



# STRATEGIC BUSINESS PLAN ISO/TC 138

## EXECUTIVE SUMMARY

The scope of ISO/TC 138 is the standardization of plastics piping systems including material aspects, pipes, flanges, fittings, valves and auxiliary equipments intended for the transport of fluids. Plastics piping components are made from all types of plastic materials, including all types of reinforced plastics. Joining of plastics piping components (pipes, flanges, fittings and valves) for the transport of fluids, and metal fittings used with plastics pipes are also included.

This standardization includes requirements for : dimensions and their tolerances, performances including welding, chemical, mechanical and physical properties and appropriate test methods for other properties relevant to particular application, temperature and pressure ratings. ISO/TC138 also covers the rehabilitation of pipeline systems. Recently activity for single-layer corrugated pipes for sub-drainage applications is going up, and the development and review of related standards including test methods are taking a larger part of ISO TC138 agenda.

Plastics piping systems for industrial applications are indispensable elements to civilized living from individual life to industry activities i.e., they are a basic infrastructure for urban environments. The works addressed by TC 138 are applied for supply of hot/cold water including for human consumption and irrigation, for discharge of sewage, waste, sub-soil and rain inside/ outside of buildings, for supply of gaseous fuels and for industrial applications of various uses. Remarkably, PE pipes for gas supply have shown their damage resistance to several recent large earthquakes and the rehabilitation of pipeline systems exhibit its social and environmental impacts.

The Committee has a working group under direct control of TC 138 and eight Subcommittees. SC 8 was established by promoting WG12 of TC 138 to a new SC in 2013.

- WG 8: Basic geometrical characteristics of thermoplastics pipes,
- SC 1: Plastics pipes and fittings for soil, waste and drainage (including land drainage),
- SC 2: Plastics pipes and fittings for water supplies,
- SC 3: Plastics pipes and fittings for industrial applications,
- SC 4: Plastics pipes and fittings for the supply of gaseous fuels,
- SC 5: General properties of pipes, fittings and valves of plastic materials and their accessories -Test methods and basic specifications,
- SC 6: Reinforced plastics pipes and fittings for all applications,
- SC 7: Valves and auxiliary equipment of plastics materials
- SC 8: Rehabilitation of Pipeline Systems

As appropriate, liaisons are established between other standards development committees and organizations to help facilitate the efficient and effective development of global relevant standards.

TC138 holds a plenary meeting every year hosted by the member body in Europe and outside Europe alternately. An advisory group meeting will be also held encouragingly paralleled with TC/WGs, SCs and SC/WGs meetings. ISO TC 138 and its SCs are always using the electronic communication tools such as ISO/TC server, etc.

## **1. INTRODUCTION**

### **1.1 ISO technical committees and business planning**

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to



identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

## 1.2 International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: [ISO](#) (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of [IEC](#) (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of [ITU](#) (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 164 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the [International Standard](#).

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its [Technical Committees](#) are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

## 2. BUSINESS ENVIRONMENT OF THE ISO/TC

### 2.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

Economical efficiency is first convenience characteristic of the plastic piping systems. In addition, they are durable, strong, lightweight, having resistance to chemicals, flexible, easy to mold, and so on. As the case may be, they can be recyclable to reproduce "Recycled plastic piping systems". Thanks to all such beneficial characters, the plastic piping systems have become the champion in the world pipe market.

The markets of plastic piping systems are a country-based market mainly due to high transportation costs. This kind of domestic approach has been supported indirectly by individual governments who control the expenses for infrastructures as well as national regulations for houses and buildings. The market situation of fittings and valves are different from those of pipes. Prices per volume are much higher than pipes. Thus, some manufacturers operate on global basis.

### 2.2 Structure of the market: Suppliers/Manufacturers

Resins for plastics pipes are classified into two basic categories: thermoplastic resins (thermoplastics) and thermosetting resins. The majority of thermoplastics pipes are produced by extrusion moulding of various thermoplastics such as unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C),

polypropylene (PP), polybutylene (PB) and poly(vinylidene fluoride) (PVDF), etc. In case of Polyethylene, there are 2 major types of the classifications. PE32, PE40, PE63, PE80 and PE100 at ISO classification and low density/linear low density polyethylene(LDPE/LLDPE), and high density polyethylene (HDPE) at ASTM classification. Cross-linked polyethylene (PE-X) is classified, too. Thermosetting plastics pipes are made of glass reinforced thermosetting plastics (GRP) based on unsaturated polyester (UP) and epoxy resin (EP), etc. Other than the above, the piping systems made of molecularly oriented PVC (PVC-O), Polyethylene of Raised Temperature Resistance (PE-RT), Polypropylene Random Copolymer with modified crystalline structure (PP-RCT), and Polyester Resin Concrete (PRC), etc. are commercialized.

Applications and estimated share of different plastics pipes are summarized in **Table 1**.

PVC pipes and PE pipes are two major products in the world market. PVC pipes have been widely acclaimed due to their excellent cost-performance for all facets of the pipe industries, i.e. water/gas/sewage/industrial/building services, replacing traditional clay and ductile iron pipes. However, they meet the challenge of PE pipes in recent years. PE pipes market is mainly divided into two directions in this trend. One is for the replacement of traditional materials such as metals used for water supply. The other is for the replacement of PVC pipes. PE pipes are regarded as more suitable compared to PVC or weld system when used for gas supply. The specialty pipes made of acrylonitrile/butadiene/styrene copolymer (ABS), Styrene/Acrylonitrile copolymer (SAN)+PVC, PP, PB, PVC-C and PE-X are used mainly for sanitary and hot water supply. PVDF and GRP-EP pipes are mainly used for industrial applications. Fittings made of thermoplastics are produced by injection moulding, essentially from the same category of materials as those of pipes. The thermoplastics pipes are jointed with or without a fitting. Jointing technologies with a fitting are mechanical (e.g. metal fittings), adhesion (PVC pipes), and fusion (polyolefin pipes). Polyolefin pipes can be directly jointed by butt, socket fusion and electrofusion technology. Thermosetting pipes are jointed with or without a fitting by mechanical or rubber ring joint technology, respectively. Examples of recent new materials adopted at ISO/TC 138 are as follows.

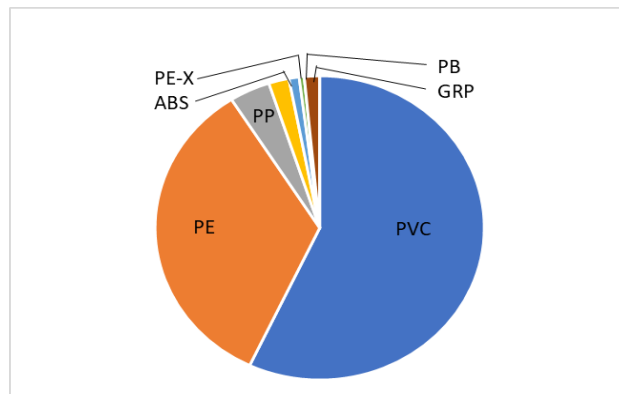
- 1) Unplasticized polyamide (PA-U): For piping systems with fusion jointing and mechanical jointing for plastics piping systems for the supply of gaseous fuels.
- 2) Acrylonitrile/butadiene/styrene (ABS) and acrylonitrile/styrene/acrylic ester (ASA): For test condition of vicat softening temperature for thermoplastics pipes and fittings.
- 3) Acrylonitrile/styrene/acrylester (ASA): General specification for moulding and extrusion materials of of for pipes and fittings.

**Table 1 - Pipe categories, estimated share, applications and jointing technologies**

Categories	Estimated Share (%)	Applications	Joint Tech *
PVC PVC-U PVC-C PVC-HI PVC-O	57	Industrial, Drainage, Cold water supply, Irrigation Hot water supply Drainage, Cold water supply, Gaseous fuel supply	m rr, ad, m ad, m rr, ad, m
PE HDPE LD/LLDPE PE-RT	34	Industrial Drainage, Cold water supply, Gaseous fuel supply Irrigation	m w, m, rr
PP PP-RCT	4	Industrial, Drainage, Cold water supply, Hot water supply	rr, w, m
ABS	2	Industrial	ad
PE-X	1	Industrial, Cold water supply, Hot water supply, Gaseous fuel supply	m, w
PB	0.5	Industrial, Cold water supply, Hot water supply	w, m
PVDF	-	Industrial	w, m
GRP (FRPM)	1.5	Industrial, Drainage, Cold water supply	rr, m
RPC	-	Industrial	

(Japan Plastics Industry Federation, Tokyo, Japan)

**Joint Tech\*** rr: rubber ring, ad: adhesion, w: welding, m: mechanical



**Figure 1 - Pipe categories, estimated share by Materials**

### 2.3 Structure of the market: customers

The structure of the markets consists of not only the manufacturers of plastics materials and producers of pipes, flanges, fittings, valves and auxiliary equipments but also the customers, such as construction and installation firms, fluids suppliers, owners and operator companies. In addition, the testing laboratories and the regional, national and local authorities concerned with this field are also important customers to this business. It is local authorities that play a great role in authorizing adoption of the plastics piping systems to civil life.

Shares of the markets of major plastics pipes, PVC and PE pipes are summarized with the representative customers of each market in **Table 2**. For PVC piping systems, the major markets are the area for sewerage, waste and drain discharge including industrial applications, and the area for water supply. These areas are closely related to local governments, civil engineering and construction firms. PE piping systems are recognized for their usefulness among gas industries due to earthquake-proof characteristics.

Speciality pipes such as PB, PE-X and PVC-C are used mainly for sanitary and hot water supply including floor and road heating. The customers of these pipes are a constructor and a sanitary engineer.

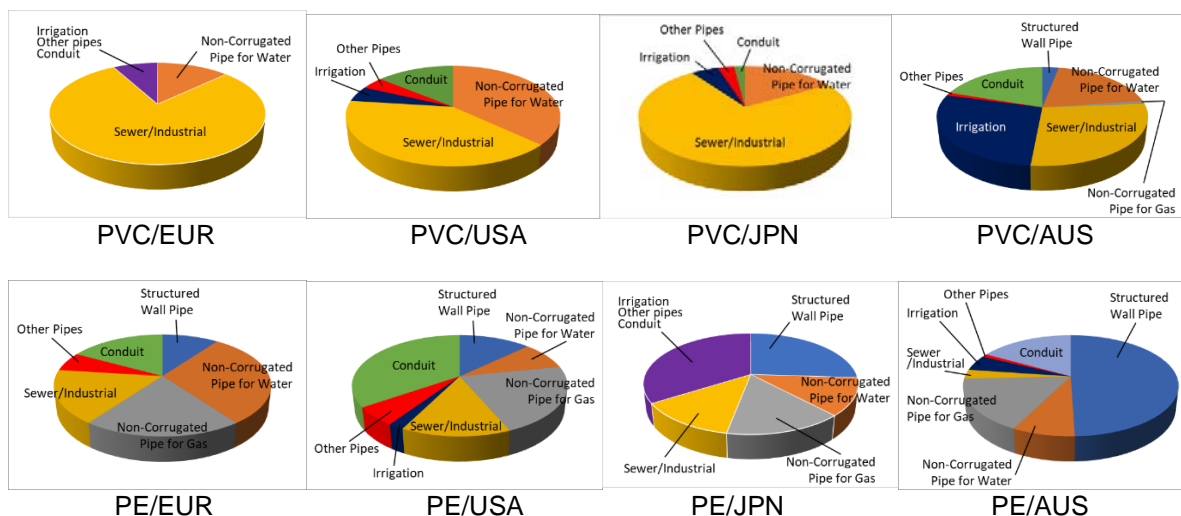
**Table 2 – Estimated share for each application of PVC and PE pipes**

Applications	PVC (%)				PE (%)				Customers **
	EUR	USA	JPN	AUS	EUR	USA	JPN	AUS	
Pipe									
Structured wall pipe (Including Corrugated)	-	-	-	3	10	13	26	50	1, 2, 4
Non-Corrugated									
Water	13	37	17	20	30	9	12	8	1, 2, 3, 4
Gas	-	-	-	1	20	22	15	17	2, 3, 4
Sewer/Industrial *	79	40	74	28	17	14	13	3	
Irrigation		5	5	28	-	2		5	1, 2, 4
Other	8	4	3	1	6	6	34	1	1, 2, 4
Conduit		14	2	20	17	35		17	2, 3, 4
Year	1996	1993	1997	1999	1996	1999	1997	1999	

(Japan Plastics Industry Federation, Tokyo, Japan)

\* : sewerage/drainage/waste discharge, vent and industrial applications

\*\* : 1: municipal authorities  
2: construction and installation firms  
3: industrial firms  
4: individual customers



**Figure 2 – Estimated share for each application of PVC and PE pipes**

## 2.4 Major factors that may have an impact on the development of the markets

The market reputation on plastics piping systems depends on a balance between the reliability of the installed systems and the total cost performance in respective field of application.

There are three factors which affect performances of the piping systems: (1) properties of piping components which are derived from material properties, design of components and their manufacturing technologies: (2) jointing technologies: (3) installation technologies and practices. In order to ensure their properties and practices, the establishment of common requirements for the reliable systems and standardization of their evaluation and/or determination of their methods are indispensable where ISO/TC 138 has its activities and consequently contributes to the markets of plastics piping systems.

Most of the nations have a variety of regulations for the use and installation of piping systems in different applications. Although the plastics pipe market is essentially country based (domestic), WTO/TBT agreement enforces the deregulation of national basis and the harmonization of national and regional standards with ISO standards.

Innovations in materials, technologies of manufacturing, installation and evaluation provide the driving force to market development. Up-grading of PE properties caused by innovation in PE materials such as PE 100 and PE 100 RC has provided the more long lasting and pressure resistant PE pipes.

Besides, new innovation provides easy and reliable jointing methods for PE-X. The reliability of jointing methods is expected to open new application of PE-X in gas supply. Innovations in pipe manufacturing technology such as multilayer pipe and an oriented PVC pipe afford the higher pressure resistance to the original pipes that establishes a strong competitive position against traditional metal and/or concrete pipes.

Development of construction methods for plastics piping systems for renovation such as trenchless methods and replacing methods provides the driving force to market development. Currently, more than 10 construction methods are existing.

## 2.5 Quantitative Indicators of the Business Environment

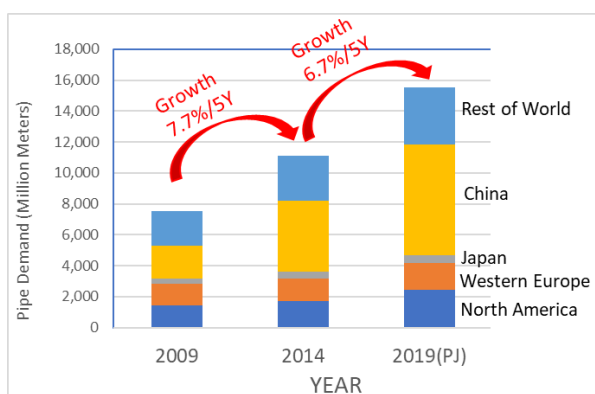
The following list of quantitative indicators describe the business environment which provides adequate information to support actions of the ISO/TC:

Plastics pipes have gained a majority position in the world pipes market in terms of economics for years. The North America, Western Europe and Asia/Pacific are major markets of plastics piping systems (Table 3). In spite of the fact that North America, Western Europe and Japan recently had some stagnation, Asia/Pacific, especially China, has gone through very high growth. Moreover, all other major markets are expected to have increased growth in years to come. In the region of rest of world, market in Middle East has shown significant and continuous increase. In developing countries, the plastics pipes play an important role to build up the infrastructure. In developed countries, there is a niche market in renovation and trenchless replacement of existing pipes.

**Table 3 – World Plastics Pipe Demand (million meters)**

Region	2009	2014	2019 (projection)	Annual Growth (%)	
				2014/2009	2019/2014
North America	1,440	1,720	2,455	3.6	7.4
Western Europe	1,370	1,450	1,720	1.1	3.5
Asia/Pacific	4,570	7,870	11,400	11.5	7.7
Japan	375	435	495	3.0	2.6
China	2,120	4,595	7,160	16.7	9.3
Rest of World	2,220	2,890	3,725	5.4	5.2
<b>Total</b>	<b>9,600</b>	<b>13,930</b>	<b>19,300</b>	<b>7.7</b>	<b>6.7</b>

(Freedonia Group Inc., Cleveland, USA)



### Figure 3 - World Plastics Pipe Demand

## 2.6 The change of the Business Environment

Aging and corrosion of metal and concrete pipes are major problem all over the world. Many pipelines are coming close to the end of lifetime. Rehabilitations including renovation by various methods including lining with plastics pipes, and trenchless replacement are labor saving and lower cost ways to extend their lifetime without digging.

Renovations of various kinds of pipelines such as underground drainage and sewerage, underground water and gas supply networks through the use of plastics pipes are being conducted.

## 3. BENEFITS EXPECTED FROM THE WORK OF THE ISO/TC

Experts from the countries worldwide interested in the work of ISO/TC 138 bring up the best knowledge and capability to assemble the technical information and requirements in every aspect such as designs, performances, test methods, installation, etc. in order to assure reliability of the plastics piping systems to their customers.

Through these works the TC contributes to the business of the plastics piping systems in such ways as to promote its wide acceptance in various applications, to provide developing countries with objectives, guides and targets in its adoption, and to save expenses by avoiding the overlapping products and technology development and testing.

Examples of the above-mentioned benefits are as follows:

- 1) Adoption and firm installation of plastics piping systems according to ISO standards developed by ISO/TC 138/SC 2 provide authorities with the means to reduce water leaks in urban water supply systems and thus to reduce the expenses for expansion of water work facilities.
- 2) Advanced evaluation method of life of plastics pipe materials, lasting against hoop stress under pressure and temperature has been standardized by the TC 138/SC 5 and widely accepted among plastics pipe industries, thus makes a designer capable to adopt proper materials for his piping system without performing long expensive life test (ISO 9080).
- 3) The Strain Hardening Test (SHT) and the Cracked Round Bar test (CRB), recently standardized by TC 138/SC 5 evaluate the slow crack growth behavior of PE much faster than conventional methods. This makes standardization of the new PE 100RC grade in the future possible.
- 4) Differential Scanning calorimeter (DSC) method which determines the degree of gelation of PVC-U (ISO 18731-1, -2) was developed by TC 138/SC 5. This test method has replaced ISO 9852 -Dichloromethane resistance at specified temperature (DCMT) method- since DSC is more accurate and environmentally safer compared to the DCMT.
- 5) Horizontal standards such as ISO 3126 "Plastics piping systems -- Plastics components --Determination of dimensions", new series of ISO 4427 "Polyethylene (PE) pipes for water supply" and ISO1167 "Thermoplastics pipes for the conveyance of fluids -- Resistance to internal pressure" are expected to remove technical barriers to trade and open markets in various regions of the world and to contribute to facilitate the harmonization of national and regional standards, consequently leading to cost savings for the users of these standards.
- 6) TC 138/SC 8 is actively developing the standards on plastics pipes for renovation of underground drainage and sewerage, underground water and gas supply. There have already been published 12 standards and several standards are currently under development.
- 7) Plastic piping systems for sewage give large benefits of the environmental and sanitary impacts, especially in developing countries.

## 4. REPRESENTATION AND PARTICIPATION IN THE ISO/TC

### 4.1 Membership

[Countries/ISO member bodies of ISO/TC 138 Participating and Observing Members](#)

### 4.2 Analysis of the participation

Major players in the TC are summarized from the aspect of member bodies in Table 4. European member bodies dominantly contribute to the activities. Other active members are USA from North America, Australia, Japan and Korea (Rep. of) from Asia/Oceania, Israel, Iran Islamic (Rep. of) and Jordan from Middle East, and South Africa from Africa.

**Table 4 - Regional Distribution of Membership of ISO/TC 138 (2017)**

Region	P-member countries (38)	O-member countries (35)
Europe	Austria, Belgium, Czech Rep., Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Russian Fed., Spain, Sweden, Switzerland, United Kingdom (17)	Belarus, Bulgaria, Croatia, Cyprus, Greece, Iceland, Ireland, Lithuania, Portugal, Romania, Slovakia, Slovenia, Serbia (13)
North/South America	United States, Canada, Colombia, Chile, Brazil (5)	Argentina, Costa Rica, Cuba, Ecuador, Mexico, Trinidad and Tobago, Uruguay (7)
Asia/Oceania	Australia, China, Japan, Korea (Rep. of), Malaysia, Philippine, Thailand (7)	Bangladesh, Korea (Dem. P. Rep. of), Hong Kong, India, Indonesia, Mongolia, Singapore, Viet Nam, Sri Lanka (9)
Middle East	Iran Islamic (Rep. of), Israel, Jordan, Lebanon, Turkey, Saudi Arabia, United Arab Emirates (7)	
Africa	Kenya, South Africa (2)	Morocco, Mauritius, Tanzania (United Rep. of), Tunisia, Uganda, Zimbabwe (6)

(ISO website as of Sept. 14, 2017)

## 5. OBJECTIVES OF THE ISO/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

### 5.1 Defined objectives of the ISO/TC

The object of TC 138 is to produce and maintain timely, first quality, market relevant test methods and standards for the global plastics piping systems industry. The TC believes that on-going strategic plan associated with its business plan can provide significant value to further define objectives for the Committee. It intends to be at the forefront of international standards development for the plastics piping systems industry and its stakeholders. While it will be sensitive to the different levels of technological sophistication among the P members, it will strive to advance state of the art plastics piping systems standardization. Attention will be paid to those standards that extend the global use of plastics piping systems to support new applications for plastics piping systems. The works in TC 138 can eliminate technical barriers to trade and address environmental aspects of plastics piping systems to communities.

Continuing efforts will be carried out to update test methods and establish new standards as long as TC 138 exists.



## 5.2 Identified strategies to achieve the ISO/TC's defined objectives

"Recycle" is one of the foremost issues to those who are concerned with plastics industries in terms of "environment" and "sustainable development". Recycled plastic pipes are already used in Europe, USA and Japan some of which have or will have national standards (EN 15344, EN 15345, EN 15346, ASTM F 1732, ASTM F 1760, JIS K 9797 and JIS K 9798). It is our next projects to develop ISO standards for recycled plastic pipes as long as TC 138 aims to give consideration to "recycle" or "environment" though it is not yet in the scope of TC 138.

According to the change of the business environment, the demand for rehabilitation methods has been increasing. Therefore, TC138 promoted its WG12 (Rehabilitation of pipeline) to a new SC in order to promote standardizing rehabilitation methods.

## 6. FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE ISO/TC WORK PROGRAMME

### 6.1 Distribution of documents to the right experts

With the aid of E-Mail system and ISO TC server, a great deal of works can now be carried out rapidly without much expense. As a result, the need for face-to-face meeting has been reduced.

However, there are some drawbacks in balloting system that relies on E-Mail system. In some countries, important documents including ballot do not reach to the right person.

It is recommended to develop some auxiliary system that notices the start of voting to all of relevant experts. Installation of a notice board of balloting in public area of ISO TC server will be of some help to solve this problem. The right persons who do not receive documents from member body can take necessary actions to get information within his/her country.

### 6.2 Limited resource and activities

The TC continues have a large programme of work divided among its 8 SCs and 1 WG. As a consequence, retaining or obtaining subcommittee secretariats can sometimes be difficult. This is largely a resource issue, i.e., many national standard bodies having faced reduced staffing and/or funding in recent years.

There are continuing concerns regarding the cost to host annual meetings. Several cost-reducing measures have been taken over the last several years and the meeting requirements are periodically reviewed to effect further savings. The establishment of the "meeting website" has been a major advance. The TC has adopted a long-range meeting schedule to facilitate future planning by host countries. Joint hosting of meetings has been encouraged.

One of the factors that affecting the completion and implantation of the ISO/TC work programme is to hold meetings by some SC's or WG's. For the consideration of the time required to obtain a visa by some members, registration of the meetings shall have enough period, for example more than three months of registration prior to the meetings.



## 7. STRUCTURE, CURRENT PROJECTS AND PUBLICATIONS OF THE ISO/TC

This section gives an overview of the ISO/TC's structure, scopes of the ISO/TCs and any existing subcommittees and information on existing and planned standardization projects, publication of the ISO/TC and its subcommittees ([ISO/TC 138 on ISO Online](#)). Click on the tabs and links on this page to find the following information:

- About (Secretariat, Secretary, Chair, Date of creation, etc.)
- Scope
- Published standards and standards under development
- Members (Participation members, Observing members)
- Structure (Subcommittees and Working Groups)
- Liaisons
- Meetings
- Contact details
- Quick links (Work programme, Business plans, Working area, ISO Electronic applications)

### Reference information

ISO Online browsing platform: available at <http://www.iso.org>

[Governance of technical work - ISO Technical Management Board](#)

[Glossary of terms and abbreviations used in ISO/TC Business Plans](#)