NATIONAL COLLEGE OF ART AND DESIGN

Printed Textiles.

AN EXPLORATION INTO THE DEVELOPMENT OF THE TEXTILE INDUSTRY IN JAPAN WITH PARTICULAR REFERENCE TO THE WORK OF JUNICHI ARAI.

BY

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INTRODUCTION

Within the last ten years a phenomenon has developed whereby every element within our cultural production has been touched by what has been dubbed the Eco-Style. Designers have resorted to natural materials and sources that are in some way intended to pay lip service to the publics growing consciousness and guilt while witnessing depletions in the environment. Within the textile industry this has meant a shift towards the use of exclusively natural fabrics where stores have adopted policies of stocking only such fabrics. This has brought hard times on industries involved in the development of new fibres and all areas of fibre technology.

Man is destined to use any technology he creates and is to some extent obliged to use this technology. So bearing this in mind this current progression towards "Natural" could be seen as little more than a fashion. The term textiles refers to all fabrics, whether a sample of cloth or in garment form. Fabrics upon their characteristics are used for many purposes so they must fulfill the requirements of everyday use so therefore it must be fuctional. The quality of a fabric is most important and this is subject to the kind of raw materials used and the kind of manufacturing processes through which it has passed. A crucial factor to learn and understand is the essence of these textiles, which makes them more than mere cloth, because tools and technique become meaningless if one does not understand the essence of the medium.

Barriers are beginning to erode and collapse and the artists of the fibre medium have found new freedom, that is a freedom of the loom, where new forms of treatment and technique have evolved to produce innovative and visually exciting fabrics. Within the notion of a freedom of expression and the creation of beauty, the Japanese have revealed important concepts in design, technique, and technology. The Japanese artistic and craft culture has become something to draw ideas from.

Within Japan, modern industry co-existing along side an active folkcraft tradition, has put the Japanese textile production in a unique position. In terms of tradition, attitude and technology, Japan is probably the textile paradise for designers, and although the Japanese have Westernized their society to some extent, they have still managed to preserve a keen sense of their own special identity.

My thesis is based on an investigation into the development of the Textiles of Japan, referring to the innovative fabrics of Junichi Arai, from the period of the Civil War to the present day. I am inspired by Arai's ability to combine traditional technique and computers to produce simple yet effective fabrics. Much of Arai's work involved experimentation with fibres. He has the power to manipulate fibres, exploiting and exploring with different techniques in order to produce fabrics which are works of art within themselves. However, my discussion, on the development of Textiles of Japan, is composed of three chapters as follows:-

Chapter One:-

Chapter one provides an insight into the History of Textiles of Japan which I hope will portray the importance of tradition and culture to the Japanese people. The Japanese people are immensely proud of their culture, and as Japan is a nation which is and has been constantly under external influences, they like to emphasise their uniqueness and homogeneity. Chapter one I hope will portray also the importance of textiles and their design in the history and design awareness of Japan. Having established an understanding of the history of Japanese textiles, I shall also discuss the importance of the Kimono to design. I will try to evaluate how, over several decades, the Japanese used the Kimono as a building block for their design purposes, until eventually due to Western influence the Kimono began to lose its original structure. Having, hopefully, within chapter one displayed concrete evidence ofr the foundation of my discussion, chapter two elaborates on the notion of National Design Identity.

Chapter Two:-

Chapter two continues with the exploration of the influencing elements within Japanese design:-
a) Architectural
b) Ecological

This chapter discusses, in detail, the surroundings to which the Japanese people are accustomed. It discusses how Japan has been devastated by forces of nature and how the Japanese as a nation in an united endeavour strives to rebuild herself. In this chapter it is important to display elements of tradition which enables the Japanese artists and designers to establish a style of their own.

Chapter Three:-

Chapter three continues the discussion on the development of textiles of Japan, focusing on Junichi Arai, to a point where attitude and tradition are now combined with technology. In chapter three I wish to display an understanding and an appreciation for the fabrics of Arai. Chapter three elaborates on technique and technology of fibre production within the textile industry. Concluding chapter three I wish to discuss how technology will command our textile industries of the future and I will hopefully portray how technology will be an advantage towards futuristic fabrics.

Conclusion:-

The conclusion will assess the main points of my discussion. My conclusion will discuss and verify how the west can gain knowledge and inspiration from Japan, and it will also contain a comparative element with Ireland and Japan. My discussion on the development of textiles, in Japan portrays an understanding of Japanese Design aesthetic, and in my conclusion I will express how Ireland could also become aware of the potential we have to reappraise old traditions and fabrics to update our indigenous textile industry.

CHAPTER 1.

A) The importance of Textiles and their design in the history and design awareness of Japan.

B) The importance of the Kimono to Design.

In Japan, more so than in other industrialised nations traditional arts have not only endured but they have flourised. At the time of rapid Westernization during the last third of the nineteenth century many of the leading citizens eagerly mimicked foreign ways often with a comical result. In a short, time Japan transformed itself from a feudal country with no rail transportation rapid communication or viable military force into a modern state that was able to defeat Russis in a war early in this century.

However, for the Japanese the rejection of the past inherant in the modernization process, proved to be a threat to Japan's cultural patrimony. The outflow of artistic treasures that took place was largely halted at the end of the nineteenth century with the creation of a government agency that registered, and protected the works of art. Since that time objects of all kinds have come to be designated as important cultural properties and National Treasures. With the passage of time the realization that it was not only important to save the artifacts but also the skills that were used to create them. Among them are included several practitioners of textile techniques such as Yuzen, indigo dyeing and paste resist dyeing.

The textile industry, as it related to the production of costly garments, included cultivators of silk, reelers of silk threads, weavers, stencil makers and embroiderers. From the sixteenth century and through the Tokugawa rule, the textile industry was subject to the same forces that shaped the whole society. Kyoto, the home of the Imperial Court had been the traditional cente for the luxury textile industry. However, during the civil war period, Sakai, a port near Osaka, replaced Kyolo as the textile centre because of its safety relative to the turmoil of the War-torn Imperial City.

Textile imports consisted of both silk threads and finished textiles, mostly coming from China. The finished textiles had an important influence on Japans textile industry. Various new techniques were learned by studying imported textiles and from Chinese textile artisans who may have settled in Japan, in the Nara Period (710-794). Techniques included improvements in the application of metallic foil on fabric known as Surihaku, the use of metallic paper strips in woven cloth and the weaving of crepe and satin weave figured silk. These techniques were employed by the Japanese and applied in creative ways, resulting in unique textiles for use in fine garments, which I will discuss later in this chapter.

From the degradation of the civil war Japan was rescued and reunited by the greatest hero in her history Toyotomi Hideyoshi, who is often referred to by westerners as the Napoleon of Japan. He restored the weaving industry by gathering together the scattered members of the craft and setting aside for them a special quarter in Kyoto known as Nishijin, to this day the centre of Japans important textile industry.

Merchants prospered at the expense of the old aristocracy and inevitably, as we have seen it happen in European art and literature, turned to themes taken from every day life best known to us through the Japanese woodblock prints.

From evidence, it appears that the Japanese were already wearing three distinguishable grades of silk cloth and two of hemp. More hemp and mulberry fibres were used than silk because the boiling of cocoons was not yet understood and reeled from cocoons held in the mouth yielded yarn of a course uneven texture. Most of the hempen fibres were obtained not only from hemp now used in Japan but also from the beaten pulp of a shrub known to the Japanese as "Kozo". Many of the distinguishable grades of silk had lain buried along the trails of central Asis since Han times, 200 BC - A.D. 200. Still more recently a silk bonnett and mitts believed to have been discovered at Chinas ancient capital of Ch'angsha appear to belong to an even earlier date. In Japanese chronicles it is recorded that in A.D. 188 the emperor received a gift of silkworm eggs from a Chinese King and about the year 200 a Korean King sent gifts of woven silk including a soft fabric called 'Kinu" and one of tightly woven fine texture called "Katori". These are said to be of a quality far superior to anything the Japanese had yet produced. The Hemp fibre today is commonly used in the manufacture of that soft and durable paper which has given such long life to Japanese woodblock prints. Another fibre in early use was "Kara-mushi" which the english call "Ramie" and for poorer classes of fibre of "wisteria vine" was used for their homespun garments. The prized polychrome silks which the Japanese call "Nishiki" were not woven in their own country until about two centuries ago. "Nishiki" means "beautiful combination of colours and is called by foreigners brocade print. To date this is one of the most precious and important products of Japan's weaving industry.

Since Japan opened its doors to the Western world in the nineteenth century it has been a source of inspiration to many designers. Japanese dress is concerned with ritual and tradition. The cloth of the Kimono serveed as a blank canvas, and the decorative arts such as needlework, weaving and dyeing applied to the fabric, proved themselves capable of such complete and varied expression for centuries, the fabric construction and applied design has played a significant part in enhancing the wearers beauty, therefore putting the fabric design in as prominent position as the garment itself. I believe that the success of Japan in the world of fashion derives from the tension that exist between Western inspiration and the perpetuation of traditional Japanese values. By the early 1970's several Japanese designers had established themselves in Paris. The first Japanese designer to actually make a mark was Hanae Hori. A legend in her own lifetime, her designs were largely western in style and inspiration with the inclusion of small Japanese details which added a particular flavour to her work.

The designer states that :-

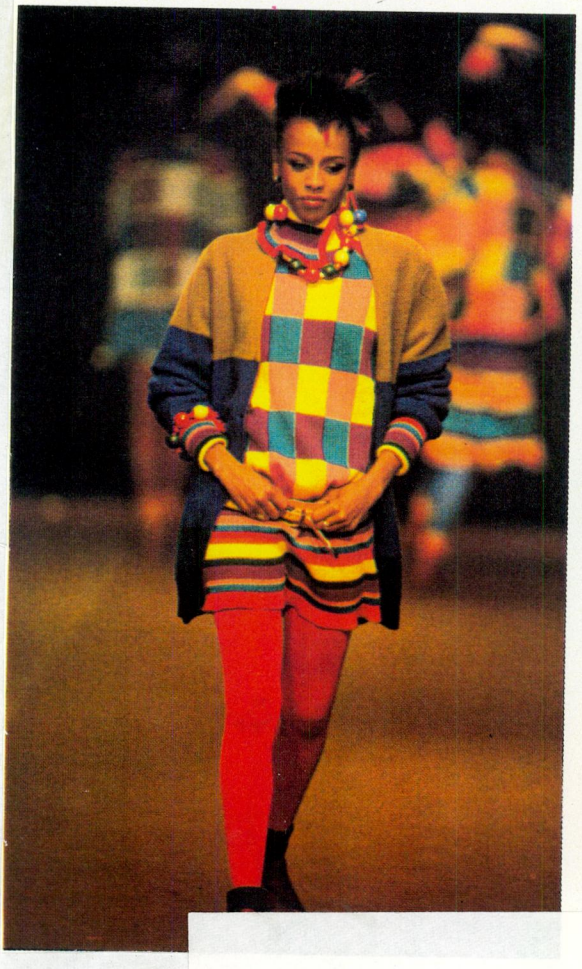
> Japanese designers have the tremendous richness of Japanese history and tradition behind them. Even though they may be studying in the Western world they have this depth of tradition to draw on that goes back more than a thousand years. It's a kind of nourishment.
>
> **(Koren, A., 1987, pg 48).**

Junichi Arai, a Japanese textile designer and businessman, achieved fame creating textiles for such designers as Mori, Issy Mijaki and Kansai Yamamoto. Arai has managed to make textiles, a means of expression for those designers, into a value in itself.

The simple shape of the Kimono has allowed for the experimentation with textiles thoughout history. Dyeing and weaving techniques have been experimented with and explored for centuries all of which have been used on or for the Kimono, as a painter will use his canvas. Decorative ideals of the Kimono are important from the view of a Japanese aesthetic. The simple symmentry of its shape, imposing no limitation on its decorator, this has encouraged much freedom in design. In the general design the main consideration was whether the ornament should be confined to the borders and shoulders of the garment, disposed more less evenly over the whole surface or arranged with dramatic asymmentr in the Ogar 'large build' manner. Subject to these principles, the pattern might be small and compact or large and sparse and more or less stylised or realistic in its pictorial content.

Although for centuries, Japanese fashion held no strong significance in the world of high fashion, it is obvious to see how some forms of design have inspired designers both past and present such as Kenzo Takada. Kenzo the next designer to Mori was the first to make an impression on the west and offer an alternative to the Parisian example of haute-couture. He also played with proportion and scale defying what was accepted in haute-couture. **Plate....(1)** illustrates Kenzo designs. His designs were largely in Japanese style and inspiration. Kenzo rejected "over-perfection" and designs his clothes mainly on geometry and he emphaasized on the use of natural fabrics. Kenzo and others who followed him, developed a clothing idiom which derived from the Kimono in that it creates space between the body and the cloth rather than been cut to fit the body. Kenzo is said to have taken many of his designs from architecture and a sense of the geometrical construction of natural fabrics directed much his work in the early 1970's. within the notion of a freedom of expression and the creation of beauty, the Kimono and its ideals has revealed important concepts in the world of designs. Although the Japanese have been able to Westernise their society they still have managed to preserve a keen sense of their own special identity.

An interesting aspect of Japanese clothing is that not only were the garments aesthetically pleasing but they were also functional. Due to the fact the cloth had a function, an important consideration was its durability. This requirement posed an importance on the choice of textile fibre, as fibre style and technique were selected to satisfy the particular function for which the textile was used. "Asa" a bast fibre, and the fabric made from it, was used for the clothing of labourers during the Heian period (794-1185) and Kamakura (1185-1333). Afther the Edo period (1615-1868) asa garments were worn mostly by the middle class. The exception was jofu, a finely woven asa of high quality, which was used by women of the wealthy urban class for their summer garments (Katabira).



KENZO TAKADA PLATE (1)

A good example of a functional and durable garment is the firemans coat. The coat which was used to protect the body from heat and retained its strength when wet, was made from a cotton fabric reinforced with sashiko stitchwork. Sashiko originally was used as a recycling technique to salvage small worn out pieces of fabric, so realising that this stitching technique improved durability the Japanese began to apply it for that reason.

Leather, also because of its durability was used by people of all social classes for armor and footwear, it never became part of regular clothing for the upper-class people as their lifestyles did not require rough labour and therefore they did not need such durable clothing. Their garments were mostly made of silk and the decorative techniques were more important than durability. The silk fibres used in the garments of the wealthy allowed for many various weaving techniques to be used, which produced delicate and intricate patterns. These patterns included aya (twill weave), shusu (satin weave), sha (gauze weave) and ra (fancy gauze weave). Leather garments were decorated with special techniques as shown in **Plate....(2)** or decorated in the same way woven fabrics were treated. The garment shown in **Plate....(2)** is a leather firefighting coat known as Kawabaori. The leather in this garment has been smoked and dyed to create the overall pattern of linked diamonds. The smoking process (fusube-gawa) exposes the leather to the smoke by smouldering materials such as pine needles or rice straw, which colours the leather. Before the smoking starts a paste-resist pattern was added with the use of a stencil and these resisted areas were not affected by the smoke. This coat was also reversible, and the linked diamond pattern is also on the inside of the coat. The brown and white pattern has indigo lines that cut vertically through the diamond shapes.

For the Japanese tradition has created a variety of textiles with differing emphasis and meaning for each characteristic.

Some patterns incorporate symbols that become decorative motifs. Among these interesing ideograms include hi(sun), ten (sky), Mizu (water), tsuchi (soil), ta (rice paddy) and yama (mountain). all important aspects of nature. The ideograms represent aspects of everyday life. The hexagram is a star-shaped design, or woven bamboo pattern, was believed to expel evil spirits it was applied to work clothes to protect the wearer from illness, accident and natural disaster. Hinode-Mon (sunrise pattern) which resembles a chrysanthenium, is symbolic of the sun's rays which reach all corners of the world, it is a wish that children grow strong and healthy under the bright sun.

Another interesting item of textile which belonged to the medieval period was the Lords Armour. The armour was created not only to protect the body while in battle but it was also consciously designed to astound and dismay energy forces as well as to impress his followers. The armour was made of horizontal rows of small metal plates held together by a multitude of flat silk brands arranged to form bold patterns of strong colour often a deep indigo blue with madder crimson.

FIREMANS LEATHER COAT PLATE (2)

Colour

Colour has always been for the Japanese an important part of their aesthetic sensibility. Colour was also used as a symbolic medium like that of the designs and motifs used to decorate their garments. The Japanese dyers exploited the brilliance of intense colour and relying on a small number of dye materials, they were able to respond to the changing demands from period to period. The introduction of Buddhism to Japan in the 6th century brought with it many influences from western society. It was at this time that textiles were important as the rich material culture of Japan. Colour and pattern was used to distinguish certain classes of people and also used to reflect authority. In 701 the Palace Dyeing Office (Naisenshi) was established to ensure the development and production of textiles for the court. Colours such as yellow which was obtained from gardenia hulls and bark of the Amur Cork tree, purple from gromwell roots, red from madder roots, blue-green from fermented leaves of indigo with a yellow overdye for green, all these colours indicated court rant. The Japanese however welcomed their own ability to create beautiful colours and as their skills in dyeing increased so too did the colours that were used to indicate various court ranks. Also due to western influence the Palace dyers were now able to produce ever finer shades and tones of colour from standard dye materials and were quick to exploit the potential of new materials.

The Palace dyers mointored the Ph factor of their dye materials by using an increased alkalinity or acidity to produce a particular tone or shade of colour. They used an alkaline solution made by leaching ashes in water to bleach the naturally off-white fibres, to gloss silk and to act as a mordant, which is an agent used to assist in the chemical bonding of dye to fibre. The dyers were aware of the chemistry of different types of ash, choosing for example ash from alum-rich woods such as camellia, to bring out the most desirable purple from gromwell roots.

However, for the Japanese lady there was a palette from which she could choose the colours of her costume. This palette was composed of pale lavenders, dark purple, layers of pure white, yellow, spring green, pinks, crimson, sky blue and a deep sappanwood red. Dark or somber colours were unattractive and were used for costumes only in time of mourning or exile.

The wards that characterized much of the medieval period in Japan le to a decline of court culture and arts including a dramatic loss of basic dyeing skills. The sections of an early 7th century embroidered Buddhist panel (the Tenjikoku mandala of Chuguji) that was repaired professionally in the Kamakura period for example, are now more faded than the unrepaired original work. A subtle evocation of feeling formed the core of aesthetic expression even in dress, particularly in colours and colour combinations that a man or a woman chose to wear on a particular season or occasion.

The Normans formal costume was composed of many layers of solid-coloured silk Kimono type garments, worn one over the other so that most showed only as layered edges at the neck, sleeve and hem edges. The women carefully choose and arranged the robes skilfully shaded or contrasting colours to echo the season, the occasion, her mood, or even a message that she wanted to convey to others.

CHAPTER 2.

Architectural and Ecological influences within Japanese design, which establishes a National Identity, to aid an understanding of Japanese Design Aesthetic.

From the earliest time the Japanese people were united in an unfeigned devotion to nature. Literature, legend, painting ceramics and textiles all bear testimony to an inate love of flowers and trees, birds and animals and all natural features of the countryside. Japan is a country where people are immensely proud of their culture.

Archaeological findings continually push back the dates of the first evidence of human life on the islands. However, there have been many waves of influence into Japan from the outside and the modern population shows considerable genetic diversity, but this is a people which seeks, at least in modern times, constantly to define its own special identity. Indeed in the face of the overwhelming Euro-American influences of the past century this concern with self identity has become almost a national obsession. Over the centuries Japan has developed her own culture drawing where it suited her on the outuside influences available. While maintaining her own characteristics in spite of enormous incursion of foreign ideas. Even after the great and immensely influential eruption of Buddhism (after A.D. 538) into Japanese life, the original and old age beliefs and traditions of Shinto survived alongside the new beliefs.

On the first of September 1923 the great Kanto Earthquake demolished two thirds of the city, Tokyo, however the city pulled itself out of the ashes and rubble to rebuild itself. The Great Earthquake signaled a new architecture within historical lines, but the devastation of 1945, ended traditional Japanese architecture, like the Japanese nation itself, sought an appropriate identity during the 1950's.

Within Japan, the impermanent and temporary nature of so many materials used for construction has meant that replacement of ancient buildings by exact replicas, as illustrated by earliest Shinto shrines A.D. 478 which though probable identical with the original design have in fact been reconstructed as frequently as every twenty years. This natural formality has been used as a contrast by the Japanese to the extreme and sometimes in the hyper-self-conscious irregularity of theeir gardens. This is also related to the contrast between their societys extreme rigidity and universality and "nature consciousness" of their religious or philosophic outlook. Economy of structure and versatility of space with its many permutations are the main factors to the design ethos of Japanese architecture

Architecture felt the force of western importations.0ver the centuries the Japanes dwelling has risen from the surface of the earth to become a platform hovering above it, and a distinction between structures for dwelling and those for storage developed. Until the modern era, wood continued as the most common structural material. The outside walls of Japanese houses often consist of sliding grille walls or sections known as 'Shogi', the inner walls are of a simular structure but lighter weight 'jusuma'.

"
The grille structure consists of closely joined strips, thicker in diameter than the thinner ones, these serve as a framework covered with paper, the screen appears as a light bright wall surface. The patterns are clearly visible during the day and also at night with lights on the inside."

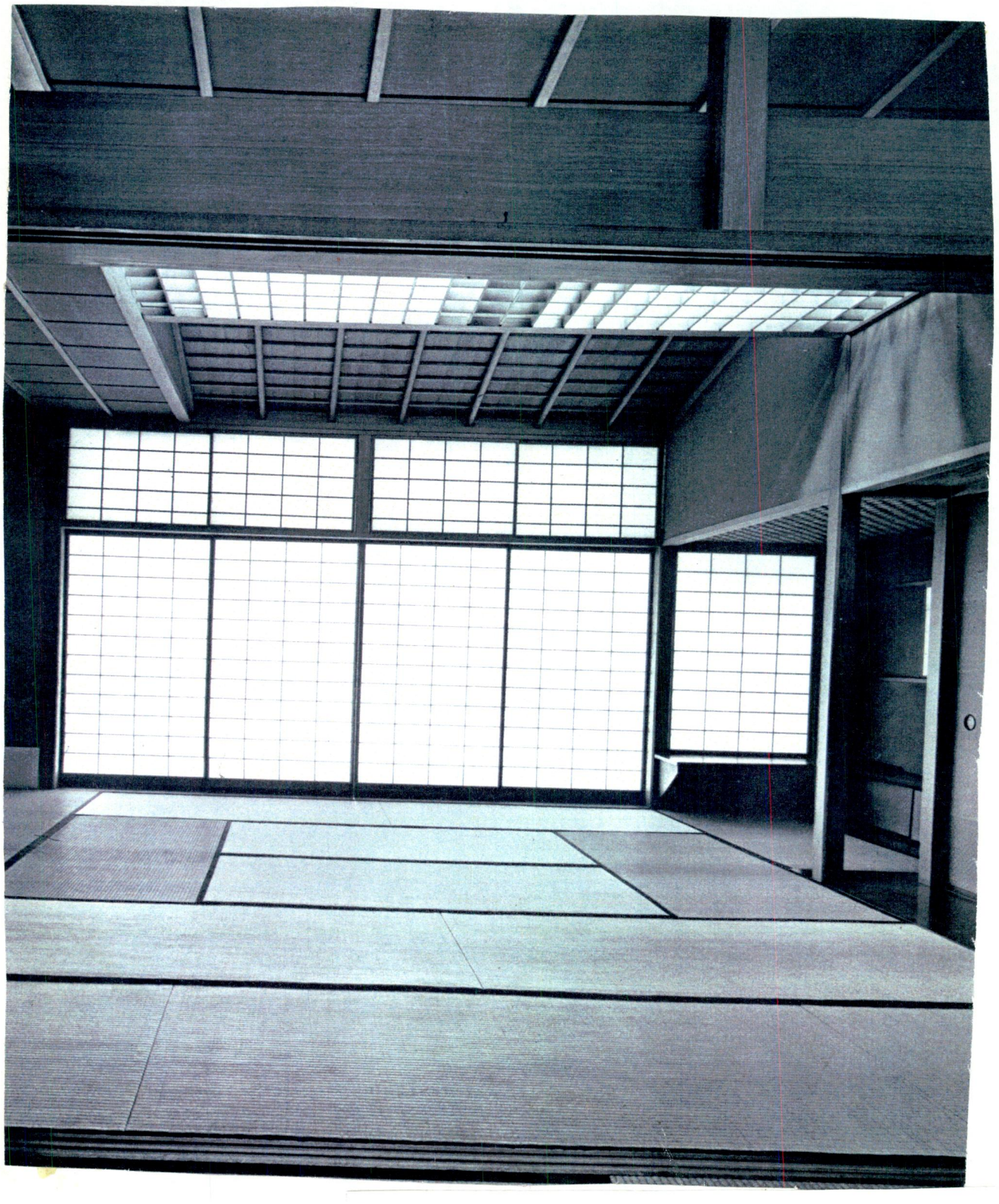
- (Siegfried Nichmann - Japonisme).

Another architectural item which receives much attention is a highly ornate form of grille known as the 'ramma'. The 'ramma' is situated below the roof and designed to allow free circulation of air around the house. All kinds of decorative motifs were used in the carving of this apparatus such as waves, birds, pine, flowers and leaves.

From the 1950's onwards Japanese architecture sought an appropriate identity of blending native attitudes with western modernism. The shape of house in plan is a rectangular shape that is subdivided spatially into four principal zones. Each segment aligns and complements the next. The adjustment of piece to piece and the astute manipulation of the rhythm of panels creates a house balanced and yet charged with a visual drive showing to us that refinement need not neessarily yield a static effect. The sliding panels which filled the interior of the house were composed of rice paper or other translucent material. The folding screens (byobu) and the hanging bamboo curtain (sudare) functioned in a parallel manner completing the system of spatial dividers. These elements are illustrated in **Plate....(3)** and **Plate....(4).**

In place of the fixed rooms of western dwellings, the spaces of the traditional Japanese house flow into one another, barely sbdivided from the whole. Variability in spatial configuration is perhaps the most important characteristic of the Japanese residence, and therefore the ossification of spaces into rooms in the twentieth century has been one of the most radical changes to have taken place under the influence of western architecture. The typical Japanese house lacked fixed rooms, such as the drawing room for specific functions. A single space could serve activities as wide ranging as conversation, dining or sleeping. Though there was relative flexibility, certain sets of functions were assigned to specific zones within the house such as the earthen floor area might be used for heavy cooking, the wooden-floored area usually accomodated the greatest traffic use while the finer tatmi covered spaces were reserved for the most honoured guests. One of the most popular formats in design was the circular or oval shape, the circular window was a common feature in Japanese houses (tokonoma) which naturally provided a direct view outdoors into the surrounding gardens.

The garden was essentially an area in which one appreciated the passing of the seasons and the subtleties of nature. Poetry writing parties were popular with nature serving as an obvious subject. As poetry reflected nature, so too the designed vegetation of the garden recalled an heightened the experience of the natural world. But, firstly under the influence of Zen Buddihism and the tea cermony, the notion of landscape gardening changed. Within the setting of the Zen compound the garden served as a contemplative vehicle towards the achievement of satori (enlightenment). The garden occupied the zone between the roofed structure and the wall, converting what might be considered a residual or negative space into a positive one.



INTERIOR OF JAPANESE HOUSE PLATE (3)

EXTERIOR OF JAPANESE HOUSE PLATE (4)

The tea garden (roji) was conceived as a progression that led from the formality of the daily world to a calm and focused repose of the tea garden. The garden form itself reflects the concept of tradition. When the tea ceremony was new and still open to development in the late sixteenth and early seventeenth centuries, it was pervaded by wild notions of experimentation. The emerging tea masters used the refinements of the chinese style of architecture for a model based on the rural farmhouse. The simple the honest were revered - "Wabi", characterised the tea tyle, 'Wabi' being a Zen aesthetic incorporating simplicity and humility, developed by tea master Senno Rikyu, which sought inner beauty hidden under a wretched surface. It is commonly defined as "refined poverty".

Four principal concepts informed the Eolo garden: the use of unfinished materials, asyumentrical planning the presence of water, and experience directed by a controlled path, this being the tea garden. Recalling the pleasure gardens of the Heian period, they distilled their ideas of landscape in the Raiyushiki teian (stroll garden). In the stroll garden, movement was essential for appreciation and comprehension. In imperial gardens such as, Katsura Rikyu, a pond occupied a focal position with direct movement along a path that kept the water to one's right. The transverse sections of the garden revealed the sequence of its events, blocking vision with plants and trees. As in the gardens of the twelfth century, literary allusions recalled foreign places or previous times whose auras hovered over the contemporary vegetation.

In discussing architecture within Japan I have learned that changes within structure develop from period to period but they have never discard4ed the basic original foundation. The most important aspect of structural design of Japan is the use of space. The plan of a Japanese house as I've already stated before and shown in **Plate....(5)** is a simple rectangular shape.. This is very similar to the construction of their garments - the Kimono. This simplicity within structure is a conscious factor among the Japanese, which allows them to be free in expression of ideas as they have no restrictions or limitations. Frank Llyod Wright, an American architect, was greatly influenced and inspired by Japanese architecture. He referred to his own work as "organic" which derived from influence of Japanese design and architecture.

".....but what is of great value to the artist in research of his nature, is knowledge of these facts of relation, those qualities of line form and colour which are themselves a language of sentiment. The Japanese reduce to simple geometry the graphic sould of the thing....."

- (Wright, Frank Lloyd, 1986 pg 10).

Line, form and colour are the most important acknowledgements to make when discussing Japanese architecutre. From this we are led to observe the characteristic habit of growth and the resultant nature of structure. All architecture worthy of the name is a growth in accord with natural feeling and industrial means to serve actual needs. Buildings will always remain the most valuable asset in a peoples environment and one most capable of cultural reaction.

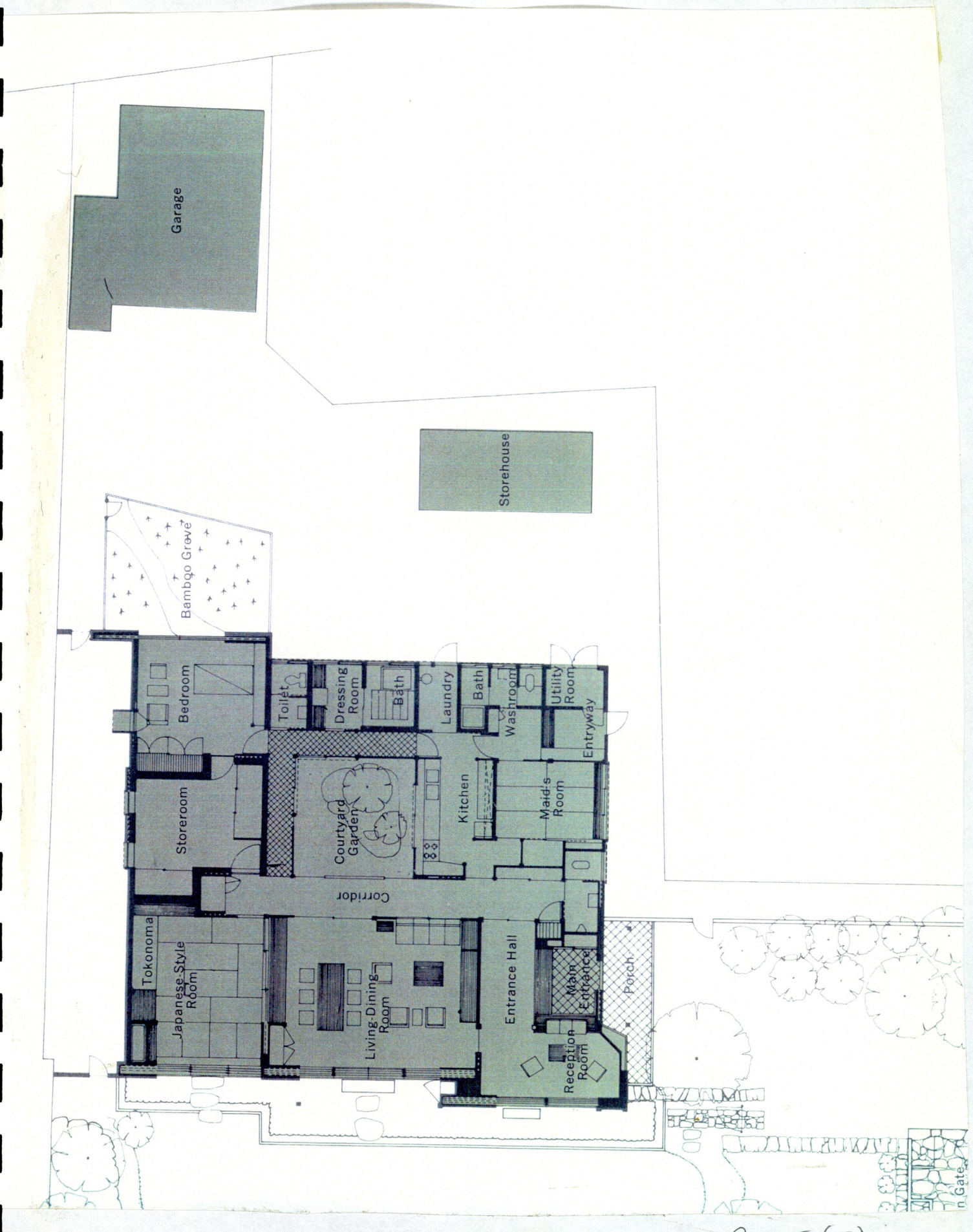

Garage
Storehouse
Bamboo Grove
Bedroom
Toilet
Dressing Room
Bath
Laundry
Bath
Washroom
Utility Room
Entryway
Storeroom
Courtyard Garden
Kitchen
Maid's Room
Corridor
Tokonoma
Japanese Style Room
Living-Dining Room
Entrance Hall
Main Entrance
Porch
Reception Room
n Gate

PLATE (5)

The dispositions throughout the entire Japanese buildings are interwoven that the structure as a whole becomes a humanized fabric with the sense of continuity and intimate relationship. The entire structure of a house rests upon a flexible foundation which is free to yield to the mutations of earthquake disturbance. The structure of the houses literally hand made are threaded though with steel fibres as to add the virtues of elasticity and resilience.

This element is evident in the fabrics created by Arai. Arai never draws his designs but regards weaving as a three-dimensional construction, a sensual form of engineering with fibres. He is interested in the orchestration of stress through balancing the properties of materials through structure in the same way as an engineer would. Expressed through cloth Arai's own brand of engineering is an intimate, tactile and vital form of physics. All woven fabrics are tension structures of a sort, though most aim for controlled tension and stability. Arai's designs are based on destabilizing fabrics and releasing rather than controlling tension. He weaves loosely, with high-twist yarns, similar to those traditionally used to make crepe fabrics in the west, to create cloth with a bouncy texture and feel which seems to spring to life.

The intrusion of "life" may be disheartening for the Japanese. Solutions began for them with fixed fact of earthquakes as a basis and a study of their nature and movements were made. A system was devised where the construction could absorb and dispose the powerful shocks, waves and violent tremors of the earthquake but yet they could maintain the buildings integrity as a fabricated structure. The Japanese obtained a free will to the finest elements of their culture.

A very interesting element, that archaeological evidence indicates is that the early inhabitants of Japan pulled fibres from the inner bark of certain trees, shrubs (Disteria, Mulberry) and grasses (hemp) and twisted them by hand to form cords and later to make straw mats and other coarse textiles in various preweaving techniques such as netting, plaiting and twining. They also cultivated fiber-bearing plants, including the lustrous long-staple ramie, which was introduced from the continent. They spun and dyed thread and wove it into cloth which they pounded smooth and plant with wooden mallets. Although the Japanese have always been justifiably proud of their woven textiles, many of their finest textiles have been dyed and their most innovative and important contributions to textile techniques have been in dyeing.

> Design seems to have been effected by skillful manipulation of colour - by vertical strips of red (madder) blue (indigo) , and yellow (various wild grasses and barks), and by the use of different colours in the warp and weft to create an iridescent effect in the finished cloth.
>
> **- (Koren, Leonard, 1948 pg 17).**

In the Henian period (1185-1333) stencil dyed patterns became evident. The paper stencils used by Japanese fabric dyers were known as Katagami, these stencils had an important influence on European textile and fashion designers of the early 1900's. Several thousand Katagami were shown at the Vienna International Exhibition in 1873, this exhibition had a profound effect on the creative direction of many artists and designers such as William Morris

Many artists and designers who attended the exhibition had been influenced by what they saw and started to produce work modelled on Japanese decorative design. The original Japanese stencils were made from the bark of the Mulberry. The stencils were similiar to paper but more waterproof, with the juice of unripe fermented fruit and oil. Knives were used for cutting out the design and sixteen sheets could be cut out at any one time. The bottom and top sheet on which the pattern was drawn was discarded and the remaining fourteen were glued together, two at a time and given a protective net of human hair or silk thread to stop them tearing. The pattern could be cut either negatively or positively into the stencil. They were used in Japan for dyeing woolen and silk cloths and it allowed the designer to produce colourful materials by using several seperate stencils or by using several seperate resist dying processes one after another.

Centain bast fibre fabrics such as the finest thread-banana cloth (bashoju) or ramie (jofu) were luxury goods whose use was restricted to the noble and the wealthy of Japan. Today, what is perceived as the "intensive labour" required to produce bast-fibre fabrics was simply the minimal effort applied in earlier eras, and today higher standards of such fabrics prevail to measure the finest quality of the Japanese. Until cotton began to be cultivated widely in Japan the women from the rural household, collected processed and wove bast fibres to cloth all the members of their family. Most of the bast-fibres are obtained from the phloem, the vascular-system tissues located in the inner back of the stems of dicotyledernous plants. They consist of elonated cell bundles which when seperated from the surrounding soft tissue by the process of controlled rotting called netting and split into consistuent elements, hold their shape and can be manipulated as threads. The bast-fibre threads from grasses differ from those of vines and trees. Grass bas-fibres are known as asa and respresented by hemp and many of thes fibres grow wilk on mountain slopes. The fibres of the wilk trees such as were tough and did not produce their natural brown colour to bleaching.

Junichi Arai, a Japanese textile designer is renowned for his continuous exploration and exploitation of fibres. An example of such a fibre is shown in **Plate....(6)** designed by Arai, and manufactured by his company Nuno which was established in Tokyo in 1985. I will discuss in chapter three the implications of Nuno, however Nuno's creativity manifests in surprising ways. Fibres with incompatible shrink ratios are intertwined and tossed into a hot dryer to yield unprecendented sculptural textures. Metalic films are also used as they are bonded to conventional threads, then melted to create transparent filigrees.

Various selective finishing processes also occur as shown in **Plate....(7).** The content of this fabric is 100% cotton and is woven by a computer assisted jacquard loom. The cotton used in this fabric is coated with Japanese Banana fibre in a cover-coating process. At the end of the manufacturing the fabric becomes firm in texture, not unlike that of linen, however it has a feeling and appearance uniquely its own. The width of this fabric is 114 cm and repeat 40cm.

In Japan until the early twentieth century bast-fibres from wisteria was used extensively for work clothes, lining cloths, wooden or earthenware food steamers and even gause-woven fishing nets. The tree called Mada throughout northeastern Japan and Shina in the mountanious area of Central Japan (Tillia cordata) provided sturdy brown fibres for weavers. The fibre of the related tree called hera was woven in northeastern Kyushu and also used for rope and raincapes. Perennial grasses called irakusa was harvested in early autumn in many parts of the country for its white fibre, and on the northern coast a species of maple called ireki produced fibre for raincapes and cloth. The very finest quality of banana-fibre cloth was woven in Shuri, the royal capital, and was not traded on the market but sent to the court. Shuri bashofu (thread banana cloth) was dyed in brilliant shades of yellow, red, blue and green. Plain weave thread-banana cloth was patterned colourfully with the Japanese stencil resist technique called bingata.

A Korean document of 1546 recorded that three different grades of bashafu were made from the varying qualities of fibre in the thread banana plant. Each piece of the thread-banana stalk, formed of bay sheaths wrapped tightly in concentric layers, opening into leaves only at the very top, has fibre on both surfaces, surrounding a pulpy centre, but only the long fibres on the outter surface are used for weaving. It is, believed that the short fibres of the inner surface formerly were used by papermakers. Also, the quality of the fibre is best on the innermost layers. Bashofu production identified six different grades of fibre indicating the great skill of the Japanese to tease and exploit from a single resource. The three outtermost layers were graded for use as heavy threads, cords and ropes. The fourth layer from the outside was used for work clothes, the fifth layer was used for everyday garments, and the sixth for formal occasions. Only the three innermost leaf-sheaths on a given plant yielded the finest grade of fibre.

- (Rathbun, William Jay, 1993) pg 41.

The production of bast-fibre textiles continues today in many parts of Japan.

Textile historian reflected.

"As I held the grain bag (tafu) that had been in continuous use for fity or sixty years and that even now was undamaged I felt as though I were looking at the character of the person who wove the cloth so well. Even if tafu is reproduced using the same processes as in the past, the life of the past when such cloth was worn is unlikely to return. Nevertheless, from the warmth of this natural fibre that could stand up to use over decades and from the manner of living of those people who gave themselves devotedly to association with it, I felt that I had many things to learn."

- (Rathbun, William Jay, 1993) pg 43.

BANANA FIBRES USED HERE

PLATE (7)

Kasuri Textiles:- **Plate....(8)**

Kasuri refers to thread-resist textiles, cloth in which warp and weft yarns are partially tied and compressed before they are dyed so that when they are stretched on the loom as warp or woven in as weft, the areas kept from the dye form a predetermined pattern in the finished cloth. Today Kasuri textiles have become a symbol of traditional Japan for the Japanese and Westerners. Kasuri refers to a certain type of cloth defined not only by technique but also by material, pattern, colour and use. Although very complex patterns can be tied into the warp the weaver has no flexibility once the warp is in the loom. Weft pattern is more flexible. Not only can the weavers change weft yarns at will, they can manipulate the weft to a certain extent as they weave. for example, a shift at a selvedge changes the direction of the image being built. As the threads shift the image they create changes. Skillful weavers were able to transform simple rectangular shapes of white on a natural or dark ground into images of flora and fauna, motifs which simple and abstracted but yet could be recognized.

Having hopefully portrayed an understanding of Japanese Design aesthetic chapter three continues with tradition but combining it with the technology of today.

KASURI TEXTILES PLATE (8)

Pl

CHAPTER 3.

The use of technology for fibre production discussing the innovative fabrics of Junichi Arai.

Japan has exerted a strong and enduring influence on Western textiles this century. Their traditional respect for textile craftsmen which leads the Japanese to award Kimono makers with the title 'National Living Treasures' explains the global strength of Japanese fabrics. According to Penny Sparke, along with shipbuilding, the textile industry led the Japanese industrial developments of the last years of the nineteenth century. This strength permitted Japan to move quickly into the production of fashion garments, at first just for the domestic market but later also for export. It has developed steadily in the years since 1945 to the extent that Japan now has a thriving fashion industry, catering for a mass market both at home and abroad.

- (Sparke, Penny. 1987, pg 110).

During the first half of the 1980's designers such as Miyake, and Yamamoto made fashion an area of synthesis between digital technologies and craft. In particular Miyake, whose Miyake Design Studion in Tokyo opened in 1971, pioneered an new approach to fashion with his more extravagant and expressive use of dramatic fabrics inspired by Japanese craft textiles. His cutting method influenced by the strict geometry of the Kimono and Madeleine Vionnets innovatory use of the bias cut in the 1920's and 1930's, introduced a looser way of draping fabric around the body, freeing it from construction of French tailoring Miyakes ideas turned Tokyo into a fashion capital and generated the interest and financial support to organise an extensive research programme into textile design.

One such designer aware of the craftsmanship that should be involved in creating fabrics is Junichi Arai. Arai produces fascinating textiles with the use of innovative techniques and materials. **Plate....(9)** illustrates Arai's creative medium.

The photorealistic image of bolts of cloth on the fabric shown in **Plate....(9)** is not a printed design, but an intricate double weave.

This woven structure pattern is composed of 100% cotton and is produced by a computer assisted Jacquard loom. Initially, the pattern is created by photocopying a piece of roughly woven cloth. Then the photocopy of the woven cloth is transferred into a computer programme. The programme is run through a computer assisted Jacquard loom to create the pattern on the fabric. The crinkled surface is created by using yarns that are tightly twisted in opposite directions.

The folds and frayed ends in the pattern repeat play off the actual folds of the cloth and the intentionally exposed frayed seams of the wall hanging. There are two planes of fabric in a double weave, and the warp and weft threads pass from one plane to the other and back again. Because of these interchanging threads the same image appears on the other side of the fabric, but in reverse, where black threads create the pattern in one layer of the cloth white threads create the same pattern in the other.

DOUBLE JACQUARD WEAVE PLATE (9)

Ari's design began as 4 x 4 photograph of bolts of fabric and was enlarded in scale by an electronic scanner. Arai used another computer to produce the 3,600 punch cards needed to weave the fabric. According to Threads Magazine October edition of 1985 Arai explained;

> I don't think I am a textile designer.
> I think I am more like a textile planner,
> a planner and a thinker of what threads do.

According to Arai, with the help of the computer any design can be engineered for the jacquard loom, but in addition to design possibilities, computers present production advantages.

Jacquard looms, driven by punch cards, had long been in use in Kiryu. Arai pioneered the idea of creating punch cards for more complex than the conventional ones with the aid of a computer. This simple but profound innovation, which has been adopted by designers all around the world, allowed a richness of pattern undreamed of before. In conventional textile design all the artistic input takes place before the weaving operation. Arai, employing his intimate familiarity with the characteristics of different threads, would deliberately use in the same fabric materials such as wool and cotton, which react quite differently to extreme heat. These fresh-woven materials were place into a hot air dryer, creating distortions in the finished material which were close to sculptural. He often used scissors to attack the finished fabric, fluffing up some parts and leaving others as they were. Therefore, much of Arai's methods were closer to craft than to commercial weaving. **Plate....(10)** called "Korean Carrot". It is 100% wool and was produced on the Jacquard loom. By using the Jacquard loom it was possible to create this sculptural fabric. The three-dimensional appearance is brought about by a felt finishing process.

Arai admitted that because the labour involved is so intensive, without computers his cloths would not have been made. To make a fabric like the one shown in **Plate....(9)** a handweaver would have to work from an elaborate graph and use pick-up-sticks to manually raise the threads. If people had to do just the punch cards for the jacquard it would take at lease one month by hand to do the pieces as shown in **Plate....(9)** for Arai this piece took him three days.

Junichi Arai produces fascinating textiles, with the ability to express through fibre the aesthetic awareness in their nature. In the 1970's Arai began to be consulted by Japanese fashion designers like Issey Miyake. His use of innovative techniques and materials complemented the new wave of fashions of Japan. The textiles he produces give a new high-tech look to Japanese fabrics. I choose to discuss Arai's fabrics because I admire the visual expressions which he creates.

Arai is aware of the craftmanship that should be involved in creating fabric, and he is also fully aware of the aesthetic principle in creating a fabric that looks like an art piece.

"KOREAN CARROT"
by Junichi Arai

PLATE (10)

Arai breaths new life into the traditional craft skills of Japan and he believes that learning from our history provides us with cultural knowledge to create better fibres, textiles and garments. According to an interview Arai had with Kyoko Mimura, in 1989, Arai stated that he has made textiles a means of expression for Japanese fashion disigners such as Miyake, into a value in itself. He also says that;

> "It's hard to find a genuine thing in life. Everything that we find in arts and crafts today is a perversion from the real thing to production motivated only by money."

He also said that;

> "Life today is rich and easy because of modern industry and technology, but individuality and uniqueness are sacrificed. Everything is standardized and has lost personality. This is the necessary evil of the modern world. Now in the era of nuclear war, our greatest goal is to balance technology and the human spirit. In order to clothe the modern man who dreams of a spiritually harmonized future, textiles the basics of everyday life must exclude the harshness of modern industry and be woven with the philosophy of tomorrow (or perhaps yesterday and the technology of tomorrow)."

Arai wants to create textiles which are genuine living art. As Ann Sutton has said of his fabric's.

> "He created cloths that combine the aesthetic qualities of fabrics from the past, of other cultures, with the technological wizadry of the present and the future."

Arai works from Zen like briefs, such as those coming from the nature aesthetic with titles like 'crystals' or 'amethyst' or 'bark' as shown in **Plate....(11).** Arai presents us with a visual expression which is an art creation as well as a design, which is also functional for modern, fashion. Arai a textile (as I shall call him) displays within his work poetic vision and personal insight. From his fabrics transcends a quiet power that comes from his inner spirit, strength and sensitivity. he creates a whole mood whereby also creating an art of its own category.

He is never happier than when working with Issey Miyake who throws provocative Zen - like suggestions his way - (in Mainichi Daily News February 27th 1989).

> "Make me a textile like stone, or like clouds or even poision - ".

"BARK" by Junichi Arai PLATE (11)

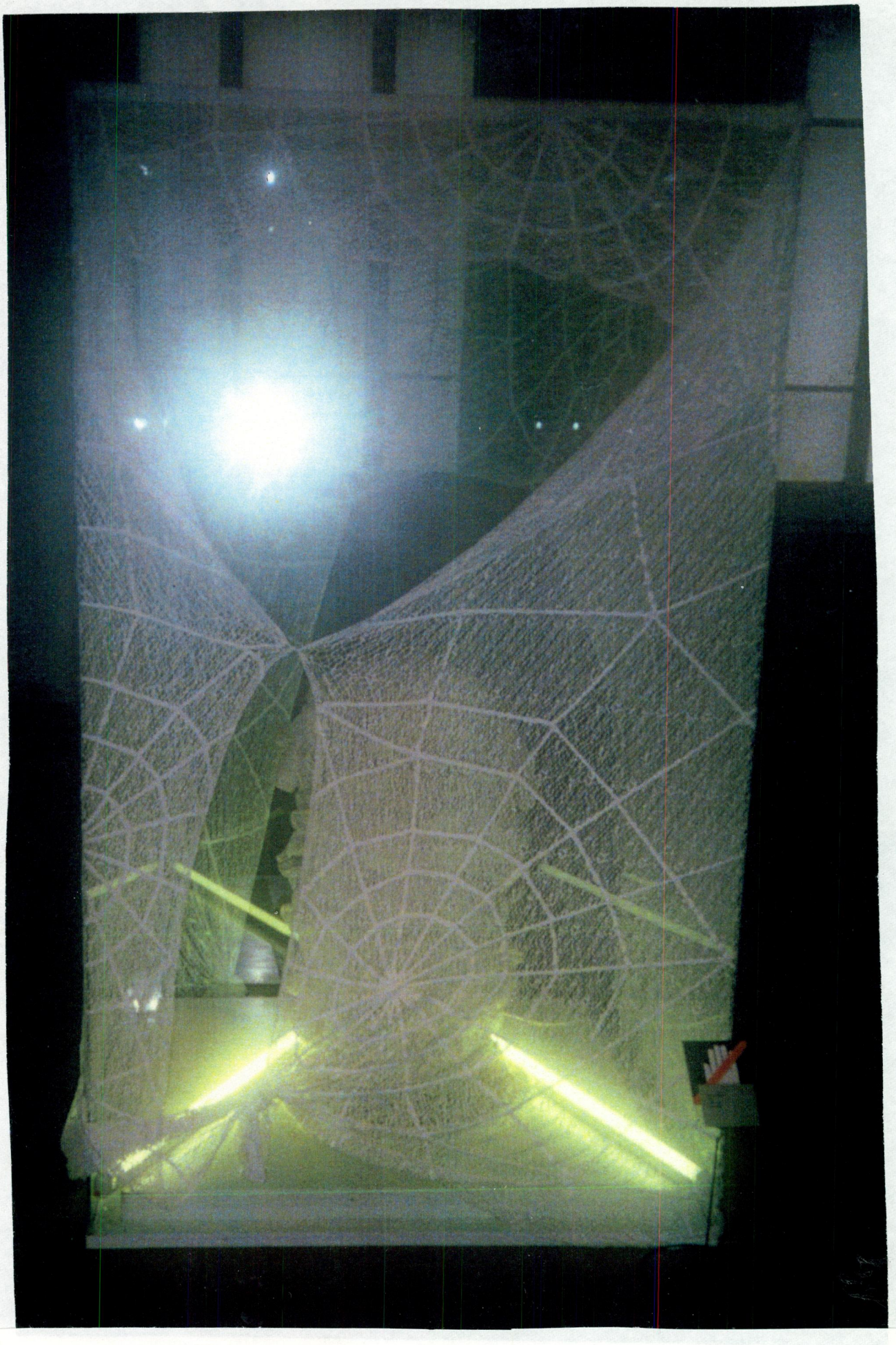
Arai designs with manufacturing processes rather than for manufacture. A problem for Arai is that he has not been able to encompass both the visionary and the commercial ends of the textile spectrum. His work for Miyake and other fashion designers has been spectacular, but its most common application has been for image building fabrics rather than for clothes which sell in large numbers. I believe that because of this reason, Arai's first long established company, Anthologie based in Tokyo in the 1970's, was closed down with unsold stock. This company produced fabrics that were undoubtadly spectacular and innovative but were considered more so image building fabrics that looked like an art piece rather than a fabric that could be used as a fashion fabric.

I feel that the greatest challenge for Arai is being able to know and understand customer needs and translating those needs expeditiously to products that will meet consumer demands. This will also challenge his technological ability to respond quickly to the increasing multiplicity of those rapid changing needs. In 1987, Decembers edition of Blueprint, Arai stated that:-

> "I want to become independent as a textile designer, not attached to a company but as a designer in the context of an atelier. I want to be able to think of my work, not merely as supplying the raw material for fashion designers, but as on par with the designers themselves as making clothing for the soul".

When Arai creates fabrics for fashion designers such as Miyake I am always aware of the simplicity of the structure of the garment. Like tradition, the structure of the garment is simple and it is the characteristics of the fabric created by Arai which gives an overall appearance of shape and movement. **Plate....(12)** shows image building fabrics of Arai compared to **Plate....(13)** which is also a fabric of Arai's used for fashion.

In 1985 Arai established a new textile company in Tokyo, with his partner Reiko Sudo. Arai has called this company "Nuno" which means functional textile which combines the best of the past and present using traditional aesthetics and technology to produce fabrics to inspire todays fashion designers. Some of his work from Nuno include **Plate....(13)** and **Plate....(14)** **Plate....(14)**, is called a "Basket Weave Big Pockets" and is also produced by Computer assisted Jacquard loom. This piece is a combination of fine cotton yarns and knitted tapes gives interesting texture to this fabric. The pockets in the fabric are raised by using a double-weave technique. **Plate.... (13)** contains 80% cotton and 20% Nylon. The Dobby loom is used for this piece of cloth. Transparent nylon yard is used to make this fabric. The corded cotton warps and tightly twisted cotton wefts are woven alternatively in the fabric to create a netted affect. It is the twisted yarn that causes the crepe effect on the surface.



EXHIBITION PLATE (12)

"ORGANDY CREP"
by Arai

PLATE (13)

BASKET WEAVE
"BIG POCKETS"

PLATE (14)

Translucence and irridescence are among the more modern concerns of aesthetics that express contemporary techniques now being explored by textile designers. They offer ameans of "dematerializing materials into a play of light, reflections and transparency, which not only evokes a contemporary response to the intangibles of the computer but also enables fabrics to be designed in such a way that they "react" to the increasingly sophisticated methods of manipulating light in an interior. Metallic pigments, light esnsitive pigments, new techniques of vacuum bonding metals on to yarn or cloth all create fabrics that are sensitive to changes in light frequency. **Plate....(15)** and **Plate....(16)** illustrate fabrics by Arai which were shown at the "form and function" exhibition in Finland last year.

Arai implemented an unorthodox new use for the heat transfer print machine which is usually used to transfer colour onto the surface of a fabric. He crafted a process of repeated pleating to permanently fix wrinles into the fabric. Extrordinary pattern and textures are created by overlapping permanently pleated wrinkles. His use of the transfer print machine as a finishing machine paved the way for an explosion of uniquely textured, shaped and coloured fabrics.

Junichi Arai's passion for slip-film techniques began more than thirty years ago. At that time he was commissioned by a Japanese textile company to research native costumes of ethnic people around the world. During his research he went to Mexico where he discovered precursors to contemporary slit-filk processes. The Mexican fabrics were made from long thin strips of leather, slit in a spiral from one entire hide, non-woven fibres knitted, braided and woven into textiles for daily use. So from this Arai launched his own slit-film exploration.

Throughout the history of Japanese textiles slit-film fibres and Kimono making have always enjoyed a symbiolic relation-ship. Japanese slit-filk has been used extensively in Kimono-making through the ages but now with the use of high technology techniques have flourished. It is now possible to vacum-seal an impossibly thin layer of metal such as titanium, chrome, gold or platinum to nylon/polyester base fabric. While most would consider the resulting high-tech fabric "man-made", Arai considered these materilas as "contemporary natural fibres".

Arai's soft-textured fabrics are woven from to-ply slit-wrap yarns. The weft yarns use a special technique called "siro-fil" in which a solid twine of tightly coiled nylon threads forms a core that is then covered with wool. The twining allows the yarn to stretch. Although these technologies were created by Japanese textile technicians it was Arai's idea to combine warp and weft threads.

In 1979, Arai created a lame fabric for designer Yamamoto using the "burn-out" method which involved a cotton surface of lame thread being dissolved leaving the metallic core. He then inverted the technique and found a way to resolve the metal leaving a transparent cloth. This he dubbed the "melt-off" technique. Then taking it a step further he tie-dyed resist, wrapping certain areas before melting off in order to keep some of the metallic.

EXHIBITION IN FINLAND
"METALIC STRIPS"

PLATE (15)

PLATE (16)

Arai dreams of realizing the "personal textile" or a system to weave personally designed textiles to reveal that "spiritual song" of individual personalities. He believes that he can achieve this by control of technique. He is developing a system that adjusts computer graphics to a drawn design and makes a jacquard pattern to weave an original fabric. He is also developing a system that video records the clients figure, calculates the curves of the body and sends the information to a cutting maching which cuts a selected dress syle, which will be sewn for the ultimate in personal attire.

However, no matter how advanced the technology is that he uses to create his fabric the most valuable part is in the way he combines his fibres. The warp and weft of a fabric gives it structure but at the same time, fludity. The fabric can be folder, stretch and shrunk.

In 1983 Arai was awarded the "Mainichi Fashion Grand Prix" and in November 1987 in London he was made haonorary member of the "Faculty of Roayl Designers for Industry", the highest honour industrial designers can achieve in Britain.

In the Spring of last year, 1993, Arai held an exhibition entitles "form and function" in Finland. The exhibition exhibited innovative fabrics which were organised to address the issue of art, craft, and technology. **Plates....(12).,..(15)** and **..(16)** indicate the various cloths and fabrics which Arai had on show.

An interesting comment from textile artist Sheila Hicks:-

the definition of textiles has exponded to include applications in "building banks, roads, race-tracks, space and marine craft, tensile structures for large-span roofing insulation walls, bridges, tents, and many other things besides furnishings. The exhibition included examples of these types of textiles and more. She closed her discussion by saying that "we will soon see designers influenced by a new kind of "eclecticism" adapting industrial fabrics to both interiors and fashion.

Junichi Arias remarkable genious as a weaver is an indication of how much the west still has to learn from Japan. He has set new standards for textile designers in the west and he has established an awareness of computer aided design for the future. Arai has proven that technology can be used to an advantage in design, as he successfully uses it as a tool for design purposes . Originality and creativity is not lost in computer aided design as Arai maintains that creativity of designers takes place at the fibre stage, in the choice of fibre, fibre manipulation and fibre combination. I myself find inspiration from Arai's textiles as they exert a feeling of excitement and freedom of expression.

CONCLUSION

Martina McBennett.

1.

Over the past two hundred years changes in technology for the production of textile products have been leading an industrial revolution from one part of the world to another. More recently the discovery of nylon, the development of melt spinning technology and the application of synthetic fibre farming processes to a variety of polymers had led to revolutionary changes in the textile industry itself.

The bare accessories of life are free from status logos and gliz. Echoeing Natural looks, they are purely elementary. Fashion designers of today have, as perhaps a tribute to the ecological movement, gravitated towards raw unbleached fibres (or ones that encapsulate the Eco-style), and even reconstruct garments made from recycled remnants have made a statement in the 90'z. In the March, 1994 edition of Cosmopolitan are the forecasts of natural colours for the season. The natural colour themes comes from sources such as tree bark. Designer Krizia states that;

> "strips of wool or linen in the colors of sacking, clay, mus and cement are used to create mainly a casual look which is the easy tunic or unstructured jacket".

The influence of Japanese and also chinese dress are being reinterpreted by designers in the West. Yves Saint Laurant glamorised the unstructured look as early as 1977 in his Paris collection, and now the look has returned for spring/summer 1994, as designers such as Donna Karan, Prada and Krizva are setting the scenes for High Street fashion. The style is long and loose and simplicity is the key for their constructions.

Approximately two hundred years have passed since the textile indsutry led the Western world into an industrial revolution. Over those years much has taken place to improve the quality and diversity of our textile products, and to improve the productivity of our production process. But even, within the last ten years, the textile industry has responded to the increasing demands of the consumer. Therefore, there is potentia for even greater advances in the next twenty to twenty five years than have taken place in the past two hundred years.

The Textile Institute Annual Concerence held in Hong Kong in 1984 devoted to the import of computers on industry. Dr. J.R. McPhee, President of the Institute said at the time

> "Advances in chemistry have resulted in new fibres, dyes and finishes, and these have been rapidly incorporated into improved textile products. Advances in engineering have made possible faster and more consistent spinning, knitting and weaving and the industry has eagerly taken advantage of these. Advances in computers are potentially of even greater importance and will come upon us faster than any of the previous technologies.".

The implications of such a trend for the world textile industry is significant. On one hand it provides a challenge to improve our knowledge and understanding of consumer needs and translating those needs to produce what will meet the consumer demands. On the other hand, these trends challenge our technological ability to respond quickly to the increasing multiplicity of those rapidly changing needs. Textile industries must be able to produce fibre, fabric and garments in shorter time than before.

The future growth rate of our textile industries will depend upon the ability of the designers to meet the challenges posed by the consumer.

A major world trend of today, as seen among the Japanese especially, is the establishment of "individual identity".

Technology alone however does not explain this growth phenomenon. Major marketing efforts were required particularly in the 1950-70 period to create consumer demand for the unique characteristics and performance advantages provided by synthetic fibres in many applications, either alone or in blends with cotton or wool. One measure of the success of this partnership between technology and marketing is the increased per capita fibre consumption. In the United States, for example the consumption trend was level in the 1950's as man-made fibres were substituted in many applications for cotton and wool. In the 1960's and early 70's per capita fibre consumption increased dramatically as consumer demand soared, peaking in 1973

As the technology of fibre production has matured and become more widely available, capacity for synthetic fibers has begun to shift from the industrially developed to the industrially developing countries. This shift in centre of gravity suggests opportunity for creation of new markets in the developing countries of the world and for expanding specialty markets in the developed countries. Both trends poing to opportunity for a renewed and geographically broadended focus on market-driven advances in technology. Such advances will be required to support the projected growth in worldwide fiber consumption from the 71 billion pound level experienced in 1983 to more than 92 billion pounds in 1994. That increase will represent new market opportunity worldwide that is nearly twice the size of the present U.S. market.

If we take a look back at the past to developing countries such as india or Peru, people there without education created beautiful weaving using a rich mixture of different threads, and different raw materials. Today, living in this present age, what is possible ? What can we achieve, using what we know from history and conventional computer aided techniques. Today within our textile industry all the artistic imput takes place before the weaving operation begins so therefore computer technology does not take away the individual imagination of a designer but is available to speed up the production process.

Ireland was once an island. where the growing of cotton and linen was much greater than that of other European countries. Many of these industries were based in the north of Ireland because it was there that the coal for rising steam in the mills could be shipped from English and Scottish coalcields cheaply as there was no overland charge. However, these industries which once thrived within our country cease to exist as they did before, as much of the work produced was handmade and crafted and therefore involved much time and labour to produce, the fibre and fabrics.

But now with the aid of technology fibres and fabrics can be produced with less time involved. So maybe if we considred to once again use our land to produce fibres as before and combine this. with the technology of today relating our industry to that of Japan this would mean a greater freedom for experimentation, and an increased productivity. This would mean that more products would become available to satisfy the growing consumer desire for individual expression.

The increased use of computers is a necessity if one is to be competitive in the textile world of the future. One important requirement for success of the future will be the ability to provide quick response to customer needs. Filling that need will require greatly compressing of time from fibre. production to the finished product. to be brought to stores in days rather than weeks. This will require bringing each link of the chain together to cut energy loss and to get just in time delivery. Computers are at the heart of linking the distribution chain which will allow short response time.

The future growth rate of our textile industry, I believe, will depend to a significant extent upon our ability to meet consumer challenges. Our success in overcoming these challenges will be determined to a great extent by the willingness and ability to translate customer needs into our products with very short time at all links of the textile chain from fibre producer to the retailer. We can learn from Arai just how important it is to be aware of the consumer market (as previously mentioned, his lack of knowledge of the consumer market meant the closure of his first major company - Anthologie.

It is obvious the technology is likely to drive future industry growth. Emerging polymerization technologies will permit construction of polymer molecules to provide more specific performance characteristics for particular applications. Even more so than today this will lead to new products which combine the performance attributes of synthetics as characteristic of natural fibres. Additionally, more product variants will become available to satisfy the growing consumer desire for individual expression. Technology has made great improvements in loom technology. The projectile loom brought the pick rate up to 1,000 picks per minute, to be replaced in only a few years by jet driven looms. The result has been 20-fold increase in pick rate in 40 years. However, the present jet technology may last only 10 years; we see speeds going to 4000 picks per minute by the turn of the century.

Weaving efficiency has imporved from 200 hours to prepare 100 square metres of fabric 200 years ato to about 40 minutes today on a modern jet loom. The reduction in labor component of these key processing steps has been important in increasing the availability of consumer choices of styles and patterns of cloth, and has helped improve the quality of life.

I hope I have portrayed through my thesis the growth of the textile industry within Japan and how we the west can learn from them to suceed in future textiles.

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