



CONSTRUCTION AND RESTORATION OF TERRAZZO FLOORS



Joseph Bagnara

National ISS Institute Overseas Fellowship

Fellowship supported by the Department
of Education, Employment and Workplace
Relations, Australian Government



ISS Institute

Suite 101
685 Burke Road
Camberwell Vic
AUSTRALIA 3124

Telephone

03 9882 0055

Facsimile

03 9882 9866

Email

issi.ceo@pacific.net.au

Web

www.issinstitute.org.au

Published by International Specialised Skills Institute, Melbourne.

ISS Institute
101/685 Burke Road
Camberwell 3124
AUSTRALIA

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Executive Summary

Terrazzo is a manufactured composite of natural marble chips, with durable aggregates set in a cement matrix with added colour. The marble chips can be selected from a wide range of colours in practically any colour of cement matrix to create any type of effect. The terrazzo aggregate and marble chips surface is polished after the matrix has set.

The most extensive use of terrazzo is for floors, whether in situ or in tiles. Skirtings, partitions, staircases and other pre-cast units can also be made of terrazzo.

Terrazzo is mainly used internally. It can be found in supermarkets, railway stations, airports, hospitals, reception areas, bakeries, and public and private foyers and buildings.

Terrazzo is a high quality, durable product which is hygienic, easy to keep clean and can be used in most heavy duty internal areas.

Terrazzo is:

- extremely hard wearing
- easy to keep clean and maintain
- attractive in appearance
- flexible, in that can be designed to be in keeping with other architectural buildings and colour schemes
- hygienic, suitable for some areas of food preparation
- manufactured to a stringent quality and safety standards
- cost effective – it will outlive most other types of hard flooring

In Australia today there is currently no training available in the National Training System training packages (Diploma/Certificate) that refer to terrazzo tiling in detail or terrazzo in situ. As a consequence there is no training course, or institution where one can be trained to place, finish and polish terrazzo to building standards and hence there are very few people who have the knowledge and skill to complete a terrazzo floor to building standards.

In addition, as the ceramic tile was introduced into the marketplace in Australia as an alternative pavement, terrazzo diminished as the preferred interior pavement, and hence terrazzo diminished as an industry. The consequence of this is reflected in existing heritage terrazzo floors being demolished and replaced with ceramic tiles or other pavements. It is estimated by the Fellow that presently no more than 5% of pavements are constructed in terrazzo.

What makes terrazzo unique is the excellent craftsmanship and understanding of the material used, its longevity and its hygiene qualities as a flooring material.

Terrazzo was created by Venetian construction workers as a low cost flooring material. Italian terrazzo workers respect the creativity of the product and have a strong dedication to the quality. Italians have also mastered the art of manufacturing and placing of terrazzo tiles.

This overseas Fellowship program was purposefully designed to explore the identified skills and knowledge deficiencies and obtain the information necessary to return to Australia equipped with the knowledge and skills to promote the use of terrazzo as a flooring product.

The primary aim of this Fellowship was to study and gain an understanding of the construction and restoration of terrazzo floors. Key objectives included:

- Development of a curriculum to include terrazzo and the associated resource material for Certificate III in Wall and Floor Tiling.
- Developing strategies to promote terrazzo as an economical and sustainable flooring product in domestic, industrial and commercial dwellings.

Executive Summary

- Promotion and development of an association for artisans and tradespeople specific to terrazzo work.
- Investigation and research of markets for manufacture of terrazzo in Australia.
- Adoption of strategies to promote terrazzo as a product to all sectors of the Building and Construction Industry.

The Fellowship provided Bagnara with an opportunity to explore and investigate the process of manufacturing terrazzo tiles from the raw materials to the final product. As part of the Fellowship, Bagnara visited the trade exposition in Bologna to research trends and technology in terrazzo tiles. In addition, Bagnara practised terrazzo placing and polishing in the context of construction, gained knowledge of the material selection, designed terrazzo pavements and investigated the durability and longevity of terrazzo pavements. Visits were also undertaken to regions of Italy to gain a comprehensive understanding of terrazzo. Bagnara undertook practical hands-on work in the preparation, placing and finishing of terrazzo on construction sites, visited manufacturers of terrazzo tiles and visited architects and restoration projects to gain an understanding of terrazzo design.

In order to optimise the outcomes of this Fellowship and revitalise the terrazzo industry, Bagnara recognises the importance of ensuring that the knowledge obtained as a result of the Fellowship is shared with others. Following an overview of the international experience, the Fellow has made suggestions regarding a range of initiatives and activities that are central to knowledge transfer and furthering opportunities for the terrazzo industry. The report then concludes with a series of recommendations for Government bodies, professional associations, education and training providers, industry, business and the community.

Key outcomes and recommendations based upon the study tour include the following:

- Nationally accredited training packages to be developed to cover terrazzo work and that the training should be delivered by registered training providers from the Building and Construction Industry.
- The Fellowship can be used to assemble resources for a training course specifically on terrazzo for the Building and Construction Industry, construction workers, TAFE lecturers, architects, tradespeople, apprentices, artists, project managers, builders, heritage conservators, producers of quarry products and retailers who sell terrazzo tiles.
- The newly acquired capabilities (skills, knowledge and understandings) should be used to form an industry association dedicated to terrazzo work including restoration of existing terrazzo floors, new terrazzo tiles and terrazzo in situ.
- These capabilities should act as a stimulus for a series of workshops around Australia to create an industry association in collaboration with the Construction and Property Services Industry Skills Council (CPSISC), the Australian Institute of Building, the Concrete Institute of Australia, the Australian Tile Council, the Construction Industry Training Board and Government and non-government heritage departments.
- A series of seminars with the Concrete Institute of Australia, the Australian Building Institute of Australia, the Construction Industry Board, the Wall and Floor Tilers Association and Government agencies such as Heritage Victoria, Heritage NSW, the Department for Environment and Heritage (South Australia) should be set up to disseminate the knowledge gained from the Fellowship.

Table of Contents

1	Acknowledgments
1	Awarding Body - International Specialised Skills Institute (ISS Institute)
3	Fellowship Supporter
3	Employer Support
3	Supporters
3	Australian Organisations and Key Bodies Impacted by the Fellowship Opportunity
5	About The Fellow
6	The Fellowship Program
6	Aim of the Fellowship
7	The Australian Context
7	History and Technology
8	SWOT of the Construction and Restoration of Terrazzo Floors
10	The Skills/Knowledge Gaps
12	International Context
12	Program Content
12	Scuola Mosaicisti del Friuli (International Training Organisation)
28	Belotti Tiles (Terrazzo Manufacturer)
28	Internazionale Marmi E Macchine Carrara S.p.A. (Carrara Marble Quarries)
28	Bologna Expo (Trade Expo Including Terrazzo Tiles)
29	Construction Site Visits
29	Consorzio il Terrazzo alla Veneziana (Professional Association)
29	Concluding Remarks
33	Knowledge Transfer
34	Recommendations
34	Government
34	Education and Training
34	Industry
35	Professional Associations
35	ISS Institute
36	References
36	Bibliography
36	Websites
37	Attachments
37	Questions Prepared For Use in Discussion With the Overseas Contacts
38	The Venetian Terrazzo Consortium

Acknowledgments

Joseph Bagnara would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide him throughout the Fellowship program.

Awarding Body - International Specialised Skills Institute (ISS Institute)

We know that Australia's economic future is reliant upon high level skills and knowledge, underpinned by design and innovation.

The International Specialised Skills Institute Inc (ISS Institute) is an independent, national organisation, which has a record of nearly twenty years of working with Australian industry and commerce to gain best-in-the-world skills and experience in traditional and leading-edge technology, design, innovation and management. The Institute has worked extensively with Government and non-Government organisations, firms, industry bodies, professional associations and education and training institutions.

The Patron in Chief is Sir James Gobbo AC, CVO. The ISS Institute Board of Management is Chaired by Noel Waite AO. The Board comprises Franco Fiorentini, John Iacovangelo, Lady Primrose Potter AC and David Wittner.

Through its CEO, Carolynne Bourne AM, the ISS Institute identifies and researches skill deficiencies and then meets the deficiency needs through its *Overseas Skill Acquisition Plan (Fellowship Program)*, its education and training activities, professional development events and consultancy services.

Under the Overseas Skill Acquisition Plan (Fellowship Program) Australians travel overseas or international experts travel to Australia. Participants then pass on what they have learnt through reports, education and training activities such as workshops, conferences, lectures, forums, seminars and events, therein ensuring that for each Fellowship undertaken many benefit.

As an outcome of its work, ISS Institute has gained a deep understanding of the nature and scope of a number of issues. Four clearly defined economic forces have emerged out of our nearly twenty years of research. The drivers have arisen out of research that has been induced rather than deduced and innovative, practical solutions created - it is about thinking and working differently.

A Global Perspective. 'Skills Deficiencies' + 'Skills Shortages'

Skill deficiencies address future needs. Skill shortages replicate the past and are focused on immediate needs.

Skill deficiency is where a demand for labour has not been recognised and where accredited courses are not available through Australian higher education institutions. This demand is met where skills and knowledge are acquired on-the-job, gleaned from published material, or from working and/or study overseas. This is the focus of the work of ISS Institute.

There may be individuals or firms that have these capabilities. However, individuals in the main do not share their capabilities, but rather keep the IP to themselves; and over time they retire and pass way. Firms likewise come and go. If Australia is to create, build and sustain Industries, knowledge/skills/understandings must be accessible trans-generationally through nationally accredited courses and not be reliant on individuals.

Our international competitors have these capabilities as well as the education and training infrastructure to underpin them.

Addressing skill shortages, however, is merely delivering more of what we already know and can do to meet current market demands. Australia needs to address the **dual** challenge – skill deficiencies and skill shortages.

Acknowledgments

Identifying and closing skills deficiencies is vital to long-term economic prospects in order to sustain sectors that are at risk of disappearing, not being developed or leaving our shores to be taken up by our competitors. The only prudent option is to achieve a high skill, high value-added economy in order to build a significant future in the local and international marketplace.

The Trades

The ISS Institute views the trades as the backbone of our economy. Yet, they are often unseen and, in the main, have no direct voice as to issues which are in their domain of expertise. The trades are equal, but different to professions.

The ISS Institute has the way forward through its 'Master Artisan Framework for Excellence. A New Model for Skilling the Trades', December 2004. The Federal Government, DEEWR commissioned ISS Institute to write an Australian Master Artisan School, Feasibility Plan.

In 2006, ISS Institute Inc. set up a new ISS advisory body, the **Trades Advisory Council**. Members are Ivan Deveson AO; Martin Ferguson AM, MP, Federal Labor Member for Batman; Geoff Masters, CEO, Australian Council of Educational Research; Simon McKeon, Executive Chairman, Macquarie Bank, Melbourne Office; Richard Pratt, Chairman, Visy Industries and Julius Roe, National President Australian Manufacturing Workers' Union.

Think and Work in an Holistic Approach along the Supply Chain - Collaboration and Communication

Our experience has shown that most perceive that lack of skills is the principal factor related to quality and productivity. We believe that attitudes are often the constraint to turning ideas into product and a successful business; the ability to think laterally, to work and communicate across disciplines and industry sectors, to be able to take risks and think outside the familiar, to share – to turn competitors into partners.

Australia needs to change to thinking and working holistically along the entire Supply Chain; to collaborate and communicate across industries and occupations - designers with master artisans, trades men and women, Government agencies, manufacturers, engineers, farmers, retailers, suppliers to name a few in the Chain.

'Design' has to be seen as more than 'Art' discipline – it is a fundamental economic and business tool for the 21st Century

Design is crucial to the economic future of our nation. Australia needs to understand and learn the value of design, the benefits of good design and for it to become part of everyday language, decision making and choice.

Design is as important to the child exploring the possibilities of the world, as it is to the architect developing new concepts, and as it is to the electrician placing power points or the furniture designer working with a cabinet-maker and manufacturer. As such, design is vested in every member of our community and touches every aspect of our lives.

Our holistic approach takes us to working across occupations and industry sectors and building bridges along the way. The result has been highly effective in the creation of new business, the development of existing business and the return of lost skills and knowledge to our workforce, thus creating jobs - whereby individuals gain; industry and business gain; the Australian community gains economically, educationally and culturally.

ISS Institute
Suite 101
685 Burke Rd
Camberwell 3124 Australia

P 61 3 9882 0055
F 61 3 9882 9866
E issi.ceo@pacific.net.au
W www.issinstitute.org.au

Acknowledgments

Fellowship Supporter

This Fellowship has been supported by the Department of Education, Employment and Workplace Relations (DEEWR), Australian Government.

The Australian Government's Department of Education, Employment and Workplace Relations (DEEWR) implements Government policies and programs to provide education and training opportunities for all Australians, to increase employment participation and to ensure fair and productive workplaces. Education, training and workforce participation are central to our goal of building a productive and socially inclusive nation, one which values diversity and provides opportunities for all Australians to build rewarding social and economic lives. Joseph Bagnara would like to thank them for providing funding support for this Fellowship.

Employer Support

Bagnara would like to acknowledge the support of TAFE South Australia (TAFESA), Department of Building, Construction and Furnishings, Gilles Plains Campus, for providing the time required to undertake the Fellowship and associated activities.

- Paul Klepczynski, Educational Manager
- Ian Robertson, Lecturer, Wall and Floor Tiling
- Gabriel Nardecchia, Lecturer, Wall and Floor Tiling

Supporters

In Australia

- Construction Industry Training Board of South Australia
- International Ceramics
- Master Tile Layers Association of South Australia
- TAFESA, Department of Building, Construction and Furnishings, Gilles Plains
- Construction and Property Services Industry Skills Council (CPSISC)

In Italy

- Scuola Mosaicisti Del Friuli, Spilimbergo, Italy, www.scuolamosaicistifriuli.it
- Belotti Tiles, Zandobbio, Italy, www.belottitiles.biz
- Carrara Quarries, Italy

Australian Organisations and Key Bodies Impacted by the Fellowship Opportunity

Education and Training

- Construction and Property Services Industry Skills Council (CPSISC)
- Construction Industry Training Board
- TAFE institutes in each state of Australia teaching Building, Engineering, Architecture and Interior Design
- University departments in each state of Australia such as Engineering, Architecture, Archaeology and Geology

Acknowledgments

Government Departments

- Heritage departments in Federal, State and Local Governments
- Builders Licensing Board

Community

- National Trust of Australia

Industry

- Tile merchants
- Commercial mineral companies
- Australian Tile Council
- Property managers
- Project managers
- General builders - commercial, industrial and domestic
- Commercial cleaning companies
- Tradespeople and apprentices such as wall and floor tilers and concreters

Professional Associations

- Master Builders Association
- Housing Industry Association
- Italian Chamber of Commerce
- Australian Institute of Architects
- Master Tile Layers of South Australia
- Concrete Institute of Australia
- Building Institute of Australia Journal
- Concrete Institute of Australia Journal
- Master Wall and Floor Association of South Australia Magazine

About The Fellow

Name: Joseph S Bagnara

Contact Details

c/- ISS Institute Inc, Suite 101, 685 Burke Road, Camberwell 3124 AUSTRALIA
Phone: 61 3 9882 0055 Fax: 61 3 9882 9866 Email: issi@pacific.net.au

Qualifications

- Certificate III in Wall Floor Tiling, TAFESA
- Diploma of Interpreting (LOTE/English), TAFESA
- Certificate IV in Training and Assessment, TAFESA
- Commercial Builders Licence R22124

Memberships

- Member of the Australian Institute of Building
- Member of the Concrete Institute of Australia
- Member of the Master Tile Layers of SA

Over a career of more than thirty years, Bagnara has gained a breadth of experience and qualifications in the Building and Construction Industry, particularly in the mortar trowel trades.

Bagnara is a lecturer at TAFESA in the area of wall and floor tiling and throughout his career has accumulated knowledge and skill across trades, education and training. Bagnara has obtained numerous positions in the Building and Construction Industry including project management and supervision.

Bagnara has written and presented papers at international conferences on topics of stone restoration, concrete construction and education. These areas have been integrated throughout his career into a holistic approach encompassing knowledge, skills and insights across trades and professional fields.

Throughout his career Bagnara has continued to build partnerships and strategic alliances with industry, Government agencies, professional associations and community groups in Australia and internationally.

The Fellowship Program

The purpose of the Fellowship was to undertake an overseas study program in regions of Italy, to gain a comprehensive understanding in the field of the design, manufacturing, placing and finishing of terrazzo pavements. This included study of the history, theory and practice of terrazzo and its impact on the Building and Construction Industry.

Currently in the National Training System, there is no training available in training packages (Diploma/Certificate) that refer to terrazzo tiling in detail or terrazzo in situ. There is no accredited course available through Australian higher education institutions, or in any community-based programs.

There is an enthusiastic and interested core group of people and industries in Australia who need direction, information and skills from a country such as Italy. These capabilities have been developed and demonstrated over many thousands of years and the Italian artisans are consistently able to produce a quality product and maintain the skill that is highly sought after. These capabilities can be transposed into an Australian context.

Aim of the Fellowship

The aim of this Fellowship was to study and gain an understanding of the construction and restoration of terrazzo floors in tile and in situ form.

Specific Areas of Study and Development

- Methods of the manufacturing process
- Latest advances in machinery and raw materials
- Latest techniques in restoration
- Latest technology in polishing materials and machinery
- Information on improvements as a flooring system and serviceability

Ongoing Areas for Development

- Promote and develop an association for artisans and tradespeople specific to terrazzo
- Investigate and research markets for manufacture of terrazzo in Australia
- Adopt strategies to promote terrazzo as a product to all sectors of the Building and Construction Industry
- Develop resource material for Certificate III in Wall and Floor Tiling
- Develop ongoing education programs through ISS Institute and TAFE Institutes
- Develop strategies to promote terrazzo as an economical and sustainable flooring product in domestic, industrial and commercial dwellings

The Australian Context

While there is some manufacturing of terrazzo tiles occurring in Australia at present, there is a lack of understanding in the placing and finishing of terrazzo, in tile form, or in particular, terrazzo in situ. Currently in the industry there are only a small number of people who can successfully complete a floor to a standard. The number of operatives the Fellow estimates to be in Australia working in the industry is approximately 20-25 people. They tend to work independently.

Terrazzo was traditionally used in Australia in the early 1930s as an interior pavement in bathrooms, laundries, toilets and verandahs in residential dwellings. Around the same time terrazzo was also used as partition walls in public toilets and stairways in commercial buildings. Terrazzo in tile form was also used as exterior cladding for commercial buildings in capital cities of Australia.

Terrazzo started out as the 'poor' man's flooring, but as techniques, machinery and technology evolved terrazzo floors became a unique and 'high class' product that only the affluent could afford.

In the beginning, terrazzo was placed and finished with basic equipment and was very laborious to construct. Due to the labour intensive techniques required, floors would take many days to complete. Today with machinery and technology, terrazzo floors are easier to make and are of better quality.

History and Technology

The art of terrazzo flooring has its origins in Italy with Terrazzo being a municipality in the Province of Verona. The history of terrazzo flooring is long, with Italian craftsmen establishing themselves as leaders and artisans thousands of years ago. This depth of history is evidenced with archaeologists using the term 'terrazzo' to describe the floors of early Neolithic buildings between 9000-8000 BC.

Terrazzo was created by Venetian construction workers as a low cost flooring material, known for its longevity and hygiene qualities as a superior flooring material. Many public hospitals still retain terrazzo floors in their operating theatres due to its durability and hygiene. Italian terrazzo workers respect the creativity of the product and have a strong dedication to issues of quality; having mastered the art of the manufacturing and placing of terrazzo tiles.

When the migrant Italian population began arriving in Australia over 50 years ago they brought with them the many skills associated with the craft of terrazzo. Over the next 50 years terrazzo was introduced as a pavement for interior flooring and for decorating and embellishing houses. It was also mass produced for wall partitions and other products such as table tops. However, as the ceramic tile was introduced into the marketplace in Australia as an alternative pavement, terrazzo diminished as the preferred interior pavement, and hence terrazzo diminished as an industry. The Fellow estimates that in Australia today, no more than 5% of pavements are constructed in terrazzo.

Subsequently, the Australian Building and Construction Industry has a skills deficiency amongst skilled tradespeople when it comes to the restoration and construction of terrazzo flooring.

Skill deficiencies in terrazzo are significant in Australia with no national accredited course on offer at any Australian university or TAFE institute within this field. This situation is not unique to terrazzo; many trade techniques pertaining to other traditional trades and crafts are also being lost.

The Australian Context

There is a flow-on effect for architectural designers in so far that, in the main, they cannot design, nor provide specifications to the trades, in these traditional trades and crafts, for new builds. As a consequence designers have accommodated the lack of skilled craftsmanship with alternate products and other solutions. The flow-on effect continues into the sphere of heritage activities, with the lack of skilled tradespeople impacting on the quality and conservation solutions available.

The small number of existing heritage terrazzo floors in Australia are being demolished due to the shortage of skilled people in the industry who have the knowledge and expertise in this area. Australia, through overseas contact with craftsmen who have established themselves over centuries as the world's leaders and artisans in terrazzo, will benefit economically as it addresses the deficiency of skills. Through a recognition of its inherent positive qualities, terrazzo pavements should, once again, become increasingly specified in Australia by designers. This recognition, combined with the availability of trained artisans, could in turn encourage the ongoing use of the product. Terrazzo could return as a popular flooring material, boosting the manufacturing sector to produce more products.

A SWOT (strengths, weaknesses, opportunities and threats) analysis provides a useful avenue for summarising the current situation and the implications of addressing, or not addressing, the need for ongoing skills associated with the construction and restoration of terrazzo floors.

SWOT of the Construction and Restoration of Terrazzo Floors

Strengths	Weaknesses
<ul style="list-style-type: none"> • Low competition • Strong educational system • Stable economy • Government regulation • Building industry licensing • Building codes and standards • High levels of construction • Technology of plant and equipment • Promotional product range • Durable, long lasting product • Visually satisfying product • Healthy and safe product • Well established product in industry • Strong manufacturing base • Supply and fix component • Easily manufactured • High profit margin • Capability to export • Diverse product range • Course design for universities and TAFEs 	<ul style="list-style-type: none"> • Limited operatives for production • Limited tradespeople to fix product • Sub-standard product entering Australian markets, lowering prices • No training for tradespeople in the TAFE system • Architects and interior designers do not have tilers who are skilled at terrazzo work, therein, it is not offered as a choice to clients

continued...

The Fellowship Program

Opportunities	Threats
<ul style="list-style-type: none"> • Customers for export overseas • Reliable, quality controlled product for export • Continuity of strong exports • Building and construction training courses for universities and TAFE • Up-skill existing tradespeople • Co-operative agreement to supply European and Asian markets • Resources: mining raw materials for production of tiles • Consumer choice of terrazzo as a surface treatment • Architects and interior designers have skilled tradespeople to undertake terrazzo work 	<ul style="list-style-type: none"> • Asian competitors' product standard and price • Possibility of price reduction due to world economy and markets • Change on Government's policy on trade and manufacturing

The Skills/Knowledge Gaps

Australia is currently experiencing significant skills and knowledge gaps within the practice of the construction and restoration of terrazzo floors. Underpinning this situation is Australia's lack of personnel with the necessary skills and knowledge to instruct people in the craft or to carry out terrazzo in situ.

Currently there are very few people who have the knowledge and skill to complete a terrazzo floor to building standards. In Australia there is no training course or institution where one can be trained to place, finish and polish terrazzo to comply with building standards. As established previously, the flow-on effect to architectural designers is that they, in the main, cannot design, nor provide specifications for terrazzo to the trades for new builds. They have accommodated the lack of craftsmanship with alternate products and other solutions. In addition, there are significant implications for those involved in heritage activities where the lack of skilled tradespeople impacts upon the quality and conservation solutions available.

In Europe (in Italy in particular), there are schools attached to the local community councils where people attend training courses on a full time basis, where they are instructed in all facets of terrazzo pavements from design to polishing. These institutions are privately managed and are funded in part by private organisations.

In Italy, there is no apprenticeship system in the mortar/trowel trades. In Australia, participants attend a registered training organisation as a compulsory part of their employment. Instead, in Italy, young people work on the job if they want to learn a trade, or as in the case with terrazzo, one may attend a community school full time for a number of months or years to learn the craft of terrazzo. The cost of this training is paid fully by the participant with no subsidy, or some small amount of financial assistance from the Government. The community schools themselves continue to exist through the ongoing support from corporations and the Government.

Australia is in a unique position in that its vocational training system allows for people to undertake training with relatively low fee structures through apprenticeship schemes.

Specific Skill Gaps Addressed During the Fellowship

- Understand the techniques required to construct a terrazzo floor to building standards. To achieve this:
 - The Fellow to experience practical hands-on training
 - The Fellow to detail the construction of terrazzo floors
- Knowledge required in order for trainers in the Building and Construction Industry to adopt a standard required for constructing a terrazzo floor. To achieve this:
 - Leaders and specialists to form a committee
 - The Fellow to write resources, information on technical aspects of terrazzo
 - The Fellow to deliver seminars, symposiums on the subject
- Skills to facilitate and pass on the knowledge and skill to others. To achieve this:
 - A training program to be developed for experienced tradespeople in allied fields, for example the mortar trowel trades
 - Train trainers to deliver theory and practical components
 - Develop a training package that deals with terrazzo floors

The Skills/Knowledge Gaps

- Currently the training system has no certificate or training package that refers to terrazzo whether in situ or tile form. To create this:
 - Develop the curriculum for a module in terrazzo flooring for delivery to Certificate III in Trade, Wall and Floor Tiling, Concreting and Solid Plastering apprenticeships
 - Establish a trade qualification, Certificate III in Terrazzo – a dedicated apprenticeship
 - Develop learning materials



Terrazzo in Situ



Terrazzo in Situ

International Context

The overseas program was purposefully designed to explore the identified skills and knowledge gaps and obtain the information necessary for Bagnara to return to Australia equipped with the skills, knowledge and enthusiasm to enable him to advise, instruct, promote and re-position terrazzo as an economically viable and durable pavement in Australia.

Program Content

The Fellowship Program included visits to establishments and meetings with individuals involved in the terrazzo industry in Italy. The activities were planned prior to departure (including question sheets – see 'Attachments' chapter).

Key objectives to be achieved included:

- Undertaking an overseas study program in regions of Italy to gain a comprehensive understanding of terrazzo
- Undertaking a training program in an internationally recognised registered training organisation in Italy
- Undertaking practical hands-on work in the preparation, placing and finishing of terrazzo on construction sites
- Visiting architects and restoration projects to gain an understanding of design of terrazzo
- Visiting manufacturers of terrazzo tiles

The following site visits, training course and meetings were the most significant in providing Bagnara with the knowledge, skills and information required to successfully undertake the study program.

Scuola Mosaicisti del Friuli (International Training Organisation)

Website: www.scuolamosaicistifriuli.it **Contact:** Dott Gian Piero Brovedani

Objective

To undertake a training course in terrazzo, incorporating high level skills in design, placement, material selection, durability and maintenance of the product.

Outcome

Scuola Mosaicisti del Friuli enabled the Fellow to learn the basic requirements to achieve the skills to produce a terrazzo floor to a standard. The content of the course had aspects of design, layout, preparation of background, placing, finishing and polishing of a terrazzo floor.

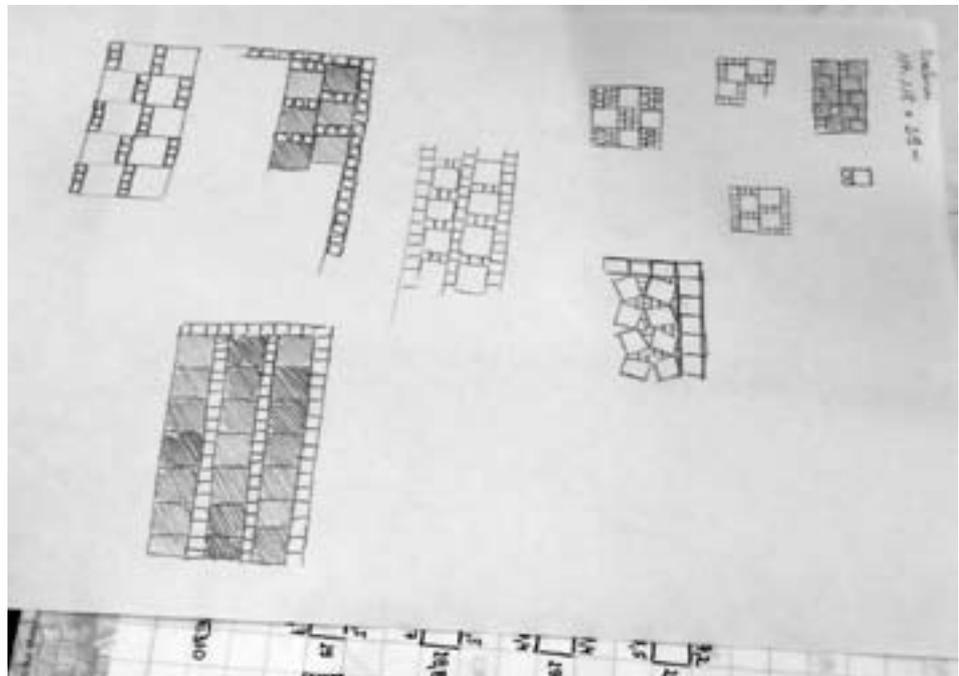
Bagnara learned the art of designing, mixing, placing and finishing a terrazzo pavement to international professional standards. The Fellow gained knowledge of the requirements to prepare the substrate to place and finish terrazzo. He gained an understanding and experience in the practice of placing and finishing of terrazzo in the context of construction and he gained knowledge of the material selection and design of terrazzo pavements.

International Context

Design and Layout

Before commencing a pavement, one must look at what the space/room will be used for, colour selection, and patterns, if suitable.

It is a legislative requirement in wet areas that certain falls are required to assist any water to drain away into a floor grate, fixed by plumbers, before the concrete process. In designing a pavement several types of marble chips may be chosen for size and hardness.



Design and layout

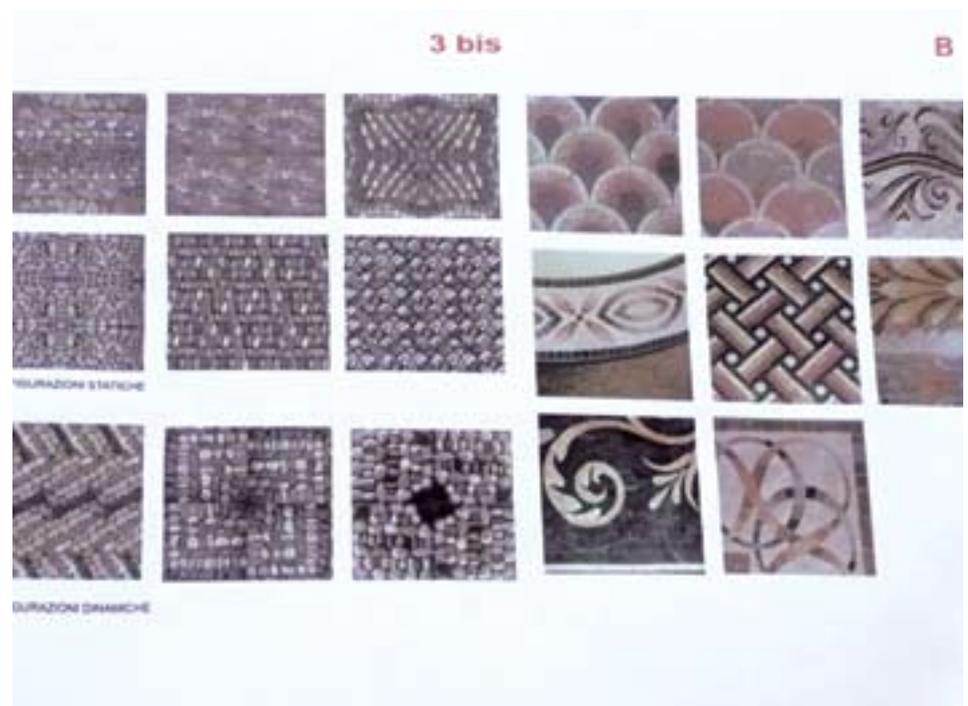


Design and layout

International Context



Design and layout

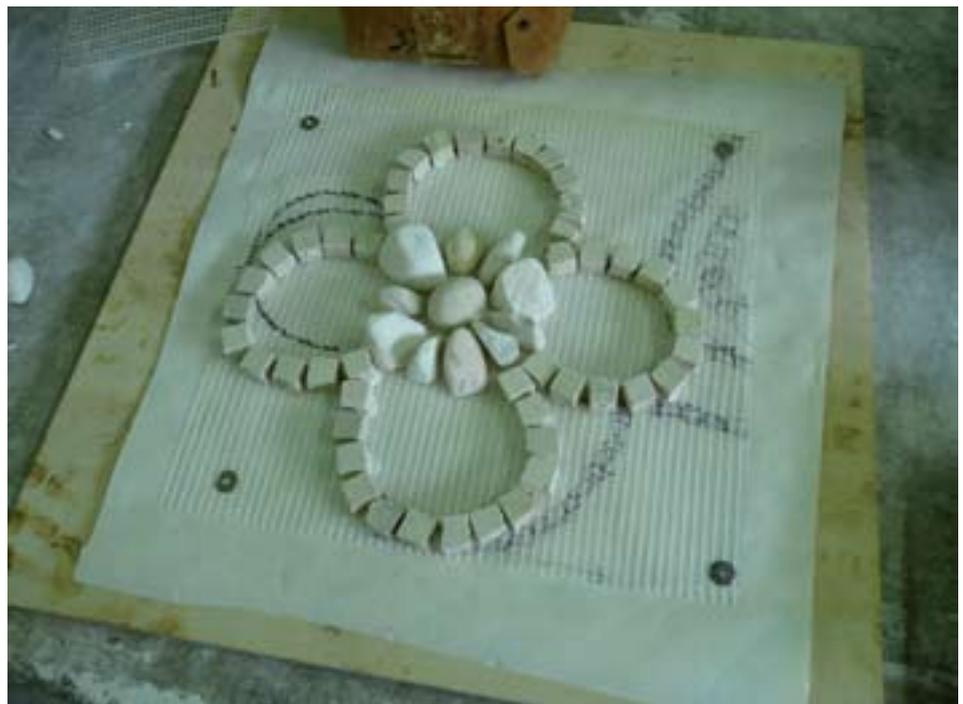


Design and layout

International Context



Design and layout



Design and layout

International Context



Design and layout



Design and layout

International Context

Preparation of Floor

In order to place a terrazzo floor to an international standard, the preparation of the floor is paramount to the pavement. The concrete floor must be free from dust, impurities and not trowelled to a smooth finish. It is optimum to sweep the concrete surface with a broom just before it sets to give a key to the terrazzo which in turn allows the terrazzo floor to adhere to the concrete floor. It is important that the concrete floor upon which the terrazzo will be placed is straight and flat and that there is an even thickness of 20-25mm of terrazzo across the floor.



Preparation of floor



Preparation of floor

International Context



Placing a concrete base flat, straight to 25mm below finished level



Floating the concrete base to a coarse finish

International Context

Mixing of Marble Chips and Material

Mixing of the marble chips, cement and colour oxide must be batched precisely. The different sized aggregates must also be batched equally so the material is consistent throughout the finished product – so that there are no patches of smaller aggregate in a particular place in the finished floor, nor any discrepancy in colour. Mixing of material is done by a cement mixer on site.



There are a variety of sizes and colours of marble chips and other durable aggregates

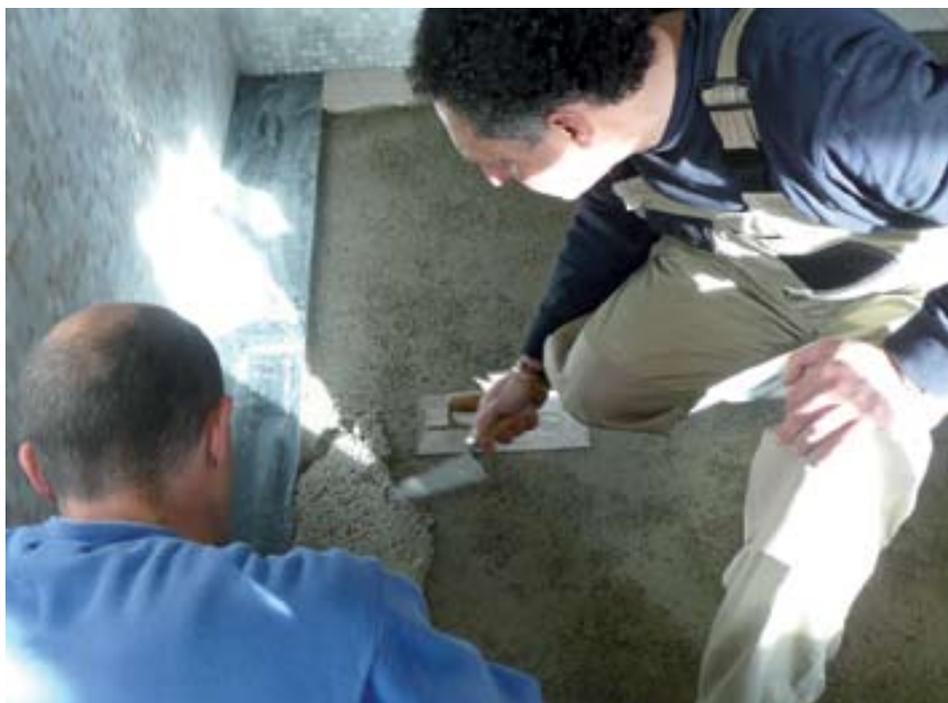


Mixing of marble chips and material

International Context

Placing of Terrazzo in Situ

In placing the terrazzo in situ care must be taken so that there is consistency in thickness, ie 20-25mm throughout the floor. Screeds are placed around the room with a cement finishing trowel and the terrazzo is placed as flat and as straight as possible. If different colours are used in the floor, all the same coloured terrazzo is mixed, placed and finished. Other coloured terrazzo is then mixed, placed and finished. This is so colours are not mixed into each other.



Placing of terrazzo in situ



Placing of terrazzo in situ

International Context



Placing of terrazzo in situ

Placement of Decorative Patterns

Decorative patterns can be achieved using a brass angle placed on the surface after the concrete has been placed and finished. The terrazzo is placed firstly into the brass strips (usually coloured differently from the rest of the floor). The same process applies to this patterning as to the rest of the floor.

Another method is the 'webbing method'. The webbing method is when one adheres other types of aggregates on a webbing designed for terrazzo and places the pattern into the wet terrazzo. This pattern is placed wherever designed on the floor, then rolled, beaten and finished along with the rest of the terrazzo floor.



Placement of decorative patterns

International Context



Placement of decorative patterns



Placement of decorative patterns

Seeding

Seeding is the process of placing aggregates of different colour, size and type, that one wants to stand out from the finished pavement. Seeding occurs immediately once the initial terrazzo has been placed. This is done by throwing the aggregates over the wet floor by hand. Seeding highlights the effect of the finished pavement.



Seeding

International Context



Seeding – aggregates of different colours and sizes

Rolling and Beating

Once the terrazzo has been placed and seeded, the floor is beaten with a wooden or magnesium float to make sure the aggregates are all embedded and surrounded by the matrix – the cement binder. Rolling the pavement allows the cement (the binder) to fully coat all the aggregates so they all bind together cohesively to a hardened state. This is important so when the process of polishing commences the aggregates do not dislodge from the floor.



Rolling and beating

International Context



Rolling ensures the aggregates are fully embedded in the mix and are fully coated in the cement matrix, so as not to dislodge the aggregates when the terrazzo is cut and polished with machines.

International Context



Rolling and beating



Rolling and beating

International Context



Another form of rolling using a vibratory roller to bring up and immerse the cement matrix surrounding the aggregates.



Once rolled and beaten the webbing from the pattern is removed

International Context

Final Finish and Curing of the Terrazzo Floor

Once the placement of patters, seeding, rolling and beating is complete, the finishing of the terrazzo takes place. This is carried out with a cement finishing trowel, to create a dense smooth finish. At this stage one is unable to see the aggregates through the cement. All one should see is a cement finished floor. Just before completion of trowelling, one must sweep a broom over the surface to roughen it up. This is so that the polishing machines can grip the surface to begin the polishing process.



Final finish and curing of the terrazzo floor



Final finish and curing of the terrazzo floor

Belotti Tiles (Terrazzo Manufacturer)

Website: www.belottitiles.biz

Objective

To visit a terrazzo tile manufacturer, to learn the production, handling, and processes required to manufacture quality terrazzo tiles to international standards

Outcome

The visit to Belotti Tiles enabled the Fellow to gain a basic understanding of the processes involved in the manufacturing of terrazzo tiles. Bagnara gained knowledge of the production, handling and processes required to manufacture quality terrazzo tiles to international standards, including the design of tiles and the selection of materials.

With this understanding, the Fellow was able to observe the different stages in the process of manufacturing from the mix design, quality control, polishing process to the packaging for export. Importantly, this visit enabled Bagnara to detail the difference between terrazzo in situ and in tile form, to understand their characteristics and the reasons for using them in their different forms.

Internazionale Marmi E Macchine Carrara S.p.A. (Carrara Marble Quarries)

Location: Carrara, Italy **Contact:** Paola Blasi

Objective

To research and investigate one of the raw materials that produces terrazzo tiles and to gain an understanding of the implications of these materials in the placing and polishing of the tiles upon installation. To explore extraction of marble and raw materials for the production of tiles and marble chips.

Outcome

Bagnara gained an understanding and knowledge of marble as a raw material. He followed the path from raw material in a quarry, to seeing material crushed in different sized grains, ready for sale to manufacturers of terrazzo tiles and as marble chips for placing as terrazzo in situ. As marble is one of the main ingredients in the construction of terrazzo pavements Bagnara was able to understand how the material reacted and adapted with other materials in a liquid state to a hardened state to form a terrazzo floor.

Bologna Expo (Trade Expo Including Terrazzo Tiles)

Location: Bologna, Italy

Objective

To gain knowledge on all aspects of terrazzo, from architects, designers, manufacturers and artisans. To gain an understanding on the complete flooring system including raw materials, placing, polishing and maintenance requirements.

Outcome

Bagnara was able to see the difference in ceramic versus terrazzo, in regard to the method of production, quality, water absorption, abrasive resistance, scratch hardness, and surface flatness. He was able to understand the factors influencing the aesthetic appeal, functionality and durability of terrazzo tiles.

International Context

Construction Site Visits

Contact: Dott Gian Piero Brovedani

Objective

To participate in a practical 'hands on' approach to placing and finishing terrazzo, putting theoretical knowledge into practice.

Outcome

Bagnara gained knowledge and practice in all aspects of the preparation, mixing, placing and finishing of terrazzo in a 'real live' commercial works site. This ensured that the theoretical knowledge learnt was put into practice, enabling the creation of a high quality pavement with the right balance of skill and theory.

Consorzio il Terrazzo alla Veneziana (Professional Association)

An association and training organisation dedicated to continuing and developing the art and skills of terrazzo, specifically in the design, placing and finishing.

This is an association dedicated to keeping up the standard of terrazzo workers. In order to become a member it is necessary for the association to inspect one's work and assess the standard of work over several visits. They are very strict and follow detailed guidelines that must be adhered to in order to have a terrazzo floor certified by the association. In addition, to the site inspections, a tradesperson must also pass a series of tests in order to become a member.

Refer to the 'Attachments' chapter for further information about the Consorzio il Terrazzo alla Veneziana.

Concluding Remarks

The overseas Fellowship program was extremely valuable and Bagnara was able to meet the aims and objectives of the Fellowship. The program provided him with the opportunity to explore and investigate the manufacture of terrazzo tiles and the technology involved in the construction of terrazzo pavements. The Fellow was extremely privileged to participate and practice the placing and polishing of terrazzo in situ, on a construction site. It is very important that this knowledge and skill gained through the Fellowship is shared with others in order to optimise the outcomes of the Fellowship so as to develop and revitalise the terrazzo industry in Australia.

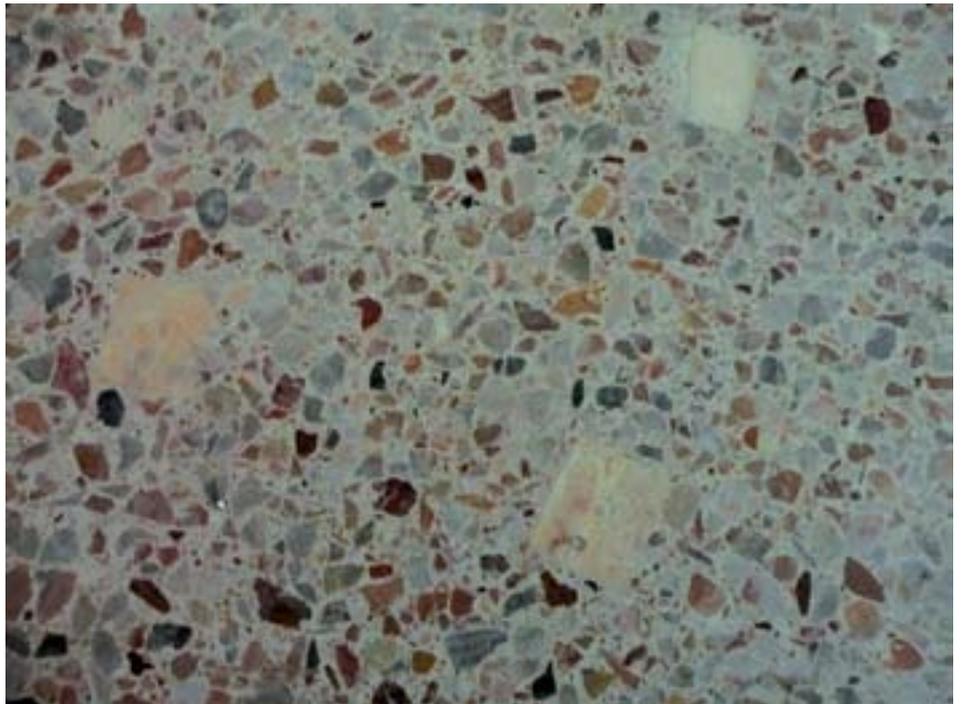


Example of a final terrazzo pavement

International Context



Example of a final terrazzo pavement



Example of a final terrazzo pavement

International Context



Example of a final terrazzo pavement

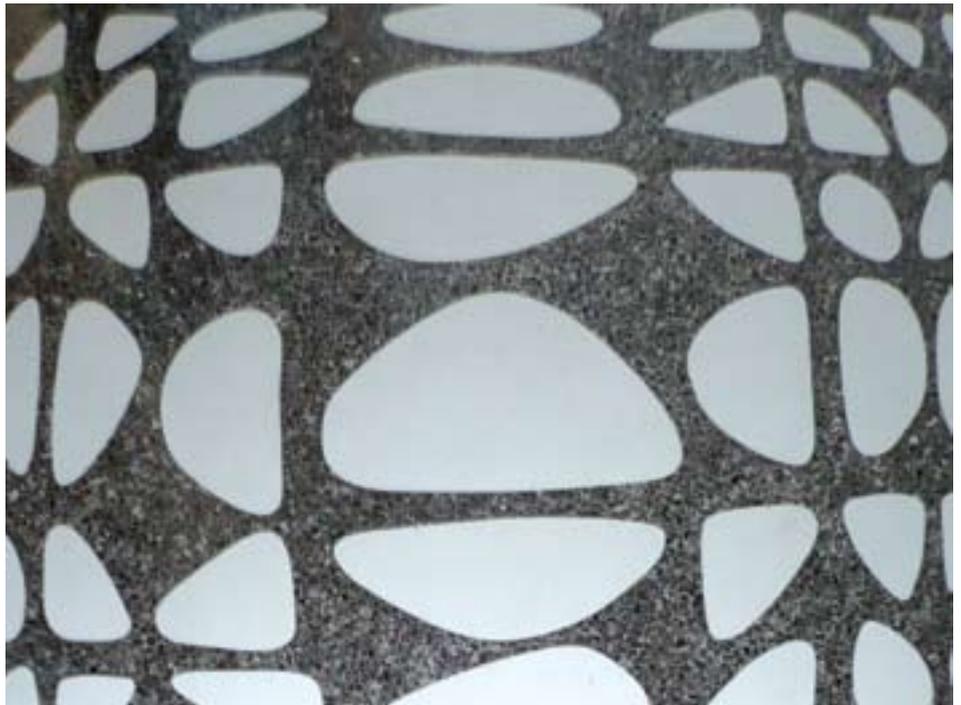


Example of a final terrazzo pavement

International Context



Example of a terrazzo pavement near completion



Example of a final terrazzo pavement

Knowledge Transfer

In order to optimise the outcomes of this Fellowship and revitalise the terrazzo industry in Australia, Bagnara recognises the importance of ensuring that the knowledge obtained as a result of the Fellowship is shared with others.

The Fellow has incorporated the overseas learning experience into his own teaching courses at TAFESA, Department of Building, Construction and Furnishings, Gilles Plains Campus. In addition, Bagnara speaks about terrazzo to apprentices in wall and floor tiling, as it is allied to their trade and some have had limited exposure to terrazzo tiles. However, there is currently no mandatory section about terrazzo in their training package. The Fellow would like to set up a nationally accredited training package specifically in terrazzo flooring, or incorporate it in the advanced building studies.

Bagnara proposes to assemble resources for a training course specifically on terrazzo for the Building and Construction Industry, construction workers, TAFE lecturers, architects, tradespeople, apprentices, artists, project managers, builders, heritage conservators, producers of quarry products and retailers who sell terrazzo tiles.

The Fellow proposes to write resources for a training package, developing written material with support from and in collaboration with the Construction and Property Services Industry Skills Council (CPSISC), the Australian Institute of Building, the Concrete Institute of Australia, the Australian Tile Council, the Construction Industry Training Board and Government and non-government heritage departments.

This knowledge should also be used to form an industry association, dedicated to terrazzo work, including restoration of existing terrazzo floors, new terrazzo tiles and terrazzo in situ. In addition a series of seminars should be initiated to disseminate the knowledge gained from the Fellowship. This could be done in collaboration with the ISS Institute and with support from the Concrete Institute of Australia, the Australian Building Institute of Australia, the Construction Industry Board, the Wall and Floor Tilers Association and Government agencies such as Heritage Victoria, Heritage NSW, the Department for Environment and Heritage (South Australia).

Recommendations

Government

The Fellow recommends that appropriate Government agencies support the following:

- The support/sponsorship of a series of seminars and workshops around Australia to create an industry association and to address construction industry specialists through ISS Institute, as they are an independent organisation which has a significant and long-standing association within the Building and Construction Industry and the related Heritage Industry.
- Heritage terrazzo pavements in buildings to be protected from being demolished through legislation at a Local, State and Federal levels.
- Government to introduce a trade level training Certificate III in terrazzo. Alternatively, terrazzo could be introduced as a compulsory subject in an apprenticeship in the mortar/trowel trade area.
- Support marble quarries in Angaston, South Australia, and other areas of Australia, to enable the cost of materials to be compatible with imported ceramic tiles.
- Austrade to assist in the marketing of Australian product to overseas markets.
- Fund school programs such as 'VET In Schools', dedicated to terrazzo and marble, similar to the programs now being run in trades such as bricklaying, tiling, carpentry, plumbing and others – so that young people are made aware of the trade and product. It will open opportunities – for young people as an additional career option, and for experienced tradespeople as an upskilling option, within a lifelong learning context.

Education and Training

The Fellow recommends that the Australian Government, through the Construction and Property Services Industry Skills Council (CPSISC), establish a national package for terrazzo as part of a Certificate III qualification, or a qualification on its own as a Certificate III in Terrazzo, or a unit within the Certificate III in Wall and Floor Tiling and the Certificate III in Concreting.

Training packages should be developed to cover terrazzo work and training should be delivered by registered training providers from the Building and Construction Industry. Before this can happen, trainers should be sought and complete a training course to be competent in all aspects of terrazzo, so they are upskilled to an artisan level.

The Fellow is available for consultation with CPSISC to contribute his learnings to the development of these qualifications.

Industry

Suppliers of material and their industry representatives need to:

- Maintain communication and further develop collaborations, such as visiting architects and project designers to showcase terrazzo and promote terrazzo floors as a superior pavement.
- Demonstrate reasons for choosing terrazzo as opposed to ceramic or other product.
- Through industry associations, develop ongoing education programs and seminars. Through these seminars they need to promote terrazzo as an economical and sustainable flooring for any type of dwelling. This can be backed up with the certainty that operatives are being trained in the placing and finishing of terrazzo to a quality standard, through apprenticeships and the skilling of allied tradespeople.
- Develop the phrase 'artisans'. People who work with terrazzo are specialists and regarded in the construction industry as leaders in the field.

Recommendations

Professional Associations

The Fellow recommends that an industry association dedicated to terrazzo work (including restoration, new terrazzo tiles and terrazzo in situ) be formed. The industry association could be developed in collaboration with the Construction and Property Services Industry Skills Council (CPSISC), the Australian Institute of Building, the Concrete Institute of Australia, the Australian Tile Council, the Construction Industry Training Board and Government and non-government heritage departments.

ISS Institute

The Fellow recommends that ISS Institute act as a catalyst to develop a series of workshops in collaboration with bodies such as the Concrete Institute of Australia, the Australian Building Institute of Australia, the Construction Industry Board, the Wall and Floor Tilers Association and Government agencies such as Heritage Victoria, Heritage NSW, and the Department for Environment and Heritage (South Australia) to disseminate the knowledge gained from the Fellowship.

Furthermore, the Fellow recommends that ISS Institute continue their commitment to developing a 'Master Artisan' training pathway and credential that takes the capabilities of those in the trades to the highest level in-line with their overseas counterparts.

References

Bibliography

Crovato, Antonio. *I pavimenti alla veneziana*, 1999

Websites

Terrazzo Consortium of Venice, Italy

<http://www.consorzioilterrazzoallaveneziana.it/Index.asp?Lan=Eng>

Scuola Mosaicisti Del Friuli, Spilimbergo, Italy

www.scuolamosaicistifriuli.it

Attachments

Questions Prepared For Use in Discussion With the Overseas Contacts

- What are the basic raw materials?
- How are they found and extracted?
- Where are they found and why?
- What is the preferred process of extraction and why?
- What is the manufacturing process for terrazzo tiles?
- What are the techniques in the manufacture of terrazzo tiles as a flooring material?
- What are the techniques required for placing and polishing terrazzo as a flooring material?
- What are the design parameters for terrazzo?
- What are the techniques for long lasting maintenance?
- What are the techniques required for polishing terrazzo?
- What are the requirements for surface treatment to adhere the terrazzo to and the glues – indoor, outdoor, high sunlight, shaded areas; hot weather; under snow; by the sea (salt)?
- What are the cutting techniques and equipment – hand tools and mechanical?
- What dictates the colour range?
- What are the impediments/advantages of terrazzo compared to other tiles?
- What is the training system for skilling tradespeople in an apprenticeship level and then to Master Artisan level in terrazzo work – Government and non-government?
- What is taught at Master Artisan level?
- Who are the recognised world leaders in terrazzo work – architect and tradesperson?
- In what building can the most innovative use of terrazzo be found (in a contemporary construction)?
- What other questions should I be asking that I have not already done so?

Attachments

IL CONSORZIO IL TERRAZZO ALLA VENEZIANA (THE VENETIAN TERRAZZO CONSORTIUM)

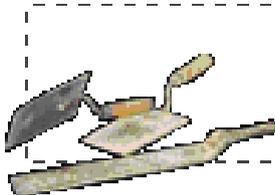
HISTORICAL BACKGROUND

This is a story of stones and men. Stones to build solid homes, smaller stones for decorating and embellishing them. In an era of prefabricated structures, industrial mass production and building standards, Venetian terrazzo is still widespread in the Veneto region and in Friuli, in the houses and palaces of the major cities of the arts, representing a sort of living fossil. It is proof of quality and practicality of interior flooring which has survived the insidious encroaching of novelty for centuries. Terrazzo adapts surprisingly well, and despite innovation, to uneven decks and rooms that are out of alignment, giving new life even to the darkest and most dismal room, using unique colour combinations. For at least 600 years, the terrazzo craftsmen from the North-Eastern Italian regions, rich in imagination and poor in pocket, have walked the roads of Europe from Paris to St. Petersburg, armed with colourful stones from their native quarries (the so-called “claps” or pebbles), the only resource that was abundant in a land that was difficult to farm, and on their knees combined the use of their own, home-made working tools to create and mould their works.

Giobatta Crovato was one of the founders of the very poor Guild of Terrazzo-layers, founded in 1582, which had its headquarters and an altar dedicated to its patron saint, San Floriano, in Venice, in the abandoned church of Saint Paternian. Not all terrazzo-layers were as fortunate as Giandomenico Facchina, from Sequals, buried in Paris at Père Lachaise, cemetery of the artists, because he had created some of the most beautiful works of art, working side by side with the famous architect Charles Garnier. This book is dedicated to them, to those anonymous craftsmen, so that a written and visual testimony will remain of an ancient craft that was humble and tiring, evocative and creative.

Some tools used for making the Venetian Terrazzo

square trowel



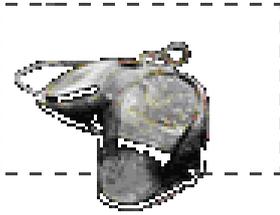
wood stone-breaker



iron hammer



knee-pad



The Venetian Terrazzo or battuto (beaten) floor was attributed this name because it was in the lagoon city of Venice that it reached its maximum development and splendour. Its origins date right back to the early times of floor decoration in Ancient Greece, where floors composed of river pebbles were arranged and cemented with lime mortar or clay. Later on, this type of flooring, which was somewhat basic, was replaced – especially in Roman times – by various flooring techniques including the one that is of interest to us, i.e. the opus signinum, which seems to have also gone by name of pavement barbaricum.



In Italy, the opus signinum was made by mixing broken tiles with lime mortar: the mixture took on a pinkish colour, which is why it was also called pavementum testaceum. If the mixture also included marble chips, it was called opus segmentatum. Examples of this latter type of floor, dating back to the first century AD, can be found on the lowest floor level between the basilica and the church tower in Aquileia.

Though it has been much admired, this type of flooring has never been the object of any specific and detailed research, possibly because the topic might seem to be simple and unpretentious, or maybe because it was considered as one of the lesser arts in the building world.

Attachments

To install a terrazzo floor is a craft whose origins date back to the Ancient Roman mosaic school, handed down almost inexplicably over the centuries by the Friuli people, since it was in their little community that terrazzo floors have always had a place among the local country practices.

The earliest illustration of the making of a terrazzo floor is found in Della Architettura by Giovanni Antonio Rusconi, in which the wood engravings date back to the mid-sixteenth century, though the year of publication was only 1590, after the author's death, when the editor published the book with a brief written comment. This treatise is along the same lines as Barbaro's, but there is an important difference in the proportions of lime mortar to opus signinum, which is one to three (instead of 2) for new floors and five to two for old floors. By the end of the 16th century, when the Guild of Terrazzo-layers was granted its statue, the techniques had become well established, though they varied considerably, and had come to form an integral part of the architectural heritage and of the printed documents of the period.

REASONS FOR A CONSORTIUM

1586: The Statute of the Terrazzo-Layers



....bring together all the Masters of Art to treat, conclude and discuss Our problems and fix forever more the rules with which to govern Our Guild, and do all that is necessary for its preservation... May all those who wish to work in Our Trade as "terrazzer" (terrazzo-layers) be obliged to join the Guild, and for this first year must pay one ducat entrance fee, but after the aforesaid year let anyone wishing to join as a Master be obliged to take a test.. One must know how to construct (a new terrazzo) in a room, lay and polish it in the manner of Our Art. If he be considered sufficient, he will enter in the Guild and must pay two ducats entrance fee. All this so that the noble citizens and builders are not fooled by people who do not know the trade.

The Statute of the Terrazzo-Layers composed of 17 chapters was approved the 13th September 1586.

2000: "Carta del Terraziere" (Terrazzo.Layers Paper)



After almost five centuries from the Statute of the Terrazzo-Layers, The Venetian Terrazzo Consortium proposes to re-establish a series of rules from which one cannot prescind in order to furnish a high artistic quality flooring.

Today the Consortium selects and unites all those companies which have showed through their works to be able to construct a Venetian terrazzo following the traditional techniques.

After 500 years the premises are the same: protect and propose this flooring which today as in the past represents one of the most refined artistic and cultural expressions of our territory.

We desire to furnish our customers a Venetian terrazzo like the one we have inherited from tradition, as it has been handed down to us, not in a written form but through the repletion of antique and humble gestures.

Carta del terraziere written in the occasion of the General Convention of terrazzo-Layers in Treviso the 11th December 1999

Attachments

Publications by the Venetian Terrazzo Consortium

1. Venetian Pavements

Book by Antonio Crovato

2. Brochure presenting the volume

3. Technical Manual

Catalogue introducing the Consortium and presenting the General Rules to professional workers and customers, the final characteristics and maintenance of Venetian Terrazzo.

4. Table sign

Sign which certifies the company's membership to the Venetian Terrazzo Consortium

5. Il Terraziere, periodical newspaper edited by Venetian Consortium

6) Rules for the Using of the Trade-mark

Rules for the correct use of the trade-mark by the members of the Venetian Consortium in all of its forms, variations and in advertisement.

7) General Rules

The General Rules for constructing and restoring Venetian terrazzo which binds the members to operate in a correct and professional manner.



Conorzio Il Terrazzo alla veneziana

Borgo Treviso 164/e - 31033 Castelfranco Veneto (Tv) Tel 0423 420068 - Fax 0423 771584

<http://www.conorzioilterrazzoallaveneziana.it> e-mail: info@conorzioilterrazzoallaveneziana.it

Why a Consortium: “Carta del terraziere” Professional ethics code

Venetian terrazzo is a typical product of creativity and handicraft ingenuity. The raw materials to begin with are simple, often necessarily basic, but the end-result is so beautiful that it verges on mastery. Obviously, only a technique that has been honed over the centuries can produce such high quality technical and aesthetic results. In this century technological breakthroughs have played a crucial role in developing both the materials and the techniques used to make this flooring. The major factors which have determined a radical transformation of terrazzo are cement and electricity.

Cement substituted lime as a binder and electricity has permitted to polish terrazzo mechanically instead of by hand. The rest – has remained for the most, unchanged in time. Today the terrazzo-layer makes use of a blend of experience, rules and trade secrets handed down from one generation of traditional craftsmen to another.

One can state then that:

1. It is impossible to take up the craftsmanship of the terrazzo-layers without knowing the history of the materials and the techniques of terrazzo.
2. The introduction of new materials and techniques designed to speed up, economise and industrialise floor production has always led, especially in recent years, to poor technical and aesthetic imitations, a sub-species of genuine Venetian Terrazzo flooring.

Some companies, lured by the prospect of easy money, attempt to market low-quality imitations of terrazzo flooring by making it with poor materials and shoddy methods. Consequently they:

- 1) defraud the purchaser by passing off a lower quality product for genuine Venetian Terrazzo flooring;
- 2) degrade the authentic product as potential clients are given a negative image;
- 3) financially damage genuine terrazzo companies by

Attachments

- A- causing a progressive loss of orders due to an influx of fake low-quality flooring;
- B- an unfair price competition made possible by using incorrect, cheaper materials and shoddy workmanship.

Technical Manual of Guarantee and Quality. The Venetian Terrazzo Consortium

Selects and unites the best Italian terrazzo companies;

- Certifies the flooring's quality by choosing and treating the materials, as well as by checking each work stage and ensuring punctual delivery of the end-product, so that clients are safeguarded against imitations;
- Guarantees that every associated company complies with the "General Rules" for making and restoring Venetian terrazzo flooring. These rules have been drawn up, discussed and undersigned by all of the Consortium's members;
- Carries out constant quality controls at associated company premises to guarantee the end-products, materials and production processes;
- requires each associated company to comply with the payment, contribution and assistance regulations for their collaborators and employees, as well as to meet current worksite safety and environment standards;

Consequently, every associated company has the skills and equipment to lay and restore authentic Venetian terrazzo flooring in compliance with the "VENETIAN TERRAZZO FLOORING CONSORTIUM"..

Venetian Terrazzo

Venetian terrazzo is a very particular pavement.

Beyond a purely aesthetic factor, there is an aspect which distinguishes it from any other type of pavement on the market: Venetian terrazzo is completely build on the work site.

All the materials which compose it arrive on the work site in their natural state, separated from one another; nothing is pre-packaged. The working phases, with the exception of cement mixers and electric grinding machines for cement terrazzo, have remained exclusively manual.

There is, in fact, no machine which can substitute the "terrazziere" in the delicate operations of seeding and rolling, which moreover distinguish the real Venetian terrazzo from other imitations, always more diffused on the market and resulting from hasty workmanship.

The high manual workmanship has contributed to creating little differences between the various operators in this sector and these differences represent a distinctive sign of an artistically unique product. In spite of these necessary differences, representing a just affirmation of individual artistic potentials, all the members of the Consortium agree on the General Rules for the Construction and Restoration of the real Venetian Terrazzo.

Historical Facts

Venetian Terrazzo is the fruit of the Latin people's genius, a people who were able to exploit the poor elements at their disposal to create a product of great artistic value. This type of pavement, having very antique origins, found its formal expression in Venice, where in 1586 the "Arte de' Terrazzeri" was born, the first written set of rules for making terrazzo.

Originally in lime, Venetian terrazzo has undergone numerous and continuous evolutions during the centuries, adapting itself to the tastes of each age.

The use of grinding machines permitted the passage to a cement binder guaranteeing this type of pavement more resistance to the wear and tear through the centuries. From Venice Venetian terrazzo was exported to all the world and testifying even today, with its presence in the most important buildings, the superior quality of a typical Venetian handwork. In the 70's it was first supplanted by industrial surrogates of low technical and aesthetic quality at an equally low price, after by the introducing of ceramics and carpeting considered at those times innovative and revolutionary. In the 80's, this brief parenthesis is closed and the great period of restoration is open.

Attachments

A new manner of operating in historical palaces along with the discovery of classical materials in building permitted the architects to restore to Venetian terrazzo its original dignity and importance. Customers have rediscovered a particular sensibility in conserving original architectural structures and therefore restore or select Venetian terrazzo floorings, acknowledging its exclusive role above all in the Veneto-Lombardo area.

The great interest that has been created in this pavement has brought about the need to defend its construction and aesthetic characteristics by the creation of the Venetian Terrazzo Consortium.

The Characteristics

Venetian terrazzo is chosen for its great versatility.

The combinations of colours and different materials guarantees the possibility of satisfying even the most modern aesthetic needs. Its variegated composition doesn't let dirt show and the fact that there aren't any grooves makes it easy to clean throughout the years. Venetian terrazzo is a handicraft where the manual predominates over the mechanical one. For this reason, when observing a traditional Venetian terrazzo one can note the following particularities:

- a) it is a conglomerate of marble chips and cement, giving its final aspect, especially if seen against the light it will not appear perfectly homogeneous as a slab of marble or granite; terrazzo's typical finish is never as shiny as the other types of pavement
- b) for the same reasons as described above, on terrazzo's surface one can find little holes or slightly bigger ones where small chips have come off through the years and which can be refilled by using grout;
- c) Even if all types of precautions are taken there is no definite method for preventing little cracks which can appear along the years; the causes are numerous and not always assessable from the beginning. In any case it is possible to intervene and restore the pavement's original aspect.
- d) The grinding of Venetian terrazzo is done with grinding machines manually manoeuvred; slight undulations in the surface are inevitable, if, of course, they are contained and of acceptable size. Terrazzo naturally tends to slightly rise along the borders: this is due in part to the manual grinding, not easily done near the perimeters of the walls and to the natural withdrawal of the cement binder.

Maintenance

Venetian terrazzo does not need any particular care. It is known for its durability and practicality of maintenance.

After having consigned the work and after some time, some dull zones due to deposited dust can appear on the pavement. To bring back the terrazzo's optimal aspect, it is sufficient to wipe away the dust with a damp cloth and then polish it with a household polishing machine.

As time passes it is suggested to periodically perform a wax treatment on those zones which are more prone to everyday wear. One should first wipe with a damp cloth, then with the same cloth spread a very thin layer of liquid wax and finally polish with a polishing machine.

In order to obtain a particularly brilliant polish we suggest using steel wool under the brushes of the polishing machine because they will totally remove any wax remaining on the surface. This operation must be done rarely (once a year) because an excessive amount of wax which has not been absorbed by the pavement would remain on the surface creating fastidious marks. A pavement treated with linseed oil should be cleaned using natural detergents only and refreshed every three to four years (based on wear). Cleaning using water mixed with liquid wax will help maintain a shiny surface. It is best to avoid cleaning the pavement inappropriate detergents – ammonia, bleach, detergents containing hydrochloric acid – because in due time they will corrode the surface.

Even if the wax treatment protects the pavement from the quick penetration of accidentally spilled liquids, it is best to remember that all liquid substances, in particular those linked to the domestic environment, that is, wine, soft drinks, vinegar and coffee, must be removed immediately so as to limit deep absorption.

Attachments

GENERAL RULES FOR THE CONSTRUCTION AND RESTORATION OF VENETIAN TERRAZZO

The Venetian terrazzo Flooring Consortium was founded to safeguard the image and reputation of this ancient art, recognised the world over as an artistic and cultural symbol of our region, and to defend the professionalism and potential orders of many terrazzo companies who faithfully follow this noble trade. It has the clear intention of isolating those who try to market low-quality imitations of terrazzo flooring by making it with poor materials and shoddy methods and of increasing the value of the authentic terrazzo. The Venetian Terrazzo Flooring Consortium wants to dictate the general rules for the construction and restoration of Venetian Terrazzo.

The General Rules for the Construction and Restoration of Venetian Terrazzo are part of the internal regulations undersigned by all the Consortium's members in art. 22 of the Venetian Terrazzo Flooring Consortium's Statute, which in turn binds its members to operate in a correct and professional manner in all their works and to undergo, at any time, eventual controls done by the Consortium's Control Commission. The Venetian Terrazzo Flooring Consortium certifies all those works which confirm to the "General Rules for the Construction and Restoration of Venetian Terrazzo" and considers itself alien to all that which does not pertain to its Regulations.

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Venetian Terrazzo Pavement in Cement

Thickness	min. 6-7 cm. Total
Isolation	from the base: thin sheets of nylon or tarred felt; to isolate from the walls: band of polyethylene foam or other compressible material
Underbed	to be constructed preferably by the terrazzo layer or under his responsibility
Composition	concrete with electrically welded wire
Materials	32,5 cement – coarse sand and crushed stones or round gravel size 4-12 mm. Welded wire having a diameter of 2 to 6 mm, mash size 5X5 cm to 20X 20 cm
Dosage	200-300 kg of cement per 1 m ³ of inert
TOPPING	(spread on a consolidated underbed)
Thickness	1.5 – 2.5 cm

COMPOSITION

Binder	white cement 52,5 predominant quantity and 42,5 or 32,5; grey cement 42,5 or 32,5
Colouring	iron oxides
Grains	marble and or stones with particle size ranging from n°0 to n°5
Seeding	adding of grains of bigger dimensions through manual seeding; done accurately and homogeneously with marble chips and pebbles which must be sifted, washed and of particle size ranging from n.°4 to n.°6 done in one round. When using chips of greater size, superior to n.°6 and above, the seeding must be done in more rounds.

LAVORAZIONE A FRESCO

Rolling and beating	to incorporate the chips with the topping in order to obtain a smooth and compact surface
Tools	metal rollers, trowels, beating iron
Decorations	ornaments, decorations, seams done with wooden frames or other material. Along the borders it is possible to have marble cubes or chips or stones or regular forms and dimensions

FINISHING

Grinding, grouting	done minimum 10 days after the laying of the terrazzo
Polishing	done with polishing machines, abrasive materials and polish minimum 30 days after the laying of the terrazzo
Final treatment	done with solid wax or natural oil.

Attachments

Venetian Terrazzo with a Mixed Binder

Thickness	min. 6-7 cm. Total
Isolation	from the base: thin sheets of nylon or tarred felt; to isolate from the walls: band of polyethylene foam or other compressible material
Underbed	same as for terrazzo in cement with the addition of hydraulic lime, lime putty and gravel, sand, selected crushed bricks
TOPPING	(spread on a consolidated underbed)
Thickness	1.5 – 2.5 cm

COMPOSITION

Binders	white cement 52,5 42,5; hydraulic lime, white hydraulic lime 42,5 or 32,5; putty lime
Colouring	iron oxides and colouring earth
Grains	marble and or stones with particle size ranging from n°0 to n°5 or material from bricks
Seeding	adding of grains of bigger dimensions through manual seeding; done accurately and homogeneously with marble chips and pebbles which must be sifted, washed and of particle size ranging from n.°4 to n.°6 done in one round. When using chips of greater size, superior to n.°6 and above, the seeding must be done in more rounds

“LAVORAZIONE A FRESCO”

Rolling and beating	to incorporate the chips with the topping in order to obtain a smooth and compact surface
Tools	metal rollers, trowels, beating iron
Decorations	ornaments, decorations, seams done with wooden frames or other material. Along the borders it is possible to have marble cubes or chips or stones or regular forms and dimensions

FINISHING

levigatura, stuccatura	done minimum 10 days after the laying of the terrazzo
Polishing	done with polishing machines, abrasive materials and polish minimum 30 days after the laying of the terrazzo
Final treatment	with natural oils (linseed oil, straw oil) and solid wax.

Original Venetian Terrazzo in Lime

Thickness	min. 10 cm
Underbed	conglomeration of slaked lime and selected factory remains of bricks and tiles, crushed stone beaten and rolledo
Covering	intermediate layer of 2 – 3 cm of coarse brick dust and slaked lime, well levelled, beaten and tamped
TOPPING	final layer of slaked lime mortar and marble chips or stones
semina	inserimento di granulati di maggiori dimensioni tramite semina manuale, accurata e omogenea di graniglie di marmo e ciottolo vagliate e lavate, di granulometria dal n. 4 al n. 6 in un'unica tornata, con semina a tornate successive per granulati superiori al n. 6 e fuori vaglio

“LAVORAZIONE A FRESCO”

Rolling and beating	to incorporate the chips with the topping in order to obtain a smooth and compact surface, combined with a first phase of manual grinding done with an orso
Tools	metal rollers, trowels, beating iron, orso
Grinding	to be done manually after an adequate period of seasoning of the terrazzo until the marble chips are perfectly visible on the surface
Grouting	done with a trowel and oil grout (cooked linseed oil and gypsum) on a terrazzo that is completely dry and previously oiled with cooked linseed oil

Attachments

Polishing hand polishing with cooked linseed oil and a jute cloth, waxing with solid wax

N.B. This type of pavement is carried out with a greater difficulty and effort in respect to the previous terrazzo pavements.

RESTORATION

To correctly proceed in restoring a Venetian terrazzo it is necessary to:

- a) determine the period of construction of the pavement;
- b) identify the materials the pavement is composed of, taking care in distinguishing the type of binder used (lime or cement);
- c) plan to intervene without changing the characteristics of the existing terrazzo, that is, in a way which can permit a historical reading of the terrazzo itself even after the restoration;
- d) especially in those cases where it is necessary to reconstruct or add parts of terrazzo, intervene with the appropriate materials, tools and techniques (possibly original) in order to obtain an aesthetically acceptable result, correct also in its procedure of restoration;
- e) avoid the use of materials and techniques (additives, treatments, synthetic resins etc.) which are incompatible to the nature of the materials contained in the terrazzo and in any case not sufficiently tested through working experience.

FINAL ASPECT OF TERRAZZO

A finished terrazzo must present a homogeneous distribution of the grains regarding both colour and size. The grains must be clearly visible, "spaccato", that is, split in its best section, especially for stones of great dimensions. The pavement must be well grinded in every part, in line with the nature of the characteristics of the terrazzo. To avoid unpleasant misunderstanding at the consignment of the work, it is best to remember that:

- Venetian terrazzo is a conglomeration composed of marble chips and cement, so its final aspect, especially if seen against a light, it cannot result in being perfecting homogeneous like a sheet of marble or granite; the typical finishing of terrazzo is slightly dull and never mirror - shiny as other types of pavements;
- For the same reasons as described above, it is possible to find little holes; although if these holes are numerous and of substantial size it is necessary to intervene;
- Even though care is taken in the choice and laying of the materials, eventual cracks or slits on the surface of the terrazzo cannot be completely excluded, even in the years; the causes are multiple - phenomena of retreating, little thickness, little cracks in the structure etc. and not always assessable at the beginning of the works; in any case, thanks to particular types of synthetic resins nowadays available on the market, it is always possible to intervene and restore the original state of the terrazzo even after many years have passed from its making.
- the grinding of terrazzo is done with grinding machines manoeuvred by hand; slight undulations in the surface are therefore inevitable, if they are however contained; terrazzo has the characteristic of slightly rising near the borders, due in part to the mechanical/manual grinding – difficult near walls – and also in part to the natural effect of retreating caused by the cement binder

THE PASTELLONE

Terrazzo's forefather, the pastellone has antique origins, so much so that examples are found not only in ancient Venetian villas but also in constructions of the Roman and Medieval epoch.

Pastellone is composed of two layers of which the first is the underbed made of slaked lime and broken stones and bricks, levelled, beaten and rolled until perfectly compact. The second is composed of a mixture of slaked lime, crushed bricks and in a minor part, other materials such as pebbles or grainy marble dust. This second layer corresponds to the original terrazzo in lime covering which, in the case of the pastellone, does not undergo the last phases nor the seeding of marble chips or pebbles.

Attachments

Beaten and rolled until compact, when it is seasoned it is pasted with a paste made of lime putty and crushed brick dust spread in various coats with a trowel on the surfaced which had been dampened. When the surface is completely dried one proceeds with sandpapering in order to eliminate any slobbering done by pasting. Finally an oil treatment is carried out by using an abundant quantity of cooked linseed oil and a jute cloth to eliminate any extra oil.

THE COCCIOPESTO

Modern evolution of the ancient pastellone, the cocchiopesto distinguishes itself from these in the moment that it is grinded. The process to construct a pavement in cocchiopesto is the same as explained for the Venetian terrazzo with a mixed binder, the only difference being that the final layer and the seeding is composed of crushed brick.

The brick must be recovered from the demolition of old buildings. The final polishing is carried out with various oils (cooked linseed oil, linseed oil, straw oil) and paste wax.

CONTROL COMMITTEE

Requirements and valuation criteria for administering of The Venetian Terrazzo Consortium.

For an accurate valuation of the requirements necessary for becoming part of the Consortium one must keep in mind three fundamental parameters:

1) Legal Requirements

Anyone applying to become a member of the Consortium must produce all the documentation necessary to demonstrate his regularity and correctness in the market.

Documentation

- Certificate of registration to the C.C.I.A.A., Company Register, Constructors Register
- Insurance position INAIL – INPS

2) Product Quality

The applicant must furnish all the information necessary to better illustrate the quality of his product. In any case the Control Committee will base itself according to the principles dictated in the “Carta del Terrazziere” (Paper of the Terrazzo – Layer)

Documentation

- List of finished works (minimum three, possibly public)
- Construction site under way
- Deposit and handling of materials

3) Production Quality

Product quality cannot prescind the methods used to achieve it and therefore the applicant must produce all the documentation necessary to demonstrate his observance of security and environmental laws (machinery in compliance with EC laws, the discharging of the muds, etc.)

Documentation

- documentation provided by the 629/64 law
- register of mud discharges

VALUATION CRITERIA

In a final valuation the judging of the quality of the finished product is predominant.

When the applicant has passed the first phase regarding the quality of the product, he can produce certificate in which he affirms to comply with the other requirements stated in points 1 and 3 above.

After having received the necessary documents explained in points 1-2-3 the Control Committee gives its conclusion to the Consortium’s Administration Committee which will proceed with taking a decision based on the Statute.

Attachments

WORKS



Living room with a typical example of a modern re-elaboration of decorated terrazzo with multicoloured marble tesserae placed along the brass divider strip that separates the floor. Private home, Ormelle (Treviso)



Living room with modern Venetian terrazzo. Private home in Salgareda (TV)



Venetian hallway with a series of colourful waves, obtained using a "graded" seeding technique and extending over the entire surface of the terrazzo. Private home, Gorgo al Monticano (Treviso)



Dining room, Villa Pasqualini in Preganziol (TV)

Attachments



Unusual Venetian terrazzo floor, in terms of both pattern and the seeding (finely crushed marble with a particle size of 5mm.). The fields are marked off by brass strips 10mm thick. Company reception and waiting room area. Asolo, Casella (Treviso)



Venetian hallway with a series of colourful waves, obtained using a "graded" seeding technique and extending over the entire surface of the terrazzo. Private home, Gorgo al Monticano (Treviso)



Foyer with floor decorations central to the gallery.



Living-room view with Venetian terrazzo: base in cocchio-pesto; thick grained seeding in nero ebano, bianco del Grappa, rosa corallo and giallo Mori.

Attachments



Hotel foyer with venetian terrazzo floor using multicoloured marble chips size No. 5-6, with bianco Carrara marble inserts. Hotel and Restaurant, bar and reception area, Vedelago (Trevsio).



Venetian floor with mixed colours composed of marble chips size No. 5 (from 5mm to 25mm) with decorative perimeter fascia. Private home, Rossano Veneto (Vicenza)



Foyer with decorations, gallery view.



Venetian floor with Carrara pebbles. Marble chips size No.6 and perimeter inserts of verde Alpi and rosa Asiago marble. Private home, Romano d'Ezzelino (Vicenza)

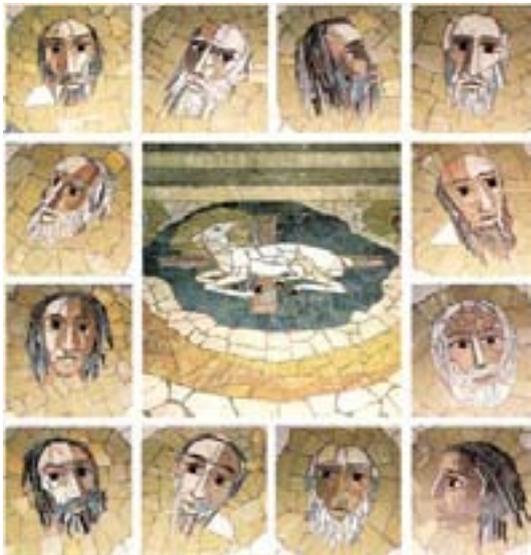
Attachments



Modern-style floor decorated using oval patterns acting as carpets and made using cubes of multicoloured marble and rounds of Murano glass with a very fine-grained seeding. Company directors' meeting room. Noale (Venice)



Main room of first floor with decorated fasce medium-grained seeding. Detail of Villa Giauna, San Vito di Altivole (TV)



Palladiana floor; details of the faces of the twelve apostles and the lamb of God. Church of the B.V. Immacolata, Crea Spinea (Venice)



Modern church with floor composed of a single seeding colour for the assembly area and a different one for the flooring of the high altar. Parish church, Olmo di Martellago (Venice)

Attachments



Room with diamone decorations in rosso Verona and various marbles; central decors in bianco Carrara and grigio perla. Castello cerato in Bevilaqua (VR)



Floor installed in situ using rosso Verona, giallo Mori, bianco biscotto and giallo Magrè marble chips. In the foreground, an eight-tipped star made of bianco biscotto. Private home, Vicenza



Umbrella decorations in bianco biscotto and verde bardiglio with perimetral fasce in bianco biscotto, center in giallo Mori and Siena. Castello Cerato in Bevilaqua (Verona)



Table in Venetian terrazzo with decorations using different marbles.

Attachments



Venetian terrazzo hallway complete with diamone-patterned "carpet" at the entrance and a fascia of diamonds framing the living room. The material used is bianco Pove and rosso Asiago. Private home, Carmignano di Brenta (Padova)



Entrance hall with floor decorated in the 18th century style, mahogany red beading and pebble white floral patterns. Uniform rosso Verona seeding with opus signinum binder. Villa Canzian, S. Elena di Silea (Treviso)



Restored red pastellone pavement ('600s) with a short grinding phase, even by hand, patching where necessary and making of a perimetral fascia in new terrazzo. Palazzo Roberti, Bassano del Grappa (VI)



Floor-rose of the the central part of an entrance hall

Attachments



Venetian terrazzo with traditional decorations and colours.



Venetian terrazzo in mother of pearl with marble mosaic inserts.

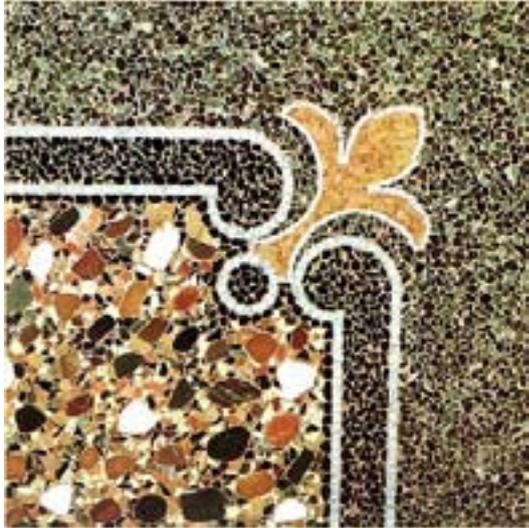


Venetian terrazzo in mother of pearl with marble mosaic inserts.



Seeded Venetian terrazzo with mosaic inserts.

Attachments



Venetian terrazzo with floral decorations. Seeding with river pebbles.



Venetian terrazzo made with river pebbles.



Venetian terrazzo made with marble aggregate.



Venetian terrazzo made with marble aggregate.