Mass Retirement May Lead to Loss of Technical Skills

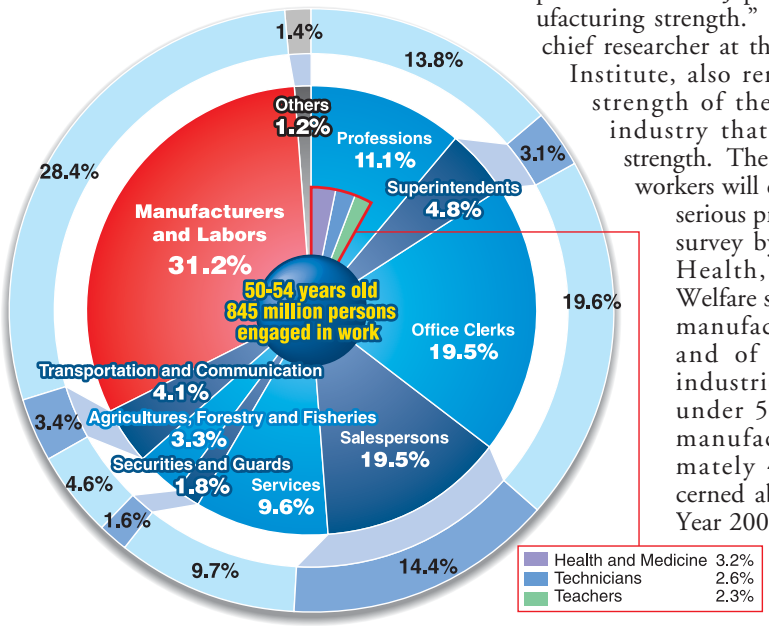
– Companies Agonize over the Transmission of Expertise –

By Tanaka Fusahiro

JAPAN'S baby boomers, approximately 6.91 million people born from 1947 to 1949, will start to retire in 2007. Comprising 5.4% of the total population, such a mass loss of workers in a short period of time is unprecedented in the modern world. Combined with a Japan's rapidly aging society with falling birthrate, which is progressing at a pace hitherto unknown in the world, the mass retirement of the baby boomers could potentially have an enormous effect on the country's future economic growth, and this concern has become the subject of debate from various perspectives.

In particular, the loss of production skills from manufacturing industries, which are regarded as Japan's economic core, is a hot topic. Japan's baby boomers account for a large proportion of blue-collar jobs. (Fig. 1) The typical composition of the labor force structure of the Japanese manufacturing sector forms a wine glass shape, where the baby boomers aged over 50 are particularly numerous, while conversely there are only a few workers in their late 30s to late 40s. Realizing the dangers of such a distorted labor force structure, companies have subsequently increased employment and the number of young workers has recently started to increase. According to Yamada Hitoshi, director of the Personal Education Center for *Kaizen* (PEC) and the evangelist of Toyota Production Systems who led Sony and Canon to a revolution in production, "Over the last 10 years, companies have neglected the human resources development in the production field. Japan has lost its manufacturing strength." Yamada Hisashi, chief researcher at the Japan Research Institute, also remarks, "It is the strength of the manufacturing industry that gives Japan its strength. The shortage of skilled workers will certainly become a serious problem." A recent survey by the Ministry of Health, Labour and Welfare shows one third of manufacturing sectors – and of those chemical industries comprise just under 50% and aircraft manufacturers approximately 40% – are concerned about the so-called Year 2007 problem. Japan is being forced to rethink its skilled manufacturing.

Figure 1 Over 30% of Baby Boomers Have Blue-Collar Jobs



Source : *Weekly Toyo Keizai, May 21, 2005 issue*, p.29 (original source: *2002 Employment Status Survey*, Ministry of Health, Labour and Welfare)
Note : Ratios in the outer ring are for all generations.

Back to Basics at the Training Program

Mitsubishi Heavy Industries (MHI) is one of the many companies facing the problem of the transfer of technical skills. The company, which manufactures and develops heavy machinery in a wide range of fields including shipbuilding, aerospace, power systems, general machinery, special vehicles and nuclear energy systems, massively increased its labor force during the shipbuilding boom in 1970-1975. However, following the first oil shock of the 1970s, the shipbuilding boom ended and the company cut recruitment for 10 years. Consequently the proportion of workers now in their late 30s to late 40s is very small, giving the labor force structure the typical wine glass shape. At present, the company employs 13,000 skilled workers. The majority of them are the baby boomers,

Photo : Toyo Keizai Inc.

Gino Juku of Mitsubishi Heavy Industries

and half of them will retire over the next 10 years. However, a company-wide effort to hand on the proficient skills and to train skilled workers is a relatively new thing for the MHI. The impetus came following a series of disasters in 2002, such as the snapping of a cable on a fighter aircraft and a fire during the construction of a passenger ship. Nakamoto Koshin, general manager of the Personnel Department at MHI, noted, "Due to specialization and division of work, the pleasure of skilled work has been lost. What we need is not improvements in design; we need improvements in the production field to be competitive. Attention to detail at manufacturing sites is Japan's strength, which is something that China does not have. It is essential to pass on manufacturing know-how to the next generation."

The company established the Workplace Improvement Committee in December 2002, and set up *Gino Juku* (Cram School of Technical Skill), which aims to develop skilled workers and had taken place independently in some departments until then, from the spring of 2004.

The pioneer of this system was the company's General Machinery & Special Vehicle Headquarters based in Sagamihara City, Kanagawa Prefecture. Here, in January 2001, the Cram School of Technical Skill was launched utilizing skilled workers from the baby boomer generation as instructors.

The targets of this program were mid-ranking employees with 9-13 years of experience. A six-month course in machining was the first to be started; and only four trainees were selected from each department. In October, 2001, a 10-month engine construction course was added, followed by a welding course the following April and a vehicle construction course in October last year. There are currently 12 students in four courses.

All the instruction is on a one-to-one basis. Its instruction combines classroom lecture (which teaches the basics) and practical training in each section, where all the necessary skills are acquired. The students are required to write a daily report, but despite this heavy workload, some manage to produce reports of more than 300 pages showing great enthusiasm.

The person who founded the Cram School of Technical Skill was Muto Minoru, assistant manager of the Labor and Safety Section in the General Affairs Department. Muto is an experienced technician who was transferred from a medium-sized company and worked his way up from the factory floor. Along the increasing complaints from customers, he realized, "Young engineers did not have the basic knowledge and often overlooked details." He says, "People of my generation took pride in the things they made. To become a truly skilled technician requires 10 to 15 years, and whether or not a person knows the basics makes all the difference in the degree of proficiency achievable. We wanted to give the young people a feeling of pride in the things that they make and so we initiated this cram school." At the General Machinery & Special Vehicles section, the company is currently working at full capacity making turbo chargers for cars, forklift trucks and manufacturing machinery. Due to a shortage of staff, there was some resistance to giving young people time out for training, but now the number of supervisors who appreciate the importance of the program has increased and things are going more smoothly.

In 2002, a massive 14.2% of the workers in Japanese manufacturing industry were aged between 50-54, which means the baby boomer generation is still underpinning the industry. The problems facing MHI are common to manufacturers all over Japan.

Photo : Toyo Keizai Inc.

Gino Juku provides a great opportunity to transfer technical skills at MHI

Encouraging Innovative Skills

At the Tanashi Aero-Engine Plant of Ishikawajima-Harima Heavy Industries (IHI), a cram school known as *Takumi Dojo* (Craftsman Training Center) was established in May 2001, targeting the new recruits.

The Tanashi Aero-Engine Plant adopted the Toyota Production System (IPS: IHI Production System) in 1993, which was said to be difficult for jet engine manufacturing, and immediately ran into a dilemma. In the production of aircraft parts, the trust of the client is paramount, and following approved standard procedures is essential. Workers are prohibited from trying any of their own innovations, unlike in the past. This being the case, it is difficult to encourage innovative skills. "We want to create a generation of workers who not only follow instructions but can also be innovative. That's why our job is to teach the basic skills," says Nemoto Toru, manager of the Tanashi Plant, emphasizing the importance of the Craftsman Training Center.

New employees take classes in seven trades including lathing, milling, grinding and finishing every Wednesday afternoon for one year, for a total of 72 hours. This is intended to give them a broad range of skills. Middle, higher and advanced level classes, which were held on an irregular basis in the past, are now taking place to a set curriculum and

Photo : Toyo Keizai Inc.

Takumi Dojo at Ishikawajima-Harima Heavy Industries

Photo : Toyo Keizai Inc.

OJT at Chiyoda Corporation

timetable. Thanks to the Craftsman Training Center, it now only takes eight years to obtain the first certificate of the National Technical Skill Test, which used to take 12 years. Coupled with the effect of having adopted the Toyota Production System 10 years ago, productivity has increased while the labor force has been reduced by 30%. However, jet engines are complex machines requiring between 30,000 and 100,000 parts. Tanashi Plant produce all of the required parts which involve over 100 different tasks. Of the 350 skilled workers, about one third are aged over 55. Passing on skills has become an urgent problem.

The Chiba Shipyard of Mitsui Engineering and Shipbuilding is another example of a factory where the baby boomer workers have started working on a one-on-one basis with young workers to pass on their skills.

A ship requires around 100,000 parts; this comes to one million if the fittings are included. Additionally, each shipyard has the know-how that can only be gained from many years of experience at the site. In the case of the original designs that are used for cutting metal sheets, there are "a lot of detailed rules that they would not be understood at other shipyards," says Yoneyama Takashi, general manager of the Ship Design Department. "If you do not know those rules, you cannot make a design, and it is also important to reduce the amount of waste scrap metal to cut production costs. It is like solving a difficult jigsaw puzzle."

When carrying out manufacturing jobs such as making a three-dimensional curved object from a flat sheet of metal, or fitting together precisely the 130 pieces required to make a large tanker, extremely highly developed skills are necessary. A decade-long of experience is required to acquire the skills, but "in the end, the most important thing is we cannot learn from books. The only way to learn is to pair up with an experienced worker and use on-the-job training (OJT)," says Matsuda Akinori of the Production Planning Department.

Chiyoda Corporation is a large engineering specialist company that has spent 15 years training the younger generation of workers. At the site of the company's LPG storage facility currently under construction in Kamisu City, Ibaraki Prefecture, Tamura Satoru, a field engineering manager in charge of design, is undergoing training in project management. Under the supervision of site manager Hayashi Tadashi, he is in the middle of an "on-the-job" intensive course.

In the case of engineering, if they have a large overseas project, the scale of the budget may be in excess of ¥100 to 200 billion, even putting the entire company's fortunes at stake. The project managers bears a heavy responsibility at the construction site. Everything from engineering, procurement and construction, to profit management and management of subcontractors falls on the person's shoulders; this is not the kind of job that can be undertaken with just ordinary training. "The progress of the project needs to be checked and meetings held everyday. Solutions have to be provided to a range of issues, and the following day's schedule must also be decided upon. If there is any trouble at the site, this is my job to take care of it," says Hayashi. "There are many things we can only understand if we are on the project site, and which require much experience in engineering," adds Tamura, emphasizing the importance of on-site training.

Utilizing the Knowledge of Retired Workers

Apart from the founding of training courses or one-to-one instruction, companies are using a wide range of methods to pass down skills to the next generation.

At the Yawata Works, where the Nippon Steel Corporation was founded, a system was established to certify technicians with highly developed skills in 2002. A changeover between the generations is taking place and in some departments, where new transferees, mid-career workers or reemployed retirees comprise around 30% of the labor force, Yawata Works has introduced the title *Tetsujin* (Skilled Iron Master) to increase the appreciation of the importance of expertise. There are currently 23 such Tetsujin. Impressed by the success of the project at the

Yawata Works, last year the Kimitsu Works of Nippon Steel introduced the similar "Steel-Meister" title.

Komatsu has introduced a system of three levels of special titles for highly skilled technicians. Eleven technicians currently hold the top level of Master Craftsman. There has been an increase in the reutilization of the potential of skilled technicians who are reaching retirement age.

At the Toyota Motor Corporation, a training place has been designated where the baby boom skilled workers instruct younger members of the company. In 2001, the company introduced the Skilled Partner System for the part-time re-employment of skilled workers. Staff with skilled knowledge that can be passed down to the younger generations are kept in the workplace until a maximum age of 63. Not only the manufacturing lines, but also development, prototype vehicle evaluation, design and other sections are reaping the benefits of the transmission of know-how and experience.

Chiyoda Corporation has introduced an audit system for the inspection of projects. Retirees who are experienced project managers or site managers are granted Senior Engineer certificates and supervise each project carefully.

JGC Corporation has also started to re-employ workers up to the age of 63, with the purpose of "transmitting experience." "We believe that sharing the experience of failures with younger people is especially important," says Miyagawa Norio, senior manager of the Human Resources Department in the Corporate Planning and Administration Division.

Standardization of Skills Releases Companies from the Limitations of Technical Know-how

Another Japanese company is taking an even more drastic approach to tackling the year 2007 problem.

In April 2000, Hitachi renamed its production technology division the "MONOZUKURI Engineering Division," and is stepping up efforts to pass on expertise to the younger workers, before many of the baby boomers who have sustained the country's production sites reach retirement age. In October 2001, the "e-Meister" system was introduced across the whole company. Skills that need to be passed on to the young workers for each manufacturing process are specified, then recorded on video or noted in detail with specific figures. The inclusion of these standardized teaching tools enables skills to be passed down to the next generation. "Until now, the craftsmen's skills were passed on informally through OJT at each production site. This way we have made the knowledge explicit; the same technical skills can be adopted right across the company," says Ota Mitsuhiro, senior project manager of the Skills Transmission and Human Resource Development Project, and head of the MONOZUKURI Human Resources Center.

The changeover from implicit to explicit knowledge has had all kinds of extra benefits. The barrier between the designers and engineers has been lowered. "There have been several instances where the designers received feedback, and as a result small changes were introduced that reduced the number of difficult jobs on the factory floor. The e-Meister system has also been linked with a cost reduction," says Ota.

In 1997, Kawasaki Heavy Industries introduced a senior employees system with the intention of utilizing the skills of elderly workers and passing them on to younger staff. Under this system, at each factory a chart is created to map the needed skills, then the highly skilled elderly workers are retained. Similarly, Kawasaki's Akashi Works of the Consumer Products and Machinery Company is trying to "standardize technical skills." Ogawa Koji, a head of the Production Department, explains that instead of simply relying on the skill of technicians, it is an approach to substitute standard operation for each technical task. At the moment, 85% of the work is standardized so that anyone will be able to do it with a little training. However, 15% of the entire operations such as casting, resin molding, coating and some machining processes are difficult to standardize. According to Ogawa, the basis for the transmission of skills in these areas is "OJT. On the factory floor the young people watch and copy the veteran workers, and skills are passed on orally."

It is not just manufacturing industries that are facing the Year 2007 Problem. IT industries are in the same position. In Japan, major companies introduced large-scale computer systems during the 1970s and 1980s. These systems were created by the baby boomer generation. In the 1990s, when the "bubble" era of fast economic growth reached an end, there was no new investment in Japan and the switch to open systems was delayed. When these veterans reach retirement age, those left behind will have no experience in setting up large-scale systems, and will only have superficial knowledge of the inner workings of the programs. Failing to take measures against it could lead to wide-scale economic damage in Japan. This is the worrying Year 2007 Problem that is being discussed in the IT world. Even the life insurance industry is not free from the Year 2007 Problem. Among the so-called "life insurance ladies," or sales staff, the proportion of the baby boomer generation is only around 20%, but they generate around 80% of the total number of contracts. The retirement of these staff will result in the weakening of the sales system.

The mass retirement of the baby boomers and the accompanying mass payment of retirement bonuses are expected to have a good effect on consumption, and will produce other short term benefits. In the medium to long term, however, it is likely that Japan will experience serious economic effects caused by insufficient manpower following the mass retirement of the baby boomers. Japanese industries are urged to find solutions for this hitherto unprecedented problem. JS

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