

TRAINING & EMPLOYMENT

FRENCH DIMENSIONS

A NEWSLETTER FROM CEREQ
AND ITS ASSOCIATED CENTRES

The Outlook for Work and Qualifications in the Chemical Industries

THE profound changes affecting **work**, particularly in manufacturing, make heavy demands on operators and supervisors. But the continued workforce cuts that accompany the reduction of the hierarchical ranks noticeably limit career possibilities. In such a context, the instruments of job management, notably classification **systems**, may prove to be increasingly outmoded. Recruitment criteria encouraging the hiring of young initial training graduates for **each** job level will only accentuate the "bottleneck" in the promotion and career systems. There is a **need** for new forms of mobility that would **take** into account the degree of technical and occupational expertise acquired by employees through their work experience.

PROFOUND TRANSFORMATION OF WORK

TECHNOLOGICAL changes, contributions of science through better understanding and measuring of process activities, restructuring of functions,

particularly **with** new forms of production management and the pursuit of total quality all combine to stimulate major changes **in** two main areas of production activity: manufacture and packaging. Supervisory functions are undergoing notable changes.

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CONTENTS

THE OUTLOOK FOR WORK AND
QUALIFICATIONS IN THE
CHEMICAL **INDUSTRIES**

- Profound Transformation of Work**
- Pursuit of Workforce Reductions**
 - a **Careers: A Decisive Issue**
CEREQ BRIEFING
 - a **Formation Emploi: A New International Orientation**
- Recent CEREQ Publications**
 - a **Articles Published in Formation Emploi**

CEREQ

A FRENCH RESEARCH CENTRE
FOR ANALYSIS OF OCCUPATIONS AND OF
VOCATIONAL EDUCATION AND TRAINING

**TABLE 1: CHEMICAL INDUSTRIES PRODUCTION CHAIN
(SCOPE OF FORECASTING STUDIES CONTRACT)**

Chemical * Manufacture	Formulation	Packaging
HEAVY CHEMISTRY	FINE CHEMISTRY	PARACHEMISTRY
•large intermediaries	•active principles	•products for industry (1) households (2)
•large quantities	•limited, variable quantities	•small quantities (1) •large quantities (2)
•stable products*	•unstable products* by campaign and lots	•very diversified products
•continuous process	•sequential processes	•processes generally sequential
•large specialised plants	•medium or small plants (specialised or polyvalent)	•small, medium plants
•highly centralised automation	•flexible, decentralised automation	•partial mechanisation and automation
•technical nature++++	•technical nature+++	•technical nature+
•flexibility+	•flexibility+++	•flexibility++++

(*) In the economic sense of the terra

Source: CEREG Forecasting Studies Contract-CHEMICALS

I Changes in the Manufacture of Chemical Products

This function is faced with the emergence of activities based on a profoundly altered logic of operator intervention. The development of automation increasingly limits direct interventions in favour of surveillance and anticipation of the process. Such an activity implies: an understanding of the chemical transformation process, the interpretation of available information for the purpose of preventive and corrective interventions in this process; the use of laboratory testing in order to verify the result of the preceding stages of transformations; the ability to diagnose the causes of malfunctions and the kind of maintenance to be sought as a result.

The issue here is not **multifunctionalism** but a real professionalisation that requires **multidisciplinary** aptitudes. It will not take the same forms for totally automated and continuous processes (generally heavy chemistry) as for processes that are partially automated and sequential for economic and technical reasons (generally fine chemistry). In the latter case, in addition to surveillance activities there is a need for direct intervention on the equipment (cleaning and reconfiguration).

This insistence on the professionalisation of the work, which is sometimes only at the planning stage, is linked to or even conditioned by the nature of manufacturing processes employed. It will, for example, assume a more technical form at the beginning of the transformation chain (chemistry) and a more commercial one at the end (**parachemistry**), which is particularly significant in packaging activities.

I Professionalisation of Product Packaging Activities

The automation of the packaging of finished products (cosmetics, paints, herbicides, pesticides, etc.) entails an even greater transformation of the activity since it is associated with a **kan-ban** type of organisation. It

requires the operator to perform regulatory/managerial tasks based on the mastery of multifunctional competences: **initiating** the process, changing formats, operating the machinery and the assembly line, controlling quality, etc. The emerging professionalism is that of managing a production system that goes beyond a simple reconstitution of tasks.

I Reorganisation of Maintenance Activities

Increasing computerisation of production processes and their management is leading to a reorganisation of the maintenance function. This reorganisation includes: **reintegration** into the production sites of maintenance activities tied to the upkeep and development of regulation and automation mechanisms, the closer cooperation of maintenance and manufacturing functions through the decentralisation of maintenance teams among the production units (heavy chemistry) or through the transfer to production staff of some tasks concerning primary maintenance or adjustment of installations (**parachemicals**). Maintenance is thus undergoing a redefinition, whereby its activities tend to be shifted towards more advanced, specialised technical interventions as well as towards a monitoring role in relation to manufacturing.

I Supervisors: Super-Operators or Technicians?

The management of a functioning productive system carried out by the production operator, as described above, cannot be identified with a technician's activity as it is carried out by a maintenance agent assigned to a production unit. These two categories may draw on certain shared basic knowledge, but in very different ways. For the technician, this knowledge is used to repair or develop part of the technical system. The analysis and the intervention that he has to carry out are based on defined, formalised operating schemas, which means that he has recourse to advanced, specialised knowledge.

The operator is placed in a very different situation. He has to use less specific but more diversified kinds of knowledge, in real time, in order to carry out an action that responds to a complex, unanticipated situation. The fact that he is faced with different kinds of unpredictable situations means that his approach is more inductive.

In fact, these two approaches correspond to two different profiles, and this cannot be regulated solely by a change in the levels of the diplomas or the status of the jobs. The activities of the operator and the technician correspond to two different forms of using knowledge.

Training-Employment relationships are not as strict in France as they are in other countries such as Germany. Obviously, the diplomas recognised in the collective branch agreements define a classification level that is generally respected by the firms. This qualification, however, does not correspond to a precise activity content. Thus, a Level III diploma (Skilled Technician Certificate or DUT in chemistry) leads to a "technician" classification, but this can entail working as a manufacturing operator together with the skilled workers or carrying out technical functions outside the manufacturing line. Another particularity of the French system is the fact that the recognition of skilled workers in chemical manufacturing took place quite early: it dates from the PARODI agreements of 1945.

Which of the two profiles will be called upon to fill supervisory jobs in the years to come? This is the big question. The future of the supervisor category itself is far from being defined. It will depend largely on the extent of professionalisation of the operators and the relations that supervisors develop with them. Basically,

their activity will be distinguished by a broader space and a longer lead time than those of the operators. The reinforcement of roles involving co-ordination and direction of work teams and the assuming of responsibility for economic and technical management will probably accentuate the trend towards reduced numbers of hierarchical ranks.

Forecasting Studies Contracts

The forecasting studies contracts (contrats d'études prévisionnelles, or CEP) are intended to analyse, on the level of one occupational branch, the anticipated changes in employment and qualifications. Created in 1989 on the initiative of the French Ministry of Labour, Employment and Vocational Training, this programme is characterised on the one hand by joint funding by the national government and the employers' organisations) of studies commissioned from research bodies and consultants, and on the other, by the desire for social dialogue. [For a more detailed explanation of the CEPs, see Training and Employment n° 10, Winter 1992.]

PURSUIT OF WORKFORCE REDUCTIONS

THESE changes in work are accompanied by sharp reductions in jobs. In the decade between 1980 and 1990, the chemical and paracheimical industries lost 225,000 jobs (- 15%). This drop, which is less severe than in the industry as a whole (- 22%) has led to sharp productivity gains (+ 48% in the 1980-1988 period, compared to + 29% for the industry), which remain far from being compensated by a sufficient increase in the volume of production. More specifically, between 1982 and 1990, industrial employment in production dropped more than 8 percent (as indicated by data from the last two censuses). The decrease in the number of workers is the result of a double process of elimination and creation of jobs that firms have used to accompany and consolidate technological and organisational changes. This means that many retirees are not being replaced, and recruitments are aimed at young people with higher degree levels. (1) The reduction of jobs has particularly become the rule in the management of workers over forty years of age. Unskilled workers have lost most in these restructuring movements: not only have their work stations been eliminated when they retire, but the retirements themselves have been accelerated by the organisation of departures toward unemployment or pre-retirement programmes compensated by the government.

• Balance of Recruitments and Dismissals (BRD) 1982-1990 by Age, Socio Occupational Category (SOC) and Degree Level (2)

Age	under 25	25-30	30-40	40-50	50-55	over 55
BRD	13,368	15,032	7,840	-4,044	-2,642	-7,742

SOC	Engineer	Technician	Supervisor	Skilled Worker	Unskilled Worker
BRD	9,040	6,008	3,548	6,328	-3,112

(1) This kind of substitution is all the more easily accomplished in France because, unlike other countries, there are no laws dictating "Last hired, first fired". Furthermore, in the first half of the 1980s, the government instituted changes in this direction through the "solidarity contracts", which were mainly used by the large groups.
(2) See the box on degree levels.

Degree level	I and II	III	IV	V	VI
BRD	5,904	5,256	4,868	12,042	-6,240

Source: 1982 and 1990 Census, adapted by CEREQ

• Retirements (Rt) 1982-1990 by Socio-Occupational Category (SOC) and Degree Level

SOC	Engineer	Technician	Supervisor	Skilled Worker	Unskilled Worker
Rt	3,816	2,216	6,164	13,464	12,608

Degree level	I and II	III	IV	V	VI
Rt	2,068	372	2,012	3,952	29,864

Source: 1982 and 1990 Census, adapted by CEREQ

• Workforce Fluctuation (WF) 1982-1990 by Socio-Occupational Category (SOC) and Degree Level (3)

SOC	Engineer	Technician	Supervisor	Skilled Worker	Unskilled Worker
WF	5,224	3,792	-2,616	-7,136	-15,720

Degree level	I and II	III	IV	V	VI
WF	3,836	4,884	2,856	8,072	-36,104

Source: 1982 and 1990 Census, adapted by CEREQ

Definition of Degree Levels

- Levels I and II Personnel holding Jobs requiring a degree equal or superior to that of the *licence* (bachelor's degree) or that of engineering schools.
- Level III Personnel holding Jobs requiring a *brevet de technicien supérieur* (BTS, higher technician diploma) or a degree from the University Institutes of Technology (IUT) or the end of the first cycle of higher education.
- Level IV Personnel holding jobs requiring a *baccalauréat*.
- Level V Personnel holding jobs requiring a *brevet d'études professionnelles* (BEP, vocational studies diploma) or a *certificat d'aptitude professionnelle* (CAP, vocational aptitude certificate).
- Level VI Personnel holding jobs not requiring any diploma beyond a certificate of elementary school studies.

Note: These definitions are the product of an adaptation of standard degree nomenclature to the censuses of 1982 and 1990. In particular, this has entailed including all forms of *baccalauréats* in Level IV.

Concentrated among workers, job reductions have particularly affected the beginning of the transformation chain (heavy chemistry) and spared the end (hygiene products), where greater demand has compensated for the effects of increased productivity. In the future, these tendencies will continue as a consequence of technological changes, scientific contributions and organisational restructuring.

(3) WF = BRD - Rt.

TABLE 2: CHANGING NUMBERS OF INDUSTRIAL JOBS IN THE CHEMICAL INDUSTRIES (1984/1989 in %)

	Heavy Chem.		Fine Chem.		Parachem.		Paints, Ink		Health Prods.	
	84	89	84	89	84	89	84	89	84	89
Engineers	5.8	6.6	7.8	9.4	8.2	9.7	8.9	11.1	5.9	7.6
Technicians	7.6	9.1	9.6	13.4	8.5	9.6	8.3	9.2	6.6	7.5
Supervisors	12.6	14.0	9.4	10.0	6.9	7.4	7.8	6.7	4.2	4.4
Skilled Workers	58.8	56.6	59.4	57.6	51.5	53.8	48.6	48.7	37.4	34.6
Semi and unskilled Workers	15.2	13.8	13.9	9.6	24.9	19.5	26.4	24.3	45.9	45.9
Total	65,942-57,444		30,459-26,819		36,332-33,143		12,668-12,215		19,669-22,656	

Source: ESE/UNEDIC, adapted by CEREG

Manufacturing will be particularly affected by the ongoing computerisation of procedures. This process will slow down at the beginning of the transformation chain (basic chemistry) but it will spread in areas of production that have been more recently affected such as fine chemistry and above all, general **parachemistry** (paints and hygiene products). New generations of equipment will have to overcome the constraints posed by the ongoing discontinuous nature of **certain** procedures and the variability of products with shorter life spans. Unskilled and low-skilled jobs will be the most affected by job losses that could only be limited by a very favorable change in demand.

Packaging will also be subject to greater automation, particularly in those activities whose products are intended for final demand (**paints**, health products, etc.). The scope of workforce reductions will depend on the numbers of small enterprises that remain.

Maintenance will begin to undergo **rationalisation**, especially in the large plants devoted to heavy and fine chemistry, and this will accelerate with the development of computer-assisted maintenance management. The resulting workforce **reductions** could be compensated by the resumption of maintenance activities that were subcontracted during the 1980s.

Job reductions in quality control and service units, which have until **now** been relatively protected, are also to be expected.

CAREERS: A DECISIVE ISSUE

THE increasing recourse to young degree-holders is becoming somewhat contradictory in relation to the old system of gradual **qualification** of workers through experience and seniority (the internal market). The number of grades that these degree-holders have ahead of them is in fact reduced. In **addition**, the reduction of hierarchical ranks and the rationale of workforce cuts automatically lead to a decrease in the career opportunities offered to them.

I Recruitment Criteria and Careers

The old workers with little training started at the bottom of the worker track and advanced according to their experience. The new degree-holders who enter in the middle of these tracks will now have much more limited hopes of promotion: for example, the worker with a diploma for operating manufacturing equipment in the chemical industries has only two grades to advance after he is hired.

In the 1980s, **continuing training** played an important role in this sector by creating promotions towards skilled worker and technician jobs and thus adapting the personnel to technological and organisational changes. This was the case notably in manufacturing and maintenance for the **teaching** of new adjustment and **programming** functions. If it turns out that every job level is to be filled through the recruitment of young initial training graduates, the result will be a total "bottleneck" in the mobility systems for workers and technicians alike.

I Imagining New Forms of Mobility

The reduction in career possibilities could have extremely negative consequences for both individuals and firms. It could lead to a lack of involvement among employees that runs counter to the new demands for **professionalisation** brought about by changes in work, especially for manufacturing but also for related functions.

The elimination of these contradictions calls for the establishment of new forms of mobility and promotion not simply of hierarchical nature but tied to increasing **tecnico-occupational** expertise. Such an overture assumes a revision of the forms of movement from one category to another that are provided for in the collective agreements. (4) In addition, initial training and continuing training must not become the target of an unrestricted, non-organised competition. The experience acquired through work activities should still be able to be recognised.

I Professionalising the Training of Operators

In order to run complicated production systems, the manufacturing operator has to take into account increasingly numerous and varied technical and economic constraints. Considerable progress has already been made in the area of initial training, but there is no guarantee that graduates will be capable of making the transition from academic knowledge to daily operations in the industrial context. The scientific and technical knowledge that is taught is indispensable, but the actual running of process operations assumes the development of occupational skills that are not likely to be acquired through schooling, if only because of the difficulty of **simulating** actual conditions of industrial production. At the same time, in-house training at the work station may not be fully capable of endowing operators with the capacities of analysis, diagnosis and intervention that are now required for the optimum operation of systems that are highly automated, complex and flexible.

Building new forms of mobility and career patterns, organising training programmes that consolidate competences, whether technical or occupational, and encouraging involvement in work all make the development of new instruments for identifying the emerging occupational configurations indispensable. **Existing job** titles, whether those used in the national statistics or those proper to the branch (as stipulated in the collective agreements) are falling out of step with the movement of professionalisation that is currently underway.

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(4) At present, the worker, technician-supervisor and engineer tracks constitute three independent paths of mobility.