating Know How II Enrollment Form

I want to learn all about modern metal finishing and electroplating techniques from you, Dr. Kushner, so enroll me at once in your **Electroplating Know How II** correspondence program. My payment for \$1,449.00 (**add \$119.55 sales tax for California delivery**) is enclosed. I will also include \$35.00 shipping & handling for each training program purchased. I will receive (1) your completely illustrated 1,200-page, 20-lesson (books) course under your personal teaching supervision; (2) a Certificate suitable for framing (on successful completion of the course) as a *Metal Finishing Technician*; and (3) your personal grading and advisory service in connection with the course for a period of 15 months commencing with my receipt of Lessons 1 and 2.1 understand I have 15 months (longer times can be arranged) to complete the course. I also understand that I can return all course material, within 10 days, for a full refund of **all** fees, if I am not completely satisfied.

### General Information

Name _____		Company _____		
Address (street address required for UPS/FedEx delivery) _____		City _____	State _____	Zip/Postal Code _____
Current Occupation _____		Education _____		
Telephone Number (Daytime) _____	Fax Number _____	E-mail Address _____		

### Payment Information

Payment must be made upon enrollment in the program. Payment can be by check, money order or credit card. We will accept purchase orders from nationally recognized companies and government agencies. All tuition and shipping fees are payable in U. S. Dollars. Checks must be drawn on an U. S. bank. We also accept American Express, MasterCard and VISA.

My check for \$\_\_\_\_\_ payable to the Kushner Electroplating School is enclosed.  
 Charge my  American Express  MasterCard  VISA for \$\_\_\_\_\_

Please add CA sales tax or international shipping charges if required.

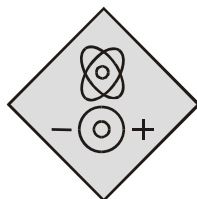
Card Number _____	Expiration Date _____	CVV2 Code* (3- or 4-digit number) _____
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**Billing Address for Credit Card if Not the Same as Above:**

Address _____	City _____	State _____	Zip/Postal Code _____
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\*MasterCard and VISA credit cards have a 3- or 4-digit code printed at the right hand side of the signature panel of the card. American Express credit cards have a 4-digit number printed on the front side of the card above the embossed number. The 4-digit number is not embossed.

Please Mail or Fax Registration Form and Payment to:



**Kushner Electroplating School**  
 "Training Electroplaters Since 1947"

732 Glencoe Court, Sunnyvale, California 94087  
 Telephone: (408) 749-8652 • Fax: (408) 749-0176  
 E-mail: platingman@platingschool.com

## **INTERNATIONAL STUDENTS PLEASE NOTE:**

**Additional shipping charges must be added for all shipments outside of the United States.** The additional fees, payable in advance, to cover air shipment of training materials and examination papers are as follows:

Canada	\$ 175.00	Asia, Australia, New Zealand	\$ 395.00
Mexico	\$ 195.00	Eastern Europe, Russia	\$ 410.00
Western Europe	\$ 275.00	Africa	\$ 435.00
Central & South America	\$ 355.00		

All tuition and shipping charges are payable in U. S. Dollars. Checks must be drawn on a U. S. bank. We also accept American Express, MasterCard and VISA.

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