

The Milwaukee Road's Role

Systems And Data Processing

In an era of jets and cybernetics, of petrochemical complexes and biochemical research, aerospace projects and other glamorous industries,

why work for a railroad?

There are sound reasons for a railroad career, reasons that too often are overlooked by those outside our industry. High on the list is the chance to break ground, to build, to devise and develop new systems, new ideas, new approaches - instead of just helping to maintain a business. The railroad industry is in ferment, fighting in a hotly competitive field and yet growing, adopting techniques and technology that would have been rejected as unorthodox just a few years ago - and looking for more.

In all of American industry, it would be hard to match the rate of innovation, experiment and research that's now a part of life in railroading. And as we find new ideas and equipment, we're adopting them. In the past few years, the industry has been investing some \$1.5 billion a year for improvements, and especially for new equipment; a billion or more a year is the *usual* level of expenditure.



CURRENT CAREER OPENINGS FOR 1970



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For further information contact

L. E. Long, The Milwaukee Road, Room 738 Union Station Building Chicago, Illinois 60606 Phone CE 6-7600, Ext. 135 Area Code 312 WHY WORK FOR A RAILROAD?

The Milwaukee Road's Role in Railroading's Revolution Systems And Data Processing At The Milwaukee Road

In an era of jets and cybernetics, of petrochemical complexes and biochemical research, aerospace projects and other glamorous industries,

why work for a railroad?

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Admittedly, freights still look like freights, and men wear overalls while working in unpretty freight yards. But a closer look shows that the switchman is testing a new "no hands" walkie talkie; orders come to the yard by micro-wave relay; closed circuit television watches cars while computers count them; the man in the caboose talks to the engineer by VHF radio. Outside of the freight yard, cars of nearly twice the former size and capacity move fast - 60 mph isn't at all unusual anymore. These same cars have brand new cushioning devices, special loading equipment and load-protecting devices in many cases, even if they're still called by the old names: reefer, box car, gondola and so on.

How well we do in our revolution, however, will be decided not by the machinery we use but by people. One of the old-fashioned parts of our business is that it's known for respecting individuality and lots of people like this. There's less chance to be lost in the crowd that can form in one office of one division of one corporation; there's still room in railroading for individuality and individual accomplishment.

There's room to work and room to try out new ideas. Your work is important and what you produce stands out; responsibility and advancement can come early; new ideas are welcomed instead of given lip service and a brushoff, because past procedures and systems are the very things we're trying to get rid of. More than in most other industries, fresh techniques and talents are vital in today's railroading. And we know that innovation is likeliest to come from individuals, operating without fixed limits and pre-conceived opinions, with the freedom and flexibility to try the unorthodox and unheard-of. That's why we put a premium on individual ability.

If you want to work in an atmosphere of excitement and challenge, in an industry that's plunging headfirst into the future, then take time for serious thought about the advantages of a job in today's railroading. Think a little, too, about the advantages of railroading for what it'll be in a decade or more. And, as you look at the other material in this brochure, think about joining one of the leaders in the industry - **the Milwaukee Road**:



The Milwaukee Road's Role in Railroading's Revolution









HOW DO You Engineer The Revolution?

If you take an objective, long-range look at the railroad industry, you'll probably see this: the entire present technology of the industry is being phased out in favor of a completely new technology that's really just beginning to come.

As an example of what we mean, the diesel-electric locomotive is an important and relatively recent innovation —but it's entirely possible that it's on the way out.

Some really major developments have already come to the industry, but most of the foreseeable change is still just on the way. For one thing, consider the changes in equipment or operating techniques that may come as a direct or indirect result of new government-sponsored research into high-speed railroading. This research is just getting underway.

The changes that inevitably are coming will be substantial, significant changes. And this means that many critically important engineering decisions will have to be made in the years immediately ahead. These decisions, involving millions and millions of dollars, will help decide the course that's going to be taken by one of America's most vital industries.

The Milwaukee Road is already busy with many developments that have come as part of the technological change taking place on our railroad. Some examples of what we've been doing are shown on the inside of this card:









Here's a quick look at the size and spread of the Milwaukee Road:

- ----The Milwaukee Road's operating revenues (our equivalent of sales volume) average near a quarter of a billion dollars annually. Of this, freight hauling revenues account for more than \$200 million.
- -We have 15,000 employees and a total annual payroll of some \$140 million.
- -We annually carry 40 million tons of freight, and 6 million passengers, including commuters.
- -The Milwaukee Road operates on 10,500 miles of track that stretch from Chicago and Indiana westward to Omaha and northwest to Seattle.
- —The Milwaukee Road, headquartered in Chicago, serves 14 states: Illinois, Wisconsin, Michigan, Iowa, Minnesota, Montana, South and North Dakota, Washington, Idaho, Indiana, Missouri, Kansas and Nebraska.

The Milwaukee Road's Role in Railroading's Revolution

Here's what's happening



- -Today, our freight cars are longer, with much greater capacity. We're buying box cars as long as 86-feet, where 40-feet was once standard. Covered hoppers carry 100 tons, where just a while ago 70 was standard. Entirely new types of cars are being designed and put into service.
- —Older freight cars are being rebuilt by the thousands; in a short time, we've rebuilt about a fifth of our 36,000 car fleet. Hundreds have been lengthened by as much as 10-feet (or more) and equipped with special new loading and protective devices.
- —Heavier, more powerful, more versatile locomotives are being purchased in volume. Horsepower is up to the 3,600 hp mark—per locomotive unit—and going up in the years ahead.
- -We've completely replaced an old fleet of commuter cars with bright new stainless steel double-deck coaches that are electrically heated and air-conditioned.
- -Our relatively new piggyback service is snatching business away from truckers—while our new multi-level auto carrier cars are winning back a lost market.
- —A new concept—called unit trains—has introduced the single-commodity shuttle service from point-to-point. Only one load is carried per train—coal, ore, grain with no stops along the way between, for example, mine and power generating plant. These high capacity (100 or more car) unit trains, in effect, are high-volume conveyor belt operations.
- --All of this new equipment is moving faster than ever. The Milwaukee's "XL Special" and "Thunderhawk" freights on the Chicago-Seattle run move at almost passenger train speeds on record-setting schedules. When we introduced these trains, we knocked a full **day** off the old schedule—we cut one-third off of the former running time.

In Technology

- —One of the best examples of change is in communications. Our operation now routinely uses micro-wave relay networks; VHF radio for on-train and other communication; direct-line long distance phone systems; automatic teletypewriters; IBM equipment; "walkie-talkies"; regional "data offices" that feed a stream of information to our central computing equipment—and more is coming.
- --We find hot boxes on our freights with automatic scanning equipment sensitive to infra-red radiation; in the old days we had to look for smoke. The Milwaukee was the first railroad with complete detector protection on main lines between Omaha-Chicago and Twin Cities-Chicago.
- —By use of centralized traffic control (CTC), one man controls train movements and passing over hundreds of miles of single-line main track. Automatic block signal systems also control traffic.
- -By using electronically controlled switching and car routing, our big freight classification yards handle thousands of freight cars daily.

Engineering the Revolution

You can tell that our engineering department has been kept busy—and has had a critically important part — in bringing on the revolution. Over a 10,-500 mile system—stretching from midwest to Pacific ocean—there's been lots of engineering done to match the changes in equipment and operations. Consider the problems involved in bringing the revolution to the familiar average, everyday railroad track-to plainold ties, rail and ballast. There's more engineering here than shows. Why? Consider this as an engineering study: On that track, put as many as five locomotive units (with each weighing as much as 132 tons) and behind them a train consisting of perhaps 120 cars, carrying 4,000 or more tons. Now get it all moving at speeds of 60 mph across rivers, through mountain ranges, over flatland and through cities. Make a

2,000 mile trip, virtually non-stop; turn around, come back. And then repeat the cycle, day and night, week-after-week. There's more. Along the right of way, construct—maintain—improve all the supporting facilities, up to and including giant freight yards. Build and maintain bridges over rivers, including the Mississippi and Missouri. Enlarge tunnels. Check grades, curves and elevations to meet needs of higher speeds, heavier equipment, longer cars and greater train length. Allow for such weather hazards as floods, heavy snows in mountains, washouts, and so on.

All of this is a part of routine railroad engineering that just doesn't show much, when looked at by someone outside of the industry. But it's the kind of engineering that is making the revolution work—and making additional changes possible.









Systems And Data Processing At The Milwaukee Road









Putting The "Third Generation" Computers To Work

The Milwaukee Road's initial computer applications were accounting-oriented, with work also in traffic and market research, record keeping and traffic reporting. Major improvements and savings in these areas have been achieved.

Now we have some new IBM 360 System "third generation" computers used to develop and implement new management information systems which can be used for corporate planning and problem-solving.

Here are some projects that are presently under development or being considered.

- Development of data for broader market research activities.
- Measurement and analysis of fixed and variable costs.
- Simulation and linear programming.
- Computer programs for solving engineering problems.
- · Capital investment and cash flow analysis.
- · Forecasting and trend analyses.

One of the problems we face, along with the railroad industry in general, is getting better utilization from cars and locomotives.

The Milwaukee Road has 36,000 freight cars and 800 diesel locomotives operating over more than 10,000 miles of track. Our freight cars, and those belonging to other roads, move daily with any imaginable load to hundreds of destinations on our line or on lines of other railroads. All told, about 45,000 freight cars move over Milwaukee tracks on any given day.

With assets in equipment valued at nearly \$350 million, the problem is how to:

- Provide customers with an adequate supply of cars;
- Expedite car movement through freight classification yards;
- Move traffic efficiently and economically;
- Maintain schedules and objectives;
- · Take full advantage of specialized equipment.

The answers to improved utilization will come from people capable of studying the problems, planning new courses of action, and making use of new techniques and computer systems.

College graduates and others who have joined us in the past have gone right to work on these problems. However, we need more people with imagination, creative ability and a desire to excel and grow. Our EDP usage has been very productive to date, but the new generation of computers will bring a new era in railroading. It will bring a need for additional people who can exploit the potential of EDP applications and systems and procedures work.

CURRENT CAREER OPENINGS FOR 1970

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CURRICULUM CUIDE*	Field 2	Structural Bruchtering	Mechanical	Signals .	Tests mications	Cost Ro.	Indus. o	Systems	Accto	Sales & Finance	Pricing	Operation	Purchas
ACCOUNTING							X	X	X				X
BUSINESS ADMINISTRATION							X	X	Х	Х	Х	X	X
ECONOMICS							Х	Х	Х	Х		X	
ENGINEERING-													
CIVIL	X	Х					X						
ELECTRICAL		X	Χ	Х	X		2,46						
GENERAL.	X		Х				Х		-				
INDUSTRIAL	X		X			X							
MECHANICAL	X	Х	X		X								
MECHANICS	X	X	X										
TECHNOLOGY—													
CONSTRUCTION	X	X					X						
ELECTRONICS			X										
INDUSTRIAL						X				X		X	
MECHANICAL	X	X	X		X								
FINANCE							Х		X				
INDUSTRIAL ADMINISTRATION									X	X		X	
LIBERAL ARTS								X		X		X	
MARKETING							X			X	X		
MARKET RESEARCH							X			X			
OFFICE MANAGEMENT									X			X	
PERSONNEL & INDUSTRIAL RELATIONS							X			X			
PRODUCTION MANAGEMENT										X		X	
PURCHASING													X
REAL ESTATE							X						
SALES MANAGEMENT										X			
STATISTICS							X	X					
TRANSPORTATION AND PUBLIC UTILITIES							X	X	X	X	X	X	
	All statements									-	-		-

🛠 Even if you don't see your curriculum on this general chart, we want you to contact us if you have an interest in a career with the Milwaukee Road.

THE BUSINESS OF MANY BUSINESSES

Whether you're certain or uncertain about your choice of a career or specialty . . .

Whether you're interested in railroads as such, or not . . .

Whether you're interested in business administration, law, labor relations, corporate finance, accounting, engineering, data processing, advertising, construction, communications, traffic, market research, sales, warehousing and distribution, electronics, real estate, agriculture, forestry, geology or similar fields . . .

You can find an excellent career with the Milwaukee Road. All of the fields that we've mentioned are an important part of our daily operation.

We have this variety because a railroad is not just a railroad; it's a business of many businesses, closely tied to all of industry, agriculture, commerce and manufacturing. Name a raw material, finished product or food—and we're undoubtedly carrying it.

Then, there's a great diversity within the Milwaukee's own operations. To give you an idea of this diversity, let's note that the Milwaukee Road owns more buildings—and has a larger police force—than you'll find in many small towns; operates barges and builds bridges; owns more trailers than many trucking firms, and serves more meals than many restaurants. Our car building and repair shops are big enough to be an industry within an industry.

Because of this size and diversity, we usually have openings in our departments so that a varied choice of fields is open to the college-trained man or woman.

When you join the Milwaukee Road, you're not necessarily fixed in your career. It's common procedure to transfer men from department to department so that a broad knowledge of company operations can be had. This is an advantage that we offer to the college graduates who aren't yet certain about a lifelong career, or for those who may develop new abilities and interests as they work. At the Milwaukee, you can find the room to develop, to grow and to move to new work in the many fields open to you. To help with this further development, education and training, the Milwaukee Road has a Tuition Refund Plan available to all regular, full-time employees.



An equal opportunity employer.

ENGINEERING:

In an age of push-button classification yards, electronics, microwave relay, VHF radio, closed-circuit television, improved metal technology, higher speed operation of heavier, longer trains, and mechanized track maintenance, railroads have a steady need for trained engineers in such fields as **electrical**, **mechanical** and **structural engineering**.

In the civil engineering field, the graduate entering railroading usually specializes in one of two broad fields: structural engineering or field engineering. For the student not yet graduated, co-op trainee programs are available in these fields.

STRUCTURAL ENGINEERING deals with planning, design, construction and maintenance of the hundreds of bridges, buildings and other structures used by the Milwaukee Road. We presently have need for several civil, mechanical or architectural engineers. A graduate mechanical engineer is needed for electrical, heating and air conditioning design. Also needed is a graduate architect with training or interest in mechanical engineering.

Positions are also open for non-graduate technicians in such jobs as draftsmen or estimators.

FIELD ENGINEERING is concerned with the planning, programming, scheduling and budgeting of projects involving roadbeds, track and physical property. Openings are now available for several graduate civil engineers.

DIVISION OFFICE LOCATIONS for civil engineers are often available in addition to those at the Chicago headquarters. Our division offices are at Tacoma, Wash.; Deer Lodge, Mont.; Aberdeen, S. D.; Austin, Minn.; La Crosse, Wis.; Milwaukee; Bensenville, III.; Savanna, III.; Perry, Ia.; and Minneapolis.

SIGNALS AND COMMUNICATIONS requires a graduate electrical engineer with specialties in electronics or computer sciences, for work in design, development, specification, construction and operation of advanced signal and communication systems.

Current projects underway include computerized message switching; automatic car identification; VHF radio network and controls; computer controlled retarder yards; infra-red hot-box detectors; electronic motion detection; solid-state overlay and grade crossing control systems; and CTC and interlocking systems.

Two-year engineering technician graduates are required for assignments in signal and communications drafting and design, and to train for later promotion to positions of inspector and field supervisor.

ELECTRICAL ENGINEERS also are needed for employment on the approximately 650 miles of electrified lines that the Milwaukee Road operates in Washington, Idaho and Montana. This is the longest electrified operation of any railroad.

MILWAUKEE ROAD SHOPS have openings for mechanical and electrical engineers interested in work that involves diesel locomotive testing; design of freight and passenger cars; planning and administration of equipment maintenance; investigations of special equipment; cost estimation; and comparable activities. Co-op programs are also available. Our shops are located in Milwaukee, Wis.

TESTING LABORATORIES at the Milwaukee Road shops offer opportunities for **electrical** or **mechanical** engineers interested in research; quality control; performance control and testing; accident and equipment failure investigations; equipment design and modification studies; and other work in testing and industrial engineering. This department is responsible for testing mechanical equipment including diesel locomotives, and for quality control of the railroad shop work.

INDUSTRIAL ENGINEERS are needed in the cost research section of the management services department to support the railroad's pricing activities, conduct special studies and analyses, and support the cost reduction and control programs of all departments. Industrial engineering techniques are used in simulations of terminal, train, equipment and maintenance operations to provide guides for management decisions.

SYSTEMS AND PROCEDURES:

Systems and procedures, as a part of the management services department, participates in corporate study and planning activities. It works in close coordination with data processing operations, also a part of the department.

Systems analyst applicants should have a background in one of these fields: business administration, preferably with a minor in transportation; accounting; finance management; mathematics; industrial engineering; economics; or physics.

The systems analyst, after indoctrination in our present systems and data processing methods, will be assigned to a project team. As part of this job, analysts may become involved in making a systems study in any of our departments and thereby can acquire a wide knowledge of management, operations, equipment, planning, scheduling and other matters.

For a full description of this work, please see the card entitled "Systems and Data Processing at the Milwaukee Road."

INDUSTRIAL DEVELOPMENT:

This department is important in adding to our business volume by working to locate industry and to develop industrial sites on our line. Candidates for a position in this department should have abilities in salesmanship and public speaking, as well as civil engineering. An industrial development representative must be a salesman-engineer, capable of working closely with architects, Chambers of Commerce, construction engineers, industry executives, traffic managers, government representatives and others.

ACCOUNTING/FINANCE:

Desirable opportunities to move ahead fast are occurring frequently and at all levels in our accounting and finance department because of expanding functions and responsibilities, upgrading of personnel and operations, and the establishment of new levels of management. These things are happening primarily because of such developments as the use of EDP and systems and procedures methods. The result is that recognition and the responsibility for important work can come early, whether your interest is generally in business, management, finance or economics, or more specifically in accounting, budget or audit.

Our accounting and finance department trainees usually begin as internal auditors, doing work that immediately provides significant, useful experience in the broadest areas of the railroad's business.

For further information contact

L. E. Long, The Milwaukee Road, Room 738 Union Station, Chicago, Illinois 60606 Phone CE 6-7600, Ext. 135 Area Code 312

It is work that calls upon the use of skills from virtually all of your college courses, including accounting, business law, report writing or statistics.

After a short, carefully planned and proven training program in Chicago, internal auditors may be assigned in that city or to Milwaukee, Minneapolis or Seattle. Auditors often work individually, although they are assigned to an overall group that has specified duties. An auditor's function includes making independent audits of various offices, examining agency operations, or investigating labor and material expenses of engineering crews. It also involves work with other auditors on such major engagements as making examinations of the cash account, payables, receivables or of material and supply inventories.

Each auditor works under the guidance of an experienced supervising auditor, who has, as a primary responsibility, the job of seeing that auditors are coached and assignments planned so as to give each auditor the best chance for professional growth.

Our internal auditors participate in meetings of the Association of American Railroads and the Institute of Internal Auditors, as well as other professional organizations. The work, experiences, associations and rewards of internal auditing provide a very satisfying career in itself, as well as an excellent background for supervisory and management positions.

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Because railroad sales does not involve a product, a Milwaukee Road sales representative primarily is concerned with offering service to a customer. He not only helps provide a wide range of companies and industries with the transportation they need, but also becomes involved in solving the total physical distribution problems of the customer. This includes aiding in the development of new rail services needed by a changing, modern industry. Because of the service element in this work, the Milwaukee's sales personnel are backed up by a full array of customer-oriented service facilities, including detailed marketing research, product sales specialists, costing research, pricing and a computer-centered reporting/communications network. Applicants should have academic training in marketing, economics or business administration.

TRAINING PROGRAM—A six-month program engages the trainee in discussions with company officers, a survey of the physical plant and in marketing research, which requires contact with many departments of the railroad and familiarization with overall operations. The trainee spends about six weeks in a formal training program which is followed by a $41/_2$ month learning process of supervised participation in departments at various points on the system.

After the program, the trainee may be assigned as a sales representative at one of our 54 sales offices, located within the 14 states we serve, as well as in most major cities in the United States or Canada. We also have a newly established international sales office in Tokyo.

RATES and DIVISIONS (PRICING):

Pricing - the setting of rates and charges for the services the Milwaukee provides its customers - is especially important in a time when new rail services are being developed and when competition is keen within the transportation industry. Today's traffic

patterns, involving rail and other modes of transportation, require better techniques for determining the correct rates to charge. This is why pricing now relies on thorough, sophisticated costing research and market research, and careful analysis of traffic movements and trends.

Applicants should have training in marketing, business administration or transportation.

TRAINING PROGRAM — A special program, designed to prepare applicants for a career in pricing in our rates and divisions department, begins with 6 weeks in the marketing research department where trainees are actively involved in costing, market research and pricing. Afterwards, the trainees are engaged in supervised participation with departmental and company officers so that the trainees become familiar with general rate making activities. During this period they also attend the very important rate association meetings, at which rate determinations are made. The trainee has contact with many departments of the railroad during the program so that he gains knowledge of all areas of company operations.

On completion of the program, the trainee will be assigned to pricing work in the rates and divisions department at either Chicago or Seattle, with specific assignments in the area of developing new pricing.

OPERATIONS/MANAGEMENT

Positions are available in our operating department, which, as its name indicates, is the section of the company directly involved with operating and scheduling trains. Also within this department are transportation, which controls the assignment and utilization of equipment, and car location and expediting; safety; police, and fire prevention; mechanical departments; and freight claim prevention.

Applicants may be selected for an **operations management training program** which provides a broad background and preparation for possible appointments to junior management positions such as assistant trainmaster. This training takes the applicant into all areas of company operation. The program includes orientation in road train operations, terminal freight yard operations, switching, equipment repairs, maintenance of property, car tracing and many others.

It should be noted that many operating department positions call for work at irregular hours, for outdoor work in any weather and may be subject to relocation and travel. Good physical condition and stamina are prerequisites for operating department positions.

PURCHASING

Purchasing is one of the largest and most important activities at the Milwaukee, involving as it does sizeable amounts of money and a huge volume of supplies and stores which must be kept in stock. For example, acquiring new locomotives and freight cars can total as much as \$50 million or more; in a year, the Milwaukee may spend as much as \$10 million just for locomotive fuel. Data processing techniques have been extensively adapted to both purchasing and inventory control because of the volume and importance of the work.

Applicants, preferably with a degree in business administration, are needed for work that is related to material purchases and handling, and, in addition, inventory control work.



