From the Integration of the Handicapped to Better Industrial Architecture

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Theme: Workspace Design II

In June, 1995, the Department of Industrial Architecture and Planning at the School of Architecture, Chalmers University of Technology, Göteborg and the Samhall company jointly organized a seminar on the design of industrial buildings which help integrate the handicapped into the workplace[1]. Samhall is a group of medium-sized firms which receive government assistance because almost all of their employees are handicapped. The organization unites about 30,000 wage earners working in a variety of production and service positions. During the seminar we visited two Samhall facilities. This paper will report observations and lessons learned from these visits.

There is nothing remarkable about the appearance of the factories we visited, neither the siting, the exterior, nor the interior design of the buildings. The sites are ordinary, one factory located in an industrial park and the other in an old factory right in the middle of the city within which several units coexist. The approaches are ordinary as well. The first factory is a single-floor building at street level. The second operates in a multi-story building and is reached by a staircase, though there is also freight elevator and a large elevator equipped with a special opening and safety system which makes access easier to people with reduced mobility. At first sight, the workshops and office spaces do not seem to have extra space or specific devices for the handicapped.

For Samhall, integrating handicapped workers does not appear to require specially designed buildings. There are indeed some elementary practical arrangements which today are mandated by national legislation throughout Europe for all new buildings accessible to the public, such as wheelchair accessibility, minimum door widths, call buttons and switch location requirements, and handicap sanitary fixtures. Local authorities confirm that these two buildings do no more than is required by law to provide for the handicapped.

But a closer look reveals a work environment for the handicapped that is supported by the particular characteristics not of the building itself but of the organization of the workplace. Workers are allowed particularly careful control of their environment – of

light, dust, noise, flooring material, and so on – and are given unusually large workstation surfaces. There are special tools for the handicapped, such as adjustable tables and seats, hardware of superior quality, and often technically sophisticated systems that compensate for worker deficiencies. Where these factories are clearly different from others is in the unusual attention given to the *physical and social work environment*[2]. As these differences entail higher costs with respect to other companies in similar fields of production, the Swedish government provides financial assistance to compensate Samhall[3].

Adapting the work environment to the worker

In most ordinary production workshops, the work environment is predetermined, and each worker must adjust to them. To do this, a worker must transform the orders he or she has been given – sometimes slightly, but sometimes substantially, summoning all his or her physical and mental powers. The work environment is also enriched by the social relationships among workers and by the techniques they develop which were not foreseen by administrators.

What is different about the Samhall factories is their systematic will to *adapt the work environment to the workers*. There do occur, of course, some failures, some mistakes, and some insufficiencies. I do not imply that Samhall factories are perfect. I am primarily concerned here with the meaning of things, in this case the inversion of the common relationships between work, the workers, and their environment.

This adaptation of the work environment to the workers is performed at two levels: a personal level and a general level. *The personal level* includes various workstation equipment which is installed to enable a particular person, with a specific handicap, with specific abilities, to work in better conditions. It also includes alterations to increase mobility or facilitate relationships between workers who might otherwise be isolated, such as the hard of hearing or those with poor eyesight. Adaptation at the personal level also includes assigning employees to specific workstations or workshops based on their individual abilities[4]. Interviewing Samhall factory foremen, we were impressed by the importance of this aspect of their jobs. They are required to have a good knowledge of the trades involved and to pay close attention to each of the workers in the shop.

All of these details, and all this attention to individuals, make up a whole which is adaptation at the *general level*, the sum of adaptations at the personal level. But this general adaptation goes in fact beyond the sum of all the minor actions and interventions. Adaptive behavior, which can be observed in specific instances aimed at particular persons with well-determined difficulties, is also generalized beyond these specific examples and applied to any work situation and any work environment.

Design principles

Let us consider the example of a Samhall woodshop with machines for sawing, planing, joining, and sanding wood. Some of the machines are equipped with a special device to enable the operator to work there in spite of his handicap. This is adaptation at the personal level. However, running a finger over one of these woodworking machines, one notices that there is no dust. To one experienced with woodshops, this absence of dust means that the *entire* shop has been specially designed to prevent airborne particles. Likewise, though not absolutely silent, the workshop is unusually quiet. The reason is not that particular individuals working in the shop have hearing problems or suffer from noise, breathing difficulties or allergies to dust. In fact, the workshop has been designed and the machinery chosen so that they in themselves do not pose an obstacle to – or create a handicap for – the workers. This is adaptation at the general level.

Another example is a Samhall clothing workshop served by a conveyor system which enables fabric pieces to be positioned for knitting so that they do not encumber the operators, do not have to be carried to and from the knitting machines, and so on. Thus, the work, while still demanding, is not encumbered (should we say handicapped?) with superfluous effort and movements. This conveyor represents a considerable investment indeed. But by enabling people to work who otherwise would not have the strength or mobility to do so, and by conserving time and energy for others, it justifies the investment. It makes productive work accessible to nearly everyone regardless of physical or mental capacity.

In each of these workshops, other environmental aspects should be noted, such as the generous spacing between machines and workstations, good

lighting conditions, and good visibility allowing everyone an overview of the production process. Movements – of people as well as materials – are made easy. Samhall's work environment is a far cry from the labyrinthine spaces common in this kind of workshop. Not only does the open layout reduce the risk of production hitches and accidents and make work easier, it enables everyone to understand his position with respect to others and to the production process as a whole. Whether working alone or in a group, everyone can situate himself within the collective work effort. This, of course, makes cooperation and among workers much easier when required.

Another aspect of Samhall that should be mentioned here is their effort to prepare their workers for integration into other, more challenging workplaces. The managers we met told us that they strive to introduce about 10% of their staff each year into ordinary work environments. There are those for whom returning to a job in an ordinary factory is inconceivable, but alongside them are many who use the Samhall workshop to gradually get accustomed to working again, to regain their work tempo, develop technical skills, rediscover the value of relationships with others, and so on. While work usually brings out people's handicaps, for these individuals, work helps in overcoming those handicaps. Work at Samhall can be an apprenticeship, a training ground, a vehicle for progress. This is the primary goal of adaptation at the general level: work, and therefore workplaces, must enable the handicapped to progress beyond their present conditions.

What can we learn from Samhall's methods?

There is no reason for making Samhall a model to be followed as it is. Besides, a whole aspect of this firm and of its various workshops lies outside of the question of the design of industrial buildings. Even if Samhall is primarily a business[5], competes with other businesses in a market economy[6], and pursues production and (relative) profitability objectives, it remains a unique organization with a higher purpose which cannot be the focus of other firms. Nevertheless, the *relationships* Samhall is attempting to establish between *work, the work environment, and workers* can provide useful clues about the integration of the handicapped for this research project and beyond, in fact for any intervention into workplaces.

Work and the notion of handicap

If society requires that everyone work, including those who are physically, mentally or socially handicapped, this is because, in our societies, work is the primary means of socialization. But work also defines every person as handicapped in one way or another due to age, skill, physical force or intellectual ability. Though these handicaps may not be considered as such, they are actual handicaps with respect to certain very real work tasks. They are often avoided by sorting individuals into different categories, different jobs and careers, in such a manner that their handicaps are not actually visible. For each job, a suitable person, or a person who is able to fit it, is chosen. Someone who is no longer able to perform his or her job will be withdrawn from it, and sometimes granted a promotion[7]. These ordinary handicaps are also treated at the collective level by managing work to comply with staff characteristics (age, training, sometimes sex). Inversely, people who no longer suit the given work organization are often weeded out, sometimes by way of social services (retirement, medicalization of difficulties, or simply laid off).

In fact, every firm uses this ordinary method of adjusting the kind of work they do and their staff capabilities to suit each other. Two major tactics can be identified: choosing for a given job people who have "average" characteristics, and fitting the means of work (organization, tooling, workspace, etc.) to suit the "average" person. The definition of average here is essential. Whatever the criteria may be, it is well established that within a given population there is a proportion of individuals who do not possess the average characteristics[8]. In both cases, since people are not all identical, adjustments toward the average will leave part of the staff in a difficult situation. These people become handicapped with respect to the work expected. However, it is clear that the first tactic excludes more people than the second: all those non-average job applicants who cannot be hired to do a specific task because their abilities are insufficient. A detailed analysis of work-places often shows the necessarily "athletic" character of the person who is "suitable" for the job. On the other hand, tailoring the means of work to socially average individuals results in a larger field of persons who are likely to be able to perform the required task.

In a way, Samhall does nothing more than extend the notion of the "average individual" beyond its ordinary limits, adapting the means of work to a broader population that includes some who are handicapped[9]. This constitutes one of the possible directions for future developments. Instead of talking about the integration of the handicapped, the challenge becomes to design workplaces which are suitable for a broader population than that normally considered in the design of industrial buildings.

Work causes handicap

By defining certain individuals as unsuitable for a given task, work itself is often, if not always, a source of handicap[10]. Samhall incorporates this notion all the better because a large part of its staff is made of people handicapped by work-related injuries, that is to say people whose previous work has given them a handicap.

Whether or not employees are handicapped by their jobs seems to be less a matter of workplace design than of the nature of the work and its organization. Nevertheless, the building plays a role which is not without significance, and often contributes to the creation of handicaps. For example, when public servants moved into a large new office building in France, there was a significant increase in illness-related work absences compared to the previous building, and particularly in respiratory system ailments presumably arising from the air conditioning and ventilation system.

This case does not directly involve work, but rather the conditions under which it is carried out. There is a multitude of examples in which the building, a part of it, or one of its functions (air conditioning, lighting, soundproofing, dust removal, etc.) is injurious to workers to such an extent that it produces handicaps. Sometimes a combination of working methods and spatial configuration is involved: inefficient spatial organization in hospitals often causes a great deal of fatigue for nurses because of all the extra movements required[11]. Goods delivery is often made unnecessarily hazardous by poorly designed loading platforms, corridors which make trolley traffic complicated or dangerous, underdimensioned staircases, and so forth. In addition, the site may cause difficulties such as poor accessibility or unsuitable environmental conditions.

Again, two tactics may be considered: either to adapt the space to make it accessible to a particular handicapped individual or to provide the space with attributes which expand the field of people who can access it and work there without discomfort, that is to say without additional handicaps.

A strategy of consideration for the worker

When we began by noting the apparently ordinary character of the Samhall facilities, we did so not to deprecate their quality, but to help define precisely how they were different. One can wonder how Samhall makes apparently ordinary workplaces suitable to a broader population. It appeared to us that they did this essentially by means of a strategy of consideration for the worker.

Samhall has focused their attention on two objects which are closely related: people, in their working methods and their working environments, and buildings, in their details. The result of such consideration for their employees is the recognition of the fact that everyone has their own characteristics and abilities, that there are no standard individuals[12]. Whether they are currently employed, or are potential future employees, all operators are basically unique. Their differences – not their average – must be the focus of our attention.

The ordinary organization of workshops takes for granted that anyone can manage to get along with standard tooling at a standard workstation in a standard factory. Samhall, on the other hand, assumes that any tool, any workstation, and any factory must be able to adapt to the worker. And since people come and go, moving from job to job and from home to home, each tool, each workstation, each factory, and each home must be suitable to the maximum number of people.

This flexibility is so critical that Samhall moves operators from one workstation to another, from one activity to another, as a means of preparing them for reintegration. As a result, when Samhall employees are absent they can be replaced by others, just like in the common factory, and production lines can run with a varying number of persons. Better still, this strategy allows everyone to test different operations, allows them to try more challenging tasks, and to develop a variety of skills and become more versatile workers.

Such versatility guarantees production at any given time, but its primary aim is to give meaning to each indivi-

dual's work. That meaning stems from the larger objective of eventually reintegrating the workers into ordinary industrial production. Thus it is essential that each worker thinks beyond the production task he has to perform and assumes personal responsibility for achieving that reintegration. Focusing on this objective makes the job, at least in part, like *working for oneself*[13].

What buildings say to and about workers
Management strategies, like short-term objectives, will vary, but one goal should remain constant: *to make work meaningful for each worker among as large a population as possible.* The building has a role to play in achieving that goal: it serves technical purposes like controlling the inside environment, preventing hazards to the workers, and respecting accessibility regulations for handicapped people. But more importantly, the building demonstrates the degree of concern for the workers, defines what is expected of them, reveals what they are offered in terms of career development or personal status within the firm, and expresses the social meaning of their work.

We have already emphasized how ordinary the Samhall facilities look. The standardization of the site and of the exterior and interior appearance of the buildings is a quality for handicapped people, since it classifies them as normal workers. This issue is essential: aside from their potential for creating personal handicaps, how do industrial buildings classify workers? How can buildings show work to be either a source of handicap or an opportunity for self fulfillment[14]?

The job's image depends on the exterior of the building and its situation within the town, but concern for the worker shows itself most clearly in the many aspects of the interior architecture. Does it make movements easier for everyone? Is it easy to understand the different parts of the building, and the relationships between them, and the production process as a whole? Is it physically and socially possible for everyone to go everywhere? What opportunities does it provide for finding oneself, at a functional level as well as at a level of social significance? Does the building's organization segregate the different functions from one another? Are those functions mutually impermeable in terms of everyday use and in terms of career development, precluding movement, for example, between offices and workshops or between machine shops and assembly? Does the building enable individuals to have their own place where they can feel somehow "at home"? Or does it standardize workstations to such an extent that no one knows his place in the building or in the company[15]?

Many other similar questions could be asked, but the point here is to clarify the challenge facing the designers of industrial buildings and workstations. It is quite easy to see that this challenge can only be met by treating the building as not merely an enclosure for accommodating people and activities, but also as a vehicle for expressing a company's policy regarding its workers and their organization. Architecture then becomes an important management tool.

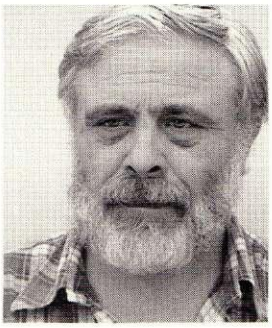
Conclusion

If we combine the ordinary appearance of the Samhall factories with their detailed attention to worker's needs, we get what could be a model workplace and an architectural principle applicable not only to handicapped workers but to everyone: spaces which are in all respects attentive to each individual. The goal of this concern for the individual is not only to avoid physical discomfort and the risk of injury, the goal is also to ensure flexibility in the work environment and in task assignments in the interest of both production efficiency and worker satisfaction[16].

The building's role is not only to accommodate activities but to organize them. Architecture is both the means and the image of a company's organization. But the company's objectives must be defined before the building is designed. The kind of concern for the worker I have proposed can only be meaningfully expressed in architecture if it stems from genuine company policy.

One way for a company to broaden its concern for its workers is by adapting the work environment for integration of the handicapped. The issue of integration raises specific, practical questions about architectural detailing for handicap accessibility, but it also sheds light on the company's attitude toward its ordinary workers. Are they expected to conform to certain standard categories? Do they in fact fit those standards? What would be the effects on productivity of adapting the work environment to accommodate the variety of actual workers instead of the prototypical

average worker? Seen in this light, rather than being an act of philanthropy, incorporating handicapped workers into an ordinary company can be an opportunity for business improvement. It also represents an area of future design innovation for architects.



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Notes

1. This seminar was arranged in the context of the study "Design for Integration" undertaken by the European Foundation for Improvement of Living and Working Conditions, Dublin; Chalmers' Department of Industrial Architecture and Planning, Göteborg; the Centre for Facilities Management at the Universtiy of Strathclyde, Glasgow; and the Laboratoire Espaces-Travail of the Ecole d'Architecture de Paris La Villette. The study was coordinated by Thomas A. Markus of Glasgow.
2. One might also point out "means of work" which belong to other areas and to which a similar degree of attention has been paid, such as managerial staff, social relationships, etc.
3. This assistance is also necessary because the work tempo which can be achieved by Samhall workers is often slower than average.
4. At Samhall's factories we find the same concern for addressing workers' personal, family, or reintegration problems, for handicaps which are more psychological or social than physical.
5. In this respect, it is absolutely remarkable that the managers we met (the factory directors and foremen) all come from the industrial sphere, and consider themselves industrialists first. In France, the "protected workshops" and other *Centres d'Aides par le Travail*, which have much in common with Samhall, are under the tutelage of the *Action Sanitaire et Sociale* (Medical and Social Action), and are run and managed by social workers (although they employ technicians for the various trades involved in case of technical difficulties). Moreover, the elementary tasks performed in the corresponding French factories (such as putting small items in plastic bags and labelling them for shop display) often require very few if any qualifications and add very limited value to the goods.
6. This is another important dimension: Samhall's products are not palliatives to keep people busy, but viable commercial products which are competitive, socially identifiable, and useful. This is essential to the employees' conception of the value of their work.
7. This is true for a wide variety of professions including scientific research, shipping and handling jobs, airplane pilots, and even football players (at least at the professional level).
8. Here we can refer to the famous Gauss curve and to standard deviation computations. At both ends of this curve, individuals deviate so much from the mean that they are not considered to possess the defining criterion.
9. Nevertheless, there remains a number of people who cannot be accommodated within even this broader system. Samhall does not integrate all forms of handicap and all handicapped people. The difference between Samhall and other companies is in fact a matter of margins: while Samhall's margins are wider, they have by no means entirely eliminated marginalization.
10. In addition to the familiar work-related injuries and industrial diseases, these handicaps include the physical, psychological or social problems which are generated by fatigue, boredom, and, more generally, by work alienation. See P. Cazamian, *Traité d'ergonomie* (Marseille: Ed. Octarès, 1987).
11. These excesses can be measured in kilometers per day, often amounting to between ten and twelve, and sometimes as many as eighteen or twenty. Refer to studies by M. Estryn Behar on this issue. For example, "Designing an Architecture and Organisation for Health and Safety in Hospital" in *Building for People in Hospital: Workers and Consumers* (Dublin: European Foundation for the Improvement of Living and Working Conditions, 1988).
12. This represents a radical break with the tradition of work organization according to Taylorist/Fordist models. Even if some aspects of production in the Samhall factories can be traced to these models, such as the division of labor into tasks of short duration, repetition, and workstation sequencing, taking the variety of people and their abilities into account requires a fundamentally different attitude toward work among supervisors as well as machine operators.
13. See P. Bernoux, *Un travail à soi* (Toulouse: Ed. Privat, 1981.
14. See A. Gorz, *Métamorphoses du travail, quête du sens* (Paris: Ed. Galilée, 1988.
15. See F. Lautier, "Spaces, Inter-Personal Communication and Architecture in Workplaces," in A. Törnqvist, and P. Ullmark (eds.), *Appropriate Architecture, Workplace Design in Post-Industrial Society* (Stockholm-Göteborg: Royal Inst. of Technology and Chalmers U. of Technology, 1993) 59–64.
16. Those intentions are conveyed by the title of the 1989 Stockholm and Göteborg CIB-UIA Symposium on Industrial Architecture and Engineering Design: "When People Matter."