



TO MARK PROGRESS

LADISH

Controlled Quality

FITTINGS

CATALOG NO. 55

SEAMLESS
WELDING
FITTINGS

FORGED
STEEL
FLANGES

LARGE
DIAMETER
FLANGES

LONG
WELDING
NECKS

FORGED
STEEL
FITTINGS

LADISH

GENERAL CATALOG No. 55

Controlled Quality

**FORGED AND
SEAMLESS WELDING
PIPE FITTINGS**



TO MARK PROGRESS

Copyright 1954

LADISH CO.

1 SEAMLESS
WELDING
FITTINGS

2 FORGED
STEEL
FLANGES

3 LARGE O. D.
& TEMA FLANGES,
LONG NECKS,
ROLLED RINGS

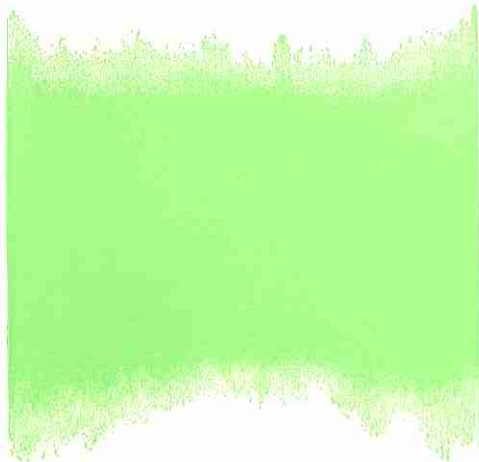
4 FORGED
STEEL
FITTINGS

5 STAINLESS
AND ALLOY
FITTINGS

6 ENGINEERING
AND
TECHNICAL DATA

7 GENERAL INDEX
AND
PART NUMBERS

A GOOD *reputation* EXACTS GREATER



TO MARK PROGRESS

RESPONSIBILITY

LADISH CO. of today with over 1,500,000 square feet of floor space devoted to modern manufacturing equipment and outstanding laboratory facilities stands as evidence of a reputation earned through providing prompt and efficient service on products of unexcelled quality.

The Ladish trademark . . . symbol of that reputation, emblematic of highest quality standards, fine engineering skills, craftsmanship, modern manufacturing equipment and scientific metallurgical-research facilities . . . gives visual assurance of manufacturing responsibility and integrity.

An aggressive, maintained program of research and development for improved methods, processes, materials and designs assures that Ladish products will continue to be outstanding.

On the following pages are illustrated many of the quality safeguards and manufacturing facilities responsible for the added assurance of dependability in all Ladish Controlled Quality products.

Ladish fittings are marketed through authorized distributors carefully selected from the outstanding supply organizations in the country. Each is known for business integrity, completeness of stock and knowledge of piping problems. Place your orders with your local authorized Ladish distributor with the complete confidence that you will receive prompt, efficient service on your requirements.

LADISH CO.

Established 1905



ALL PRODUCED UNDER ONE ROOF...
TO ONE STANDARD OF

Controlled Quality

Available in

- Carbon Steels
- Alloy Steels
- Stainless Steels
- Nickel and Nickel Alloys
- Aluminum and Aluminum Alloys
- Copper and Copper Alloys
- Other Ferrous and Non-Ferrous Metals and Alloys

For complete listing, refer to pages 225-236

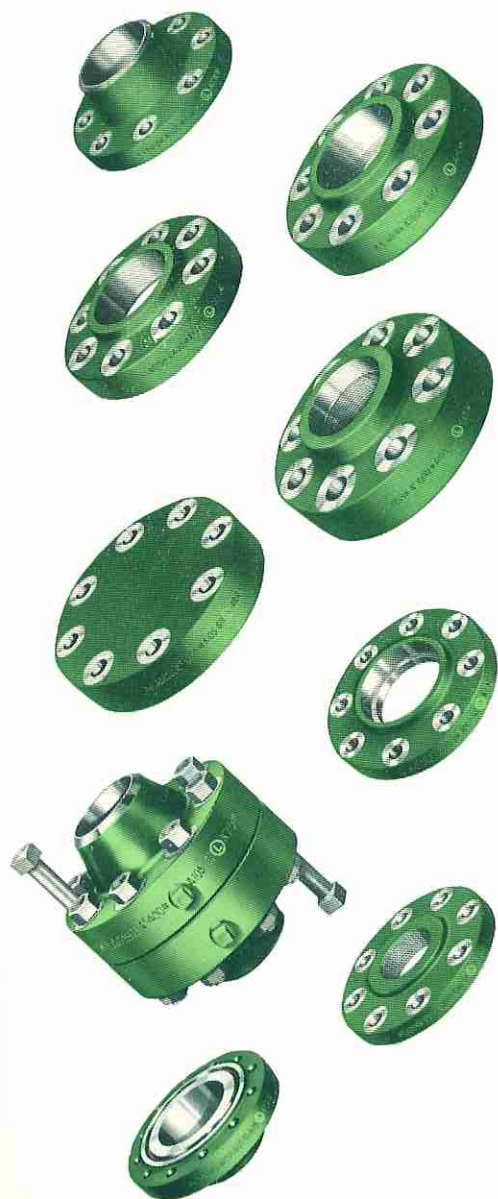
SEAMLESS WELDING FITTINGS

Size Range 1/2 Inch Through 36 Inches, Sizes Above 36 Inches Quoted on Request... Standard Weight Through Double Extra Strong and a Wide Range of Schedules.

LADISH OFFERS A LINE

Complete in

SIZE RANGE • TYPES AND DESIGNS • MATERIALS



FORGED STEEL ASA FLANGES AND CORROSION RESISTANT FLANGES

ASA Flanges from 1/2 Inch Through 24 Inches ... 150 Pounds Through 2500 Pounds Pressure. 150 Pound Corrosion Resistant Flanges from 1/4 Inch Through 12 inches.

LARGE O.D. & TEMA FLANGES, LONG NECKS, ROLLED RINGS

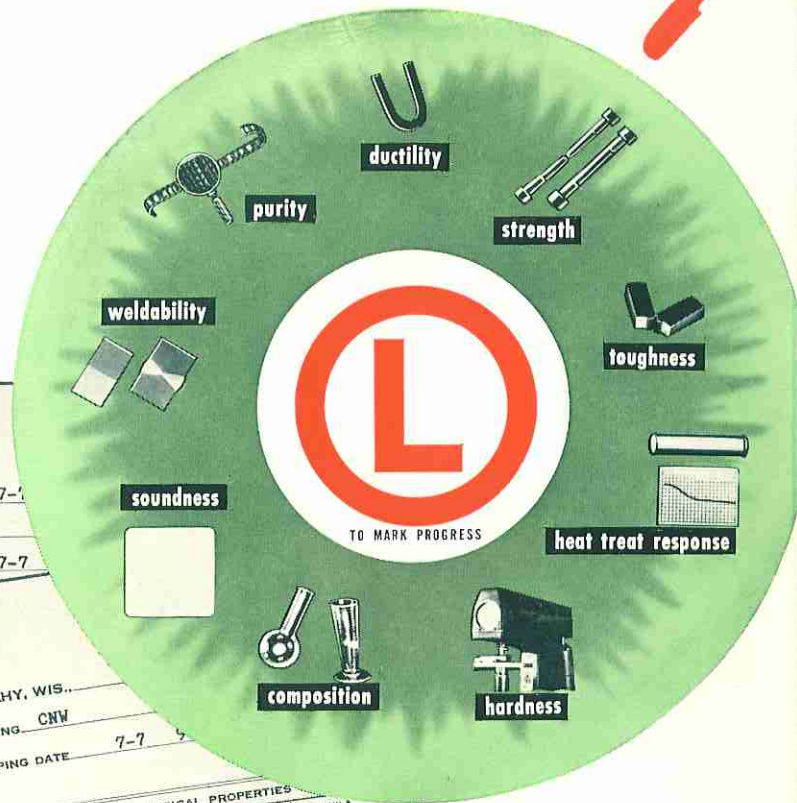
Large O.D. Flanges Through 240 Inches... Complete Range of TEMA Flanges ... Long Necks Through 24 Inches ... Rolled Rings Through 240 Inches O.D.

FORGED STEEL SCREWED & SOCKET WELDING FITTINGS

Size Range 1/8 Inch Through 4 Inches ... 2000 Pounds Through 6000 Pounds Pressure.

Steel Identity

Exact laboratory determination of complete chemical composition and physical properties of materials in every fitting is a fundamental of Ladish Controlled Quality.



LADISH CO.
Material Analysis Report
METALLURGICAL DEPARTMENT

PURCHASER Doe Mfg. Company CUDAHY, WIS. 7-
75-100
New York, New York
ROUTING CNW
SHIPPING DATE 7-7

LADISH CO.
Material Analysis Report
METALLURGICAL DEPARTMENT

PURCHASER John Doe Mfg. Company CUDAHY, WIS. 7-
PURCHASER'S ORDER NO. 75-100 ROUTING CNW
ADDRESS New York, New York SHIPPING DATE 7-7

PURCHASER'S ORDER NO. 75-100										PHYSICAL PROPERTIES						
ADDRESS New York, New York																
NO. CB.	DESCRIPTION	SPECIFICATION	HEAT NO.	CODE	CHEMICAL COMPOSITION								YIELD POINT LB. PER SQ. IN.	ULTIMATE STRENGTH LB. PER SQ. IN.	ELONGATION %	REDUCTION OF AREA %
					C	MN	P	S	SI	NI	CR	MO				
50	6" Std. 90° LR Seamless Welding Ells	A106-Gr.B	3321	AJS	.23	.75	.008	.029	.15				59800	68500	46.0	
50	4" 600# Welding Neck Flanges, XH bore	A105-Gr.1	5590	LRB	.27	.76	.017	.029	.23				37000			
75	2" 3000# 90° Screwed Ells	A105-Gr.2	1129	FLR	.27	.72	.022	.032	.23							

I HEREBY
AND BY

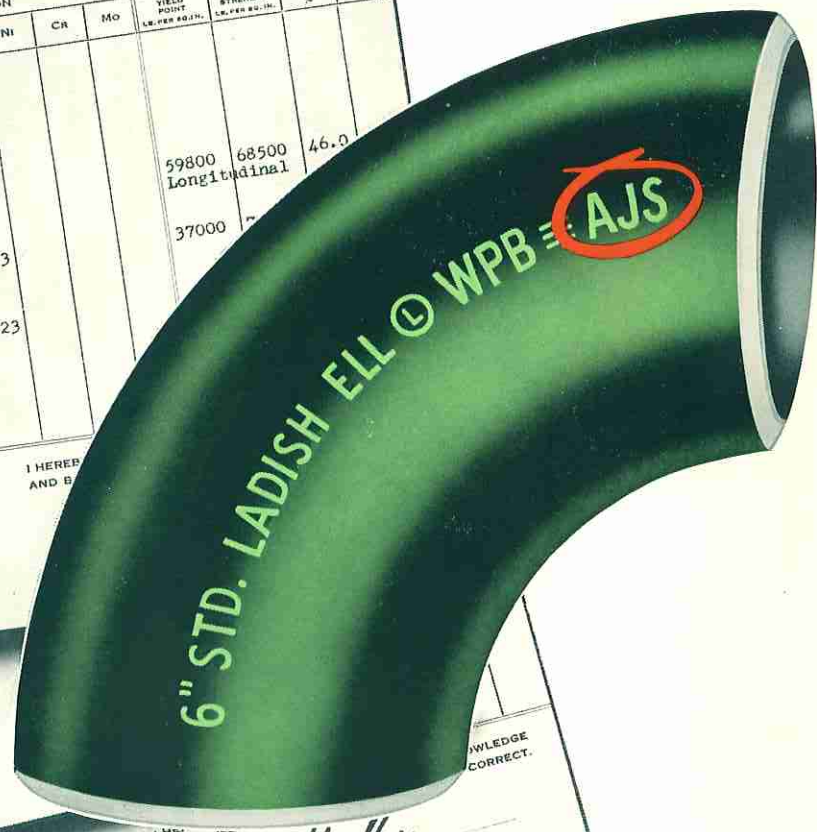
BEFORE ME THIS

ADISH ELL

SUBSCRIBED AND SWORN TO BEFORE ME THIS
29 DAY OF September 19
J.H. Smith
NOTARY PUBLIC
MY COMMISSION EXPIRES April 5,

SUBSCRIBED AND SWORN TO BEFORE ME THIS
8 DAY OF July 19
D.M. Clark
NOTARY PUBLIC
MY COMMISSION EXPIRES April 5,

SUBSCRIBED AND SWORN TO BEFORE ME THIS
7 DAY OF July 19
J.D. Lyons
NOTARY PUBLIC
MY COMMISSION EXPIRES April 5,



I HEREBY
AND BELIEVE
D.C. Miller
METALLURGIST

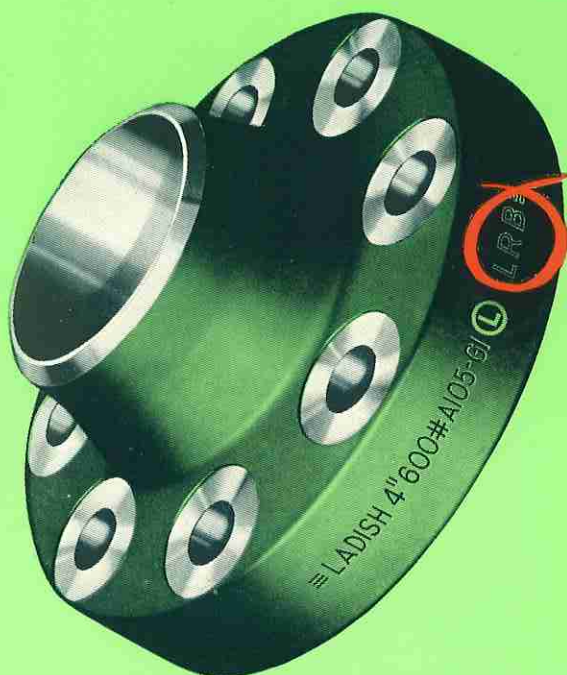
KNOWLEDGE
CORRECT.

SAFEGUARDS EVERY LADISH FITTING...

THROUGHOUT THE COMPLETE LADISH CONTROLLED QUALITY FITTINGS
LINE . . . STEEL HEAT CODE IDENTIFICATION IS MAINTAINED AS
ADDED ASSURANCE OF QUALITY AND DEPENDABLE PERFORMANCE

On arrival at the Ladish plant, samples are taken of each mill heat and subjected to exhaustive chemical analyses and physical tests in the completely equipped Ladish Metallurgical, Engineering and Research Laboratories. Only when it has been verified by these tests that materials meet the high standards of Ladish specifications are they accepted and assigned letter heat codes to identify them through future operations.

Complete reports of each test are filed and form the basis for determining forging heats, hammer impact values and heat treating procedures. All subsequent laboratory tests performed during or following manufacture are also made part of this file. Each fitting, when forged, is permanently marked with the same material's heat code symbol so that at any time reference can be made to its complete metallurgical history.



THE HEAT CODE ON EVERY LADISH FITTING
IS THE KEY TO LABORATORY REPORTS
PROVING THE METALLURGICAL INTEGRITY
OF LADISH

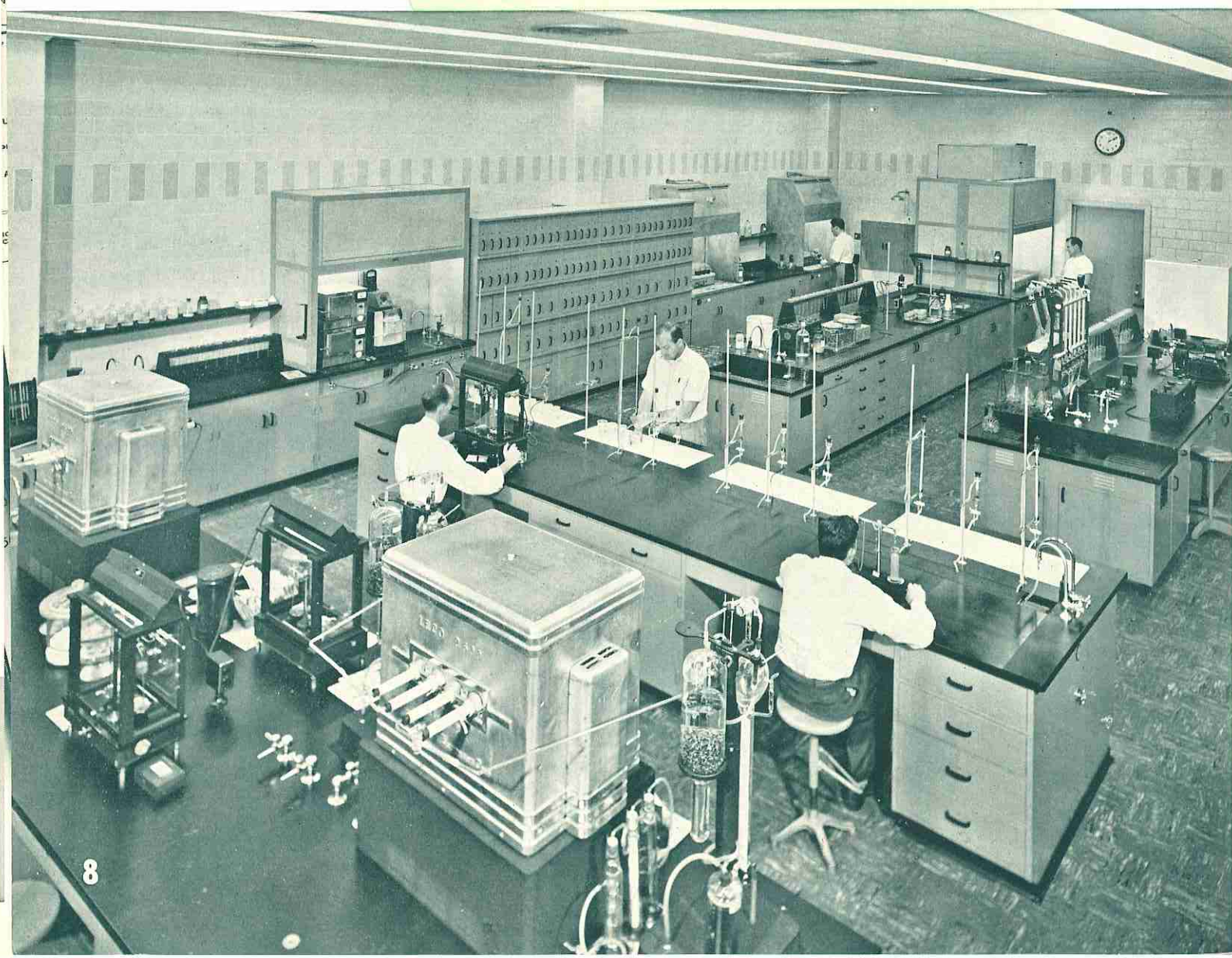
Controlled Quality

Controlled Quality OFFERS
Laboratory Proof
THAT METAL PROPERTIES ARE
DEVELOPED TO THE MAXIMUM

Certified copies of all laboratory tests performed on the material from which any fitting was forged are available to users at any time by reference to the Ladish heat code shown upon it. These reports give scientific proof that all important physical properties . . . such as yield point, tensile strength, elongation, reduction of area and fatigue strength . . . are developed to the maximum as added assurance of long, dependable performance—and give the same information that would be obtained by a witnessing inspector.

**IN THE LADISH
METALLURGICAL
ENGINEERING
AND RESEARCH
LABORATORIES...**

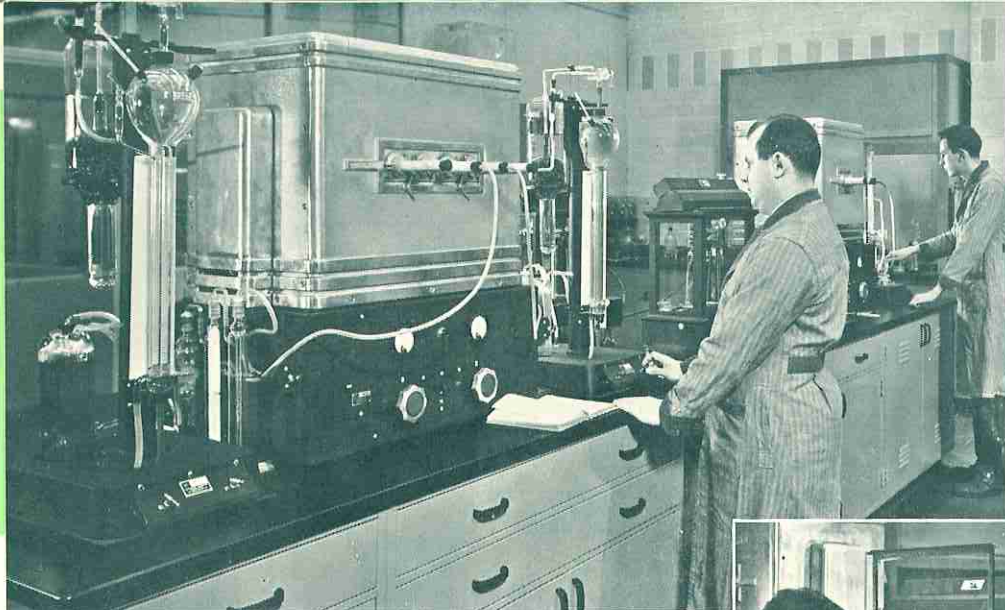
Controlled Quality



Scientific laboratory procedures are fundamental to Ladish Controlled Quality. From raw material analysis to control of forging techniques, every step in the production of Ladish fittings is originally determined and constantly reviewed by a large staff of trained metallurgists working in one of the industry's most modern and completely equipped laboratories. Many series of chemical and physical tests, various of which are illustrated on following pages, are the foundation on which these men exercise metallurgical controls over production processes. This reliance upon actual scientific test data . . . research as well as analytical proof of dependability . . . is the basis of Ladish Controlled Quality.

ASSURES METAL SOUNDNESS

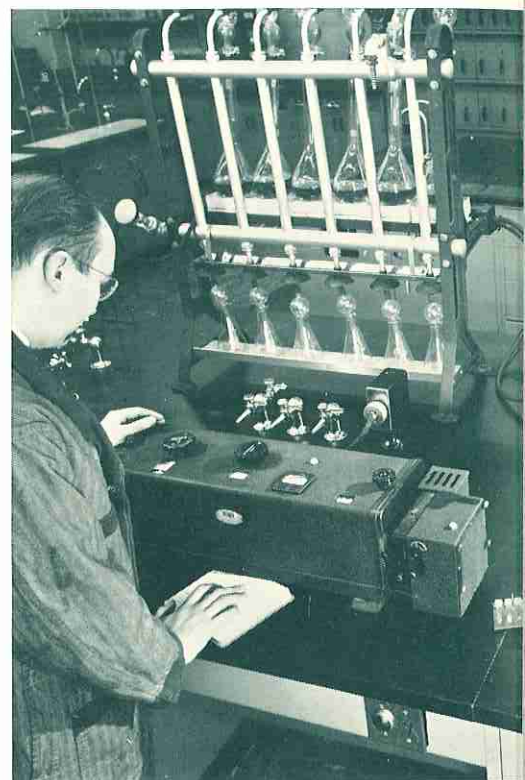




Since carbon is the most vital single element of steel, directly affecting strength, toughness, ductility and resistance to shock and abrasion, the Ladish Chemical Laboratory is equipped with advanced apparatus for accurate and rapid determination of the carbon content of steel.



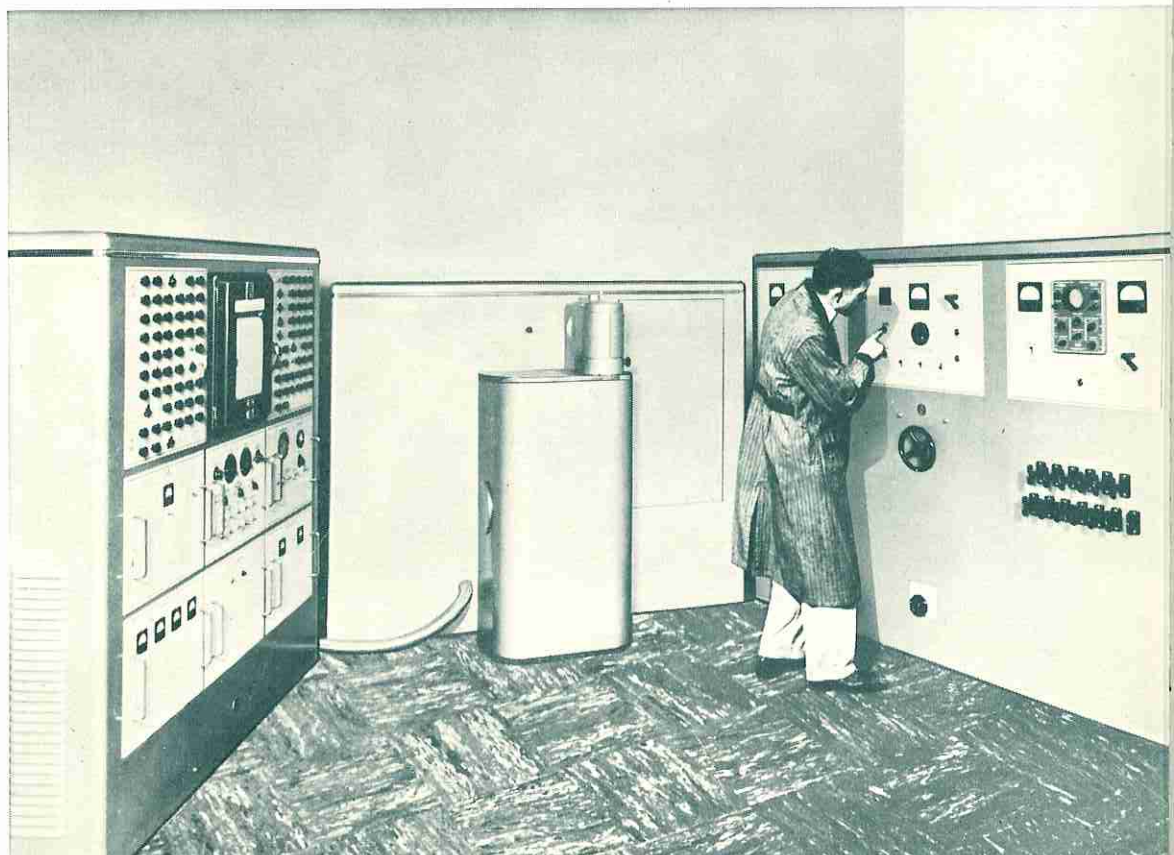
A sample is carefully weighed prior to the carbon test where combustion in purified oxygen stream will evolve carbon dioxide which is measured and carbon content determined.



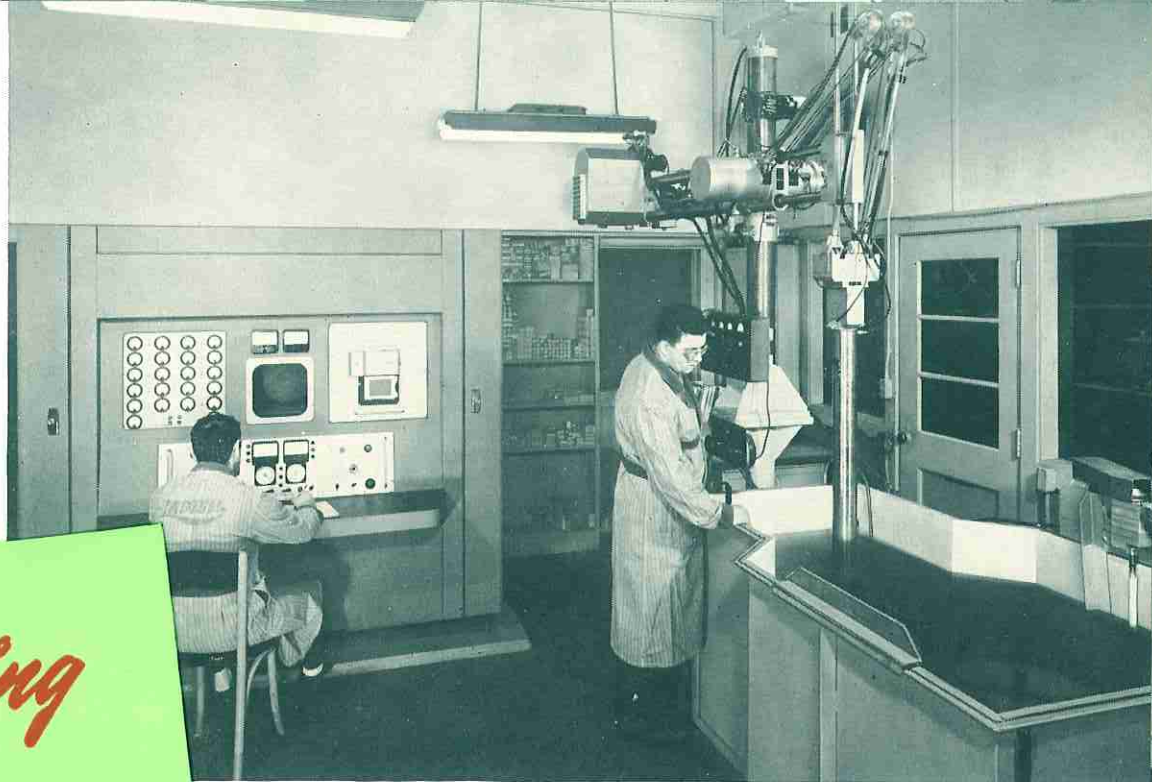
Spectrophotometry is employed in accurate determination of metal composition by measuring color intensity at various wave lengths of light transmitted through solutions of the metal under examination.

Verifying **CHEMICAL COMPOSITION**

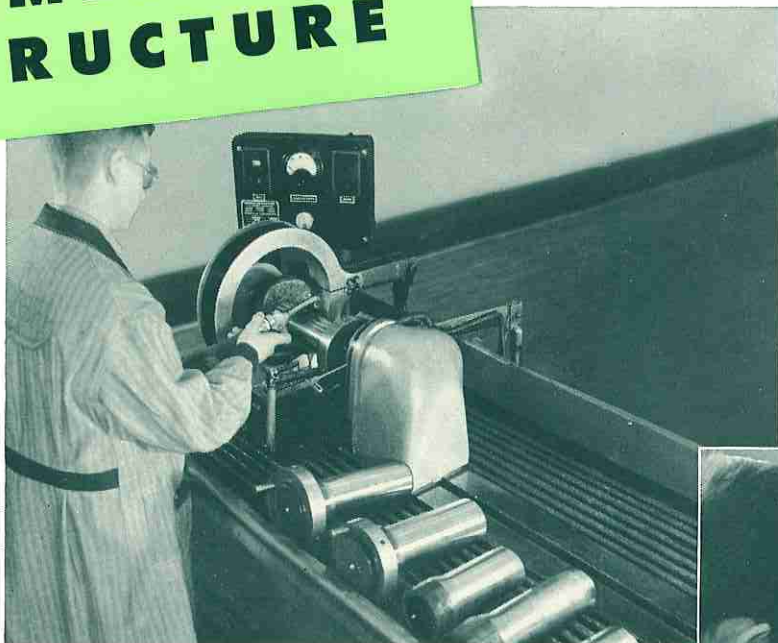
Scientific determination of the chemical composition of alloys and commercial metals is facilitated in the Ladish Chemical Laboratory by this modern direct reading spectrograph. Radiation emitted by incandescent metal vapors is dispersed to a series of photo-multiplier tubes, each positioned to intercept a preselected wave band characteristically radiated by the element to be evaluated. The intensity of light given off by each element is measured by these tubes and a recorder produces, within a few seconds, a graphic indication of the proportions or percentages of the various elements present in the material under test.



New, highly sensitive equipment, pioneered by Ladish Co., utilizing electronic dispatch and reception of ultra-sonic waves through water, automatically scans and records internal soundness of both steel billets and finished forgings.

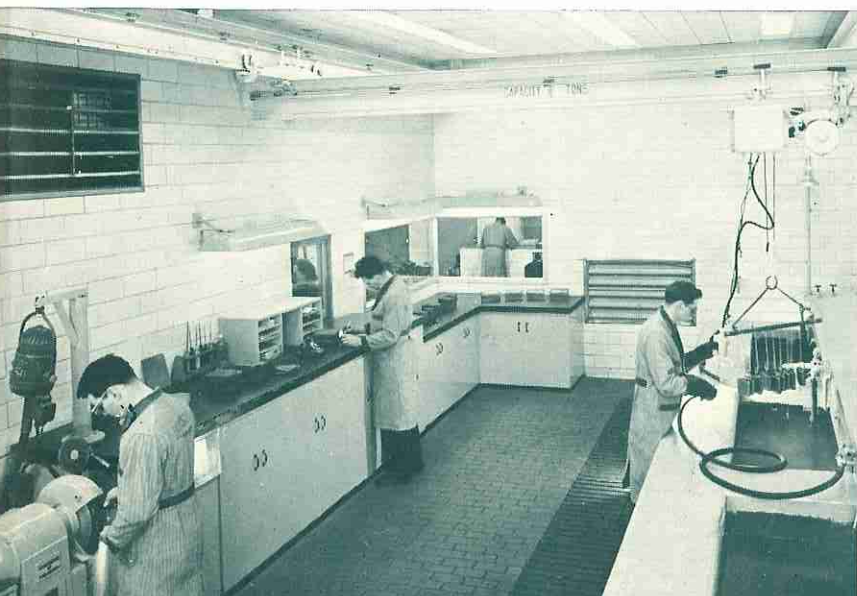
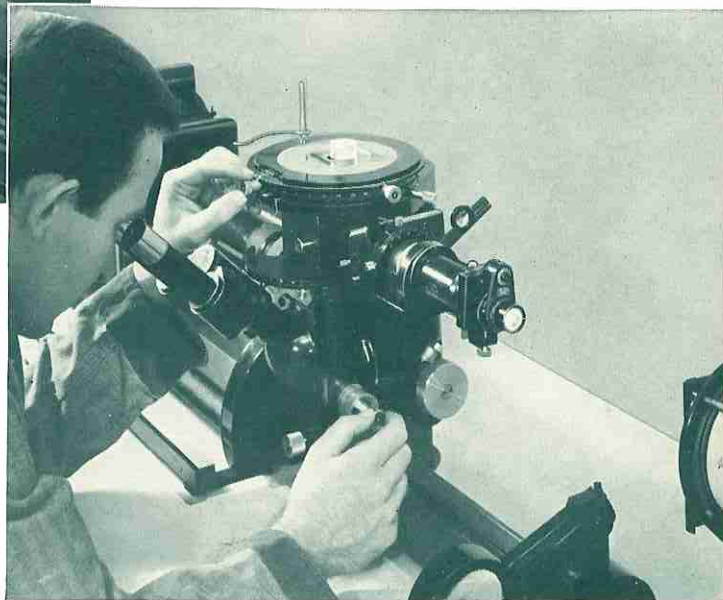


Examining **METAL STRUCTURE**



Proof of soundness of the surface and underlying zones of metal is obtained by magnetic particle inspection wherein forgings or preliminary test samples of steel are magnetized, then sprayed with oil suspension of minute ferrous particles. The particles are magnetically attracted to flaws which thus become visible. Non-ferrous pieces are immersed in a fluorescent liquid and then, after rinsing, scanned with ultra-violet "black light" under which minute imperfections are readily visible.

Metallography, the examination of micro structure of metals reveals previous thermal history, grain size, phase composition and indicates to the metallurgist important engineering characteristics.



Macro-etched test sections of billets in each lot of steel provide Ladish metallurgists with data indicative of the uniformity of metal quality. Grain flow patterns of finished forgings are also checked by this method.



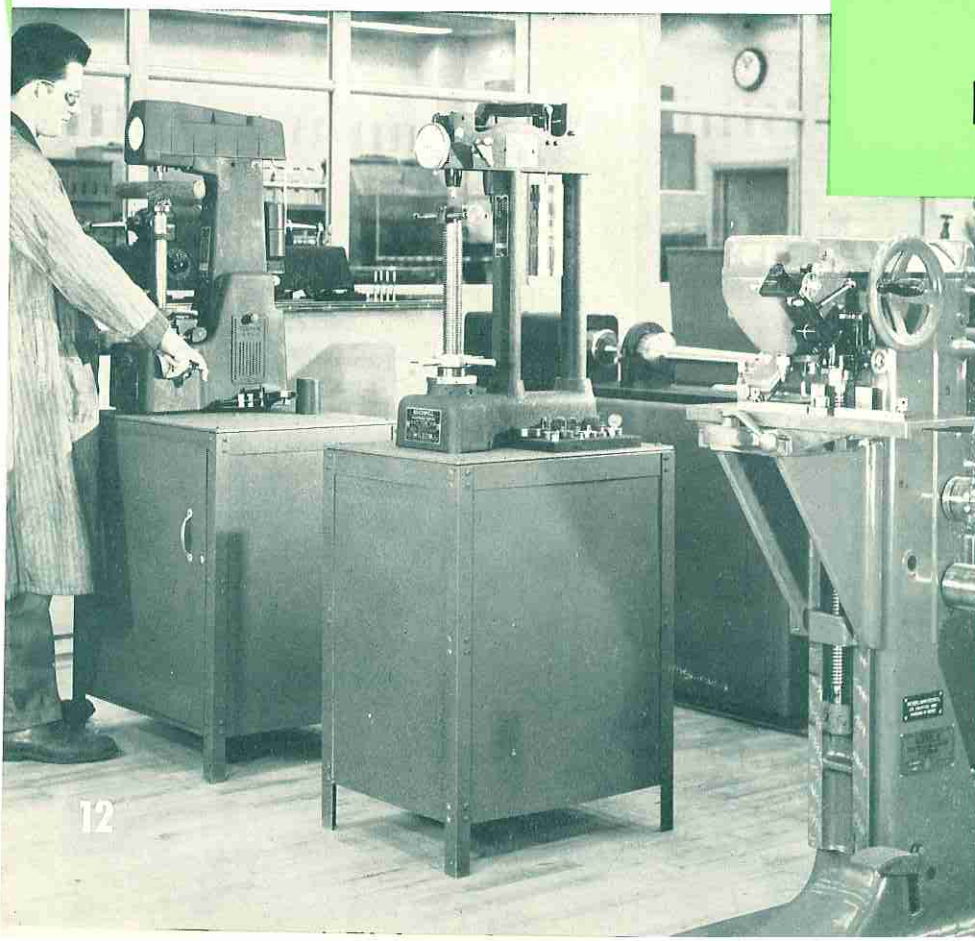
Fatigue strength of metal, as affected by composition, heat treatment and forging methods, is determined by tests conducted on a battery of fatigue testing machines of various sizes. Accurately formed test bars are subjected to fluctuating stress from 2600 to 10,000 cycles per minute through alternate compression and tension to find the endurance limit of the metal.



Measuring relative toughness of metal determines its ability to withstand suddenly applied impact loads. A pendulum type impact testing machine is used in the Ladish metallurgical laboratory to perform hundreds of Charpy and Izod tests daily on notched bar samples.

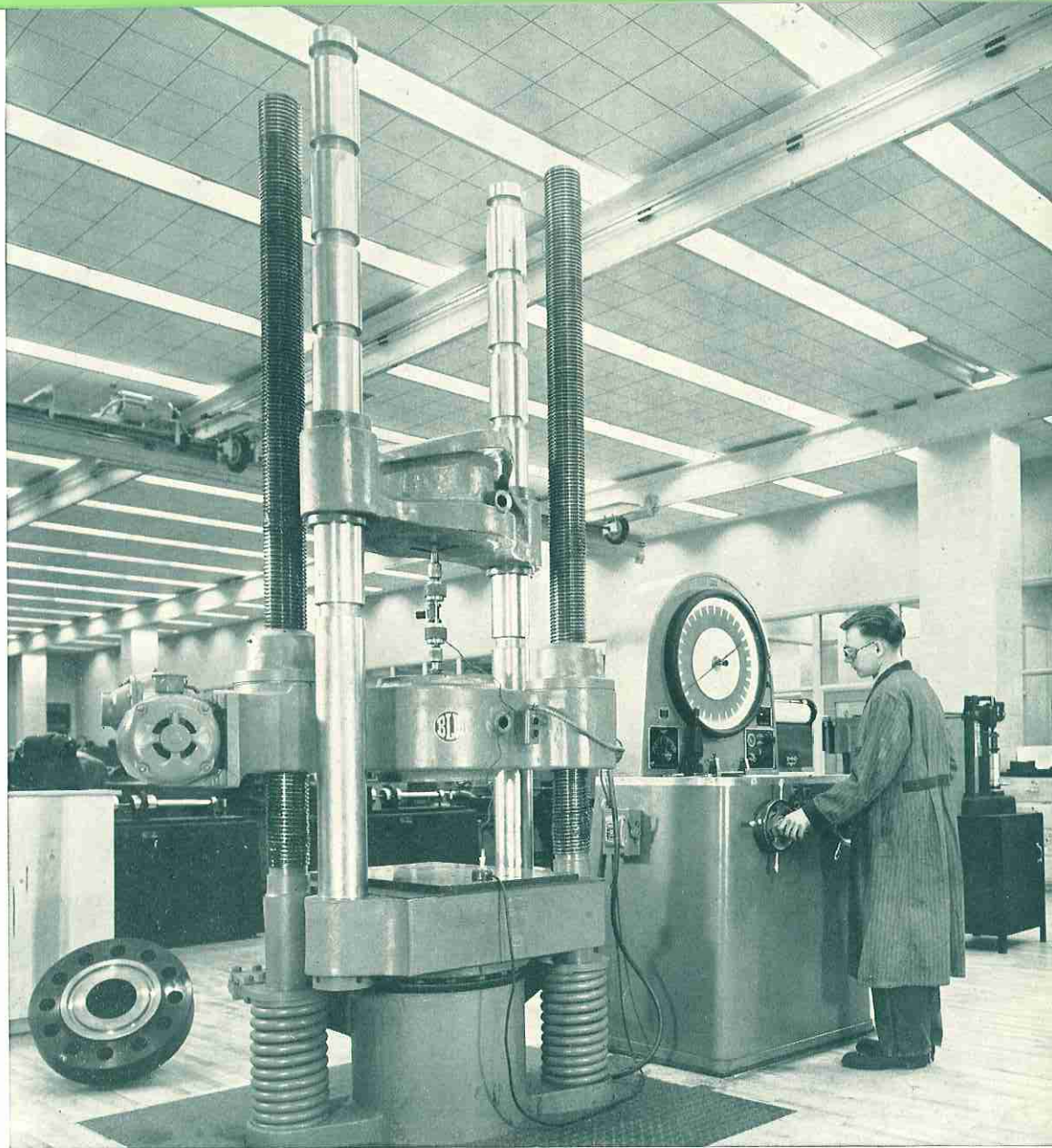
Determining

PHYSICAL PROPERTIES



Hardness determination, accurately measuring the resistance of steel to penetration or surface deformation, forms an important corollary of such desirable physical properties as strength, toughness and ductility and their proper balance. Various standard methods are used in the Ladish laboratory.

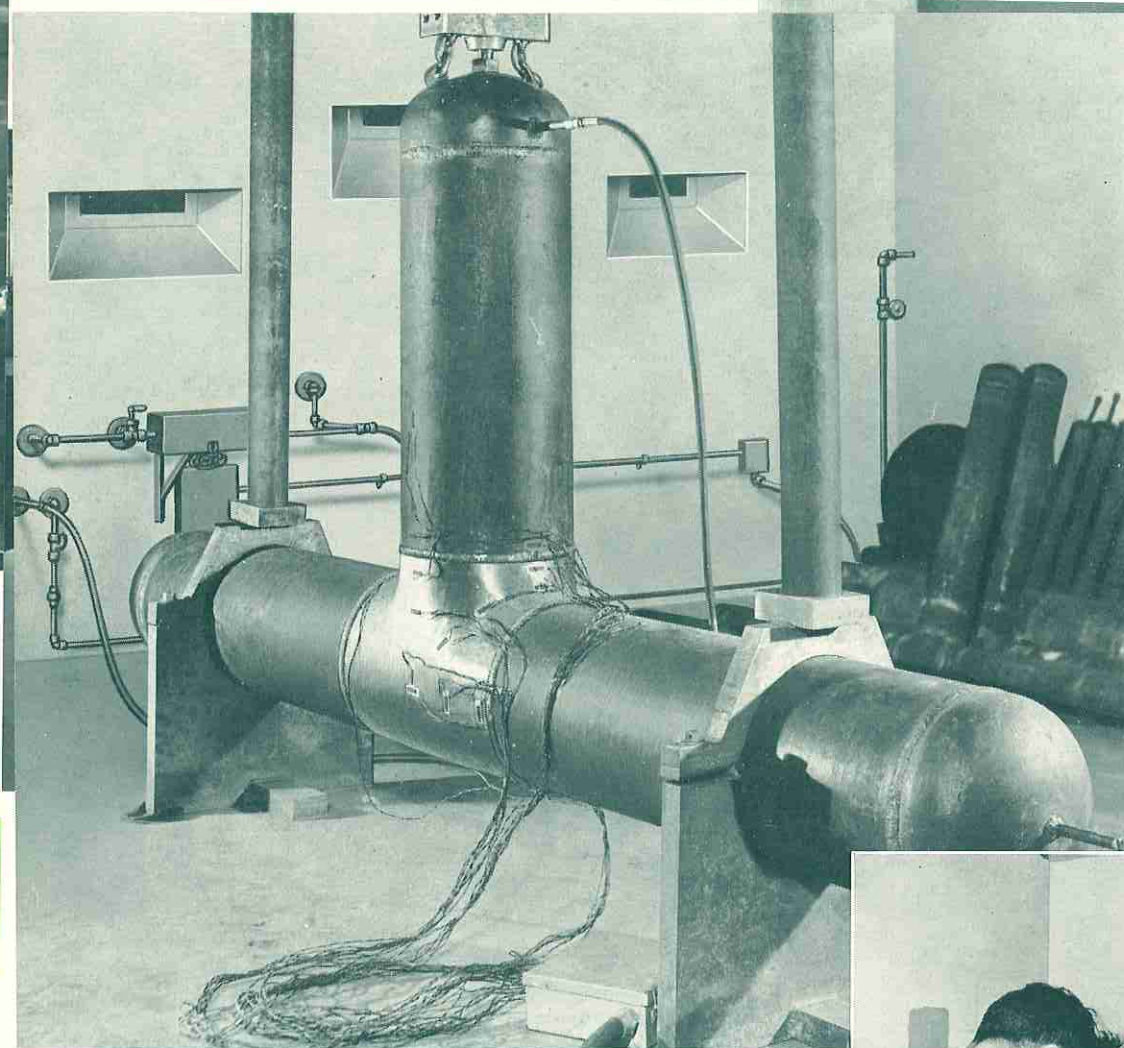
Exact determination of such important physical properties as static strength, yield strength, elongation, reduction of area and elasticity of metal is made in the Ladish laboratory on this 300,000 pound hydraulic Tensile Testing machine. These physical tests are performed over wide ranges of temperature. In common with all other chemical and metallurgical tests contributing to Ladish Controlled Quality, tensile examination is made of every lot of steel used by Ladish to assure its compliance with specifications.



In preparing test bars for notch impact tests at extremely low temperatures, Ladish metallurgists utilize the properties of "dry ice," petroleum ether, liquid nitrogen and other cooling agents, singly and in combination to achieve extremes of temperature. Test bars are fractured within five seconds of removal from freezing cabinet.

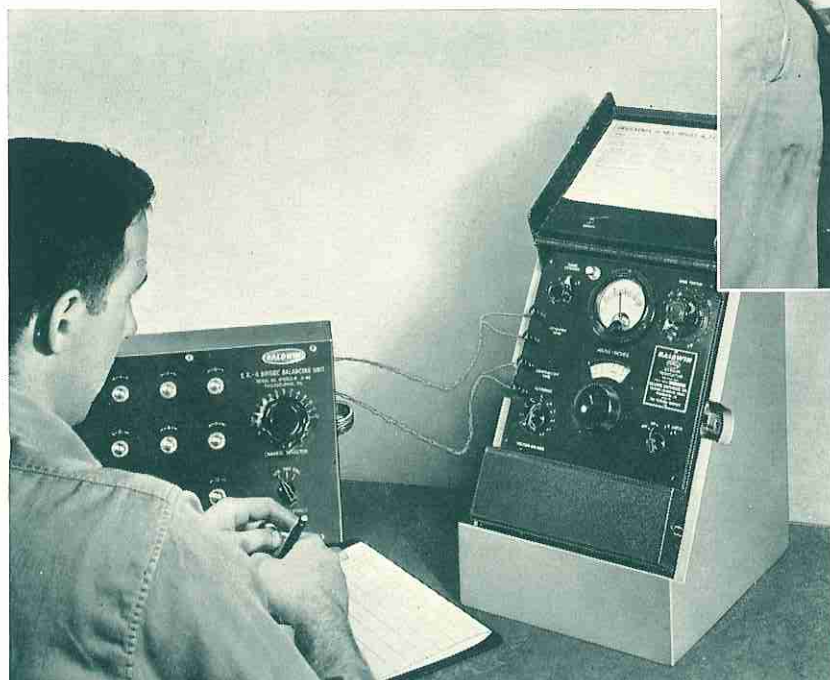
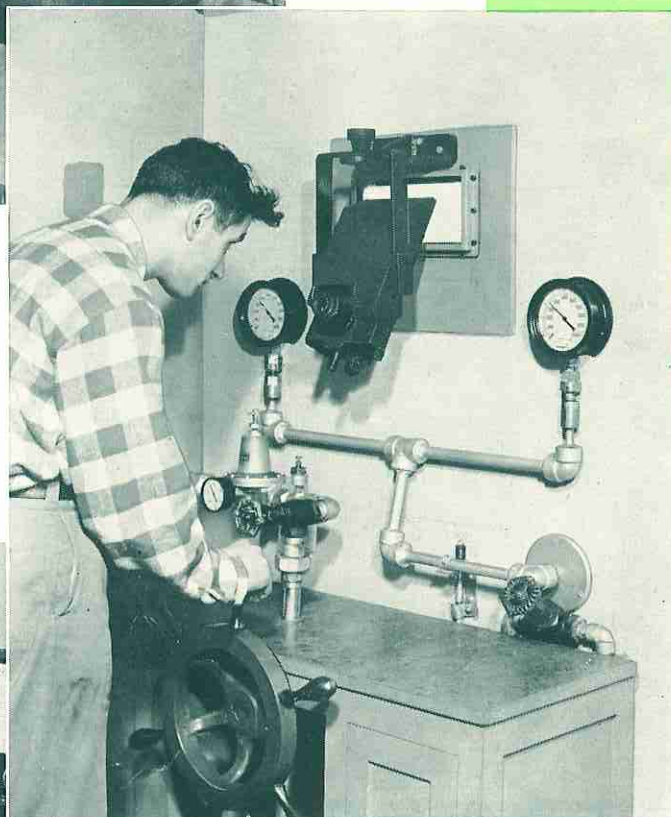


Metal's ability to stand up under severe shock and strain at temperatures far below those encountered in service is essential to fittings reliability. Impact notched bar tests in the Ladish laboratory are carried on at temperatures as low as -320° F. to insure against brittleness under subzero operating conditions.



Another phase of Controlled Quality is the continuing effort of Ladish metallurgists to determine scientifically endurance limits of finished fittings. In this subterranean burst chamber, behind concrete walls, fittings are subjected to tremendous internal hydrostatic loads and external mechanical loading far in excess of the service for which they are rated. Strain measurements taken under these excessive loads help Ladish research engineers to improve designs and assure safe operation.

Safe control of Ladish burst chamber tests is achieved through the use of periscopes behind heavy safety glass ports and remote reading hydraulic gauges and control apparatus.



Strain gauge measurements through sensitive electronic circuits connected to stressed areas of the fittings under test provide data verifying the high safety factors built into the design of every Ladish fitting. Such scientific methods are typical of the thoroughness of Ladish research and engineering.



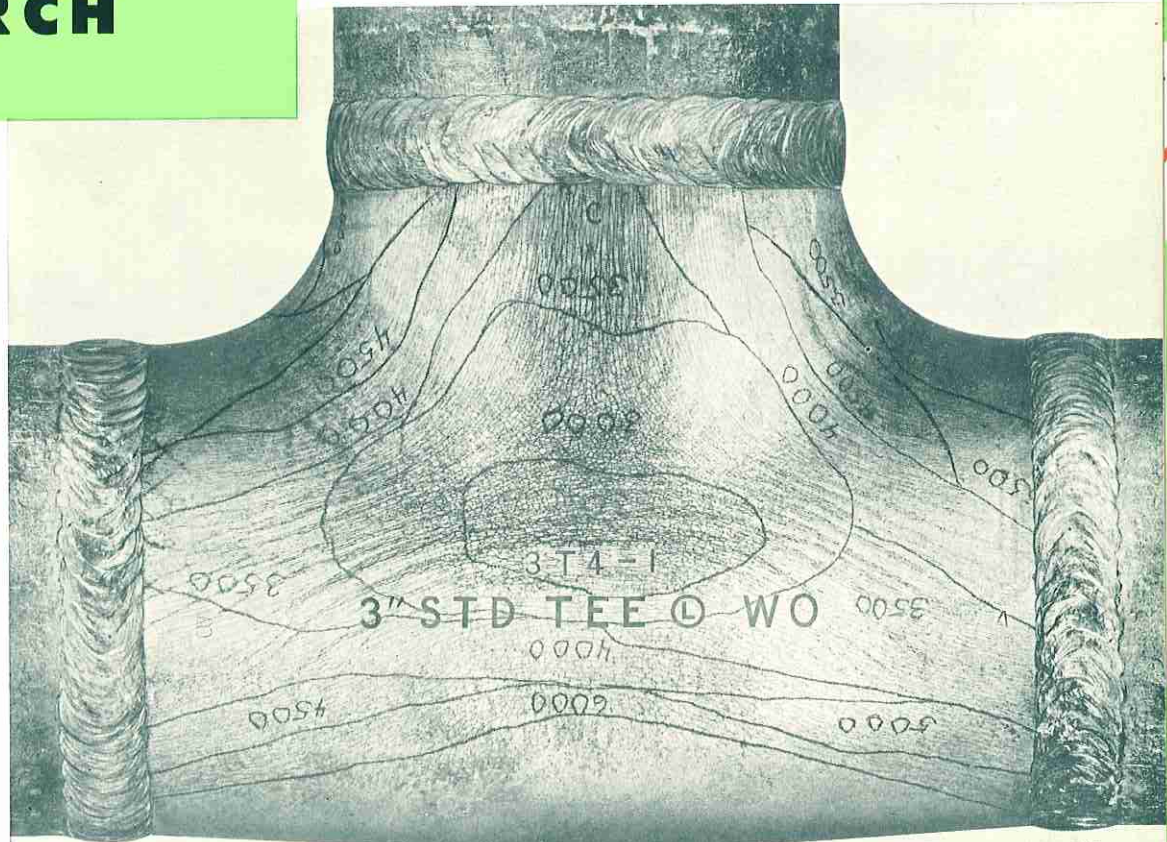
A continuing research program on the behavior of metals at elevated temperatures is facilitated in the Ladish laboratories through use of more than a score of sensitive stress-rupture and creep-testing units. Test results provide a sound basis for specification of proper materials for service at elevated temperatures and verify conformity of the finished product to specifications.



Files of scientific journals, society papers, engineering handbooks and technical publications are maintained in the Ladish library. Quick and easy reference is made by Ladish engineers to data available in any field of research, metallurgy, chemistry and physics by means of the exhaustive cross-indexing system covering a wide variety of scientific subjects.

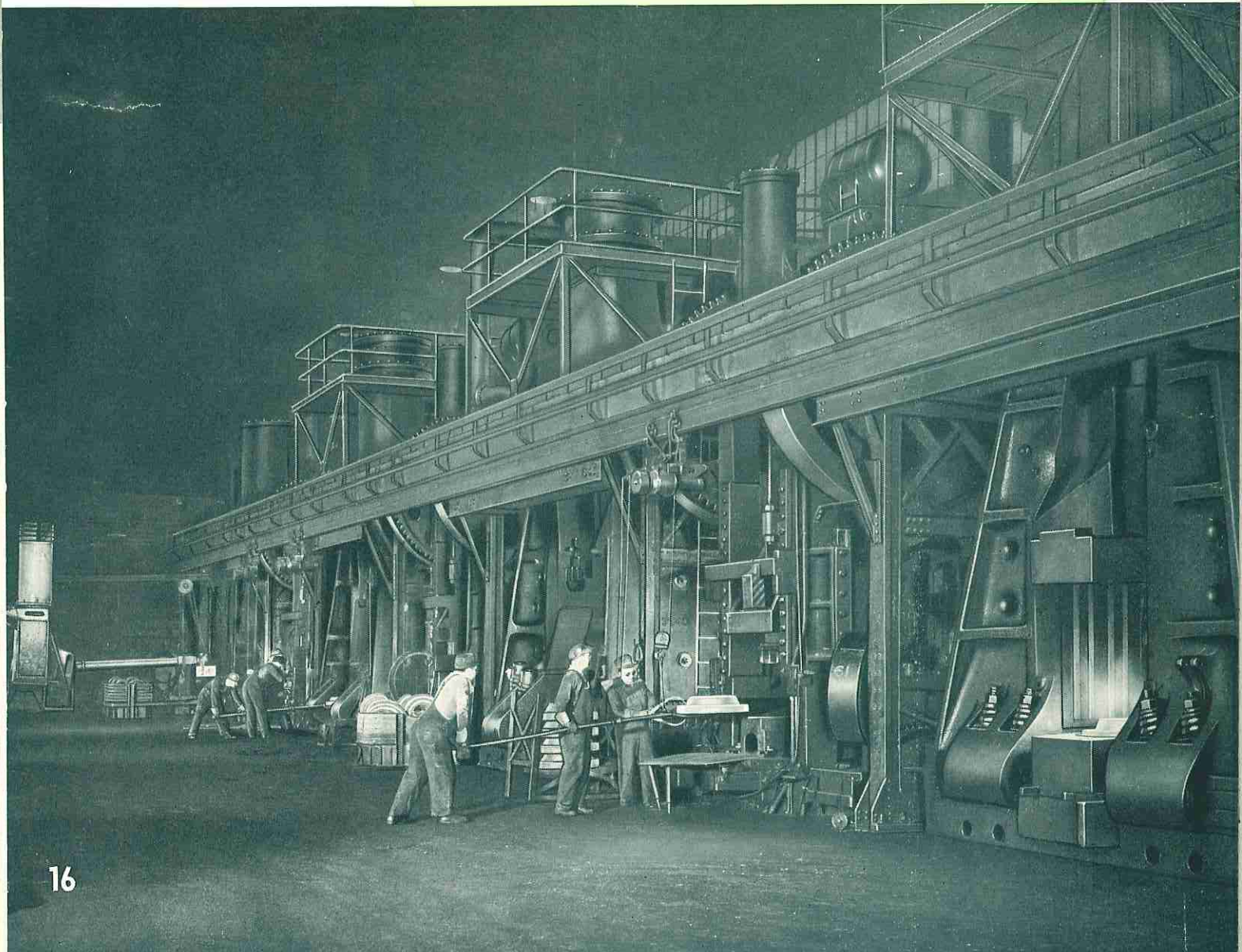
Pursuing **CONTINUOUS RESEARCH**

Utilizing advanced methods and techniques Ladish metallurgical research engineers are constantly striving to improve product design. Illustrated here is an example of how brittle lacquer is used to determine stress concentration in actual forged metal designs under applied internal pressure with or without superimposed external mechanical loads. Results enable Ladish designers to scientifically distribute metal to vital areas and thus produce a fitting of balanced design that will uniformly disperse load stresses and be free of critical areas.



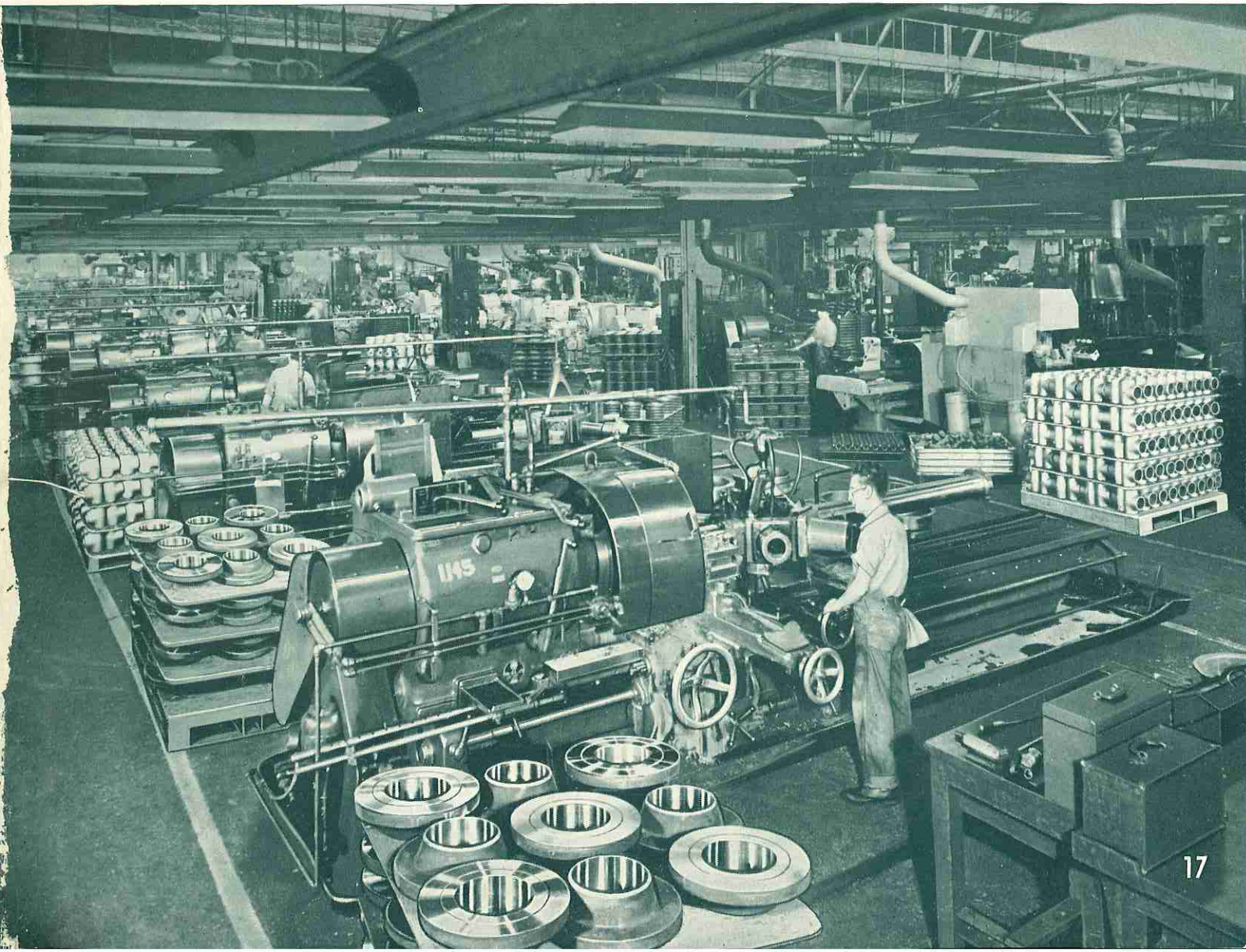
**IN EVERY PHASE
OF THE LADISH
FORGING AND
MANUFACTURING
PROCESSES...**

Controlled Quality

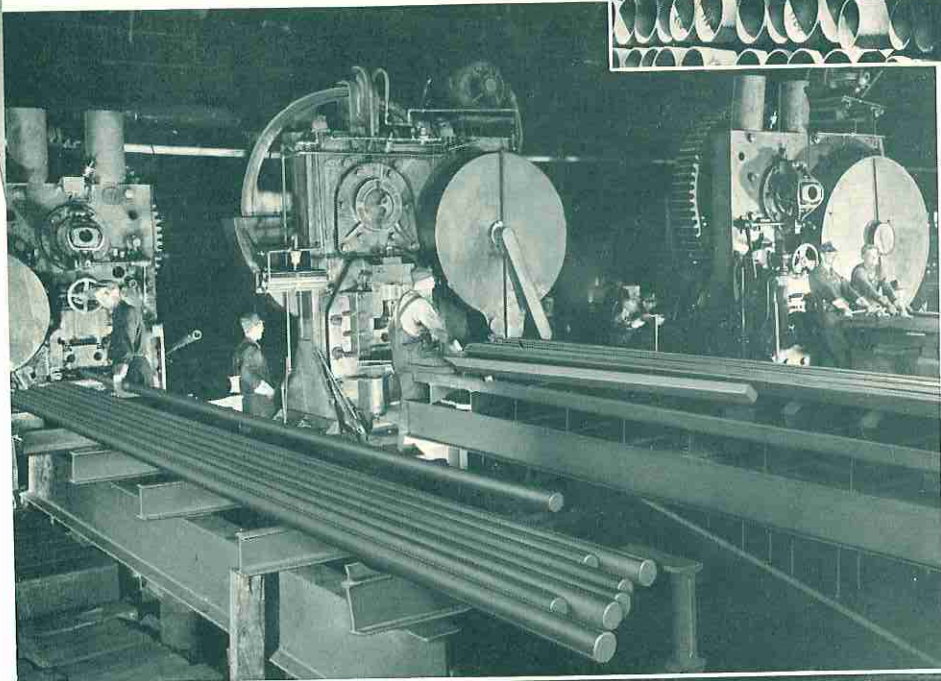
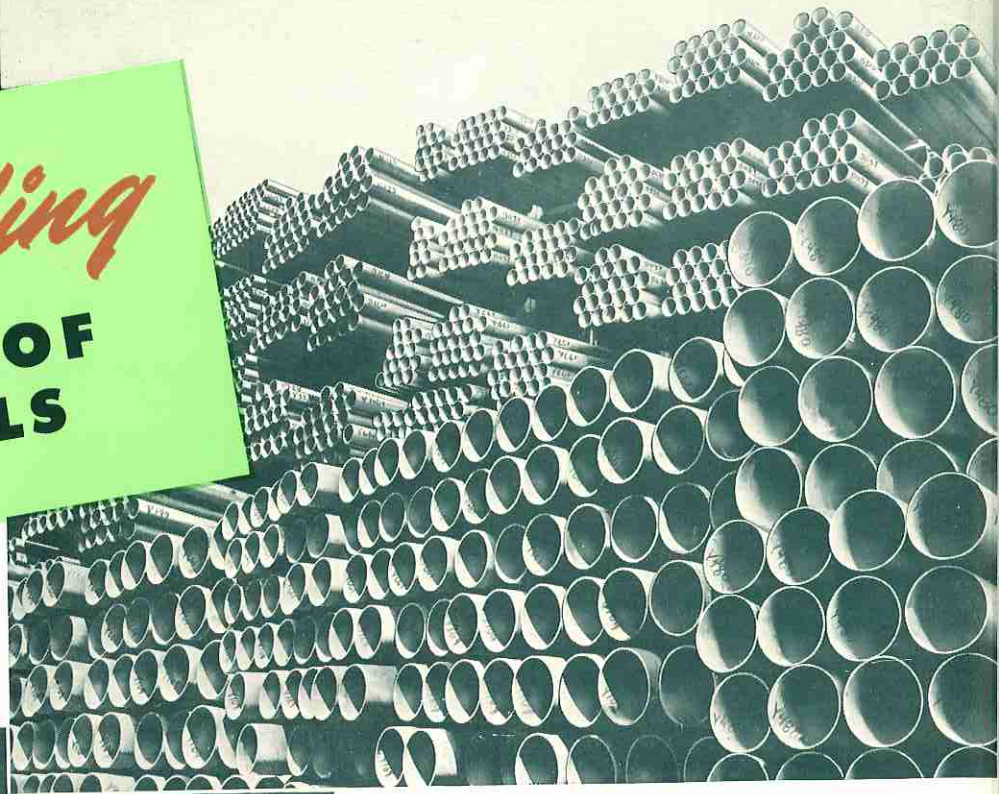


Made effective by modern production facilities . . . manufacturing methods . . . and inspection procedures . . . Controlled Quality maintains high standards of workmanship in the Ladish plant. While evident in material identification, machining accuracy and inspection standards, it also influences every manufacturing detail to assure the uniformly high standards for which Ladish products are known. Many of the methods by which Controlled Quality protects this reputation are illustrated on the following pages.

PROMOTES CRAFTSMANSHIP



Safeguarding **IDENTITY OF MATERIALS**



The ample tubing inventories maintained in the Ladish plant are carefully segregated by size and steel analysis with each length of tubing identified to make it readily available to meet production schedules.

Steel bars, billets and tubing are cut into proper mults by batteries of shears, saws, cutting torches and cut-off machines.

Materials in a wide range of sizes and specifications are stocked in a huge, well-planned steel storage building easily accessible to manufacturing operations.





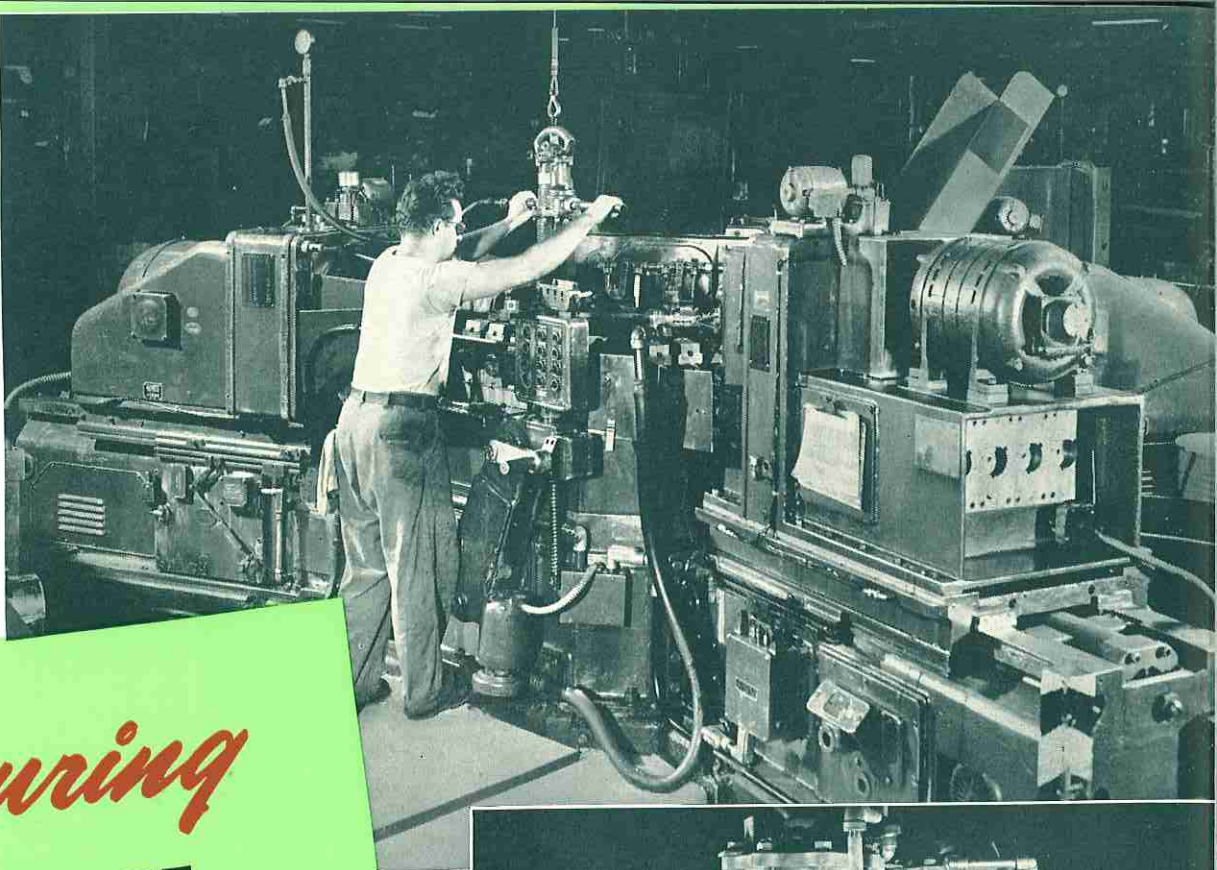
Developing **ADVANCED FORGING TECHNIQUES**

Illustrated here is the world's largest drop forging hammer. It is capable of producing closed impression drop forgings up to 10,000 pounds. Along with a wide range of additional drop hammers, modern hydraulic and mechanical presses, ring rolls and upsetting equipment, it provides Ladish engineers with unequalled latitude in selecting the proper unit to produce the most favorable end result.

Modern heat treating furnaces are a vital adjunct to developing physical properties in the final fittings. Temperatures in Ladish furnaces are accurately and automatically measured, regulated and recorded by hundreds of pyrometers which operate in conjunction with other modern scientific apparatus to assure pre-determined metallurgical qualities.

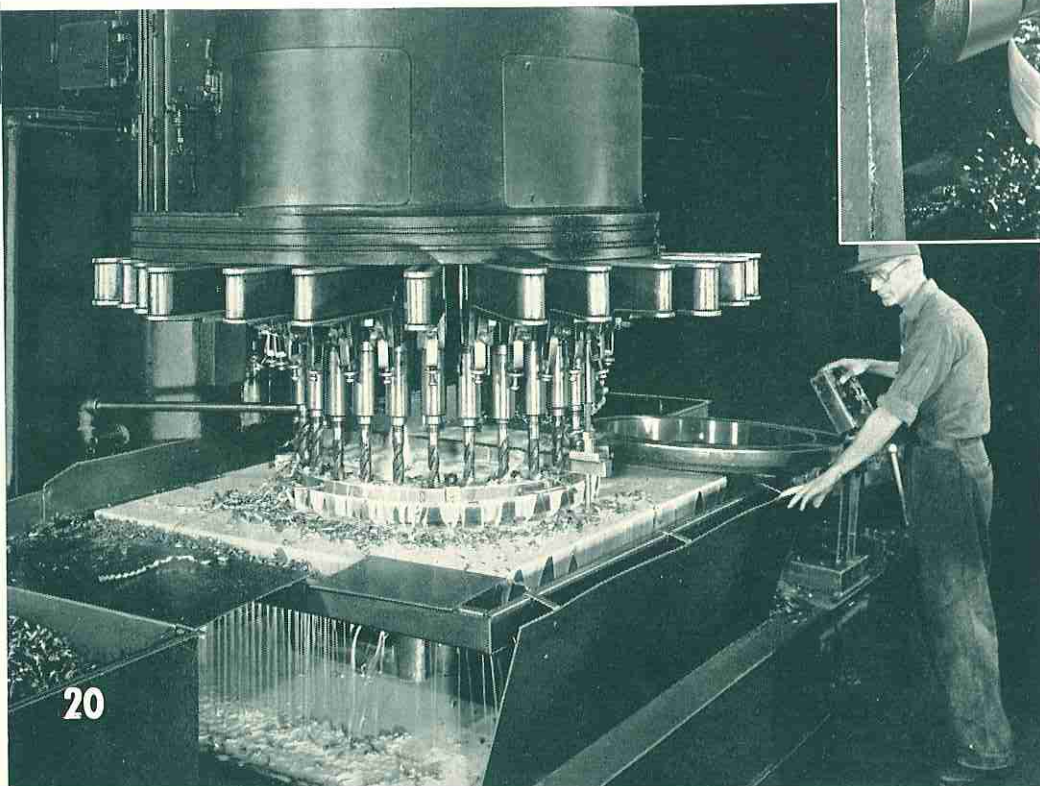
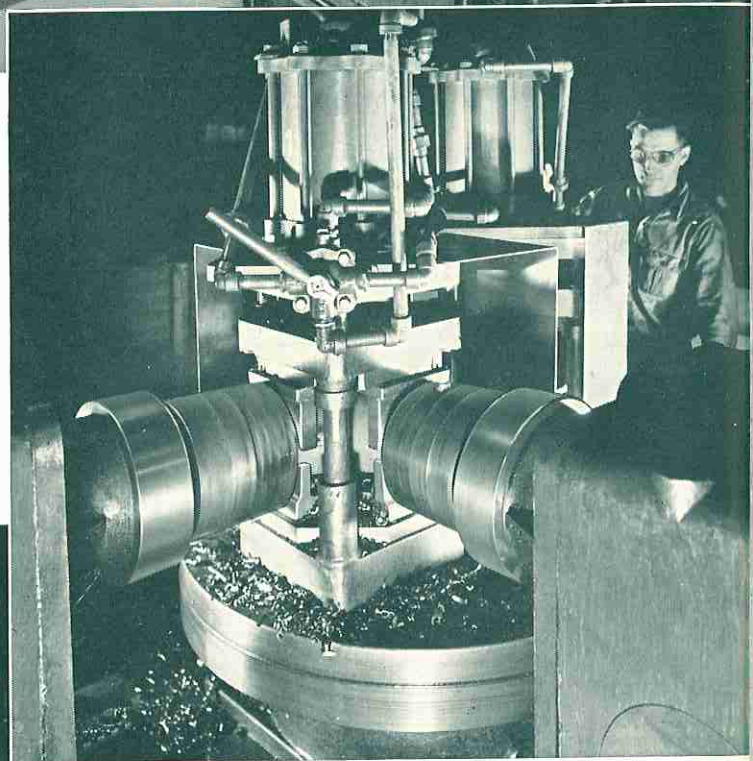


Ladish control of quality is as exacting in the machine shop as in the laboratory or final inspection. Typical of Ladish machining methods is this multiple-head horizontal drilling machine which progressively bores and threads a number of Forged Steel Fittings simultaneously.



Assuring **ACCURATE MACHINING**

Accuracy in drilling bolt holes in Ladish Flanges is maintained by machining all holes in one operation on multi-spindle drilling machines or through use of special indexing jigs. Accurately machined spot or back facings assure square seating of bolt heads and nuts.



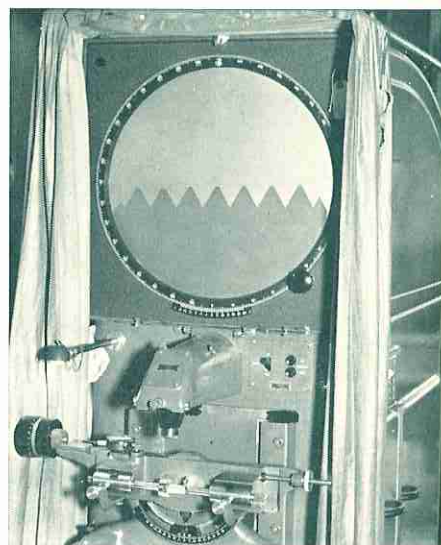
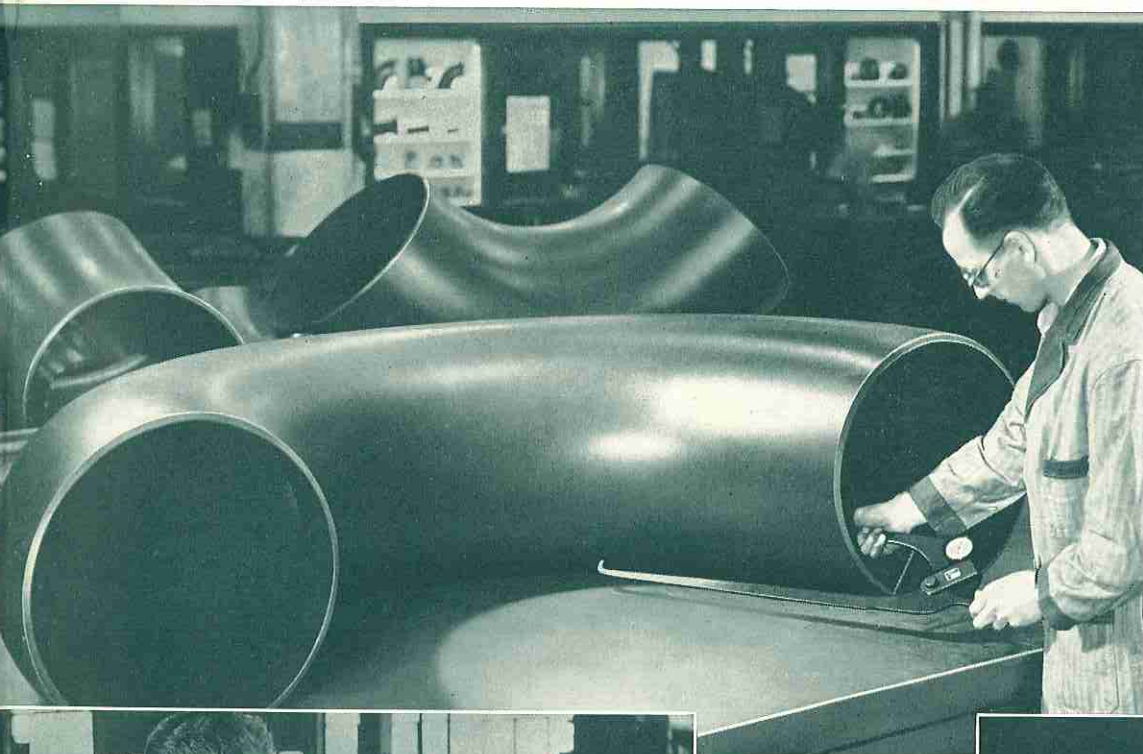
Precision tool jigs combined with modern machine tools assure that Ladish Seamless Welding Fittings are geometrically accurate, have square faces and fully meet specifications as to contour and angle of welding bevel. All Ladish machining operations are in the hands of skilled workmen whose production is checked at the machine and by a final subsequent inspection system.

Attaining **EXACTING INSPECTION**

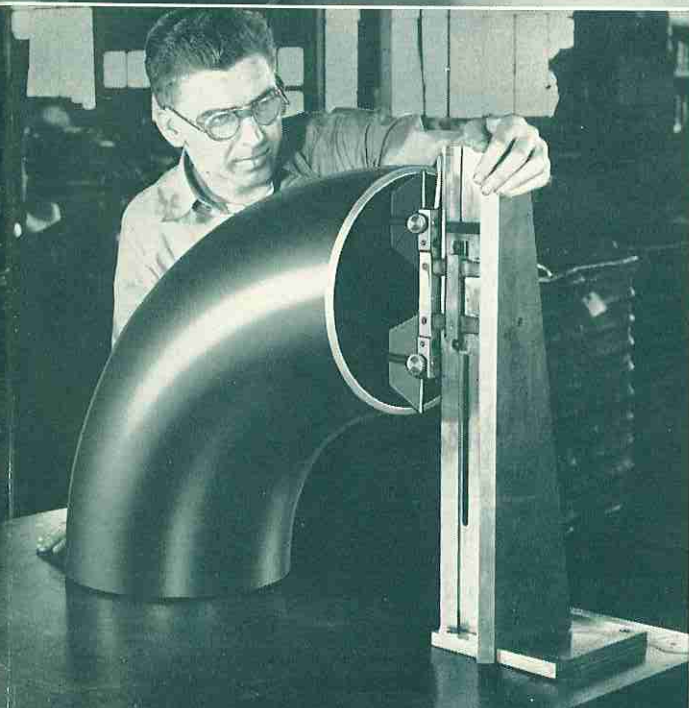
Adherence to dimensional standards is an essential factor in Ladish Controlled Quality. Wall thickness of Seamless Welding Fittings is carefully checked for uniformity and compliance with ASA Standard B 16.9 by special caliper dial gauges.



Evidence of thorough inspection methods is found in this gauging of the socket diameter of Forged Steel Socket Welding fittings. Final inspection completes a series of examinations which maintains Ladish standards of workmanship through all phases of production in full accordance with ASA Standard B 16.11.



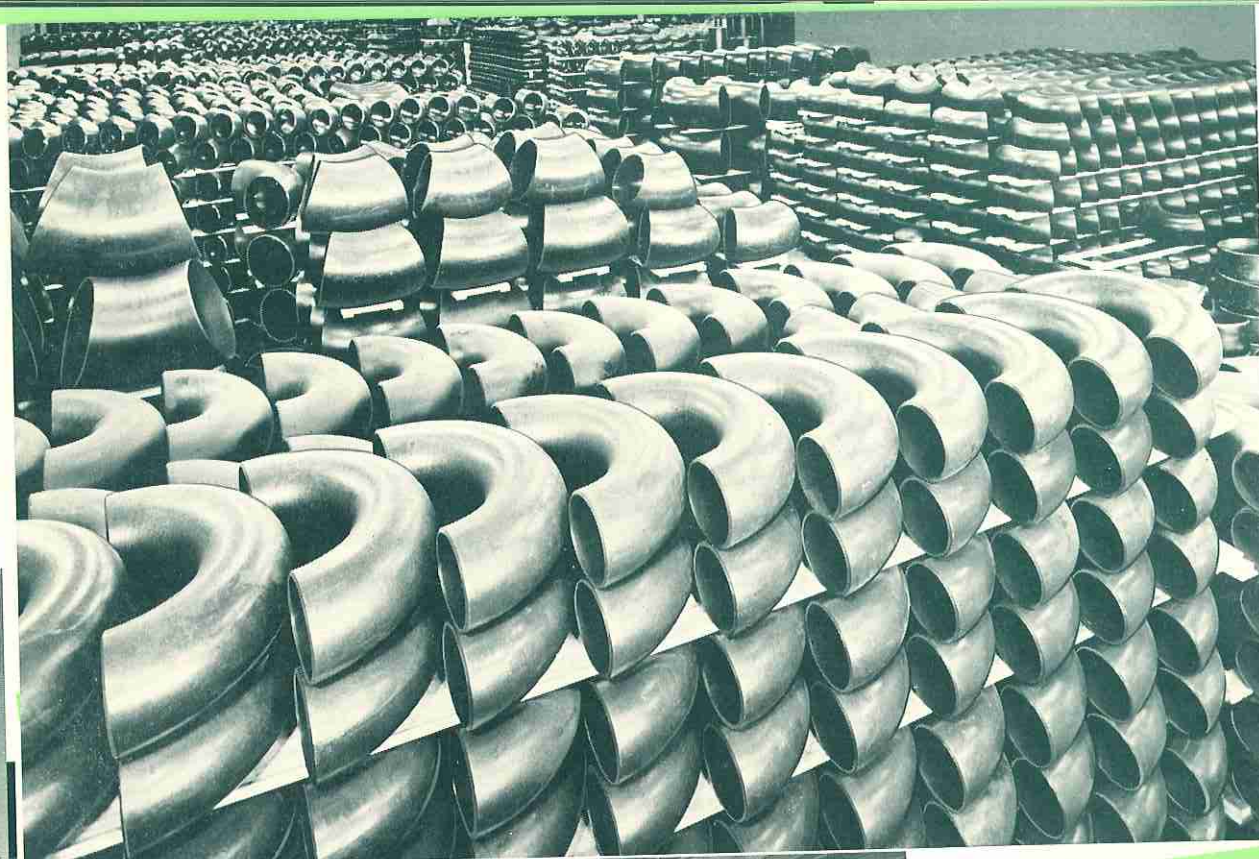
This Comparator provides an accurate means of comparing test pieces to known standards and thus contributes to safeguarding accuracy.



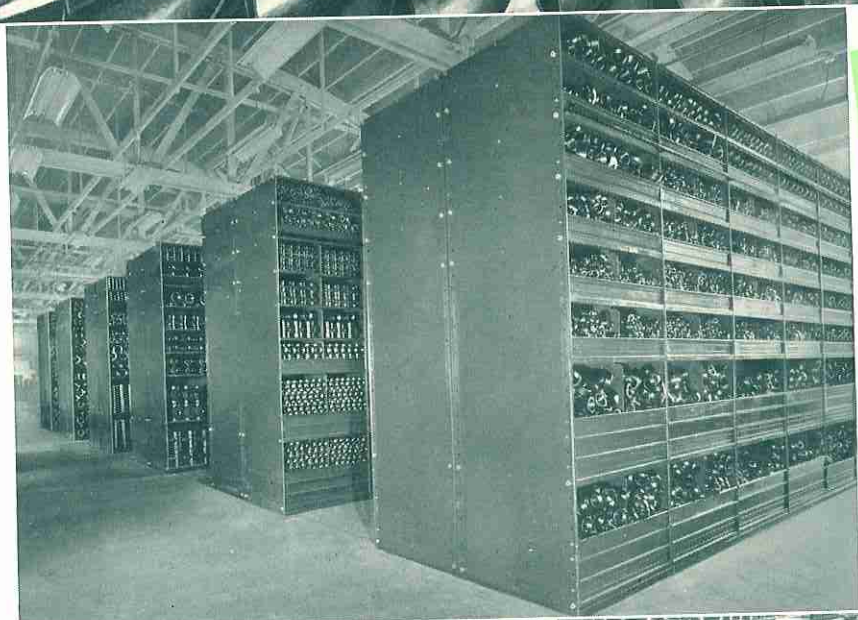
Geometric accuracy of Ladish Seamless Welding Fittings is verified by specially designed gauges.

Ladish inspection methods are made effective by precision instruments which are constantly checked against master gauges.





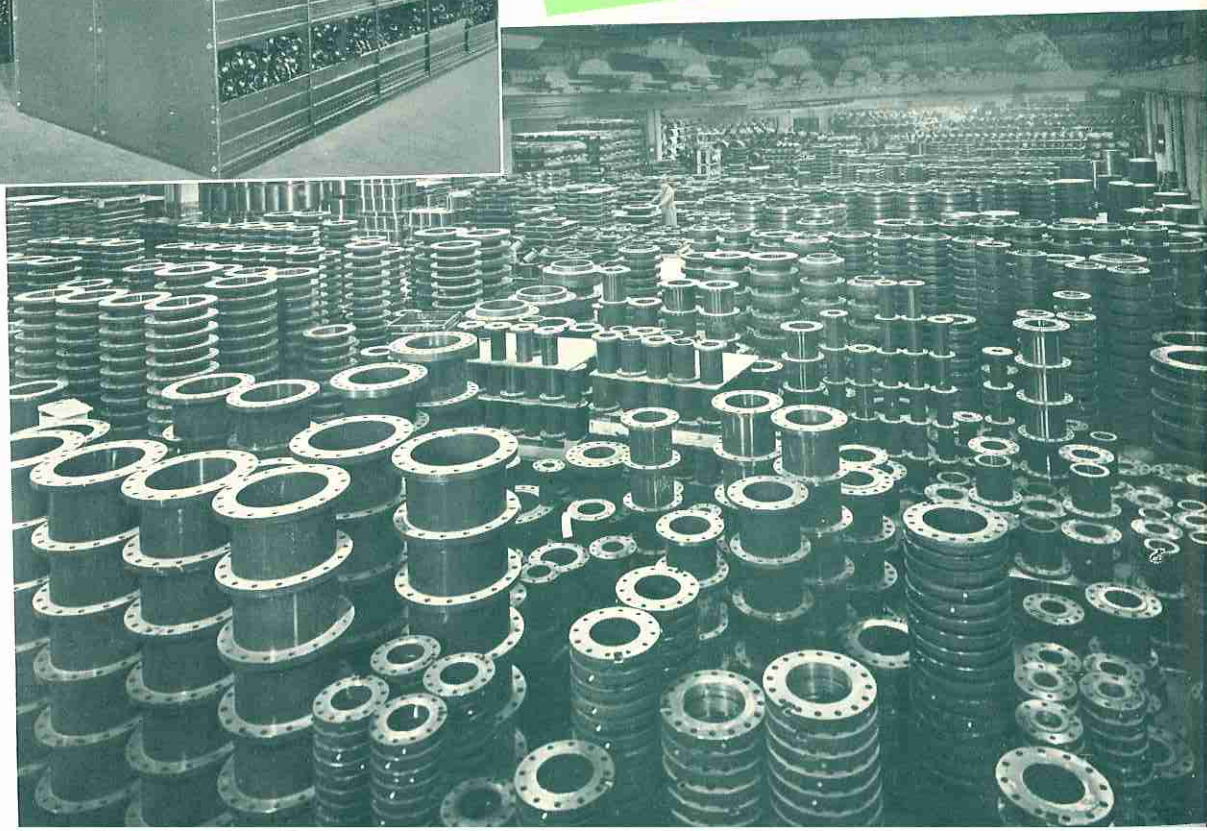
Large factory inventories—supplemented by distributor stocks in principal centers—are your assurance that Ladish delivery schedules are met promptly. Here is a partial view of the extensive stocks of Seamless Welding Fittings on hand at the Ladish plant—stocks which cover virtually every type, size and material requirement.



Forged Steel Fittings in ample quantities are carefully segregated for promptness and accuracy in filling orders.

Whatever your flange requirements in quantity, type or materials, you are sure of prompt service from this complete stock.

Maintaining
**ADEQUATE
FACTORY STOCK**



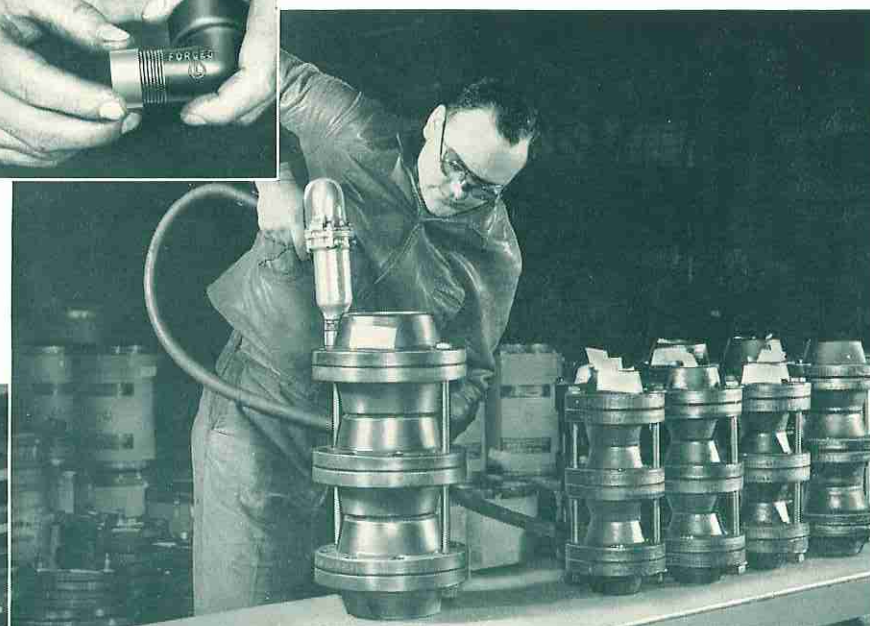
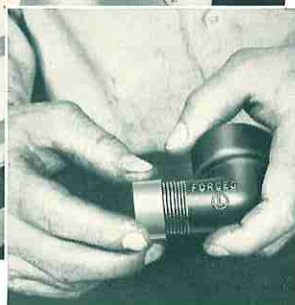
Speeding **SERVICE AND SHIPPING**



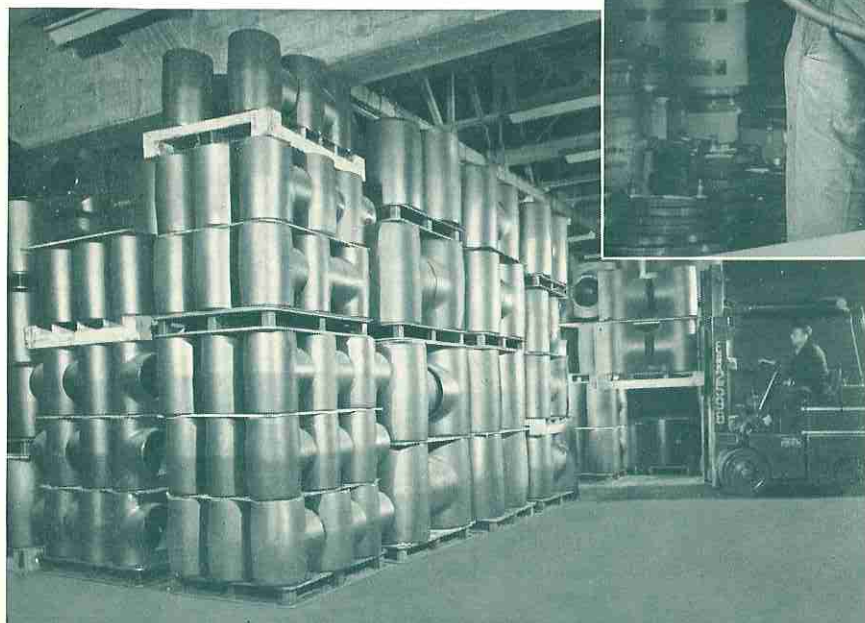
Handling your order expeditiously—taking care that it is packed carefully and filled accurately—is as much a part of Ladish Controlled Quality as laboratory tests and rigid inspection.



An example of the care taken to insure safe delivery of smaller sized Ladish fittings are these shipping containers which provide extra protection enroute and simplify storage at destination. External threads are further shielded against damage by special coverings which are fitted on to protect threads which would normally be exposed.



Bolting Ladish Flanges together into a compact shipping unit protects gasket surfaces and facilitates handling on the job.



Larger Seamless Welding Fittings loaded on pallets are handled from stock floor to loading dock by fork trucks, another instance of Ladish time-saving methods.

Prices and all terms and conditions of sale are established in current price sheets and are subject to change without notice.

All orders are subject to acceptance by Ladish Co. at its home office, Cudahy, Wisconsin, only. No assignment of the purchaser's rights may be made without Ladish Co.'s written consent.

Terms and Warranty

Each Ladish Fitting is warranted to be free from manufacturing defects and will be replaced without charge if failure occurs within one year after date of shipment providing it has been used as recommended and in accordance with recognized piping practice, and providing it has not been worn out due to severe operating service, such as is encountered under extremely corrosive or abrasive conditions. Ladish Co. makes no other warranty, either express or implied. Our liability is limited to our sale price of the particular product. In no event shall Ladish Co. be liable for any consequential damages.



TO MARK PROGRESS

LADISH CATALOG NO. 55

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