

In the chemical industries, 'we attract, we train, we hire'

The changes that have been taking place in work in the chemical industries over the past thirty years have led to a reconfiguration of production and maintenance jobs. The profiles of these manual workers, technicians and supervisors, who now tend to be more highly qualified and more functionally flexible, have become more diverse. In a sector in which work has become considerably denser and modernised, albeit unevenly, the transmission of knowledge, on-the-job learning and internal mobility still predominate.

Production and maintenance occupations in the chemical industries have been undergoing considerable changes for several decades. What is more, the multiplicity of sectors engaged in production and the diversity of company size and location give rise to considerable variation in recruitment choices, relations with the vocational training system, career management and continuing training policy.

For all that, cross-cutting tendencies are emerging, notably in respect of the way in which firms acquire and develop the competences required to hold the jobs they offer. Even though the average level of training on recruitment has risen very significantly in these occupations, there is still a period of on-the-job learning before job stability is achieved. This integration phase can be observed across the industry and its persistence could very well be a strong marker for the sector.

Cross-cutting tendencies

The chemical industry has been through a lengthy period of restructuring: between 1982 and 2012, the number of jobs fell by half before stabilising in recent years. This massive reduction in employment went hand in hand with the increasing automation of production processes and the 'rationalisation' of production systems (computerisation, diffusion of lean management and organisational methods, etc.). It has been reflected in both a fall in recruitment and a reduction in the number of people in post as a result of redundancy programmes and severance schemes. Another common feature is that companies in the industry struggle to attract outside candidates for

production jobs. However, once they have become stabilised in their jobs, mobility among the recruits tends to be low. The combination of small numbers of new entrants due to restructuring and the lack of voluntary quits has led to accelerated ageing of the workforce, particularly among technicians and supervisors. This is why it is necessary to replace the many employees who have left the industry now that the volume of jobs has stabilised. The industry now has to attract new employees and train them to meet its requirements, particularly in isolated employment areas.

Two groups of emblematic occupations

In order to make sense of the changes in work and their impact on modes of recruitment and careers, the focus here will be on two groups of occupations, those linked to production and those linked to maintenance.

In 1982, about 45% of manual workers in the chemical industry had no formal qualifications. On the production side, holders of level V or IV qualifications (the lowest two levels in the French classification system) were recruited, with or without a requirement for specialist training. New recruits were eligible for upskilling programmes (such as the AFPIC) or for training courses leading to the award of qualifications (TP CAIC, BEP or CAP, etc.). In most cases, however, they learnt their trade on the job and progressed from entry level to higher positions in accordance with the mode of job promotion characteristic of internal labour markets. On the maintenance side, the work was often subcontracted, at least in part. Workers tended to have level V or IV qualifications in a specialism linked to their particular jobs (mechanics or electricians, for example).

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CHEMICAL INDUSTRY
OCCUPATION
MAINTENANCE
PRODUCTION
QUALIFICATION
RECRUITMENT

AFPIC • Vocational training certificate for the chemical industry.

TP CAIC • Vocational qualification as 'machine operator in the chemical industry' (level V).

1 Distribution of non-managerial employees by age group in the 'Chemical production activities' sector* in 2014

	< 25 ans	25-39 ans	40-49 ans	> 50 ans	Total
Manual workers and white-collar/clerical staff	5,9 %	39,5 %	30,1 %	24,6 %	100 %
Technicians and supervisors	3,9 %	27,4 %	34,6 %	34,1 %	100 %
Total	4,8 %	33,1 %	32,5 %	29,6 %	100 %

* All occupational groups together (production, laboratory, maintenance, logistics, sales, etc.).

Example: 34.1 % of technicians and supervisor in the 'Chemical production activities' sector are over 50 years of age. Note : Production occupations account for almost 50% of all jobs in the chemical industry, while the technical occupations, which include the maintenance function, account for 13% (Scope: National Collective Agreement for the Chemical Industry, Opic-Céreq survey, 2015).

Source: Céreq-Opic 2015.

* *Lean production*

A term used from the end of the 1980s onwards by American academics at the Massachusetts Institute of Technology to denote management and corporate organisation methods based on Toyotism (Toyota Production System or TPS), i.e. a model of industrial management that aims to eradicate all waste (waiting periods, costs, stocks, unnecessary space etc.) through continuous, gradual actions taken by the workforce as a whole.

A *qualification norm* is an analytical category that denotes the fact that employers recruit for certain jobs using uniform criteria in terms of education/training levels. The statistical observations that corroborate this fact form the basis for precise reports on individual occupations.

●●● The two groups of occupations were clearly separate: production workers were involved in product loading, monitoring and making adjustments to production processes and carrying out initial diagnoses. Nevertheless, as careers developed, moves between production and maintenance were sometimes possible. This situation has now changed.

From functional flexibility to multi-skilling in production

With employment at its lowest-ever level, the continuation of plant modernisation, an ongoing process of rationalisation aimed at increasing returns and the accumulation of changes at various levels of the companies concerned, work became denser. The variability (or multiplicity) of competences required in production units gave rise to increased functional flexibility on the shop floor, giving operators the ability to change jobs or production unit but also requiring them to carry out or monitor a greater number of unit operations in one or more processes. As a result, production workers gradually became multi-skilled operators.

Multi-skilling is characterised in particular by the performance of level 1 maintenance tasks and of quality control processes and the management of traceability procedures. This progression towards multi-skilling has gone hand in hand with the establishment of the principle that workers at all levels of the hierarchy should be responsible for the effects of their actions, in terms not just of risks and product quality but also of returns.

The workshop technician is the emblematic figure here. These developments have made it possible to relieve supervisory staff of certain technical tasks; in many cases, this has led in turn to reductions in the number of middle-management posts.

Thus in most of the firms visited, the number of control and monitoring tools in operators' hands had proliferated, which in turn had increased the mental and psychological burden on them. As a result, the issues of wage recognition and career development prospects have become ever more acute.

A marked increase in the qualification norm

This change in the occupational identity and competence of production workers and technicians in the chemical industry is concomitant with a marked increase in levels of training/education on recruitment.

Thus the manual worker who has passed the baccalauréat is a firmly established figure in the landscape of the chemical industry. However, companies also recruit operators with level V (lower than bac) or even level III (higher than bac) qualifications. Operators hired at this latter level can progress rapidly to technician or supervisor level once they have acquired in-depth knowledge of the work and the various teams.

For their part, technicians and supervisory staff are recruited almost as much at level II as at level III. However, these averages conceal pronounced disparities between individual firms, whose recruitment practices depend on a multiplicity of factors, such as the industry segment (qualifications are lower where packaging is the main activity), the relative complexity of the processes, size of firm, location and so on.

Regardless of the level of training/education on entry, it takes a long time for a worker to be able to operate independently (the various stages of the different operations, knowledge of the site, risk management, team working, etc.). The support for new recruits is based on in-house, peer-provided training, with knowledge and skills being transmitted on the job: 'A lot of training has to be provided by the experienced senior operators, as we call them. Their expertise is extremely important' (supervisor). Consequently, priority is given to on-site experience, which helps new recruits to acquire 'expertise based on the safety-first principle' (in-house trainer at a large plant). This training is sometimes supplemented by a range of formal qualifications, which provide a signal of confidence in the expertise acquired and form the basis for recognition in terms of pay.

The restructurings of the 1980s and 90s limited internal mobility by fragmenting production organisations. Nevertheless, where workforce size still makes it possible to construct adequate mobility spaces, internal promotion remains possible for production workers, as long as they have not been confined to repetitive activities (such as, in certain cases, handling and packaging). Through a sort of 'musical chairs' effect, external recruitment is then often restricted to entry-level positions. The first promotion for manual workers is to a position as production technician. They may subsequently become supervisors. They are then expected to leave behind the manual workers' shop floor culture and assume the role of a front line supervisor. This shift in occupational culture can be problematic and requires the provision of support in the form of training. It is much rarer for former manual workers to be promoted to management positions.

Maintenance activities largely brought back in house

The context in which maintenance is carried out has changed compared with the previous period, in two ways in particular. Firstly, as already noted, the production equipment has gradually been modernised. To the extent that they are able to do so maintenance teams have to carry out both preventive and corrective maintenance on machines of different generations. The installation of increasingly sophisticated machines has led to an increase in the skills required to maintain them but not to the disappearance of the traditional knowledge and expertise required to maintain older plant.

Thus the profiles of maintenance team members often vary considerably in terms of training (ranging from the CAP to vocational degrees) and discipline (electronics and electro-mechanical engineers, automation specialists, electricians and mechanics may all be represented). The example of a plant offering a whole range of support services for a chemical platform illustrates the importance of senior employees in the maintenance department as repositories of knowledge and expertise that is no longer taught. The maintenance manager of another company explained that 'we look for technicians who have the ability to be functionally flexible, and the rest is subcontracted [...]. However, functional flexibility has its limits and we also need specific skills. We only subcontract what is beyond their competence'.

Secondly, the changes in maintenance are reflected in the drive to optimise work organisation, particularly in terms of the safety and continuity of production, for example by adopting the principles of lean manufacturing. As a result, maintenance has become a strategic activity and the retention of maintenance staff has become an important issue. This is, after all, the price to be paid for reducing the number of incidents and unscheduled downtimes and to minimise their duration. It is essential, therefore, that maintenance workers have good knowledge of the plant and equipment.

This is why temporary agency work has no place here, particularly when there are chemical risks (the case of a temporary agency worker who was stopped just in time as he was about to cause a serious accident by severing a pipe was related). This also helps to explain the frequently observed trend towards bringing maintenance teams back in house, at least in part. Thus one company recruited a particularly dynamic maintenance technician who was working in the subcontractor's team and gave him the task of supervising his former colleagues' work programme as well as tracing the history of breakdowns and how they were resolved. The majority of new recruits are young people trained in the new technologies who hold specific qualifications requiring two or three years' post-secondary training (bac+2 or +3). A young entrant might typically be hired with a bac+2 qualification and then work towards

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The study

The Observatoire des industries chimiques (OPIC) commissioned Céreq to carry out a study of non-managerial jobs in companies in the sector. These are jobs falling within the scope of Amendment 1 (manual workers and white-collar/clerical staff) and Amendment 2 (technicians and supervisors) of the national collective agreement for the chemical industry (CCNIC). The initial question was: 'What are the recruitment dynamics for non-managerial jobs in terms of flows and the evolution of the employee profiles sought by firms?'

In order to answer this question, Céreq analysed the situation in companies in both quantitative and qualitative terms. In the first quarter of 2015, 204 firms in the sector responded to a questionnaire survey; they accounted for 20% of all workers in the chemical production activities sector and 9% in the R&D sector. During 2016, some hundred interviews were carried out in 13 plants in the production activities and production and R&D support activities sectors, as well as with experts on employment and/or training issues.

a vocational degree within the company on a block-release programme. These young people are recruited directly as technicians, with a wage coefficient corresponding to their qualification. New entrants with level IV qualifications recruited as manual workers are now very much in the minority in maintenance; a number of companies no longer recruit at all at this level.

This rise in qualifical levels has had the effect of reducing the space for career progression, which has become very limited in maintenance, considerably more so than in production. For manual workers in maintenance today, not having a bac+2 qualification puts them very much in the minority and reduces their chances of becoming technicians without further training. Some senior workers with little in the way of qualifications may even feel their jobs are at risk, as the case of a 50 year old worker encountered in the survey demonstrates. Holder of a level V qualification, he had gone through the validation of experiential learning (VEL) procedure in order to obtain the vocational baccalauréat since he could not exclude the possibility of having to look for another job. However, the same also often applies to technicians because of the uniformity of qualifications within teams and the often modest size of maintenance teams, which does not justify the presence of several supervisors. Consequently, it is difficult to develop career progression strategies, all the more so since the transition to manager status cannot be envisaged without further training, the gap between the two statuses being generally too great.

OPIC • Observatory for the Chemical Industries.

CQP • Vocational training certificate – Validates specialised competences in particular occupations.

BEP • An intermediate diploma in the 3-year programme leading to the vocational baccalauréat.

CAP • A level V vocational qualification.

BTS • A national higher education diploma requiring 2 years' post-secondary education/training. Level III in the French qualification system.

TAM • Technician, supervisor.

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Recruitment in 2014 in the chemical production activities sector by level of education/training *

	< Level V	Level V	Level IV	Level III	Level II and higher
Manual workers, white-collar/clerical staff	7 %	17 %	57 %	15 %	4 %
Technicians and supervisors (TAM) de maîtrise (TAM)	< 1 %	1,5 %	2 %	49 %	46 %

* toutes familles de métiers confondues (fabrication, laboratoire, maintenance, logistique, commercial, etc.). Source : Céreq-Opic 2015.

The chemical production activities sector encompasses companies manufacturing basic pharmaceutical products, soaps, cosmetics and perfumes, inorganic and organic chemical products and chemical specialities.

The operation, supervision, management and maintenance of the equipment in chemical plants take place in the complex world of the unit operations that make up chemical processes. These unit operations are the sub-divisions of chemical processes designed on an industrial scale, such as distillation, evaporation, wringing, drying, packaging, etc. They are separate from the auxiliary operations also carried out in chemical production plants (transport and storage, steam, gas and vacuum production, measurement and checking of parameters, product analysis, decontamination, etc.). Thus production and maintenance activities in the chemical industry include some particularly specialised applications.

Changes in work and differentiation of career trajectories

The increase in qualification norms in the chemical sector certainly seems to be linked to changes in the actual work done. We are not dealing simply with a mechanical effect of the general rise in qualificational levels or a policy of over-selection at recruitment, since there is seldom a plethora of candidates for entry-level positions.

The trend towards bringing the maintenance function back in house might have expanded the space for internal mobility, but there seems to be less and less mobility now between maintenance and production. In other words, profiles and careers in the two functions are becoming increasingly more differentiated, with manual workers predominating in production and the technician/supervisor categories preponderate in maintenance. This has been accompanied by a shift in the boundary between the two functions following the reallocation of day-to-day maintenance tasks, which are now carried out by multi-skilled production workers.

Under certain circumstances, significant space for career progression persists in production departments. In maintenance, however, this is not often the case. Nevertheless, both groups of occupations have seen a rise in qualificational levels, responsibilities and skills.

Pour en savoir plus

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