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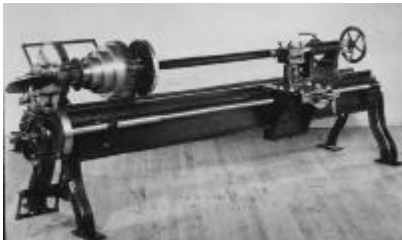
Information from the German Institute for Japanese Studies

A View into the Past

The breakthrough of the numerical control technology in Japan, or how to turn a production technology innovation into a success

by René Haak

Less than a decade ago, western industry learned to recite Japanese management concepts by heart in order to participate on the Japanese road to success in increasing sales numbers and profits. Lean Management and Lean Production, Kaizen and Kanban events, and Total-Quality-Management trainings among others stood on the agenda of European and American managers. Today, just a few years after the undoubted success of the Japanese industry, Japanese management is looking for new ways, successful models and concepts to enhance their competitiveness.



A predecessor of today's high-tech products in the machine tool industry

Can a view into Japan's past, more specifically the trail of victory of the numerical control technology, help in this search? It is at least worth a try to open the window into the past, even under the conscious presumption that the viewer's motivation and perspective set limitations to the use of history.

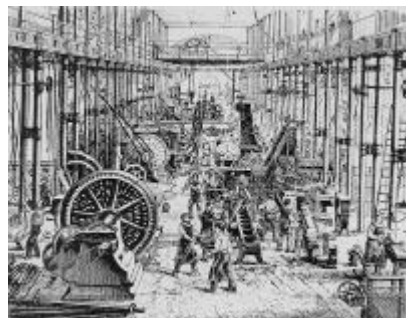
Let us start our tour of the history of Japanese technology and economy with the general recognition that the Japanese industry's economical and production technological path to victory after World War II was primarily a result of the successful carry-over and development of progressive automation technologies from the US and Western Europe. The process of developing and carrying out numerical control technology, or NC-technology, in

Japan during the first decades after the second World War was characterized by efforts to improve the existing and to convert the newly learned into industrial use.

Production scientific research is a condition for industrial practice and vice versa. Market oriented industrial integration of innovative automation technology and new forms of labor organization were significant for the successful Japanese technology enterprises. The machine-tool industry developed into a key branch of Japan's economic miracle.

The research in production technology in Japan after WWII was dominated by the progressing automation of production lines. Building upon the manufacturing experiences of the 1930s and early 1940s, the rapid economical upswing of the Japanese industry paved the way for a systematic transition from the automatic machine tool (a single machine) to the automation of the production process. The reasons for the automation were of production-technical as well as economical nature.

Among the diverse economical reasons, primarily the reforms during the time of American occupation must be mentioned. De-concentration measures, particularly the dissolution of



Machine tool factory at the end of the 19th century - when machine tools were still made by hand

the large economical conglomerates (*zaibatsu*) created essential conditions for competition, which carried the reconstruction and high growth phases, and, therefore, the need for automation until the beginning of the 1970s.

Shortly before the American occupation ended, the Korean War broke out. For several years this led to extensive US orders for the Japanese industry. This booming demand largely contributed to the rehabilitation of the Japanese economy, which was still in a labile condition by the beginning of the 1950s. The end of the "Korea boom" in 1953/54 influenced the Japanese industry, and thus the Japanese machine-tool industry, only marginally since the economy was in a broad upswing. The real economical growth (the GDP growth rate) in Japan was 8.6 percent between 1955 and 1960, 10.6 percent between 1960 and 1965, and between 1965 and 1970 it even reached an average peak value of 11.2 percent, surpassing the expectations and imaginations of most experts on the economy.

Until the 1950s, the branches that had been dominant in the pre-war times in the manufacturing industry, for example the textile industry, were prevailing. But next to primary indus-

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tries, particularly the assembly industry such as automobile manufacturing, electrical engineering, engine building, machine-tool manufacturing and fine mechanics turned out to be the main pillars of the high growth phase. The demand towards automation technology in these industrial branches was extraordinarily high. Through mutual exchange between national and international production science, they turned into the carrier and catalyst of the Japanese movement in automation technology.

Looking back, three central developmental steps can be observed in the automation technology:

- At first, automation was restricted to single fitting machines and the actual fitting process.
- Then, automation spread into the area of material flow.
- Only the third step was to automatically control the area of information flow.

Crucial for the third step was the development of a numerical control of machine tools, which was mainly based on the rapidly developing computer technologies and electronics in the US and Japan.

Important foundations for the innovation of numerically controlled machine tools were laid in Germany (among others by Konrad Zuse), but the breakthrough came in the United States. In 1945, the engineers Mauchly and Eckert introduced the first electronic calculator in the US. The development of a digital machine tool control by the scientist Parson and the Massachusetts Institute of Technology (MIT) led to the breakthrough in numerical control technology.

In Japan, the technological concept of numerical control was first published in a conference report by Professor Takahashi of the University of Tōkyō. Triggered by this report, Japanese machine tool manufacturers, as well as universities and national institutes, started intensive research on the new area of production technology. The first result of these common efforts was a numerically controlled machine tool, a revolver punch press, introduced by Fujitsu in 1956.

More developments followed quickly. At the end of the 1950s, Japanese machine tool manufacturer Makino Milling Machine in cooperation with Fujitsu developed the first Japanese numerically controlled vertical milling machine. Another milestone in the development of Japanese NC technology was a numerically controlled lathe manufactured by Ikegai. In 1958, machine tool manu-

facturer Hitachi Seiki together with Fujitsu, again involved, constructed a hydraulically driven numerically controlled milling machine, of which two samples were shipped to the Heavy Industries Nagoya Aircraft Plant.

One of the central innovations for the Japanese NC-manufacturing industry was the development of the electric and electro-hydraulic servo motor by the manufacturers Fujitsu and Fanuc. These servo motors made possible the construction of numerically controlled machines that were precise, reliable, powerful and most of all reasonably priced, which were to be manufactured in larger series, and, last but not least, laid the ground for the large economical success of the Japanese machine tool industry. Not only in the field of driver technology, which is so important for production technology, did Japanese engineers achieve their own know-how quickly. But also in the construction of controls, they could very quickly catch up with US and western European developments. Thus, Japanese machine tools manufacturers introduced the first NC-controls with built-in mini-computers between 1965 and 1969. The efforts in research and development on control technology and their construction concentrated mainly on the practical research and transfer of the new numerical control technology into the industrial practice of the fitting industry. First, NC-machines went into service in machine-tool manufacturing, automobile production and the electric industry. However, only after building upon the introduced technologies did its significance grow in importance for the manufacturing technology. Technology transfer from Western Europe and the US was executed very diversely in the early years of Japanese NC development. For instance, the Japanese machine-tool manufacturing industry took great advantage of the opportunity to buy patents and licenses and to sign cooperation contracts with technology leaders in the field of machine-tool manufacturing and the electric industry. These cooperations did not only facilitate technology transfer, but were also useful for the opening and penetration of new markets.

Japanese enterprises were very eager to adopt NC technology, mainly due to a lack of trained workers. In this context, it is interesting to note that with the adoption of the new NC technology in the manufacturing process the necessity of qualification in Japanese enterprises turned out to be only

a minor obstacle. This resulted in part from the fact that Japanese manufacturing engineers at the beginning of their careers first have to work in the field of manufacturing in their company, and, therefore, often had high qualifications on the user level. In addition, control and machinery manufacturers offered intensive often half-year long training and support programs for their customers at the beginning of NC development. Particularly in the introduction phase, customers had the manufacturer's engineers at their side to support the first steps of use and analyze problems. These measures significantly improved the acceptance of the progressive manufacturing technology. In view of manufacturing technology and labor organization, Japanese enterprises and research institutions contributed largely to the automation of the manufacturing process, which manifested in the further development of NC technology.

Therefore, it is obvious that since the mid-1960s, the influence of automation, computer technology, flexibilization, and decentralization of manufacturing processes led to a principle change in the corporate industrial labor system and its scientific reflection. New ways of labor system design, targeting the reduction of functional division of labor by integrative forming of tasks, gained importance in the Japanese industry in those years.

Today, development and use of modern manufacturing tools in the Japanese industry are distinguished by the integration of information technology, which foremost can be traced back to American basic developments and Japanese and western European product and process oriented applications. These developments result in changes in traditional factory organization. Different possibilities of manufacturing technology and organization of the manufacturing process are challenges not only for Japanese production science. In view of the expanded demand in the context of globalization, the target must be to realize international competitive advantages by market oriented and integrative design of the factory organization, as well as by progressive management concepts and automation technology. Furthermore, the target must also be to critically reflect on one's past in order to be aware of the strength that made success possible. This may be one of the keys to transforming the present.



The Genesis of Feminist Historiography in Japan: National and International Perspectives

The development of feminist historiography in Japan can be divided into five phases, which shall be characterized and contextualized by scrutinizing the accompanying historiographical discourse on subject, theory and method of research in women's history. Special emphasis is given to the question of national and international perspectives within the development of the discipline.

It is generally assumed that Japanese women's historiography has dealt almost exclusively with the Japanese context and that its international perspective as well as comparative research has only been considered since the 1990s with studies on forced prostitution organized by the Japanese military during the Asia-Pacific War (the so-called "comfort women" issue). Since the 1990s indeed two phenomena emerged: theoretical instruments were enhanced by the employment of the concept of *gender*, and the turn to Asia became manifest in comparative studies on Asian Women's History as well as in joint projects of international feminist researchers' networks. Yet, a closer look at content and theory of women's historiography in Japan shows that since its beginnings in the early 20th century this research has been influenced by international frameworks, notably the works of Morgan and Engels. Studies on the matrilineal system, Marxist women's history, the universalistic approach of Takamura in the 1950s as well as studies on Japanese women's war responsibilities published since the late 1970s account to this. But the inclusion of international theory has also, as the discussion regarding Western gender concepts shows, encountered arguments for a specifically Japanese women's history. What is new about the most recent trends is the international networking of feminist historians and their exchange at international conferences as well as the ensuing publication of comparative studies in Women's History.

Andrea Germer will present preliminary results of this research at the German Conference on Japanese Studies 2002 in Bonn.

German Institute for Japanese Studies Special Event

Writing as a Profession. A Literary Encounter between Ulla Hahn and Tsushima Yūko
(Tōkyō, 3 July 2002)



Tsushima Yūko



Ulla Hahn

An evening like this is rare indeed: a lively and extremely informative conversation between two authors, both very prominent in their own countries, developed in a pleasant atmosphere and in front of an audience of 120 people, whose probing questions aptly expanded the topic "Writing as a Profession" toward the end of the evening.

Organized by Andō Junko and Irmela Hijiya-Kirschnerreit from the German Institute for Japanese Studies in cooperation with the recently opened Center for Women and Labor Affairs ("Miraikan"), this podium discussion was held in the rooms of the easily accessible Center located in Mitā. After the welcoming address by Higuchi Keiko, Director of the Center and Professor at the Tōkyō Kasei University, Irmela Hijiya-Kirschnerreit provided a succinct introduction of both authors by recounting some basic in-



formation about their lives. Tsushima, the daughter of Dazai Osamu, who alongside Natsume Sōseki is one of the most widely read Japanese authors of the twentieth century, was brought up by her mother after the premature death of her father. She studied English literature and married at a young age. After divorcing, she raised her two children alone. She uses her life as the backdrop for her mainly autobiographically inspired narrative writing. Ulla Hahn, a poet who holds a doctoral degree in German Studies, helped contemporary poetry to new levels of acclaim in the 1980s, and then surprised her readers in 1991 and 2001 by publishing novels. Set against all these differences, both writers share a common background: they belong to the generation born a few years after the war, whose first conscious memories reach back to the early fifties, and both writers have dealt with this era in their writings. Moreover, they have both distinguished themselves as essay writers or critics, and they have both written literature since the 1970s and have received awards for their work on numerous occasions.



Irmela Hijiya-Kirschnerreit, DIJ



In the ensuing conversation, steered toward many different topics by the carefully formulated questions of the Chair, Irmela Hijiya-Kirschner, the authors exchanged ideas about the manifold aspects of "Writing as a Profession." Topics discussed included the initial phases of being a professional writer, the financial and psychological aspects of writing for a living, the sense and nonsense of the category "women's literature" as well as the relationship between the author and her readers or the conflicts between the writer and her publisher, the role of literary criticism and the tension between art and commerce. The two authors recounted astonishing examples and anecdotes in response to questions from the audience about what literature can change or has changed, or in reaction to a question referring to the relationship of imagined or experienced reality. Comments on coming to terms with one's own life in autobiographically inspired works, the process of dealing with happiness, anger or sorrow, and the answers to a question about possible injury to those who recognize themselves in such stories were particularly moving. Both authors emphasized that their literary creations are always and foremostly an attempt to understand themselves, and they both stressed that affection, or even love, for the persons or the landscapes and materials is a prerequisite for their literary interest in them. Feelings of resentment or revenge and unresolved conflicts are no basis for literature intended to last, they noted. Following their own conversation and the discussions with the audience, the authors were surprised to find that their basic beliefs regarding all fundamental aspects of "Writing as a Profession" are in agreement, even extending to the importance both attribute to professionalism. At this simultaneously interpreted event, the audience had the pleasure of learning more about two very different writers in a relaxed atmosphere.

DIJ Sponsorship

Combating Terrorism: Political and Cultural Challenge for Germany and Japan (Panel discussion)
(Tōkyō, 2 July 2002)

The panel discussion in the Nippon Press Center took place in the presence of the President of the Federal Republic

of Germany, Johannes Rau. It was organized by the Japanese-German Center, Berlin, and Asahi Shinbun and held under the sponsorship of the Japanese Foreign Ministry, the German Embassy in Tōkyō, and the DIJ. On this occasion, the German Ministry awarded a media prize for Japanese articles on Germany for the first time. Tominaga Tadashi (Asahi Shinbun) received the prize for his article "The Introduction of the Euro: Chances for Germany and Europe."

In his speech on the subject of the panel discussion, the Federal President justified using police and military means to combat terrorism. At the same time, he emphasized the necessity to eliminate the breeding-ground of terrorism. Referring to the advantages of a far-sighted globalization process, he stressed the need for a global regulatory framework providing equal opportunities and an equilibrium between developed and less developed regions, and for a dialogue among cultures at all levels.

The panelists of the discussion were Arima Tatsuo, former Japanese ambassador in Germany; Irmela Hijiya-Kirschner, DIJ; Inoguchi Takashi, Tōkyō University; Karl Kaiser, Research Institute, German Council on Foreign Relations; Wolf Lepenies, Free University Berlin; Yamazaki Masakazu, Tōa University. In order to combat terrorism, they agreed that Germany and Japan are expected to contribute politically as well as culturally towards realizing a multipolarized world.

DIJ PUBLICATIONS

Jochen Legewie, Hendrik Meyer-Ohle, and Hirasawa Katsuhiko (eds.): *Nichi-O¹ takokuseki kigyo¹ no Ajia senryaku. Ajia keizai kikigo no tenkai (Corporate Strategies for Southeast Asia after the Crisis: A Comparison of Multinational Firms from Japan and Europe)*. Tokyo¹ Hakuto¹ shobo¹ 2002, 270 pp. (ISBN 4-561-23342-3)

This volume is a translation of the book "Corporate Strategies for Southeast Asia after the Crisis: A Comparison of Multinational Firms from Japan and Europe", published by Palgrave in 2000. It evolved from the DIJ Conference on "Economic Crisis and Transformation in Southeast Asia: Strategic Responses by Japanese

and European Firms" which was organized by Jochen Legewie and Hendrik Meyer-Ohle and which was held in Tōkyō in June 1999. The book presents an in-depth analysis by experts from Europe, the US, Japan and Southeast Asia who have long-standing research experience in Asian economies and international business. The authors draw upon new management theories and empirical research to analyze the questions facing multinational corporations active in the region, and go on to examine their strategies in production, marketing and corporate finance. They present a comprehensive overview of the current activities of multinational firms from Europe and Japan in Southeast Asia. The authors address both questions of international strategy and the role of multinational firms in a global economy, while taking into account how national differences affect strategic decision-making. In the final chapter, the two editors weave together the various results from the experience in Southeast Asia and offer general conclusions for the analysis of the current shift from national to transnational business.



Working Papers

02/1 René Haak: Internationalization – The Challenges for Japanese Management (in German).

02/2 René Haak: Strategy and Organization of International Enterprises. German-Japanese Business Cooperation in China.

02/3 Harald Conrad: Towards a New Public-Private Pension Mix in Japan.

02/4 Sven Saaler: Pan-Asianism in Modern Japanese History: A Preliminary Approach.

02/5 Harald Dolles: Does Trust Matter? Analyses of German-Japanese Corporate Ventures (in German).

02/6 Isa Dücke: The History Textbook Issue 2001. A successful citizens' movement or foreign intervention?

02/7 Andrea Germer: Women's History in Japan. The Case of Takamure Itsue.

REPORTS ON CONFERENCES

15th Annual Conference of the Association of Japanese Business Studies (AJBS)

(St. Louis, 6–9 June 2002)

The 15th annual meeting of the Association of Japanese Business Studies, hosted by the University of Missouri at St. Louis, was held at the Millennium Hotel in St. Louis. The AJBS is an international organization of researchers who focus on various aspects of the Japanese economy: economic policy and economic system as well as management issues, among others. This wide variety of research interests is also the reason for a far-reaching list of topics discussed at the meeting. The ongoing economic changes in Japan was one of the topics most often referred to.

The DIJ was represented by Andreas Moerke's lecture on "Social Networks in Transition. The Changing Role of Personal Ties in Economic Relations in Japan." This paper, rewarded as one of the "Best Papers" at the con-

ference, analyzes the personal networks of top executives belonging to the boards of directors in Japanese stock corporations. These networks include links with other firms as well as to financial institutions and the state bureaucracy.

6th Asian Studies Conference Japan (ASCJ)

(Tōkyō, 22–23 June 2002)

On 22 and 23 June 2002, the annual meeting of the Asian Studies Conference Japan (ASCJ) was held at the Ichigaya campus of Sophia University. The ASCJ is a regional conference of the Association for Asian Studies. This year, the program consisted of 31 sessions (panels, roundtables and individual paper sessions) that addressed a broad range of themes relating to Asian studies.

Sven Saaler represented the DIJ on this conference and participated in the panel "Stepping-Stones to Empire: Political and Diplomatic Dimensions of the Japanese Empire" (organized by Igor Saveliev from Niigata University) with a presentation on "Empire in flux: the Siberian Intervention and Japanese Colonial Empire after World War I." In his paper, he analyzed the problems Japanese policy-makers and writers faced in the wake of World War I, when changes in the international environment became a major obstacle for Japan's colonialist expansion, and growing resistance from within the Japanese colonial empire endangered Japan's existing possessions on the Asian continent. The other papers addressed "Japanese Opinion Leaders' Views of the Post-WWI Order and their Reactions to Korean Nationalism" (Dick Stegewerns, Ōsaka Sangyō University) and "Russo-Japanese Colonial Rivalry over Northeast China and Rebellious Koreans in the Maritime Province" (Igor Saveliev, Niigata University). Mark Caprio from Rikkyō University served as a discussant. About 70 listeners attended the panel.

The other panels dealt with various topics in Asian Studies, including history, politics, religion, literature, society, gender studies and others. The keynote speech was delivered by Peter Duus (Stanford University), who reflected on "The Korea Problem in Japanese History – And Vice Versa." The detailed program of the conference as well as the abstracts of panels and pre-

sentations can be found on the ASCJ-homepage (<http://www.meijigakuin.ac.jp/~kokusai/ascj/2002/2002.htm>).

Science in the Age of Internationalization – Perspectives for German-Japanese Cooperation

(Kyōto/Tōkyō, 1–2 July 2002)

On 1 and 2 July 2002, the German Academic Exchange Service (DAAD) organized a conference on "Science in the Age of Internationalization – Perspectives for German-Japanese Cooperation," which was set off by the initiative "Concerted Action – International Marketing for Germany as an Education and Research Location." The conference was opened at the Hotel Garden Palace in Kyōto and continued at the German Cultural Center, Tōkyō, on the second day. The event marked the foundation of the Center for German and European Studies in Komaba (DESK) at Tōkyō University. Sasaki Takeshi, president of Tōkyō University, delivered the opening speech. The President of the Federal Republic of Germany, Johannes Rau, gave a speech on the second day in the German Cultural Center in Tōkyō, which was followed by a panel discussion about "German-Japanese Research Cooperation: The Role of the Scientists." An information corner in the foyer of the German Cultural Center presented Germany and its educational and research facilities.



Johannes Rau at the German Cultural Center

Participants in the panel discussions were (amongst others): Uwe Thomas, Federal Ministry of Education and Research; Hartmut Krebs, State of North Rhine-Westphalia; Christian Bode, DAAD; Manfred Osten, Alexander von Humboldt Foundation; Noyori Ryōji, Nobel Prize Winner for Chemistry 2001; Irmela Hijiya-Kirschneit, German Institute for Japanese Studies, Tōkyō; Mishima Ken'ichi, Ōsaka Uni-



versity; Hans-Joachim Queisser, Max Planck Institute Stuttgart; Ishii Shirō, Council for Science and Technology Policy; Siegmund Wittig, German Aerospace Center, Cologne; Motojima Osamu, National Institute for Fusion Science, Nagoya.

Presentations or speeches were also given by Christiane Nüsslein-Volhard, Max Planck Institute Tübingen, and Nobel Prize Winner for Medicine 1995; Hartmut Weule, Karlsruhe University; Walther Zimmerli, former president of Witten/Herdecke University; Joachim Jens Hesse, Institute for Statistics and Econometrics, Berlin. The speeches and discussions were translated simultaneously (German-Japanese-German).

Enterprise Forum Japan, 9th Conference of the German Industry on Asia and Pacific

(Tōkyō, 2–5 July 2002)

The Conference was organized by the German Chamber of Industry and Commerce in Japan together with the Asia-Pacific Committee and the OAV (German-Asia Pacific Business Association), among others, and took place under the motto: "Competition and Partnership in Times of Changing Economic Structures." The beginning of the conference, held in the hotel Grand Meridian Pacific in Tōkyō, was marked by a reception celebrating the 40th anniversary of the German Chamber of Industry and Commerce in Japan. Among other prominent figures, the President of the Federal Republic of Germany, Johannes Rau, delivered a welcome speech. On the second and third day, the conference focused on several economies of the Asia-Pacific Region and the changes and chances for German corporations. More than any other country, mainland China was in the center of discussion. Friday, 5 July 2002, was devoted solely to Japan. The "Enterprise Forum Japan" started with some introductory remarks by Dirk Vaubel (partner at Roland Berger & Partners Japan) on "Japan Inc.," and was followed by two blocks with 4 parallel seminars each, all dealing with different aspects of contemporary Japanese economy. The DIJ was asked to support three of them. Harald Conrad's lecture on "The Aging Society – Opening New Markets" as well as René Haak's speech on "The End of Conventional Marketing Concepts – Japan be-

tween Austerity and Luxury," and Andreas Moerke's talk on "Sōgō Shōsha – Struggling Japanese General Trading Corporations" could each draw about 20 listeners. Vivid discussions emerged after the talks had ended.

Topics discussed during the other seminars were the marketing of capital goods, e-commerce, mergers and acquisitions, automotive supplier networks and human resource management in Japan.

OTHER MATTERS/ OUTLOOK

Japanese Companies between Structural Reforms and Internationalization – Challenges and Opportunities for German Business (Presentation of research and discussion). Organizers: Industriecenter Düsseldorf and German Asia-Pacific Business Association (OAV) in cooperation with the DIJ, to be held at the Industriecenter Düsseldorf (7 October 2002) and Chamber of Commerce, Hamburg (9 October 2002).

Conference: Pan-Asianism in Modern Japanese History: Colonialism, Regionalism, and Borders. Tōkyō International Exchange Center, Plaza Heisei, Media Hall, 29–30 November 2002 (for details, cf. Newsletter No. 16).

Seminar: Globalization and Identity Formation in East and Southeast Asia. Japanese-German Center Berlin, 11 December 2002.

3rd Symposium "Assertions of Cultural Uniqueness in Asia: The Omnipresence of Discourses of Self-Assertion in East Asia: Chinese, Japanese, and Korean Perspectives. University Erlangen-Nuremberg, 12–14 December 2002.

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