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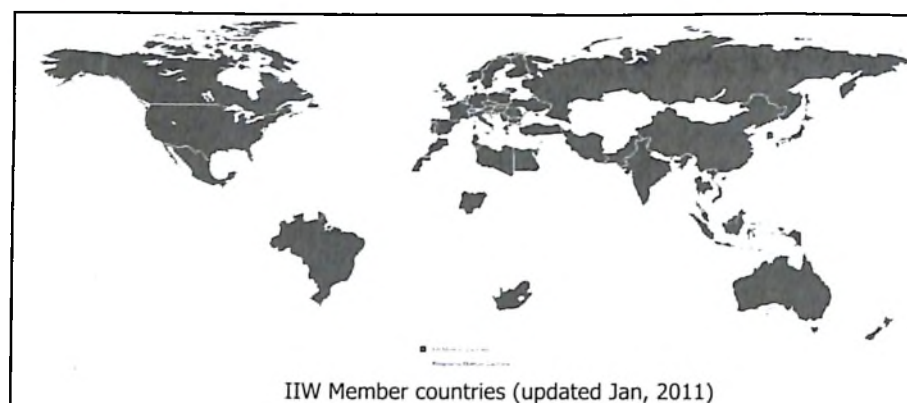
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## Welding in the World and The Future

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(With the kind support and collaboration of the IIW Chief Executive Officer, Dr. Eng Cecile Mayer)



### ABSTRACT

Since its establishment 60 years ago, the International Institute of Welding (IIW) has had numerous successes that have helped the world.

With world population predicted to top 7 billion in 2011 and 9 billion by 2045, the pressures on manufacturing, infrastructure, power generation etc. not to mention basic needs such as food, water, shelter and education, will become enormous common challenges.

In 2006, the IIW introduced a major project entitled "To Improve the Global Quality of Life Through Optimum Use of Welding Technology". Many of the initiatives implemented will be of benefit to many countries and regions, particularly with such significant global growth taking place throughout the world.

It is estimated that during this next decade, many trillions of US dollars will be spent on infrastructure projects in the energy and processing industry, in this truly global world. Besides the normal fabrication, construction and maintenance work within countries, the additional infrastructure projects will create challenges for welding technology.

Such challenges include the fabrication, construction, maintenance, inspection and testing of trillions of components whilst ensuring that they are made efficiently and cost effectively, in an environmentally friendly manner and have high integrity and reliability in service.

In most industrialised countries, much equipment is aging and plant life is pushed well beyond original design considerations. Much plant is now required to operate at extremely high levels of availability with very limited time available for inspection and maintenance.

This is a recipe for disaster. It is predicted that in five years' time the world will see an increasing number of failures such as these, possibly resulting in death, injury, environmental damage and lost production. The subsequent economic impact will be enormous.

This paper gives an overview of the work of IIW internationally, in various regions of the world and industry sectors utilizing welding, the challenges being faced, opportunities available, and probable requirements for the successful introduction and optimum use of welding technology.

Successful models used in other countries, particularly for technology diffusion to industry, education and training, improving the image of welding and the use of appropriate technologies will be highlighted.

Examples of how the elements of such models could be used will be given.

The involvement of industry and governments across the world in conjunction with the work of IIW and its 54 member countries is critical to the success of such initiatives.

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**THE INTERNATIONAL INSTITUTE OF WELDING (IIW)**

The IIW was founded in 1948 by the welding institutes or societies of 13 countries, who felt the need to create it, to make more rapid scientific and technical progress possible on a global basis.

Since then, welding associations in 53 countries make up the members and more and more are indicating interest. There are now 14 members in Western Europe, 14 in Eastern Europe, 4 in the Americas and 21 in Africa/Asia/Oceania.

From the beginning, the IIW set up international groups of specialists to study collectively the scientific phenomena associated with welding and allied processes, their more efficient industrial application and the means of communicating information about them.

It has therefore become the global body in the science and application of joining technology, providing networking and knowledge exchange as part of its mission.

Its mission is to "Act as the world-wide network for knowledge exchange of joining technologies to improve the global quality of life".

Henry Ford, the great American philanthropist and car maker said "You can do anything if you have ENTHUSIASM. Enthusiasm is the yeast that makes your hopes rise to the stars. Enthusiasm is the sparkle in your eyes, the swing in your gait, the grip of your hand, the irresistible surge of will and energy to execute your ideas. Enthusiasts are fighters. They have fortitude. They have staying qualities. Enthusiasm is at the bottom of all progress. With it there is accomplishment. Without it there are only alibis."

As an enthusiastic leader, IIW can truly

make a global contribution.

Welding technology is an enabling technology used across a wide range of industries and applications. These range from micro-joining of medical devices, electronics and photonics (down to 5 microns), to larger scale applications such as bridges, buildings, infrastructure, offshore structures, defence equipment, mining equipment, boilers and pressure vessels, piping, ships, rail and road transport, water and gas pipelines, nuclear, and including components over 1 m thick welded in one pass. All these industries and others exist in all countries to varying degrees, thus creating a significant use of welding technology. Welding and Joining is used widely in the manufacture of most consumer products.

Welding's value to a nation's economy is significant as shown by recent detailed studies in countries such as the USA (AWS 2002) and Germany (Middledorf et al., 2005).

This critical technology encompasses the total life-cycle of welded products/structures including design, manufacture, conformity assessment, inspection and testing, operation, maintenance, repair and decommissioning including recycling and other environmental considerations. Its contribution to the safety and reliability of components in industry is paramount.

**OBJECTIVES OF IIW**

IIW has undertaken a major review of its business plan involving all of its working and administrative units.

Some key IIW objectives, amongst others are:

- Identify, create, develop and transfer world's best practices

- Identify, develop and implement the IIW Education, Training, Qualification and Certification (ETQ&C) Programmes on a global basis
- Promote IIW, its Member Societies and services in various regions of the world to the mutual benefit of all
- Implement the IIW's outcomes
- Provide quality services to IIW members and other organisations

To achieve these objectives in practice, experts from around the world are voluntarily working in 16 Commissions, 4 Select Committees, 2 Study Groups and a host of Working Groups or other units on a permanent basis to stimulate and co-ordinate research and technology diffusion, and to diffuse information on welding technology, its application in terms of materials, processes, design and inspection and other associated subjects such as health and safety, education, training, qualification and certification, terminology and documentation.

**STRUCTURE OF THE IIW****Administrative Structure**

The policies of IIW are decided by the General Assembly at which are represented all the national member societies. The General Assembly elects the President of IIW and the members of the Board of Directors which directs the affairs of the IIW. The Board of Directors comprises twelve Directors among whom are elected the President, three Vice-Presidents and the Treasurer. Countries currently represented on the Board in 2011/2012 include Australia, Brazil, Spain, United Kingdom, Belgium, China, Germany, India, Japan, Romania, Turkey, Portugal, Ukraine and the USA; a good geographical balance between countries.

The day-to-day work is ensured by a five staff member permanent Secretariat based in Paris. Under the responsibility of a Chief Executive, the Secretariat includes a Scientific and Technical Officer, a Standardisation Officer, a Communications Manager and Secretarial Assistant. The CEO since 2000, Mr Daniel Beaufilets retired in January 2008 after eight years of excellent service and was replaced by Mr. André Charbonnier who continued this excellent service until January 2009. He then received a major promotion in Institut de Soudure (IS) and was replaced by Dr. Cecile Mayer.

The Secretariat also maintains contact between IIW and other international bodies such as the International Organisation for Standardisation, United Nations agencies and others.

The Board of Directors has a Technical Management Board (to which over 20 working units report) and an

International Authorisation Board (IAB), as well as three other Working Groups; Communications and Marketing, Regional Activities and Liaison with Developing Countries and Standardisation reporting to it.

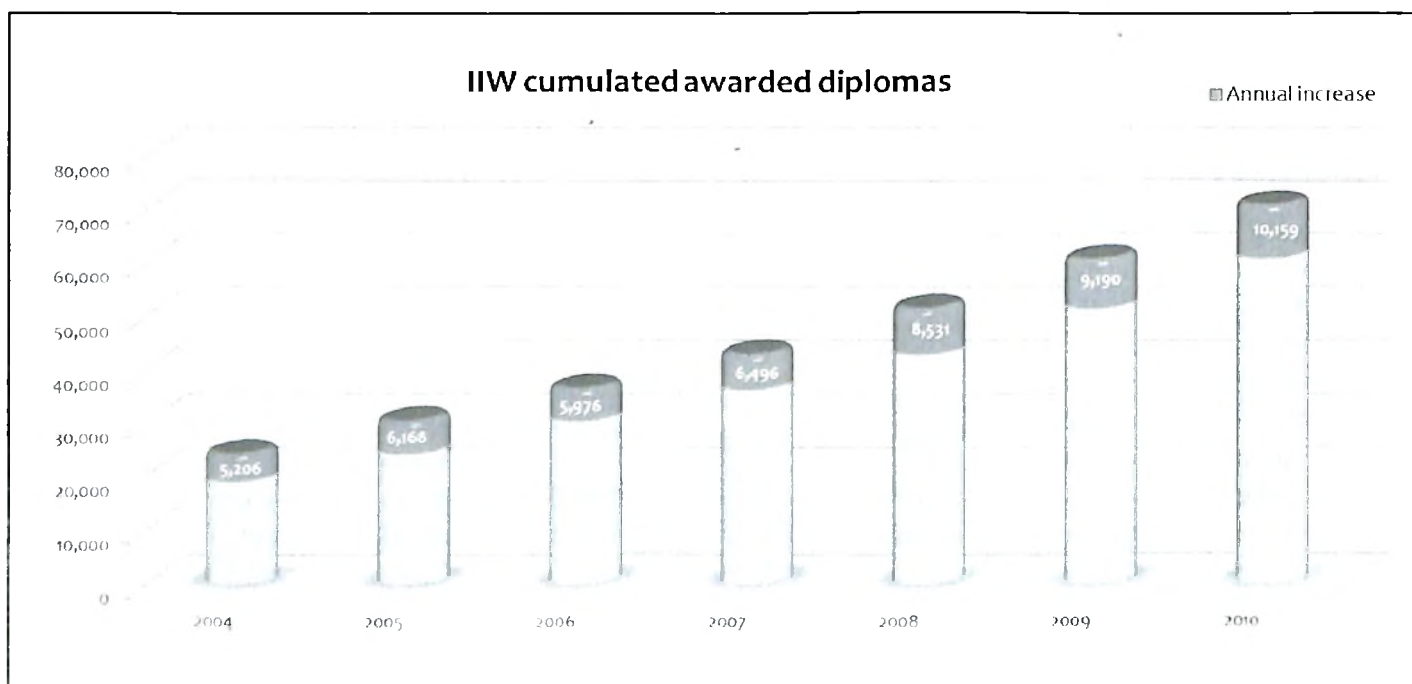
The IIW, a not-for-profit body, is funded by the member societies paying an annual subscription on a scale designed to reflect, as equitably as possible, the dependence of their country on welding technology. Such subscriptions are modest and sufficient to pay only a part of the cost of running the Secretariat and associated activities. Further income is derived from the sale of books and other documents, and fees which are collected from each Annual Assembly participant.

By far the greatest contribution from member societies comes in the form of the input of their delegates to the working programmes of the Commissions. The cost of delegates atten-

dance at Annual Assemblies and any intermediate meetings of Commissions and Sub-Commissions are borne by their Member Societies or the delegates' employers.

Throughout the life of IIW, the scope of its technical programme has been continually expanded to include new technologies. Such have included more recently, the joining of plastics and composites, micro and nano-joining technologies, the capabilities of computers in design, process control, inspection and information handling, welding in a variety of environments and under remote control, new concerns for the health and safety of those working in industry and the education, training, qualification and certification of personnel and companies.

The Institute, in July 2007, finalised its new Business Plan involving all administrative and working units to ensure ownership by all participants over the 2007-2012 period.



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**International Authorisation Board (IAB)**

An important innovation of the IIW was the formal establishment in 1999 of an international programme for the qualification of personnel involved in welding operations. Through the IAB, this scheme allows the IIW Authorised National Bodies (ANBs) in member countries to deliver, under the control of the IIW, Diplomas of International Welding Engineers (IWE), Technologists (IWT), Specialists (IWS), Practitioners (IWP), Inspectors (IWI) and Welders, amongst others. The Diploma holders for IWE, IWT and IWS are de facto recognised as able to be Responsible Welding Coordinators according to the ISO Standard ISO 14731 "Welding coordination; Tasks and responsibilities".

Forty-four IIW members actively participate in the IAB and through their ANBs, over 70,000 IIW Diplomas have been issued since the programmes started in 2000. The Instituto de Soldadura e Qualidade in Portugal provides the Secretariat for the IAB and its two working groups, A "Education, Training & Qualification" and B "Implementation & Authorisation".

With the ever-growing global use of the ISO 3834 "Quality requirements for fusion welding of metallic materials" and ISO 14731 "Welding coordination - Tasks and responsibilities" standards, more and more countries are using the IIW International Programmes.

Since January 2008, IIW through the IAB, has also introduced programmes for the certification of personnel and certification of companies to ISO 3834. Twenty IIW member countries now offer the IIW Manufacturer Certification Scheme According to ISO 3834 (IIW MCS ISO 3834) company certification programme.

**National Delegations**

People can be appointed to be members of their national delegation. The appointment process varies from one country to another but generally the main criteria are:

- to be known by the relevant national authority responsible for the appointment of the country's delegation;
- to be an expert in a subject dealt with by an IIW Commission or other Working or Administrative Unit;
- to have the motivation and energy to participate in the co-operative work of the unit which may meet not only at the Annual Assembly, but more frequently in order to maintain progress (often in Paris in January each year);
- to have an interest in working with people of other nationalities whose basic assumptions and habits of thought may well be quite unfamiliar.

For those committed to co-operation, there are many opportunities to contribute to, and learn of, work which will be valuable to them professionally and to their employers, to make the acquaintance of fellow experts from other countries, to gain, through personal contacts and technical documents, advance knowledge of impending developments and, in some cases, to influence the content of international welding standards.

**SOME ACHIEVEMENTS OF IIW****Technical Management Board**

The groups of experts in the Technical Commissions and other units under the Technical Management Board have achieved many outputs useful to

industry, both nationally and globally:

**a) Technical Papers**

Each year about 400 papers emanate from the IIW working units of which about 60 are published in the IIW journal "Welding in the World". The IIW journal has been accepted by the Science Citation Index in 2010.

In addition, a total of some 100 books dealing with recommended practices or the results of international enquiries have been published mainly in two or more languages.

**b) Terms and IIW Database**

IIW has compiled a number of works of reference such as the Multilingual Collection of Terms for Welding and Allied Processes (9 volumes mostly containing 16 or more languages), the International Welding Thesaurus developed over 40 years in conjunction with the TWI bibliographic database Weldasearch and a collection of radiographs illustrating weld defects. More recently the IIW Database, referencing all IIW technical documents since 1950, has been made available online through the IIW website ([www.iiwelding.org](http://www.iiwelding.org)).

All these works were approved for publication by international groups of experts and so are authoritative.

IIW's virtual library constitutes one of the world's largest online sources of welding information available today. IIW Members can consult and share technical documents, white papers, publications and articles through a database of around 18,000 documents, of which more than 6,300 may be downloaded



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from the IIW web site. Bibliographic reference to documents can be searched by all visitors to the website, and hard copies acquired through the IIW Secretariat.

**c) ISO Support**

With regard to the objective of formulating international standards, the working units of the IIW have supplied the technical basis of the great majority of welding standards issued by the ISO over the past 35 years. Members of these working units and their employers have therefore had a major influence over the content of such standards. Since 1989 the IIW has been authorised by ISO to prepare the final texts of international welding standards as an international standardising organisation. This work is co-ordinated by the standardisation staff within the IIW Secretariat and an increasing number of ISO Technical Reports are being produced.

**d) Promotion of National Industry**

IIW has also been successful in promoting the organisation of national welding associations. Such associations have been formed with a view to their becoming members of IIW, thus enabling experts from their respective countries to participate in IIW activities. The IIW has taken steps to increase the promotion of membership in developing countries and economies in transition, which could benefit greatly from the collective knowledge of the IIW in many areas, in particular welding education and training, appropriate welding science, technology and practice, and the health and safety of welding personnel. Before becoming full

members, countries can join as Associate Members.

Within the same country more than one organisation can group together normally under a national council for IIW.

IIW has recently amended its membership rules to make it easier for small developing countries to become members. Up to three countries with common geographical boundaries and less than 1m tonnes of steel consumed between them can group together as one member.

**e) Annual Assemblies**

IIW Annual Assemblies have been taking place since 1948 and take place on the invitation of one or other of the member countries and last for a week. Three days are normally devoted to parallel sessions of the Commissions and other working units. In addition, two days are normally devoted to an international Conference on a specified theme. The papers presented at this Conference are normally published in bound volumes and/or CD format available for purchase, and are offered to IIW journal "Welding in the World" subscribers.

Generally, over 40 countries are represented by about 600 delegates at Annual Assemblies together with about 200 accompanying persons. Attendance at meetings of IIW working units is confined to those who have been appointed by their national delegation whereas the International Conference is open to any person.

Recent public event themes including the one for 2010 are:

- 2004 "Technical Trends and Future Prospectives of Welding Technology for Transportation, Land, Sea, Air and Space", Osaka, Japan
- 2005 "Benefits of New Methods and Trends in Welding to Economy, Productivity and Quality" Prague, Czech Republic
- 2006 "11th International Symposium on Tubular Structures", Quebec, Canada.
- 2007 "Welding & Materials: Technical, economic and ecological aspects", Dubrovnik, Croatia
- 2008 "Safety and Reliability of Welded Components in Energy and Processing Industry", Graz, Austria.
- 2009 "Advances in Welding and Allied Technologies", Singapore
- 2010 "Advances in Welding Science & Technology for Construction, Energy & Transportation Systems, Istanbul, Turkey

Other specialist public events and seminars are usually held in association with the Annual Assembly.

The IIW will continue the programmes of its various working units, particularly on the occasion of forthcoming Annual Assemblies, which will be held as follows:

- 2012 Denver, Colorado, USA
- 2013 Essen, Germany
- 2014 Republic of Korea
- 2015 Helsinki, Finland.

**Regional Activities and Liaison with Developing Countries**

During the 1980s, discussions took place within IIW on how the benefits of IIW could be promulgated to countries in the different regions of the world. It was felt that the three key areas by

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which IIW could assist regions, developing countries and economies in transition to improve the quality of life of all people were through implementing:

- Appropriate welding technology
- Education, training, qualification and certification
- Occupational Health & Safety (OH&S)

To start implementing this strategy, it was agreed to hold Regional (now called International) Congresses with the following specific objectives:

- To expose delegates from industry in the host countries in the region, to the work of IIW
- To identify the needs of the surrounding countries in the region and produce IIW supported programmes to help meet those needs particularly through the efforts of the host country
- To have organisations such as the United Nations Industrial Development Organization (UNIDO), International Atomic Energy Agency (IAEA) and the European Union (EU) formally involved in the Congress and subsequent programmes
- To have authors from the less developed, surrounding countries presenting papers
- To form regional commissions of the IIW using representatives of the regional countries that could then provide input to the main IIW commissions.

These Congresses have become very popular and successful.

The IIW's first International Congress was held in Australia in 1988, followed by Brazil (1992), New Zealand (1996), South Africa (1997), Iran (1998), Australia (2000), Singapore (2002), Iran

(2003), Egypt (2004), India, Israel (2005), South Africa, Romania and Thailand (2006), Australia (2007), India, Brazil and China (2008), Nigeria, Slovakia and Iran (2009); Israel, Thailand, Tunisia (2010). Further International Congresses already planned include Australia and Turkey in 2011. A major success of these Congresses has been to assist technology development and diffusion in regions sometimes far removed from the locations of the majority of Annual Assemblies and to encourage IIW membership in developing countries in these regions.

An important approach since 1993 has been to have a more systematic approach to regional activities with the compilation of a strategic business plan for the Working Group with the Goal "To promote IIW and its member societies to the countries in the various regions of the world to the mutual benefit of all", and four key objectives:

- To promote the holding of IIW supported events throughout the Regions of the World
- To introduce the IIW Weld Care Programme for take-up by Developing Countries and Economies in Transition
- To continually promote and market IIW in different Regions of the World
- To harmonise IIW's efforts with other organisations' efforts in each Region

Over 20 detailed strategies support this Goal and Objectives.

#### **IIW STRATEGIC PLAN AND BUSINESS PLAN (2007 - 2012)**

McKinsey Quarterly Web Exclusive 2006 highlights some important global trends to watch for (McKinsey, 2006):

- Centres of economic activity will shift profoundly, not just globally but also regionally
- Shifts within regions will be even more dramatic
- Today Asia (excluding Japan) accounts for 13 percent of the world's GDP, while Western Europe accounts for more than 30 percent. Within 20 years the two will converge

#### **Objective**

The IIW, at its Annual Assembly in Prague in July 2005, agreed to a new approach on updating its Strategic Plan and Business Plan for the next five years.

In today's world, no country or organisation can remain in isolation with issues now becoming truly global e.g. the ozone layer problem, Chernobyl, trade, travel, IT, climate change, etc.

Most people in the world simply wish for a decent job and roof over their heads, sufficient food, health and security for their families and a decent education for their children, and an environment in which all forms of life can exist in harmony.

Part of the vision of IIW is to have an influence in the promotion of welding technology in all countries of the world. In particular, IIW wishes to be able to grow to an optimum size whereby the necessary identified services can be provided to its members.

There are over 200 countries in the world, however, and all use welding and joining to varying degrees; 54 of these countries are members of IIW probably representing over 80% of the developed world.

To achieve this part of its vision, IIW is now at a stage in its development where

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it is playing a leading role as a facilitator, through its member societies, to meet the needs of many non-member countries and at the same time improve its own image and influence on the global stage.

Now, particularly with the shifting of global industrial and population growth, the IIW is encouraging these new centres as well as those of the developing countries, to become more involved in IIW.

The main needs of many developing countries and those with economies in transition are arguably, in education, training, qualification, certification, health and safety as well as the introduction of appropriate technologies to be customised for use in their industries.

#### **IIW Project "To Improve the Global Quality of Life through the Optimum Use of Welding Technology"**

If one considers all the attributes of an organisation such as IIW, a key challenge is how to utilise these attributes to achieve the above Project objective. This Project, approved by the IIW Board of Directors in July 2005, can dovetail many of the IIW activities (including those of its member societies) that are taking place to everybody's mutual benefit. A few of which could be important to different world regions, are discussed below.

#### **IIW Regional Activities and the IIW WeldCare Programme**

In many developing countries numerous geo-political and socio-economic problems hold back their sustainable development in a sustainable environment. Also their science and technology attributes have struggled to develop for a myriad of reasons.

This programme was initiated in 1994 when IIW President Raul Timmerman, Vice President Chris Smallbone and Head of the IIW Technical Secretariat, John Hicks approached UNIDO representatives for support for such a programme (Hicks et al., 1994). The model was based on the South African Institute of Welding (SAIW) led by Chris Smallbone, which grew from a part-time secretary in 1977 to a full time staff of 49 in 1989, based in a fully owned 3500 sq m specific purpose building (SAIW, 1988). The concept of having educational support centre networks and technology support centre networks grew from this model (Smallbone, 1992). With 7 full-time technical consultants, 14 full-time lecturers and instructors, it operated throughout Southern Africa uplifting the quality of life of millions of people. From 1980 to 1989 it introduced more types and levels of world class personnel qualification and certification programmes than any single organisation in the world has ever done. These still operate successfully today and, where applicable, have been converted to international programmes. UNIDO was quite enthusiastic to support the programme for the rest of Africa. Unfortunately the UNIDO support fell away due to personnel changes in UNIDO but has recently been renewed.

Some success did arise however, through the International Atomic Energy Agency (IAEA). Initiated by SAIW in 1992, since 1994 the IAEA has supported parallel NDT training and qualification for the whole of Africa, conducted at the SAIW.

Over the past 20 years, many examples can be given of projects where IIW member countries have assisted both member and non-member countries to

improve their welding technology and hence quality of life.

Consider the following example amongst many others:

- Germany-China
- France-Thailand
- UK-Malaysia
- USA-Trinidad and Tobago
- Japan-Vietnam
- Portugal-Angola
- Japan-Egypt (Africa)
- Austria-Indonesia
- South Africa-Africa (IAEA)
- Germany -Vietnam
- USA - Nigeria
- Holland & Canada-South Africa
- Australia - South Africa
- Germany - Indonesia

The main emphasis on all the above examples was on education and training and appropriate technologies.

IIW is actively cooperating with aid agencies to expand these types of projects through its IIW Weldcare Programme. Discussions are taking place with agencies such as IAEA and UNIDO on welding technology training for different levels and types of personnel throughout Africa. Such programmes were first recommended back in 1992 with a joint team effort by SAIW, ESKOM and the SA Atomic Energy Agency (AEA) initiating IAEA NDT training still being supported today (SAIW, 1992-3). This was based on the successful IAEA South American model. Such programmes could also be implemented in some of the regions of the world currently being targeted by IIW, e.g. North Africa, South East Asia, and Gulf Region.

IIW has tremendous strength in its member countries. Its member societies have resources to assist in establishing within a particular country or region:

## *WeldCare* : SUCCESS STORY NUMBER 1

TRAINING FOR LIFE – A team effort between three national governments, industry bodies, national welding institutes and South African industry gives hope to new welding inspectors and a model for the future



Students trained in NDT technologies



Learning how to correctly set up X-ray equipment.

- An organisation that would be responsible for the promotion of welding technology and related disciplines;
- The required welding education and training infrastructures;
- The appropriate technologies to assist the different industries being established and able to be self sustaining in a sustainable environment.

A proper business plan for each country would need to be devised however, financially supported and implemented with appropriate milestones and key performance indicators. IIW is assisting countries with a model business plan and strategic plan.

Depending upon the geographic size of the country, its industrial size and distribution, a practical action plan to suit the specific needs of the country should be possible.

### **Education, Training, Qualification and Certification - IIW Educational Support Centres Networks**

Culture is "A way of life or life style

summarised in a system of particular values and attitudes which result in characteristic actions and customs". There are three key cultures that help make a country, company or individual successful.

A skills culture is a national way of life which is characterised by:

- support of, and value placed on, a willingness to learn
- respect for people who acquire skills
- tangible rewards for individuals who acquire skills

This means that people at all levels and in all disciplines in organisations will have a willingness to adapt or learn new skills. They will also be seen to deliver excellent work results. Organisations will be seen to promote skills development and will be highly productive and competitive.

All of the above will lead to a thriving national economy since a culture of skills development is encouraged nationally.

A quality culture where companies with the correct culture in quality

automatically:

- introduce quality management systems
- provide service quality
- improve performance and productivity
- cut costs and improve profits
- give clients confidence in the reliability of products
- give clients confidence that the orders will be right first time on time

A productivity culture is about the ability that a system [be it an individual, a department, a business or the economy] has, to use all the resources at its disposal in a collective sense to provide products and services which are useful to the end user.

Productivity improvement is the improvement of that ability.

A productive culture is where everybody and every effort contributes to improving and building up themselves, the economy and the nation.

Through IIW Commission XIV



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'Education and Training' as well as the member countries in the IIW IAB, all 54 IIW members are involved in education, training, qualification and certification of personnel and many with the certification of companies - all contributing to a skills culture in the welding industry.

This has enabled IIW to establish an international network of educational/training support centres into which any non-member country can dovetail. A similar network could become a greater reality in any country or region with the national IIW ANB (s) coordinating it. Excellent working national models exist in countries such as Germany and Australia with the German model being outstanding. South East Europe is currently introducing a model between six to nine countries.

Training is a most powerful way for national improvement. With the increase in global trade, the need for product conformity assessment and the ever increasing number of product or application standards specifying ISO 3834 and ISO 14731, there is growing demand for international approaches to personnel qualification and certification, as well as certification of companies.

In Prague, in July 2005, the IIW Board of Directors resolved to introduce IIW certification programmes already introduced by the European Welding Federation, amongst others.

These include :

- Certification of International Welding Engineers, Technologists, Specialists
- Certification of companies to ISO 3834 Quality requirements of fusion welding of metallic materials.
- Certification of companies on Occupational Health and Safety Management.

- Certification of companies on Environmental Management.

The first two above were launched in Croatia at the 2007 IIW Annual Assembly and the latter two should follow fairly quickly.

The introduction of IIW guidelines for national certification programmes for welding inspection personnel are currently being introduced.

#### **IIW Technology Support Centres Network**

A key IIW strategy is the promotion of the concept of innovation through technology diffusion which can be defined as:

- Identifying and analysing the needs of industry in a country or company
- Sourcing solutions to meet these needs
- Disseminating the technology and information into companies, particularly SMEs and micro-enterprises
- Adopting, adapting and implementing by technology receptors of new technology/ information
- Improving performance of the companies and measuring the value of improvements
- Providing feedback for further national or company improvements at each stage of the technology diffusion process

In any country, at least 97-98% of information/knowledge required is readily available from other countries' sources; technology diffusion is more important to many countries than conducting research.

IIW member societies with a well developed infrastructure can easily access and utilise the outcomes of the

IIW Technical Commissions and working units to improve innovation in their countries. Developing countries and those with economies in transition may need to utilise a different approach or concept to suit their particular condition.

IIW has investigated and developed other models for different types of countries.

It has held a number of Technology Innovation workshops in IIW member countries including India, Bulgaria, Romania, Serbia and South Africa.

In Australia, the WTIA has established a very successful model entitled 'OzWeld Technology Support Centres (TSCs) Network' (Smallbone, 2002a) which has further expanded to the "SMART Tech-Net" project. The South East European countries including Romania, Bulgaria, Croatia, Macedonia, Serbia, Bosnia, Turkey, Greece and Montenegro are now working together to implement a similar TSCs network between their countries. The first day of the three-day IIW International Congress for the South East European countries from the 26th-28th May 2006 in Timosoara, Romania was dedicated to a Technology Innovation workshop discussing the implementation of such a model.

UNIDO, IAEA, the EU and the Department for International Development (DFID) in the UK agreed to give presentations and work together with IIW member societies to investigate the correct way forward for the region.

In January 2007, a two-day workshop was held in Belgrade to move the concept further along and was followed by a further workshop in Athens in January 2008.

A key outcome could then be IIW member societies working with the aid agencies mentioned to facilitate projects

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in a variety of regions around the world e.g. Southern Africa, South East Asia, West Africa.

A combination of the models in 5.2.2 and 5.2.3 is presently being promoted as an ideal model (Smallbone, 2005). This could also be used nationally in many countries such as India, China, Brazil and Indonesia.

#### **Improving the Image of Welding**

A common complaint amongst IIW member societies is the poor image of welding, with the general public, governments and general industry, but particularly with young people, leading to their lack of interest in careers in the welding industry. Some countries such as the USA and Germany have initiated national campaigns and even countries such as Japan, which has had an excellent record in welding technology, are also facing problems in this area.

The IIW is now studying how an international approach through IIW and its member societies can be implemented. When one considers how modern society depends so much on welding technology, it is quite amazing that one still has to continually 'sell' the technology. The value of welding and its contribution to daily life are not appreciated by many sectors of society.

How could people survive without services such as transport and water, products such as computers, mobile phones, artificial hearts, bionic ear implants, etc, etc, etc? Where do the global and individual benefits end? Whether a high pressure gas pipeline extending thousands of miles across Australia or a pipe supplying water to a village in Africa, welding technology makes a huge positive impact on the global quality of life. Its value to a nation's economy is both significant and

critical as shown by studies in countries such as the USA and Germany.

16 strategies on improving the image of welding have been implemented in the sections of the IIW Business Plan involving the IIW Board of Directors, International Authorisation Board (IAB), Working Group Regional Activities and Commission XIV.

#### **IIW White Paper or White Book**

One important strategy that is part of the project is for IIW to compile a "White Paper" or "White Book" entitled "To Improve the Global Quality of Life Through the Optimum use of Welding Technology". Such a document is to be used on an international basis and aimed at decision makers in Governments, industry, research and development, academia, education and training, amongst others, to assist them in their welding related areas of interest or influence.

The IIW has formed a White Paper Task Group consisting of 12 prominent members of the global world of welding and more than 50 international experts are contributing to the document.

For example, it could:

- Influence governments and industry on the R&D needs, magnitude and types of research funding to be made available
- Improve the image of welding and its importance to both the national, regional and global economies
- Guide industry on future types and numbers of personnel requirements
- Provide technological developments including "hot topics" to improve the global quality of life
- Raise the national and international profile of IIW and its member

societies.

The title of the "White Paper" is linked to the title of the IIW Project "To Improve the Global Quality of Life Through the Optimum Use of Welding Technology".

It will have the following five objectives amongst others.

- To identify the challenges for welding and joining technology in the global arena
- To recommend the implementation of strategies to find solutions to meet these challenges
- To agree on solutions for the next 20 years
- To promote the implementation of identified solutions on a national, regional and international basis through greater collaboration, shared knowledge and partnerships.
- To improve overall global quality of life i.e. health, safety, food, water, fair trade, environment, education opportunities.

#### **POTENTIAL REGIONS OF COOPERATION**

The welding industries in all world regions are facing some exciting challenges over this next decade particularly due to the forecast in global growth and it being evident that vast amounts will be spent on infrastructure projects alone, with enormous economic growth taking place in countries such as China, India and neighbouring countries.

Industry sectors involved in such projects, and all involve welding technology, include road, rail, water, transport, power generation, petrol/chemical, nuclear, pipelines, oil and gas offshore amongst others.

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Such projects also enable countries to improve the quality of life of their people whilst at the same time protecting the environment both nationally and internationally. This is so important since "no man is an island" as has been shown by disasters such as the failure at the Chernobyl Nuclear Power Plant in the Ukraine or lately the problem of climate change.

The geo-political and socio-economic challenges of countries have been well documented. How does an organisation such as IIW and its member countries try to assist countries further to improve their quality of life? Examples have been given previously (Smallbone, 2001; Smallbone, 2002 b & c; Smallbone, 2003; Smallbone, 2004; Smallbone, 2006 a, b, c & d; Smallbone, 2007 a & b; Smallbone, 2008).

The variety and magnitude of the challenges facing countries as well as the resources to meet the challenges probably vary from country to country.

In terms of the welding industries to be involved in infrastructural projects, as well as the normal fabrication, construction and maintenance work that happens on a daily basis, the IIW is confident that there are many areas in which the national welding associations can work together with IIW for the common good.

The first step in finding a solution would be to continue to promote greater regional cooperation and greater involvement in IIW by regional country representatives.

International organisations such as UNIDO, EU, DFID (UK) and IAEA could channel projects through IIW, these countries and the regions.

The IIW Member Societies in the different world regions are prime players

in welding education, training and technology transfer, and with adequate resources, could all play a bigger role in the regions.

Since 1970, major drives have been made to establish, within the countries, training schemes leading to qualification and certification of personnel on a national, regional and now on an international basis through the IIW.

South East Europe, Southern Africa, South East Asia, Western Africa and Australasia are examples of regions that have established training facilities and IIW ANBs which could play a very successful coordinating role in the establishment and delivery of various training schemes to meet the manpower requirements of the industry of the different regions.

Two important approaches could be the establishment of national or regional Educational Support Centres Networks and national or regional Technology Support Centres Networks throughout the world. Numerous outcomes could result giving tremendous benefits to the people and companies.

#### **CONCLUSIONS AND RECOMMENDATIONS**

The IIW is probably now in its strongest position in its history with an excellent team effort during the past eight years, culminating in a well balanced organisation with sound and enthusiastic leadership from its Board of Directors, excellent teams of world experts comprising the working units, a competent hardworking Secretariat, a range of relevant outcomes including products and services of value to its members, with increasing interest by more countries in becoming members. It has strong regional members which, with

the support of IIW, industry, governments and aid agencies can deliver immense benefits to the regions throughout the world.

IIW's colleagues in all countries can contribute to these objectives, in the following ways, amongst others:

- I) Actively contribute to the IIW project 'Improving the global quality of life through the optimum use of Welding Technology'.
- ii) Actively support the IIW initiative to improve the image of welding.
- iii) Nominate more delegates to participate in meetings of the IIW technical commissions and working units (see Appendix 1), which would be to the benefit of the individual, their companies and thus the country as a whole, as well as contributing to global welding technology development.
- iv) Consider linking into and expanding the IIW technology diffusion projects including the establishment of country and regional Technology Support Centres Networks.
- v) Consider establishing country and regional Educational Support Centres Networks.
- vi) Contribute to the continual development, promotion and use of the IIW White Paper - WhiP "Improving Quality of Life Through Optimum Use and Innovation of Welding and Joining Technologies"

IIW looks forward to welcoming participants to future Annual Assemblies and to working with all people interested in improving the quality of life in the world.

We believe that, with the three attributes of ENTHUSIASM, PERSIS-

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TENCE and COOPERATION, we can all work together in an excellent team effort to improve the quality of life of people globally.

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