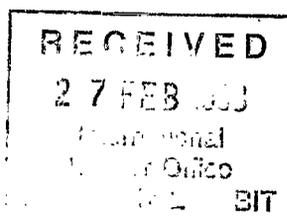


# **Stress prevention for blue-collar workers in assembly-line production**

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ISBN 92-2-110488-5

*First published 1997*

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## Preface

Occupational stress can no longer be considered an occasional, personal problem to be remedied with palliatives. It is becoming an increasingly global phenomenon, affecting all categories of workers, all workplaces and all countries. This trend — coupled with its rising cost to the individual, to industry and to society as a whole — has greatly heightened awareness of the need for effective and innovative ways of tackling stress.

Stress prevention at the workplace has proved particularly effective in combating stress, by attacking its roots and causes, rather than merely treating its effects. In line with such an approach, this series of working papers is aimed at providing concrete advice on how to prevent stress in specific occupations particularly exposed to stress. For each occupation considered, the paper indicates a number of preventive measures targeted to the elimination of the causes of stress, rather than the treatment of its effects, and how these measures can become an integral part of the necessary organizational development of a sound enterprise and eventually pay for themselves.

The series includes the following working papers:

- Dr. V.J. Sutherland and Professor C.L. Cooper,  
University of Manchester, United Kingdom  
*Stress prevention in the offshore oil and gas exploration and production industry;*
- Professor G. Costa, University of Verona, Italy  
*Occupational stress and stress prevention in air traffic control*
- Professor T. Cox and Dr. A. Griffiths, Nottingham University, United Kingdom  
Professor S. Cox, Loughborough University of Technology, United Kingdom  
*Work-related stress in nursing: Controlling the risk to health*
- Professor M.A.J. Kompier, University of Nijmegen, Netherlands  
*Occupational stress and stress prevention for bus drivers*
- Dr. S. Kvarnström, Asea Brown Boveri, Sweden  
*Stress prevention for blue-collar workers in assembly-line production*

As the series is intended to stimulate action at enterprise level, its primary audience will consist of managers, supervisors, workers, workers' representatives and engineers who have a concrete interest in introducing anti-stress programmes within their enterprise and an open approach to improvements and change. The series is also directed at policy-makers, as well as government officials and workers' and employers' organizations with a direct interest in this area.

# 1. Introduction

Assembly-line work is often performed in a workplace environment with physical problems, such as noise, vibrations and dangerous machines, that can be an important stress factor.

The feeling that supervisors do not care about creating a good work environment is another important factor of stress. Furthermore, technical development in assembly-line work, especially in large companies, has often resulted in more complicated tasks for the workers who may have difficulty in overviewing all the steps in production; this can easily build up a fear of the unknown and, consequently, more stress.

What an individual feels to be a risk can cause as much stress as a real risk. If danger has been eliminated, it is very important to convince the worker that this has been done. Even a slight suspicion that all is not faultless can develop into a stressful situation.

## 1.1. Definition of stress

It is not easy to find a simple definition of stress. The word means different things to different people. Not only pressure, strain, tension and fear, but expectation and ambition are also important contributory factors. When writing about stress in the engineering industry, and especially in assembly-line work, it is important to come to some consensus about the exact meaning of stress.

All demands and strain on the human body, whether physical or social, give rise to some reaction and, as a rule, most people can cope quite adequately with these demands. However, if the stressor, which is the name of the strain or demand, is too strong, too repetitive, too continuous, too intense and/or the individual is too weak, a sort of tension is built up in the body which is commonly referred to as *stress*.

**Positive stress.** Stress is not necessarily a negative phenomenon. If the tension can be handled in a positive way it can be of positive value. An athlete taking part in a competition will give a better performance if under stress. Even in working life stress can be something positive if there is freedom for the individual to handle the situation. Positive stress may enhance job satisfaction, competence and self-esteem. One can, for instance, hear an assembly worker say: "*We are all under stress, busy with changing our work organization, but we have lots of fun all the time*".

**Passive stress.** Strong demands and strain are likely to give rise to stress. The opposite can also be true. Temperature is a good example: too high, as well as too low, a temperature can be harmful. The same is true for mental demands. Experiments have been carried out where new-born apes have been isolated from all impulses whatsoever, such as light, sound and touch, with the result that they have died, as some parts of their brain did not develop. This, of course, is an extreme, but something similar is seen in a job free from all demands other than continuous repetition of the same movements and without the slightest variation or challenge. One can still see such jobs on assembly lines.

## 1.2. Individual reactions to stress

It is always important to remember how different people are and this is very true regarding reactions to stress. What is a stimulus for one person may represent a high degree of stress for another.

Differences between individuals are especially important in assembly-line work in the manufacturing industry. The work organization is often such that an equal contribution is expected from every worker. The consequences will be too heavy a burden on the weakest, while the more competent worker will lack all the challenges that create positive stress.

One can imagine a human being covered by a shell which varies in thickness. Stress factors are like arrows which hit the shell. The blows may be stray or weak, single or multiple, or continuous and wearing. Sometimes repetitive trauma can harden the shell and it will grow stronger and thicker. Sometimes a stress factor is strong enough to break right through the shell, especially if it hits a weak point. It is virtually impossible to know where in an individual the weak points are and surprises are often encountered.

An individual's reaction to a stress factor also varies with personal well-being. Tiredness and sickness weaken the shell and make it fragile. Lots of shortcomings in the physical work environment will make the individual more vulnerable: noise, poor illumination, vibrations, crowding, fear of danger from machines. Dangerous substances, which are normally accepted as not at all stress provoking, can become harmful and provide the explanation for some astonishing stress reaction, especially in workshops.

All heavy physical or mental demands or strains can provoke stress if the individual is weak. On the other hand, if the individual is strong, the demand or strain may be positive and create a feeling of strength and satisfaction.

**Symptoms of stress.** In an individual, symptoms of stress can vary widely, from slight irritation to stomach ulcers, heart attacks, skin disorders, anxiety, depression, etc. Effects of stress in assembly-line work, where most of the motions of the neck, shoulder, arms and hands are repetitive, can also hide behind other disorders, by far the most common of which relate to musculo-skeletal disorders. Mental stress has an effect of adding tension to muscles — it is a habit to raise the shoulders and put pressure on the jaw muscles when under mental pressure. The tension in the muscles becomes so intense that nutrition of the muscle is affected, resulting in deep pain. Investigations have shown that as many as half of all problems of the back, shoulders and arms derive from stress.

## 1.3. Effects of stress

Stress in the workplace lowers the quality of working life and also has a negative effect on the quality of life, on the whole, including leisure time. In addition, stress can severely affect enterprise efficiency and competitiveness.

**Absence due to sickness.** Stress is the reason for a large part of absence due to sickness. Stress is very seldom given as a medical diagnosis, as the effects are hidden among different symptoms, but in workplaces where absence due to sickness is high, as much as half of it is likely to be due to stress.

**Personnel turnover.** Stress has a definite influence on personnel turnover. It is an indication of shortcomings in the workplace. When workers leave, it is impossible to say whether it is because of stress or because of their inability to get on in the workplace. To cure the stress, one has to cure the workplace.

**Recruiting difficulties.** Hand-in-hand with high figures for personnel turnover are the difficulties encountered in recruiting a competent workforce. Assembly-line work is constantly ranked among the least popular. Even in periods of high unemployment when the offer of labour is at its peak, the workforce will never be as good as hoped for if the work environment is not attractive.

**Productivity.** The effect of stress on productivity is impossible to calculate. However, it is generally understood that shortcomings in quality and time delivery are often due to low motivation from the workforce and that this, in turn, has its roots in stress. Workers' time may be bought, but their engagement, motivation and interest in the work must be earned.

#### 1.4. Recognizing stress

It is easy to recognize stress in occupations where stress is caused by very heavy demands and where difficult decisions involving heavy responsibility must be made in a short time. This is not the case in assembly-line work where stress is caused by the constant requirement of continuous, although low-grade attention, combined with little influence on the work. Under these conditions, symptoms of stress will rarely be shown by outbursts of aggression or violence to other staff or by breaking things into pieces. Stress must be recognized by other means.

**Reactive methods.** These methods concentrate on the impact of stress on the individual and the workplace as identified under 1.2 and 1.3.

High figures for absence on sick leave are usually clear signals of stress and it is valuable to analyse both long-term and short-term absences. From the figures it is often possible to pinpoint which parts of the company and which jobs are more affected. High figures for absence due to sickness may have many reasons, and stress is only one piece of the puzzle.

Figures on the turnover of workers are also important. High figures indicate that something is wrong and stress is often suspect. On the assembly lines in Henry Ford's first plants, the figure for personnel turnover was as high as 340 per cent, which meant that workers, on average, stayed only three or four months.

Difficulties in recruiting workers is another signal that something is wrong and that a stress-creating workplace must be suspected.

**Active methods.** More active ways to recognize stress in a workforce include occupational health services, continuous dialogue with workers and workplace surveys.

In Sweden, for example, occupational health services provide, in general, one doctor for every 1,500 workers and a corresponding number of nurses, physiotherapists, etc. Their surgeries are usually conveniently located near the workplace and provide a valuable amount of information that can be used for improving workplaces. The integrity and anonymity of the patient who has given the information is respected.

In many companies, dialogue between workers and managers is the rule. Problems and opportunities concerning the job are discussed at regular meetings. If criticism is welcomed at these meetings and action taken, many stressful situations can be reduced and even prevented.

Well-planned surveys are an invaluable tool for recognizing stress in assembly-line work. It must be emphasized that a survey must always be openly discussed with the workforce and must lead to some improvement at the workplace if the credibility of this means of detection is to be maintained.

Reactive and active methods of identification of stress at the workplace have to be used together. Stress in assembly-line work is such a complex matter that no single method of detection is sufficient.

In a workshop where 17 workers had more than 30 per cent absence due to sickness and around 50 per cent personnel turnover, the occupational medical department was of the opinion that the work organization was at fault. The files of all the workers who had been working there in the last five years were analysed to find out what had happened to the workers with regard to their health. It was found that all but two complained of pains in the muscles and neck. Based on these results, as well as on figures for absence due to sickness, staff turnover, etc., a major change in work organization was undertaken. The result was very good: staff turnover went down to zero. Sick leave was reduced by half in a short time, and for years no more cases were reported for compensation.

## 1.5. Cost of stress

The cost of stress for the individual, the company and the community depends on the length of the sick leave and of the seriousness of the illness.

Stress may contribute to the development of heart and cerebrovascular disease, hypertension, peptic ulcers, inflammatory bowel diseases and musculo-skeletal problems. Evidence suggests that stress alters immune functions, possibly facilitating the development of cancer. Anxiety,

depression, neuroses, and alcohol and drug problems are clearly associated with stress. These latter conditions contribute to the incidence of accidents, homicides and suicides.

Considered together, these disorders are reported to be responsible for the great majority of disease, death, disability and medical care use in the United States. The cost of sickness absences for stress and mental disorders has been estimated in the United Kingdom at more than £5 billion a year.<sup>1</sup>

The magnitude of stress in manual work, and especially assembly-line work, can involve extremely high costs. A headline in a Swedish newspaper read: "*Work-related muscle and back disorders cost more than military defence*". It is well-accepted that approximately half of these kinds of disorder are caused by stress.

## 1.6. Principal approaches to combat stress

Reducing stress is not synonymous with reduced productivity. Many of those who are not aware of the true nature of stress often mistakenly think that reducing stress in a workshop is the same as reducing productivity: this is not the case. On the contrary, it has been shown that combating stress has often led to higher productivity and improved economic results.

**Optimize demand.** One key factor is to optimize the workload. The relationship between workload, on the one hand, and well-being or quality of work, on the other, follows an upside down U-shaped curve: too much and too little will have a negative effect on both well-being and quality of work. In "short-cycle" assembly-line work particularly, the body is often overloaded by repetitive motions, while mental functions are under-used. Methods of variation have to be found to prevent this. Variation also means flexibility, which is of great value for production.

**Create opportunities for self-fulfilment.** Self-fulfilment is most important in assembly-line work, which is often very monotonous and seldom offers any interesting challenges. The majority of the workforce has the capacity to undertake much more complicated tasks than the ones usually performed, but the opportunity will not always be available to the workers. The result can be a state of alienation which closely resembles stress from too low a demand.

Building more responsibility into assembly-line work, making it richer and more skillful, demanding more qualified decisions and, at the same time, giving enough competence to the worker to meet the challenge, is the best way to prevent stress among the workforce.

**Provide freedom.** It is important to provide assembly-line workers with freedom to work at a pace that they find natural and to choose the method they prefer for performing the work. Of course, some limits have to be given and some boundaries have to be set, but the fear sometimes expressed by management of low productivity when goals are set by workers themselves almost invariably appears unjustified.

<sup>1</sup> *Conditions of Work Digest on Preventing stress at work*, Vol. 11, No. 2, 1992, p. 13.

A new work organization had been introduced in a sheet-metal workshop. The competence of the workers was increased and the work organized in working groups with a great deal of responsibility delegated to the workers. After a trial period, it was decided to set goals for production. Management decided to let the workers themselves set the goals. The result largely surpassed the managers' highest expectations.

**Support.** Giving assembly-line workers a great deal of freedom to choose their own methods will also mean a new role for supervisors. The function of a supervisor has traditionally been that of the most clever worker who knew how to handle things. The supervisor intervened as soon as it was observed that the work was not being carried out exactly according to his or her own experience, with the supervisor always ready to correct the slightest deviation from what was thought to be the best way. Giving workers some freedom to choose their own way to reach their production goal means that the supervisor often has to put personal smart ideas on hold. He or she must wait and observe the result before commenting. The role will change from that of a sergeant to that of a consultant or even a gardener: taking care of the development of the workforce, pruning and weeding.

Support is something that is not only given by managers. Support from fellow workers can also be very valuable. Organizing support can prove extremely useful. Giving clear rules on how work is to be arranged at the workplace can be seen as support and can be very important, especially in respect of insecure and newly employed workers. Regular meetings where information can be given and work discussed openly can also be a means of support. The following example shows the potential of organized support in helping to solve problems at the workplace.

In a group of companies with a total of around 10,000 workers, short-term absence due to sickness was a big problem. A project named "Take care" was started, which first discussed some simple rules between union and management, with the occupational health department as a working resource. Brochures and videotapes were produced. In all companies, discussions were held in small groups making it clear that everybody was needed in production. The following rules were negotiated:

- a telephone call would be made by a co-worker on the first day of absence from work;
- telephone contact would be made once a week;
- an invitation to all meetings would be made if the sickness was not an obstacle;
- information would be sent to the home of the person on sick leave;
- invitations to come once a week to the place of work during coffee breaks would be made;
- giving the possibility of performing an alternative task would be considered;
- on-the-job training for a new job while on sick leave (cooperation with insurance company required) would be offered;
- plans for rehabilitation would be made;
- help from company doctor when short-term sick leave occurs frequently would be offered.

It was made very clear that the rules were made as an act of support and were in no way some kind of police action. The result was a considerable decrease in short-term absence.

## **2. From theory to practice: Practical ways to eliminate stress**

### **2.1. Strengthening the individual's response to stress**

Eliminating the effects of stress by improving workers' resistance is a controversial issue. It is often highlighted how blame for problems of stress at work has to be placed on the workplace and it is this that has to be changed, rather than the worker concerned. However, the worker's physical fitness can help protect against stress and employers can find it worthwhile, in terms of cost/benefits, to promote good health in the workforce by supporting the costs of gym fees, sending workers on courses designed for healthy ways of living, etc.

Certain methods of selection of workers are also criticized. It is argued that the job should be adjusted to workers rather than the other way around. It seems obvious, however, that a high degree of stress tolerance has to be a natural base for hiring policemen or members of the fire brigade. It is difficult to give rules for selecting assembly-line workers, but many experienced supervisors claim that the level of formal education of such workers should play a limited role in their selection. Unquestionably the most important factor is competence at work.

Competence at work will give the worker confidence in the task to be performed and this, in turn, creates a feeling of security which will also protect against stress. This is one of the most important factors, as it will also provide a base for variation at work, work enlargement and work enrichment.

## **2.2. Improving the physical work environment**

Many factors can make an assembly workshop uncomfortable and be a cause of stress. However, to create an absolutely perfect work environment can be unreasonably expensive. The problem here is to find out what can be looked upon as fair and reasonable, taking into account the specific circumstances in which work is performed. For instance, different criteria have to be used in a foundry as compared to a workshop for electronics.

It is a good rule always to have a workers' representative involved in all studies and decisions made concerning the work environment. The workers' representative should be open-minded, able to communicate and have the full confidence of the workforce. If the workers are not involved in the process of changing the work environment, it is unreasonable to expect full and wholehearted support when changes are introduced. It is wise to remember the formula  $E = Q \times A$ , which means that the effectiveness of a change is a function of the quality of the decision and the acceptance from the workers who are influenced by it. If a decision is made over the heads of the workforce, the acceptance (A) in the formula will be low and so will be the effectiveness of the change (E).

Whatever decisions are taken or changes made concerning the workplace, the most valuable information can be gleaned from the workers themselves. They cannot take the place of the production technicians or designers, but these specialists can seldom produce a good end result without support from the worker. Hiding facts from the workforce can lead to very serious consequences. Building up confidence is a very difficult, long-term process which can so easily be destroyed.

Investigations about possible risks in the workplace are not always reported to the workforce. Management often underestimates the value that information given concerning suspected risks, even if the information states that no risk exists, helps in building confidence between management and the workforce. Failing to report can lead to unmotivated fear, rumours and stress in the workforce.

A considerable part of the workforce in a company came into contact with material for insulation. It was very hard to avoid contact with the skin. Reports indicated that this material might cause cancer, as experiments with large concentrations of the material applied to animals over a long period of time had proved, although no human cases had been reported. The company immediately got in touch with suppliers to find a substitute material and worked with specialists to obtain more information about the possible risks. They also checked with the authorities to find out if something had to be done immediately. Then the question was raised as to how the workforce should be informed as no real risk was considered to exist. It was decided that the newspapers might publish the story and the workforce was invited to a meeting where they were given all available information by specialists from outside the company who were able to answer any questions raised. Workers' representatives were invited to follow the investigation and report back to their fellow workers. In this way, the management maintained workers' confidence and the newspapers did not make a sensational case out of the story.

### 2.3. Changing the work organization

As already mentioned, important stress factors in assembly work are anxiety, low level of control over work methods and few possibilities for self-fulfilment.

Methods such as work rotation, work enlargement and work enrichment can help reduce such stress factors while improving performance. Working in empowered working teams can also add to work quality and be a valuable social factor, which is also effective in protecting against stress.

**Work rotation.** Work rotation was first introduced into short-cycle, repetitive, monotonous work to add variation to the muscle load. In work rotation, workers move from one task to another according to an established scheme which reduces strain on the musculo-skeletal system. In old-fashioned assembly-line work, where there is not a great deal of difference in the muscle load between adjacent jobs in the production chain, the effect of introducing work rotation is often not very remarkable. Furthermore, job rotation seldom means more freedom at work or more meaningful work, as workers are still paced by the production system. However, work rotation has its positive sides. Sharing work tasks enables the workers to get to know one another as well as the work undertaken by their colleagues; they feel part of a whole, and realize that it is important to carry out their work responsibly as it affects the entire production.

**Work enlargement.** Work enlargement involves workers learning each others task in certain production. Each worker can learn to take full responsibility for the production of a given part of a certain product and, if the product is not too complicated, for all the different tasks that are needed to complete it.

In a company producing electrical motors, different categories of trained workers were employed: hand-coilers, connectors, assemblers, impregnators, truck drivers, suppliers and testers. The company had a major problem with 28 per cent absence due to sick leave, low motivation of the workforce, defects in quality, etc. A pilot group was formed where all the workers trained each other in their different work tasks. The end result was that all members of the pilot group became competent motor builders; each could produce his own motor. It was decided that the whole workshop should start to reorganize work in this fashion. This meant a substantial investment in new equipment and new layouts. Teams were formed, where five to six workers could help each other and train each other in all aspects of the job. Today, 80 per cent of the workers can produce their own motor and they are proud of the accomplishment. Absence due to sick leave is now 9 per cent, productivity has increased by 20 per cent, and delivery-on-time to customers has increased from 60 per cent to 95 per cent. Figures for motivation also increased considerably.

A workforce with a broader competence, and thus higher flexibility, can more easily create a better flow of products through the workshop, avoiding bottlenecks. This, of course, is important to the company and the customers as well as to the workforce. Workers will be aware of having done a good job, which will improve their self-esteem and, in turn, will protect them against stress.

**Work enrichment.** Work enrichment involves workers taking up more complex and varied tasks than in work enlargement. Assembly-line workers can, for instance, take over responsibility for storekeeping and packing. They can take part in production planning, production technology, production development and even planning of investments, decisions concerning new equipment and product design. At Asea Brown Boveri in Sweden, it is an unwritten, but absolute, law that, when buying equipment for manual work, the operator's opinion has to be taken into account. Workers' representatives also accompany the technical experts when visiting the contractor. Furthermore, some of the foreman's administrative work can be done by the workforce.

Work enrichment in the engineering industry almost invariably means integrating some tasks normally performed by technicians into the work normally undertaken by assemblers or the like. To train an assembler to perform all the tasks of a technician is unrealistic. However, the assembler can learn vital parts of the technician's work. An assembler and a technician working together closely can form an unbeatable team.

The difficulty is to choose parts of the technician's work which are well-defined and which can be simplified so that the assembler can undertake the work without an enormous amount of training. One problem which may arise is that the technicians may feel that their job prerogatives are threatened by the assemblers being able to do their work. It is very important to make the technicians aware that they will not be replaced and that, on the contrary, by training the assemblers in the technicians' work, they will bring even more effectiveness to the organization as a whole.

Work enrichment really means giving manual work more meaning and, for many workers, it is a welcome challenge. The more tasks that are integrated into production work, the higher the qualification of the workforce and the more effective their input to productivity.

A reorganization of assembly work by work enrichment is most often carried out with the creation of working teams.

**Working teams.** It is important to remember that assembly work is much more complicated now than in the past. In workshops where thousands of identical products are made, it makes economic sense to automate, which means that assemblers have been, or are going to be, replaced by machines. Workers are now only involved in the assembly work when customers make special requests and, the more complicated the product, the more variety of competence is needed.

By using work enrichment techniques one worker can, for example, build an entire motor by himself. However, if the product is more complicated, it is not possible to train a worker to manage all the different tasks involved in the production. In this case, a team with different competencies will have to be formed. Only by delegating to a team of workers a broad set of competencies is it possible to obtain a flexible flow of production in manufacturing. This, in turn, can increase motivation and enhanced solidarity at the workplace. These are all strong positive factors in eliminating stress.

A company group in Sweden employing approximately 27,000 persons has formed more than 1,000 task-oriented working teams in the last five years. The success has been considerable. Absence due to sickness is now much lower. One interesting measure is the number of cases of work-related musculo-skeletal disorders reported for compensation. (As mentioned above, stress phenomenon might be responsible for as much as half of those disorders.) In 1988, at the time when a reorganization of work started in the company group, these cases numbered 225. In 1994, the number of reported cases was 19. There might be several reasons for this improvement, but, in this case, medical staff, union representatives, managers and safety stewards all agreed that the outstanding factor behind this improvement was the new work organization which involved more variation, more interesting work and more delegated responsibility.

### **3. Preparing the change process**

#### **3.1. Convincing management**

To put down theories about how to create the organization of work for assembly-line workers that is reasonably free from stress is one thing; putting words into practice is another. The most important step is to convince top management that there is a need for change. Management must be persuaded that it is by giving more freedom to workers and by allowing them more influence

over their work and more possibilities to develop their competence, rather than by reducing the speed at which they work, that the problems of stress can be effectively addressed.

It is often found that upper management will support change while middle management may not be so wholehearted in their support. Even if middle management does not openly argue against change, silent counteraction can be very detrimental. It is important to pay serious attention to such problems and spend time and energy in convincing those who are skeptical. Change will be very hard to accomplish if all parties do not have a positive attitude towards change from the beginning. Trade unions, in particular, can play an important role in convincing management that change is necessary.

General Motors opened a new plant to produce Saturn cars with a workforce of more than 5,000 workers. Management and trade union representatives spent thousands of hours visiting several other plants all over the world trying to find the best solution. By bringing trade union representatives into this planning process, management created a valuable feeling of cooperation with the workforce while gaining good ideas for the new project. This was a clever way to start.

**Costs.** In order to persuade management to invest in a new work organization, it is not enough to explain that, as a result, their workers will be happier and less stressed, since large investments can be risky and the survival of the company may be threatened.

To streamline an old traditional assembly plant is neither cheap nor easy. Large sums of money have to be invested into developing competence. New layouts to suit the new organization as well as complementary equipment will entail major expenditure. The time spent on development of competence will also be a major factor of cost.

Opportunities and benefits offered by the new organization will have to be clearly shown to the management. The fact that more than 50 per cent of all companies on the *Fortunes* 500 list of the most successful American companies are actively working on changing work organization may make management interested.

Management's interest will also be enhanced when hearing that:

- in new flexible organizations conditions exist for obtaining shorter through-put time and consequently lower costs for the material tied up;
- a flexible workforce can mean the ability to meet customer demands faster;
- a broader competence among the workforce can mean more interesting work, which, in turn, will lower personnel turnover;
- a flexible company will receive more applications for vacancies and better chances to hire skilled, creative and motivated employees;

- with a broad interchangeable competence among the workforce, it is possible to avoid stoppages in production which produce bottlenecks.

Flexible work organization means more variety, not least to muscle load. This, in turn, means minimizing the risk of work-related muscle disorders. Living with the risk of developing these disorders can be an important stress factor which can be eliminated with a new organization of work. Responsibility for a healthy work environment lies with management.

### **3.2. Gathering information**

Obtaining information from customers is an essential aspect when forming a base for change. Both the strong and the weak points of the company can be identified and this can be an invaluable starting point for goal-setting.

A thorough mapping of the flow of production, from the first contact with a customer all the way to delivery and invoicing, is very important. One can, for instance, find processes away from the shop floor that can be included in the assembly workers' responsibility when work enrichment is introduced.

One company's mapping of the work flow resulted in very far-reaching simplification of operations. The orders from customers for a special product are no longer handled in an office, but go straight to the workshop, where the former assemblers, which today have formed a team with a broad competence, take care of them, make the changes of the standard product according to customer demands, do the assembly, testing, packing and report to office for invoicing. In this way, the former assemblers can feel that they are no longer just a "cog in a big wheel", but valuable key personnel in a small "business within the company". With this change in work organization, the through-put time from order to delivery improved from 26 days to seven days.

Learning from other companies before starting a change process is also of the utmost importance.

Many companies introduce new work organizations based on common sense, occasional information from different sources, and a lot of trial and error. The exchange of experience between companies is often very limited. One possible explanation for not trying to exchange experiences might be a feeling of insecurity as to one's own abilities and abhorrence to exposing them. Being embarrassed is what frightens most people.

Managers are sometimes afraid to send workers on visits to other companies as they are suspicious and think some "tourism in industry" will result. A good start can be a visit to other groups within the company, where much can be learned from a well-prepared visit to another department. This could be followed by visits to companies that function as subcontractors or customers' companies. It is best to send two representatives and to prepare a special framework

of questions in advance. During a visit it is important, at all times, to be on the look-out for ideas that can be brought back and adjusted to one's own business. It is equally important to disseminate this information within the company.

It is wise to try to introduce a culture of "stolen with pride and improved", instead of the more common "not invented here", philosophy. Companies that have attained good results with a new work organization are often proud and willing to share their experiences.

## 4. Introducing change

### 4.1. The actors

It is difficult to find two companies that have used the same process in introducing a new work organization, but some main methods can be observed.

**Consultants.** One method is to use a consultant. With this method, reliable expertise is obtained, although a consultant will not know all the important facts about the culture of the company, or vital facts concerning technical details or feelings among the workers.

It is said that people are against change and, although this may only be a myth, changing the way of work is difficult unless workers want the change themselves, have their own ideas and intentions voiced, or at least are involved in the planning of the changes to take place. If changes are forced, for example, by a consultant, the workers' reaction may be a negative one, leading to destructive consequences for the company.

**Project groups.** Another method is to use a project group with representatives from management, workers, union, etc., and give them clear directives. It can even be useful to let several groups work on the same task, taking the best ideas from each group to form a strategy for change. Project groups from within the company are aware of technical obstacles, the culture of the company and the feelings of the workers.

It is recommended that the project group hold frequent and open meetings with fellow workers. If workers are not well-informed and do not feel that they are involved in planning, it can be hard work implementing the new organization.

A disadvantage to this method is that members of the project group also have their everyday work to carry out and may have difficulties in giving priority to the project job. As a rule, members of the project group should not be too heavily charged with other tasks.

**Line manager.** A third method is when the line manager is the only one to plan changes. A prerequisite must be both enthusiasm and knowledge. Furthermore, the line manager must have the ability to listen, be a clever negotiator, be able to adapt ideas and suggestions from the workers, and to give credit where it is due.

A company put up a list of characteristics desired for a line manager: the person must have a strong desire for success; be free from prestige; flexible; tough; goal-oriented; clear-headed; have a strong commitment to the task; be positive; well-known in the organization; have experience with leadership; be prepared to put up challenging goals; be able to cooperate with everybody; have a fine attitude to people; have a strong vision and a strength to bring it forward; give everybody full insight into what is being carried out as well as having the best of relations with the unions.

It might be impossible to find someone with all the above-noted characteristics, but it is a good checklist to remember and strive for. Another important point to keep in mind is that a very successful manager of a process of change in one corporate culture can have difficulties in another.

**Involve everybody.** A fourth method is to involve everybody in planning the changes. This can be by way of regular meetings at the worksite or seminars outside the workplace. A large amount of knowledge can be utilized and, although it might be felt that time is lost in production, it should be always remembered that workers are aware of the realities in the workshop and should be involved from the design stage through to realization of the changes.

Fundamentally, when introducing a new work organization, a positive, critical mass of consensus should be built among the workforce. It is necessary to create a broad emotional acceptance for change and to motivate all workers and managers, who should also be able to see their own particular role in the new organization.

It is rare to find a company or a department where one single method has been used. On the contrary, it is a general rule that a combination of methods will lead to good results.

A consultant was given time and money to do a very thorough job in one company. He started with the attitudes of top management and talked over everything carefully with middle management. He made enquiries among customers and workers. In seminars with managers, he discussed all the changes that were planned and why and how the line managers could lead the change in their groups. Goals and frames for a new organization were given. The workers were then invited to seminars where, in groups, they could discuss the goals and break them down to action plans for themselves. When the new organization was formed, the consultant was invited to follow up the result of action plans in regular meetings. The meetings with management and workers were repeated every six months. With this scrupulous planning, which actually represents a combination of the methods described above, the result was first-rate.

## 4.2. Circulation of information

Modern production, based on assemblers being able to meet customers' varying demands very quickly while minimizing the amount of products in store, can only be accomplished with success if management provides a steady flow of information at all times. This information has to reach all the way to the assemblers and include all the relevant facts. It is better to give more information than necessary in order to eliminate the risk of giving too little. It is also important to keep the information simple, especially when the target group are assemblers who are not familiar with reading long and complex documents.

In a small company, where the manager works together with the employees, there is seldom difficulty in disseminating information. However, assembly work is often carried out in large companies where the distance from decision-makers to shop floor can be a difficult problem for management to solve.

**Information and solidarity.** To create solidarity in a company, dissemination of information should involve many more facts than just those concerning assembly work. Management often shows a tendency to withhold information about fundamental facts concerning the company until all details are absolutely clear. The reason often given for keeping back information is the risk of raising unjustified hopes among workers or, on the other hand, unnecessary fears. However this behaviour is not always justified.

Progressive disclosure of information with reservations that definitive results are not clear will seldom be regretted if the information is given to mature groups of workers. Trusting workers will seldom result in their taking undue advantage. To be generous with information will eliminate destructive rumours and stress that are invariably associated with lack of information.

In one company, change in the world market resulted in lower prices of the product and, in turn, resulted in less profit to the company and consequently reduction of salaries. As a result, some workers had to leave the company. A full, open, honest and simple declaration to all workers from the managing director avoided bad feeling from the workers and opposition from the union. Other companies in the group where information was withheld experienced troublesome stress reactions among the workers.

**Chains of information.** A practical problem concerning the dissemination of information in large manufacturing companies is that information often has to be given to several persons responsible for its circulation. Knowledge means power and to share power is not always popular. There is a tendency for both middle management and union members to hold back information and thus to keep the power to themselves. This is very harmful, as a chain of information is never stronger than its weakest link.

Few top executives go down to the shop floor, take a stand on a box and talk to the workers directly, thus cutting short the information gap that may exist. If they knew what positive reactions such an act creates, they would practise it more frequently.

It is also important to have a continuous feedback from the shop floor to management about quality of information. It is quite common to meet managers who believe that they have a very effective and thorough distribution of information in the company, while the workers, and even first-line managers in the same company, talk about permanent shortage of information.

## 5. Issues for change

### 5.1. Physical work environment

Even though the analysis of the psychological and sociological aspects of work organization is a priority in change, the physical aspect of the workplace should also be given adequate consideration. This has to be done in close connection with the assemblers for several reasons.

**Workers always participate.** It is a fact that only the assemblers have an “inside” knowledge of where the actual problems with assembly work lie. Their knowledge can never be replaced by opinions from experts.

In a company where a reorganization of work was undertaken, all the assembly work was moved into a new workshop. The technicians had designed a traditional layout with a product flow through the workshop from one part to the other along a principally straight line. The workers opposed this idea and suggested limited areas for a small team, where every team could have their own store and where they could work in close contact with each other, thereby training each other. This solution was more expensive, but after some discussions it was decided to follow the workers' suggestion. All agreed that the suggestions from the workers had given an invaluable contribution to the success of the new work organization.

Clever managers listen carefully to the workers' opinions before making their decisions. Sometimes they forget to give the workers full credit for their contribution. Assembly-line workers are very sensitive in this respect. If they are given credit for their suggestions their self-esteem will develop. If, on the other hand, a new work environment is forced upon them, they will find many negative things about it. They will only be satisfied if they are convinced that their own contributions have been taken into adequate consideration.

At one workplace, the furniture in the rest area where coffee breaks were spent was extremely worn out. The medical director, who had some responsibility for work environment, noticed a half-broken chair and took it to the managing director, stating that it was of a standard considered unacceptable. The technicians were requested to present a solution for a new rest area, which was not accepted by the assembly-line workers. The assemblers were asked to present their own design, which turned out to be far too expensive. The assemblers were then given a cost limit and, with a lot of them performing work in their spare time, achieved a very satisfactory result within the budget limit.

## 5.2. Development of competence

A key factor when reorganizing work to minimize stress factors is the development of competence. Competence is said to be a sum of knowledge, will and ability.

**Training in skill.** In old "Tayloristic" organized workshops, each assembler is responsible for only one step in the production chain. He or she has a limited overview of the total process and so will also feel a very limited responsibility for the total product. This will lead to dissatisfaction and alienation and inclination to stress. To avoid these problems, it is necessary to gain competence in several parts of the production chain. For some products it is possible to be competent in all steps. In some special automobile factories, assemblers perform as "electric motor builders", "relay builders", "electronic builders" or even "automobile builders".

The potential for development of competence varies depending on the complexity of the product. In a production of big electrical generators, for instance, one of several competencies is hand-winding, which takes five years of training and practice. With this background, it is clear that a new occupation called "generator builders" is unattainable.

However, in many workshops it is possible to gain competence in several parts of the production chain. This gives the team a valuable flexibility and provides variation and more interesting jobs. In some workshops, the target can be for a team member to gain competence in half the steps of the total production. In others, it is for each team member to know all the steps.

Training to increase skills in manual work seldom presents any major problem as the organization can train its own workers. With this new philosophy of broader competence for everybody, several experienced workers should be engaged in the training.

**On-the-job training.** Training is most often done on the job with workers training and instructing each other. This is of great value for the self-esteem of both the trainer and the trainee. It is important to strive for a training programme within the company. Among other things, this means that the workers come in close contact with each other, providing a real continuous development of competence.

To learn from experienced fellow workers has several advantages compared to learning at school. Experienced workers know exactly what is needed. They use exactly the same language as the trainee. They are still at the workshop when training is finished. It is a strong stimulus for workers to be asked to teach others. Sometimes experienced workers themselves put together training material for their fellow workers. The value of this type of learning can hardly be overestimated.

In a manufacturing company, the testing of products was a special and demanding task. The rule had been to hire new testers externally. Eventually it was decided to recruit testers from assemblers who had valuable knowledge of other parts of the production process. An experienced tester was engaged to produce material for a 20-hour theoretical and practical training course. The material was adjusted exactly to the workers' needs. The result was excellent.

Experts from technical departments are natural teachers if they have the slightest talent. It is important to aim at simple facts, and teachers should withstand the temptation to bring up sophisticated areas in order to show their own brilliance. When preparing teaching material it is advisable to cooperate with some assemblers from the team. The risk of overshooting the mark is obvious. If the teachers present subjects in an unnecessarily complicated manner, it will produce stress among the more sensitive trainees. On the other hand, if it is presented in too simplistic a style, the trainee will find everything more complicated than expected when faced with the actual problem. This will also cause insecurity and stress.

**Computer competence.** It is often necessary to give workers on the shop floor some knowledge of computer programmes before delegating traditional white-collar jobs. Computer programmes are often complicated. An assembler who works with the computer intermittently will never get the feeling that he or she will master the technique. Computer technicians are hard to convince of this fundamental fact. A simple system that can be learned by everybody and that all workers can master is much better than a very complicated system for the very clever only.

**Just-in-time training.** A very important thing about information, training and education at work is that it has to be done "just-in-time". The newly trained assembly worker must have the opportunity to use the knowledge he or she has just learned immediately, otherwise the worker will not see the meaning of it all and will think that the time spent collecting information or in training has been useless. If, for instance, training is given in a computer programme, the equipment has to be ready for use when the training is completed.

**Opposition.** Sometimes a polarization of two groups is observed during training: those who are keen on learning and those who are keen on staying in their old work. The latter are obstacles to the improvement of the team's efficiency and to the fulfilment of the team's goals. The reason is often fear of failure. It is only when they see that their fellow workers succeed that they will often be willing to try themselves. This is sometimes a time-consuming process. With an easy and gradual start, it is possible to get a large majority interested in learning.

One of the problems encountered when trying to introduce a new work organization with broader competence and the formation of empowered working teams is opposition from qualified workers. They do not want to take part in less-qualified work. This unwillingness is often looked upon as just a problem of status, but it can also be linked to the fact that the qualified workers can be unwilling to let tasks that they judge too important be placed in the hands of less-skilled workers. They feel strongly the responsibility for the complicated task they perform.

Sometimes unqualified workers hesitate to take part in more qualified work. The reason is uncertainty about succeeding in the new working role; this may be due to insufficient training and low self-esteem. It is necessary to determine whether more training is needed or whether it would be sufficient to provide the worker with extra support when tackling new working tasks.

**Competence and self-esteem.** If sufficient training is given before trying new tasks and enough support is given in the introductory period, most workers will be able to cope with new demands, be proud of their achievements and be willing to try more complicated tasks. Even unqualified workers with few years at school will often show an impressive ability to learn. It is also a gratifying experience to meet old assemblers who had lost any belief in their own capacity of learning and who are surprised and proud of their achievements. Much enthusiasm is found among workers involved in the development of new work organizations.

It is important not to give too much responsibility or to make too many demands before a sufficient amount of training for the new tasks has been given. The result can be failure, stress, lower self-esteem and unwillingness to try again.

It is equally important to care for the minority who seem to lack the ability to enlarge their working capacity. If they occupy a job that everybody wants to share a part of, conflicts may arise and the best solution might be to let them alone, while giving them the feeling that they will always be welcome to try their hand at other tasks. Sometimes they are willing to try again after some time.

Workers are seldom spoiled by too much education and this development of competence is often proof that management really believes in their abilities.

**Belonging to the company.** Assemblers must feel that they are as important as any other group of workers in the company. The old anecdote about the stonemasons is worth some reflection: when asked what he was doing, one answered that he was just cutting square stones, while another replied that he was taking part in the building of a cathedral. It is therefore important to give the assemblers feed-back from other departments. If, for instance, a salesman is given the opportunity to tell some anecdotes about his success in selling products abroad because of their high quality, it can stimulate the workers on the shop floor and create a feeling of solidarity in the company.

A group of assemblers is like a "link" in a long production chain. It is vital to know exactly what is done to the product by the previous groups as well as by the groups which follow in this chain. It is often possible to build a real supplier-customer relationship between consecutive groups within a factory. The groups can then make a legitimate claim for quality and right-time

delivery from their fellow workers responsible for the previous link in the production chain. They will equally feel a responsibility to keep their promises to workers in the next part of production.

A customer-supplier relationship introduced in a workshop will activate a direct and immediate feed-back. A team that gets feed-back on the job also feels that somebody cares: this is a stimulus. Few things make workers more sensitive to stress than the feeling that nobody cares about their job.

It is important to care for this relationship between teams, to discuss problems of responsibility and to invite, when needed, members of neighbouring teams to meetings to solve problems together. Positive cooperation or destructive rivalry depends on how relations are handled and this is, in its deepest sense, a question of leadership.

**Psycho-social competence.** Workers cooperating in a team must have certain fundamental social and psychological issues clear in mind from the start. Information, education and training on these issues, or "soft values" as they are often called, will greatly facilitate their understanding of the importance of people at the workplace and act as a solid base for action when cooperating in a team. It is essential to increase competence of soft values to avoid the risk of unwanted negative stress among the team members.

Examples of issues to be discussed by the team are:

- People are different and it must be realized that your ideas will seldom be accepted by everybody.
- Even if your suggestions are disliked, most people can come to an agreement.
- People can dislike what you say, but they can like you as a person all the same.
- It is not a personal defect if your suggestions are not accepted by the team. It only means that somebody else's suggestions were better in the given situation.
- When people hurt each other, the reason can often be pure misunderstanding.
- If a person is hurt in a discussion and reacts with aggression, it can trigger a dangerous destructive process.

Discussions like these are essential for a team to progress smoothly through the different stages of development and change. However, it is unusual to find someone within the company who has the competence or enough authority to lead such discussions, and it is often necessary to hire a consultant for assistance. It is also important to have managers taking part in such discussions, otherwise it is frequent to hear: "You ought to tell our boss this" and "Why is he not here to listen to that?". Investments in the workers' personal development is an important investment, especially in the long run, and the manager should openly demonstrate his interest.

In a large manufacturing company in Ireland, broad information and training on questions concerning soft values became so popular that workers' families put pressure on the company for the course, based on video programmes, to be repeated on Saturdays to enable them to participate.

## 6. The new organization

### 6.1. Working in teams

As a rule, one can say that human beings, like most animals, prefer to gather in flocks or herds. They do so to find security. Exceptions do exist, of course, such as the company who hired some unemployed miners for assembly work in manufacturing. The miners found it uncomfortable to work within sight of other people as they were used to working all alone deep under ground. However, generally speaking, a group of people working together will be stronger and more effective than one working alone. Working together creates motivation and this, in turn, will improve productivity. In a socially well-functioning group, the members will feel support from fellow workers which provides a feeling of security, and this in itself is a very strong means to avoid negative stress.

There is a possibility, of course, that a group can paralyze its own activity. It can form a mutual admiration society, be unproductive and poor in innovations. It can disguise its own problems, hide unproductive members and waste time in meaningless meetings. Forming groups and leading groups are not easy tasks. Effective groups can handle difficult problems, find good solutions and stimulate creativity. An ineffective group can endanger productivity. Whether a group will function well, be motivated and free from negative stress greatly depends on the leaders and on how much is invested in competence, development and support to the members.

**Team creation and composition.** Social scientists often talk about the following stages leading a fresh, new collection of workers to an established team: forming, storming, norming, and performing.

These stages will not be quite so obvious when forming new teams from workers who have been together for years. Team members that have worked together for a long time usually work well without risk of conflict. Conflicts are likely to appear when a new member joins the team.

A department of 50 workers in one company was to be divided into five teams. Management decided the competence of each group (for instance, assembling, testing, handling of stores, etc.) and the workers were then given a week to choose which group they would prefer in, giving their second and third choices. Out of 50, 48 were able to have their first choice and the other two, their second. The workers had discussed the problem during the week and those who felt that they could work well together had formed a natural group. In another department, the same method was tested with almost the same results. However, on this occasion, management had to make some changes because most of the specialists had gathered in one group. Changes were made; the team functioned well and no conflicts were observed.

**Subgroups.** If members in a group are fairly alike in character and temperament, the conditions for success are favourable. Some groups create a strong identity: they take up fancy names for their team; they design logotypes of their own; they put up photos of the team on their notice board; etc. All this can promote a group identity and give support to sensitive members. If members are very different, subgroups may appear, especially in larger groups. Production-oriented members will emphasize the need for accomplishing the work and meeting production targets. In contrast, the members who are very interested in interaction and in development of the group as a social system will emphasize the importance of mutual support among the members of the group. Sometimes conflicts can result between such subgroups. It may then be necessary to have a further discussion about the production goals for the group, so that all will work best towards achieving the goal.

**Number of members in a team.** A necessary condition for a team to be productive is for the individual members to cooperate well. It is also necessary for the individuals to know each other well, both as individuals and as to competence. Lack of knowledge in this respect will always be a strong negative factor. The number of contacts between members of a team always follows the formula  $N \times (N-1) : 2$ , where  $N$  is the number of individuals in the team. With seven members, the number of interpersonal relations are 21; with 20 members, the corresponding number is 119. Based on these facts, scientists state that the maximum number of members in a well-functioning team should be 10. Experienced managers often agree.

A less sophisticated rule is that all members should be able to go out and have a beer together. This rule gives a direct indication of the reason for a limited number; the good team also forms a socially firm group.

Practical reasons often provide important arguments: natural sections in product flow are an important factor; the number of members in a clearly defined part of production is another; and the number of workers needed to take care of everything for a certain product from order to delivery is yet another. This last number can vary within wide limits. Among all the groups studied, the minimum was four persons doing everything on a simple product, including making offers to customers and dispatching invoices. In such cases, it is easy for the members of a team to get to know each other quite well. The maximum number of workers in a team was 40. Here the product was technically much more complicated. After some time, it was obvious that it was

impossible for this group to make the work flow smoothly. The group was split into four separate groups: three groups for pure production and one group of specialists formed as a support team.

**Pilot groups.** A change in work organization on an assembly line can be very costly and will often have consequences for most of the workers. Pilot groups should therefore be used to put the planned strategy to a test. A pilot group is usually composed of volunteers and workers with more than average skills.

This group is then given a great deal of instruction, training and information. Top management pays visits. Everybody is interested in what is going on. The results are often very positive and the risk is in making sweeping statements and decisions based only on the experience of the pilot group. It is also wise not to expect such good results from other groups formed as a consequence of this success. The new teams will not be formed from the most motivated workers or the most skilled. As a rule, they will not receive as much attention, information, instruction or training. The result can be failure. If this problem is not handled carefully, conflicts can result between groups and stressful situations may arise.

## 6.2. A new leadership

**First-line manager.** Responsibility and authority need to be delegated to the place where actual value is added to the product. This is one of the most important steps when transforming assembly-line work. This is almost a revolution for many assembly workers, but it is necessary if motivation is to be created and pleasure added to the job.

The supervisor's role will be changed quite remarkably by the new organization: in simple terms, from a boss who gave orders, to a consultant, and then to a leader who inspires and stimulates creativity — one who supports the workers instead of commanding them. In the old organization, the supervisor was often the most clever worker who knew how everything had to be done in detail. The supervisor must now stop helping the workers with their actual work, otherwise he or she will stand in the way of their development. He or she must put aside smart solutions and wait for ideas to come from the workers.

In quite a few companies observed, the number of supervisors had been reduced by half. Sometimes the supervisors who were left had been systematically moved away from the assembly area that they were familiar with, in order to help them get away from the role as the best worker who knew every detail of the product and who always had a solution. When reducing the number of supervisors, those who were most suited for the new situation were kept on. The word supervisor or foreman for first-line managers in workshops has often been changed to area manager or production manager. This change of word emphasizes the change in role.

**Special training for leaders.** The team needs much support in the early stages of development. Without this support, stress and frustration will occur. Often this support is given by the first-line manager. Occasionally, a manager is found with such talent, experience and deep interest in people that he or she can perform these duties without special development of his or her own

competence. The rule is, however, that the manager must be given some special training on how to handle the "soft value" problems and how to help the team through difficult stages. It is, for instance, important that the manager make the team aware of the fact that insecurity and anxiety linked to change can result in more stress for the members of the team.

More often than not, companies tend to underestimate the need for such training. Bringing first-line managers together for some days away from the workplace for discussions with a competent and experienced consultant is a very valuable investment. By doing so, a network can be created among the managers by which they can give support to each other and discuss any problems which may arise in the future. This training should be repeated from time to time.

Companies that have overlooked this need for training usually regret it. Managers should not be given responsibility for too many employees too soon. During the first stages of team development everything will run smoother if the team has good support from a leader. This support, however, is time-consuming.

**Delegation of responsibilities.** When organizing work in teams, many responsibilities that belonged to a supervisor, even administrative tasks, are delegated to the workers. Someone in the team has to act as team representative. It is important that this function should not grow into a full-time job and the group leader must, at the same time, remain a worker among the other team members.

It is recommended to have clear rules and job descriptions for team representatives. One example could be responsibility for delivering products on time; contact with customer and suppliers; utilization of production resources; working time arrangements; development of production; development of methods; training and instruction; cooperation with other teams; keeping equipment in order; employment of workers (together with management); and introduction of new members. The team representative should also take care of the development of "soft values" in the team, such as keeping the goals and seeing that the workers, at all times, are aware of their goals for the team; building a feeling of fellowship among members; building trust among members; increasing the total competence of the team; establishing good relations with other departments; and creating possibilities for the development of the team members. The special status of the group leader must be made clear by management. Top management in the company has to show their confidence in a group leader.

Traditionally, one member of the team is to be leader; this function should rotate among all members of the team or at least the majority of them. Weak and insecure members of a team will find the position as team leader very frustrating. It is definitely wrong to force this position upon somebody who is not mentally prepared for it.

Confusion about leadership can be a serious problem and it is necessary from the very beginning of the team to establish clear rules for the leadership: How many in the group will be on rotation? What competence will be demanded for the function? For how long a period is an appointment supposed to last? As a rule, it is essential for the leader to have full flexibility and competence in all the tasks in the team.

In the group of companies studied, more than 100 task-oriented working teams were formed among 27,000 workers. In those teams, many different solutions as to the leadership problem had been tried. In the majority of the teams, only those who had full competence in all the team's different tasks could become a "leader" of the team. In some, the "leadership" changed every second week; in others, every month or every second month, or even for periods of six months. In some cases, the incoming "leader" was given the function of "assistant leader" for some time before taking over. In some teams, the tasks given to the "leader" were so complicated that no rotation whatsoever could be arranged. In other teams, nobody held the position of "leader", but everybody had full responsibility for the whole team. Both those extremes are rare exceptions. Most companies have clearly defined rules and job descriptions for their group leaders. Those descriptions are often displayed permanently on a billboard. The word "leader" is rarely used for the function described and this has a symbolic meaning. The terms preferred are team spokesman, team coordinator, team representative, team driver or the like, just to point out that the old function as a foreman no longer exists.

### 6.3. Sharing goals

Without clear and engaging goals, alienation and a "who cares?" feeling are likely to pervade the workplace. Lack of motivation will cause stress.

Nobody wants to work hard for a goal that is not considered one's own. Goals are, as a rule, set by the top management in a company. In assembly-line work, there is often a great distance from top management to workers on the shop floor. It is especially important, therefore, to take a serious look at this problem in assembly-line work and find a way in which the assemblers can feel a "personal ownership" of the goals.

In a group of companies employing in total 27,000 workers, top management had for many years pointed out the utmost importance of cutting down "through-put time", that is, the time from receipt of a customer's order until delivery. Advice on how to accomplish this in different production situations had been given by management. A new managing director for the group tried a different approach: he gave a distinct goal and stipulated that, within three years, the "through-put time" was to be cut by 50 per cent. He also pointed out that there was not only one way of obtaining this goal. On the contrary, every single employee in each company of the group had to find his or her own way.

Some tools were suggested, such as development of competence, organizing work teams, learning from others, etc. Within three years, the through-put time was cut by 48 per cent. During this process, thousands of assembly workers realized the value of their contribution: more qualified work had been given to them resulting in higher motivation, less alienation and less stress.

**Setting goals.** The starting point of setting goals must be the “vision” of the company, which is most often determined in the board room. This objective has to be discussed and broken up into specific goals for the various divisions or departments. Separate teams should then meet to discuss their goals and determine their line of action to achieve individual goals. In this way, step by step, the overarching vision is brought down to the line of action for each team.

**Team influence.** Each team must have the possibility of making its influence felt all the way up in the organization. Whether the team thinks it can achieve more, or whether it thinks the burden put on it is too heavy, has to be known all the way up to top management. This is for two reasons: first, top management has to know if the goals are judged as unrealistic; second, and very important from a psychological point of view, the team has to feel that it has a real influence as to goal-setting. To have influence is one thing; to be conscious of this influence is quite another. The latter part is so important and so often forgotten by management: even if managers actually listen carefully for signals from the shop floor, they often do not make it clear that they do. The result will be feelings of powerlessness, alienation and stress among the assemblers.

A common experience is that, if a team puts up its own goals for productivity, quality, etc., the goals will be most challenging. Sometimes management even has to modify them as they are judged too unrealistic. Frustration, which often accompanies failure, is harmful for a team.

It is always well worth spending some time to formulate the goals with the team, making sure they are perfectly understood. Targets for quality, production time, in-time-delivery to customers and the like have to be discussed. As a result, the assemblers will feel that the goals are not set by management but by themselves, and this will increase their satisfaction, self-esteem and determination in reaching these goals.

In one company, the team paid little attention to goals although the manager tried hard to get them interested. When the same goals were formulated in a different way, the team members were able to understand them and to see the ways in which they could exert their influence. The team started to illustrate goals and achievements in diagrams, which were put up in selected places in the workshop. The diagrams inspired the workers to break the results down into components to analyse areas for possible improvements. Such a process gives the team members a satisfaction of great psychological value.

Illustrations of goals and results are of highest importance. Someone has to be given responsibility for keeping them up to date. It is important not to make them too sophisticated. On-time-delivery to customers, for instance, may be illustrated by showing the number of products delivered on time and the number that was not delivered on time. This is a good way to start discussions, giving special attention to those deliveries which were unsuccessful.

Questionnaires completed by workers are also of great value, particularly to assess the solidarity of the team in the achievement of their goals. The box below gives one example of how to find out how cohesive a team really is.

Formulate on one page a few — not more than ten — simple statements illustrating the cohesion of the team. Draw a line under each question and write “yes” at one end and “no” at the other. Bring the team together and give each member a copy. Discuss the first statement so that everybody can understand the full meaning of it. One statement can, for instance, be: “We are engaged in our work. When we meet, we mostly discuss our work”. After discussion, everyone is asked to indicate whether or not they agree with the statement. From the answers given, it is usually easy to get a good idea of how the workers function as a team. The results should be presented to the team and can give rise to interesting discussions for improvement.

#### 6.4. Enhanced dialogue

The start of a change process can be extremely stressful for many assemblers. Regular meetings give firm support in this situation.

In a company where working teams were to be introduced, various groups were brought together during several meetings to enable members to get to know each other. Not until this process was completed were discussions about competence, goals, methods, distribution of tasks and responsibilities started. An open atmosphere was created, and quite soon all members knew what their contribution was to be as well as the competence of their fellow workers. The teams which emerged from this process proved to be very successful.

From the very start, it is important to give some clear rules for meetings. If this is not done, rules have to be settled when the need arises and then some workers may feel that the rules are made “against them”. An example of rules for holding meetings follows:

- everyone is to take part;
- support instead of criticism;
- all criticism constructive and to the point;
- no interruptions;
- agenda given in advance;
- agenda to be followed;
- every item brought to a clear end;
- items which produce long discussions are delegated;
- rotate the function of secretary;
- secretary responsible for information.

Well-planned and well-accomplished meetings will also create a feeling of fellowship and develop competence for cooperation and flexibility, thus contributing to the protection of workers against stress.

**Frequency of meetings.** In the initial stage of change, it is necessary to hold meetings quite frequently. Afterwards, the frequency of meetings will vary depending on the needs of the team. If the team members work closely together and if there is a need for daily production planning, there can be a short meeting every morning. If the team consists of service technicians with a fair degree of independence at work, meetings that are held too frequently can be counterproductive. If a team works well together and shares the same room for coffee breaks, they will perhaps hold an informal meeting twice a day, which will of course reduce the need for frequent, formal meetings.

In all cases, it is wise to insist on holding meetings regularly in order to keep up with team development, distribute tasks and responsibilities, plan training and check training results, inspire continued improvement and, above all, analyse whether goals are being reached or not.

In a company where the change of work organization was very successful, regular meetings every second week were planned for the whole year. They were given the highest priority, and a representative from top management sponsored each team and regularly took part in the meetings. This gave status to the team and consolidated the meetings. It also gave early warning to management if the team was not functioning well.

**Special occasions.** To hold occasional meetings lasting several hours about some special topic has proved very effective. New goals are a natural reason for this. Another reason might be reports from visits to other companies, analysing results from enquiries, etc. Representatives of customers and suppliers from other departments, internal or external, can be invited to such important meetings. Videos can be used to collect statements and criticisms from customers, which may trigger off discussions for improvement. These meetings must be well-prepared in advance.

Sometimes a team get stacked and it is then necessary to lift the whole group out of production for at least a half-day to discuss what to do. What has been missed out in the development of the group? What is lacking in information or competence? Is there need for better definition of the goal? Does the team need better methods for problem analysis? Is leadership too loose? Meetings of this type often result in a great number of creative ideas being brought forward. These meetings will also provide security to insecure and stressed members.

**Criticism.** During some meetings, expressions such as “*Are we employed to produce or just to sit here chattering*” can sometimes be heard. This type of opposition seldom reflects the position of all team members, but will grow from small subgroups of extremely production-oriented members, or from somebody who thinks this expression is fun. It is important not to immediately label this as a representative expression from the team. If the meetings are well-planned and well-led most team members will appreciate them. If a team seems to be indifferent to meetings, the reason is most often that the quality is not good enough. The meetings should not be canceled but their quality should be improved.

**Chairperson.** The function of a chairperson can be attributed to the first-line manager, but it is better if a team coordinator takes this role. Responsibility for calling meetings, booking conference rooms and sending out agendas can be given to the rotating secretary.

The role of chairperson is important. He or she must:

- listen more than talk;
- hold back the high-voiced;
- support the normally silent;
- ask for clear statements;
- help the team to make analysis before decisions are taken;
- provide summaries of the meetings;
- break up long anecdotes without hurting feelings;
- follow the agenda;
- lead the discussions towards consensus-building decisions.

## 6.5. Continuous improvement

An unprogressive company will invariably be unsuccessful. Assembly work improvements, based on technical advances or new equipment, are often made in big strides but, between those strides, many companies may make no progress at all. Deming, who is responsible for much of the quality improvement of Japanese industry, suggests: *“Improve constantly and continuously the system of production and service to improve quality and productivity and thus constantly decrease costs”*. The continuous utilization of the competence of the assemblers is an essential factor in achieving such improvements while enhancing the assembler’s personal development and self-esteem. This, in turn, provides protection against stress.

Modern work organizations, based on work enrichment and working in teams, favour continuous improvement because it is easier for a worker with broad competence to see and solve problems. Cooperation with fellow workers in the team will be a good basis for testing ideas. Support from other team members also gives the shy members the courage to express their opinions.

A manager receiving a suggestion from a worker has principally two duties: first, to find out if the idea is worth putting into practice and whether some reward is to be given according the rules of the company; second, the manager has to handle the situation in such a way that the worker feels that the idea is appreciated. Each suggestion, even those which have no chance whatsoever of being put into practice, must be evaluated seriously and the worker must see that this is the case.

It is important to remember that it is one thing to value workers’ suggestions seriously and quite another to do it in such a way that the workers understand that their suggestions are valued seriously. If this can be accomplished well, the workers who propose ideas will develop their self-esteem and strengthen their motivation. Fellow workers will notice that ideas are appreciated and

this will inspire them as well. A clever manager creates motivation and positive attitudes and, at the same time, builds up mental strength among the workers.

The path from a *stressful* to a *stress free* environment can be a long and difficult one, but the rewards in terms of personal fulfilment, both for the managers and the workers, and in terms of cost reduction and increased efficiency for the enterprise, largely compensate for the major effort which may be required.

## 7. Summary

To handle stress among assembly workers is, first of all, a question of how to get rid of stress-provoking factors in assembly work and to change the work so that the workers can develop a feeling of pride. Good support and broader competence will help the assembly-line workers to develop a feeling of confidence and self-esteem.

It is important for managers to realize that work enrichment, work enlargement, broadening of competence for flexibility and team work are very important factors in a person's working life. In extreme situations, assembly-line workers perform only what the supervisor tells them to do. Sometimes the expression "trained to be helpless" is used.

It is natural that some workers will oppose innovations, feeling the innovations are a threat to their traditional positions. Often these changes will mean a very big difference to their lives. They are anxious about what this will mean for them. This provokes negative stress.

In a modern enterprise, workers are given much responsibility. Although it can be stressful to be expected to make one's own decisions, with training and support, responsibility can be a welcome challenge and stimulate positive stress. It is well-worth motivating workers to improve their capabilities.

Workers will not oppose change if they understand the necessity for it and if the change is not forced upon them from management. Managers must have patience. They must motivate, listen and accept mistakes. They must put their own solutions on hold and sometimes wait for the workers to make their own suggestions. They must try to involve everyone and convince all parties of the necessity of cooperating.

From the very start it is important to fix the overarching goals. It has to be clear to everyone that development of competence, flexibility and cooperation in team work is essential, not only for individual members, but as a pre-condition for fast adjustment to customer demands and a cornerstone to the company's survival.

It is also important to emphasize that almost every factor that has a positive influence on stress will, at the same time, improve productivity.

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