An Aeronautics Supplier's viewpoint

INTERTECHNIQUE

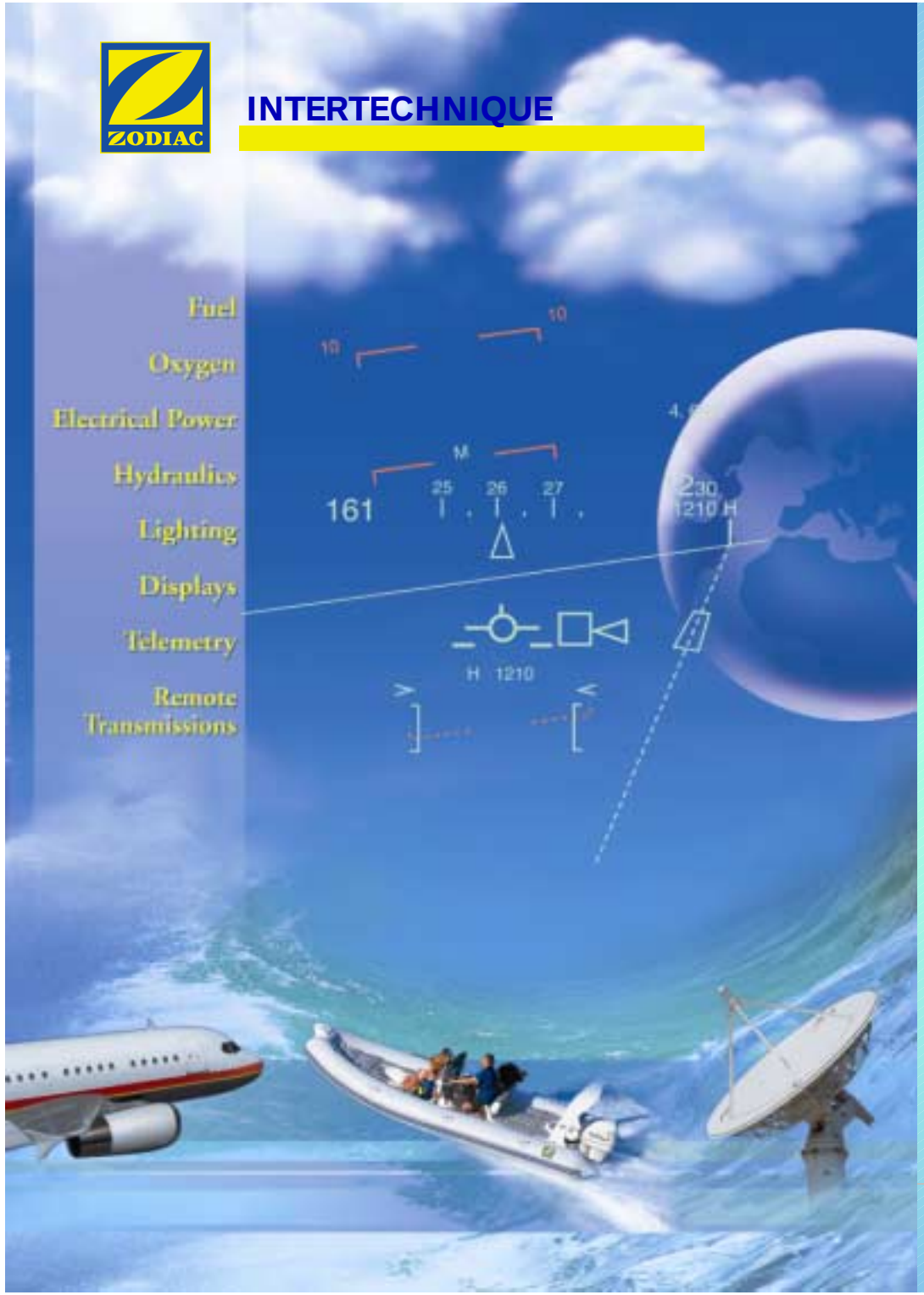
within

the quality aerospace environment

I.A.Q.G., 26th-29th June 2001 in Berlin

Summary

- **Intertechnique Company brief presentation**
- **Quality system requirements**
  - By Official Authorities
  - By Customers
  - Types of scoring
- **Audits**
  - By Customers and Official Authorities
  - Internal audits *(quality system, product audits)*
- **Other fields**
  - Quality questionnaires and surveys
  - Quality tools
  - Accompanying documents
- **Conclusion**



INTERTECHNIQUE

Presentation of Intertechnique

I.A.Q.G., 26th-29th June 2001 in Berlin

Presentation of Intertechnique

ZODIAC Group :

5 business segments

AIRCRAFT SYSTEMS

- Fuel systems, oxygen systems, hydraulic systems.
- Electrical systems.
- Systems management.
- Lighting, flight deck controls and displays.

AIRLINE EQUIPMENT

- Passenger seats.
- Cabine equipment (trash-compactors systems, galleys).

AERO SAFETY SYSTEMS

- Emergency evacuation systems.
- Deceleration systems.
- De-icing cells systems.

TECHNOLOGY

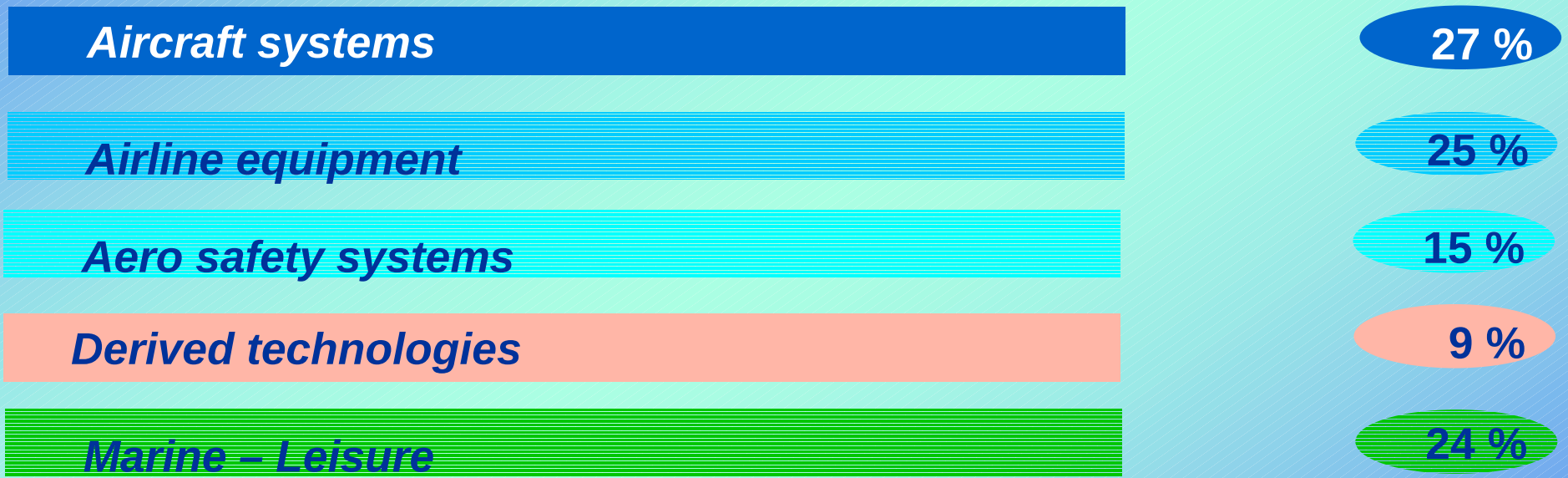
- Telemetry.
- Computer-Aided Telephony.
- Airbags.

MARINE – LEISURE

- Marine.
- Swimming pools.
- Leisure.

Presentation of Intertechnique

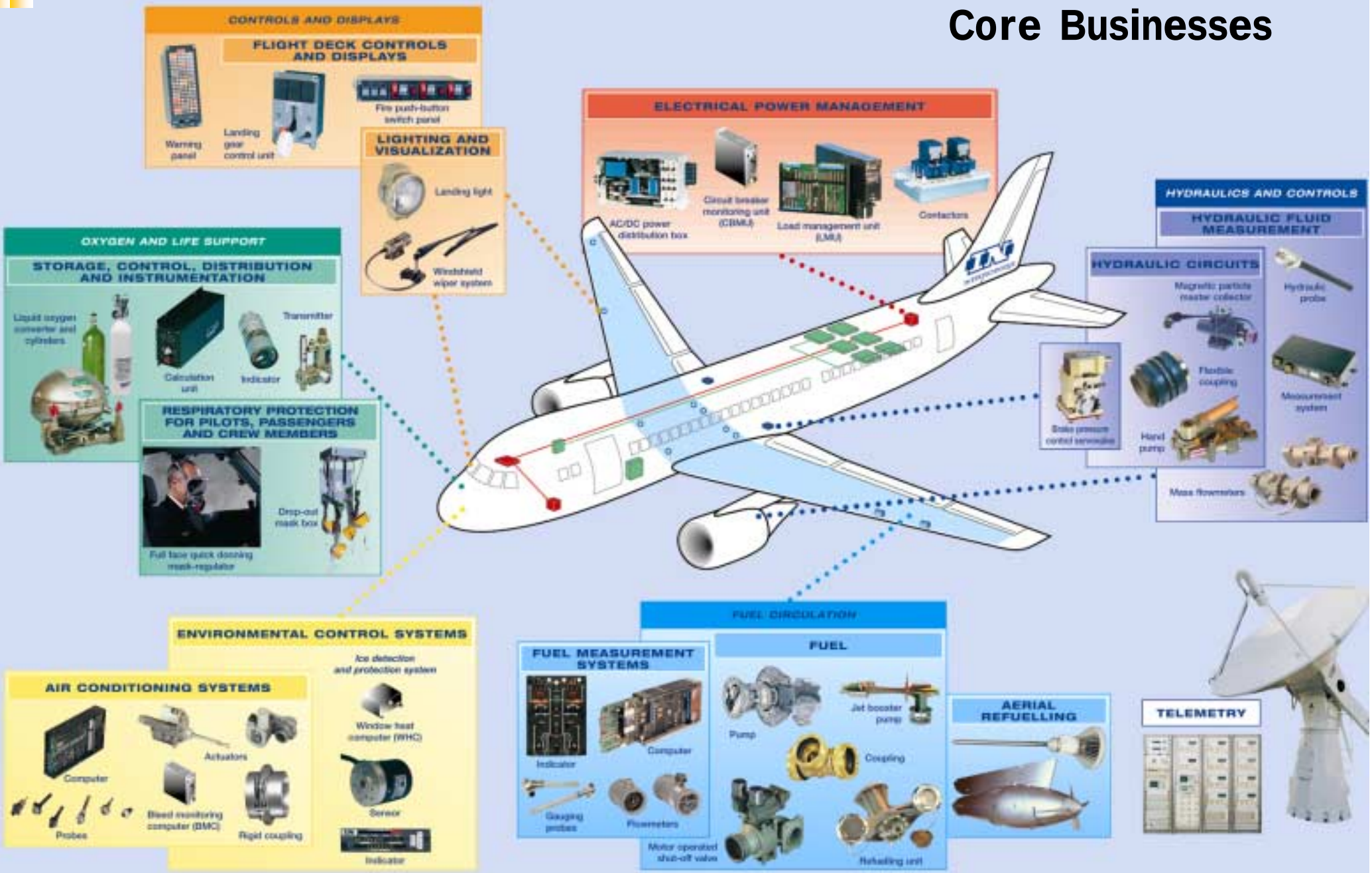
ZODIAC in 2000
Sales breakdown



Financial highlights	1 400 M$
Zodiac Group Manpower	9 615 people

Presentation of Intertechnique

Core Businesses



Presentation of Intertechnique

Fuel Systems

On ground refuelling equipment and systems	Systèmes de gestion de carburant	On board fuel circulation systems	In-flight refuelling equipment and systems

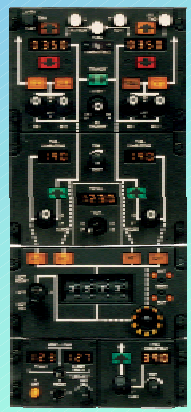
Formula I race cars refuelling systems

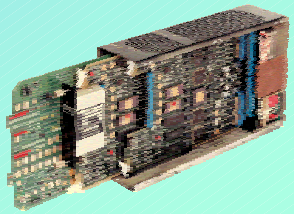
Man-machine interfaces

indicators, control units and panels

Couplings and control equipment for aircraft-fuelling systems

In-flight refuelling pods

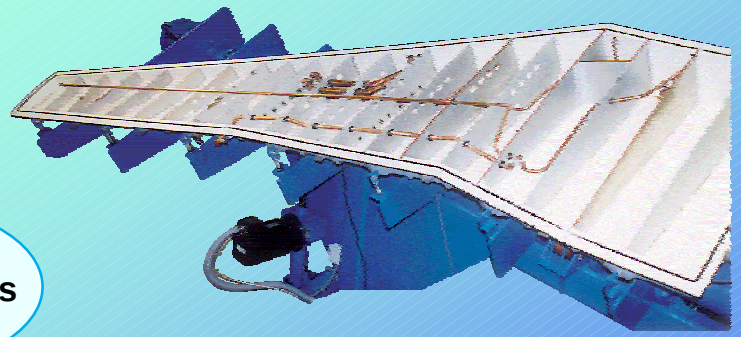




Fuel boost and transfer pumps, fuel jet pumps

Equipment for fuel, air and hydraulic circuits : Refuelling ports, valves . . .

Refuelling units



Aircraft Fuel System Test Bench

Locations

Intertechnique *at Plaisir and Roche-La-Molière - (France)*
IDC *Aerospace at Milwaukee (Wisconsin, USA)*

Presentation of Intertechnique

Systems Monitoring and Management

Fuel management systems	Air management systems	Monitoring and control
Gauging	Bleed air monitoring	Hydraulic systems
Level sensing	Air temperature control	Circuit breakers
Flowmetering	Cabin pressure control	Window heat controllers

Measurement sensors

level sensing : thermistors, float Flowmeters

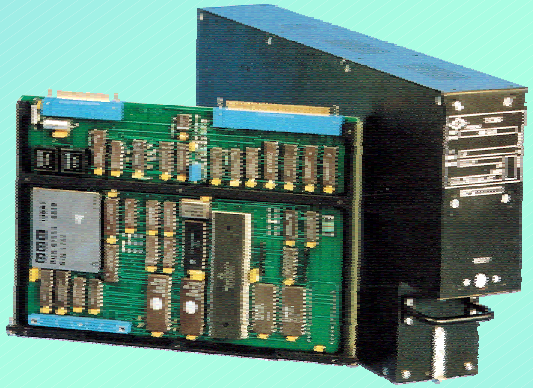
Actuators

electrovalves ram air door actuators

Man-machine interfaces

Indicators, control units and panels

Monitoring and control computers



Location

***Intertechnique** at Plaisir*

Presentation of Intertechnique

Oxygen and Life Support

ERGONOMICS, PHYSIOLOGY

- Storage, regulation and oxygen instrumentation
- Respiratory protection for pilots, passengers and crew members
- Pilot protection (accelerations, hypoxia, NBC, noise ...)

Liquid and gaseous oxygen tanks

anti-smoke protective breathing hood

Regulators

Passenger oxygen drop out module

anti-g Valves

NBC hood

quick donning masks

Location
Intertechnique *at Plaisir*

Presentation of Intertechnique

General information

Locations

- ***PLAISIR*** *(France)*
- ***ROCHE-LA-MOLIERE*** *(France)*
- ***INTERTECHNIQUE (Aerospace) Ltd*** *(Great Britain)*
- ***IDC Aerospace*** *(Milwaukee, Wisconsin, USA)*
- ***IN-EROS*** *(Fullerton, California, USA)*
- ***IN-ASIA*** *(Hong Kong, China)*

Manpower : 890 people
Turnover : 1 100 MF (150 M$)

Chairman and CEO : **E. MARCHEGAY**

Deputy CEO : **J.P. BRILLANT**

Quality Vice President : **Guy DION**

Department Vice-Presidents : **J.F. HIGOUNET**
J.P. LIBIS
J.M. MATHEY

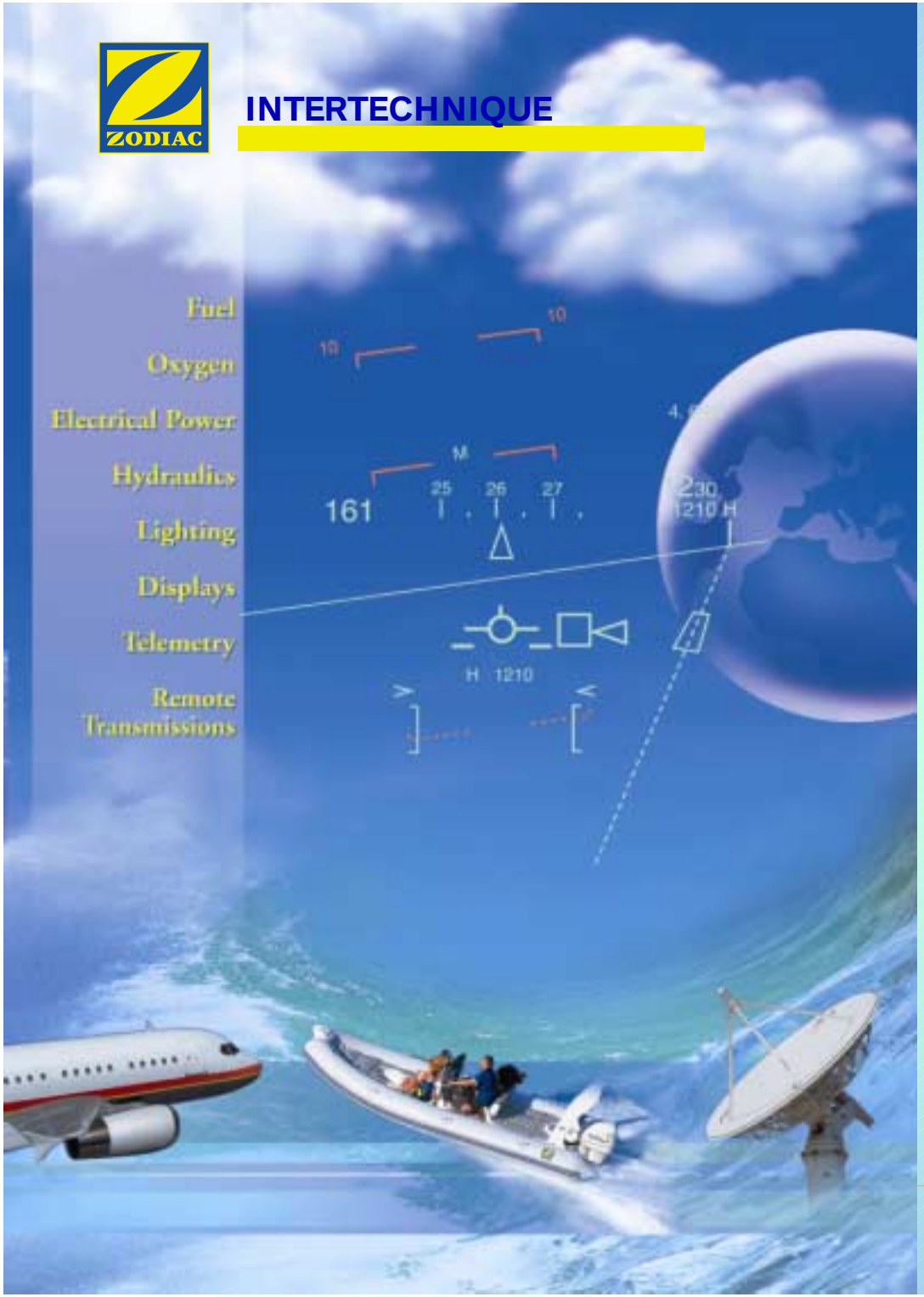
Marketing and sales, Vice-President : **M. KNAFO**

Activities

- **Fuel systems**
- **Systems management**
  Fuel, air, hydraulics,
  electrical distribution, optronics
- **Oxygen and life support**

References

Airbus family, Agusta, Alenia, ATR, Bell, Boeing, Bombardier Canadair, Casa, Dornier, Eurocopter, Falcon, Gulfstream, Jetstream, Mirage, Rafale, Saab, Sikorsky.



INTERTECHNIQUE

Quality System requirements

- Acronyms
- Certifications timetable
- From Official Authorities
- From Customers
- Types of scoring

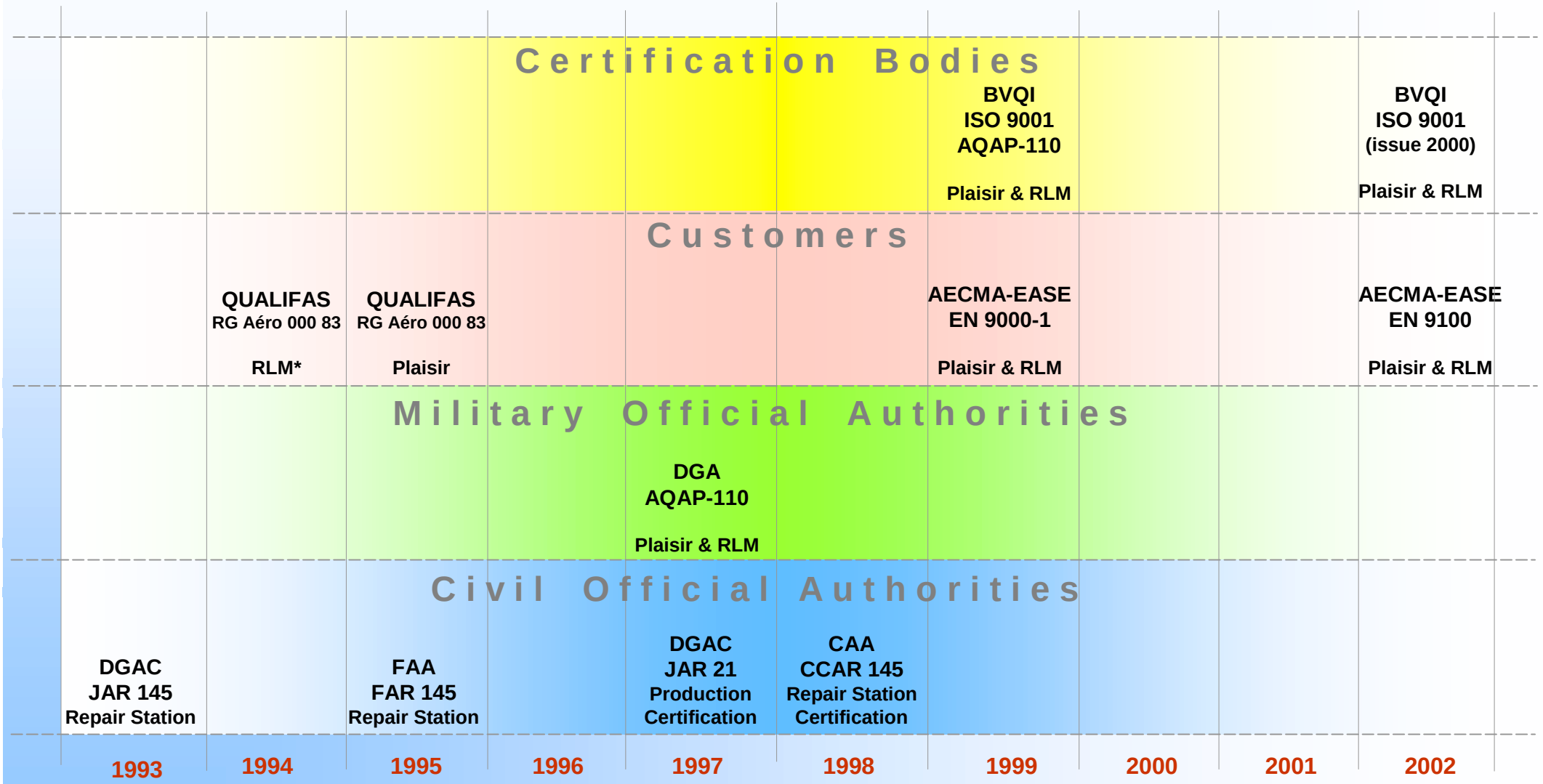
Quality system requirements

Acronyms

AECMA-EASE	(**E**uropean **A**erospace **S**upplier **E**valuation)	⇨	Association affiliated with AECMA (European Association of Aerospace Industries), composed of members from 5 "Regions" : North (Denmark, Finland, Norway, Sweden), East (Germany, The Netherlands), South (Italy, Spain, Portugal), Centre (Belgium, France), West (United Kingdom, Ireland)
BVQI	(**B**ureau **V**eritas **Q**uality **I**nternational)	⇨	Certification body.
CAA		⇨	Chinese civil aviation authority.
DGA	(**D**irection **G**énérale de l'**A**rmement)	⇨	French military official authority.
DGAC / GSAC	(**D**irection **G**énérale de l'**A**viation **C**ivile / **G**roupement pour la **S**écurité **A**viation **C**ivile)	⇨	French civil official authority.
FAA	(**F**ederal **A**viation **A**dministration)	⇨	US official authority.
JAA	(**J**oint **A**viation **A**uthorities)	⇨	European official authority.
QUALIFAS	(**Qu**alité des **A**pprovisionnements pour **l**es **I**ndustries **F**rançaises **A**éronautiques et **S**patiales)	⇨	Central Region of AECMA-EASE.
TCCA	(**T**ransport **C**anada **C**ivil **A**viation)	⇨	Canadian civil official authority.

Quality system requirements

Certifications timetable



(*) **RLM** = Intertechnique Roche-la-Molière site

Quality requirements from Official Authorities

Company Quality Certifications *(by Official Authorities or Certification Bodies)*

Quality System *All activities*

BVQI

ISO 9001
n° 62642
of 12/1999
(Expiry : 12/2002)

Quality Manual & Procedures

- Audits performed every 6 months by BVQI

*Renewal every **3 years***

Quality System *Military activities*

DGA/BVQI

AQAP 110
n° 62642
of 12/1999
(Expiry : 12/2002)

Quality Manual & Procedures

- Audits performed every 6 months by BVQI

*Renewal every **3 years***

Civil Equipment Production

JAA/DGAC

JAR 21
n° F.G.005
of 12/1997
(Expiry : 12/2001)

Production Organization Exposition (POE) & Procedures

- Audits performed by GSAC (6 per year)

*Renewal every **2 years***

Civil Equipment - Maintenance

JAA/DGAC (Europe)

JAR 145
n° F060
of 12/1993
(Expiry : 12/2001)

Maintenance Organization Exposition (MOE)

- Annual audit performed by GSAC in Plaisir, Orly & Roche-la-Molière

*Renewal every **2 years***

FAA (USA)

FAR 145
n° I6QY965J
(Plaisir)
n° I4QY966J
(Roche-la-Molière)
of 07/1995
(Expiry : 07/2001)

MOE + US supplement

- Annual audit performed by FAA in Plaisir & Roche-la-Molière

*Renewal **every year***

TCCA (Canada)
CAA (China)

Recognition of JAR 145
n° TCAC 897-30
of 12/1997
(Expiry : 02/2002)

CCAR 145
n° F.3516
de 07/1998
(Expiry : 12/2001)

MOE + Canadian & Chinese supplements

- Annual self-evaluation report to be provided to Chinese Authorities

Renewal :
Canada *: every **2 years***
China *: every **3 years***

Quality requirements from Official Authorities

Company Quality Certifications

(by Official Authorities or Certification Bodies)

- **Military Aviation Authorities** : Requirements based on ISO 9001 ☺
- **Civil Aviation Authorities** : Specific requirements ☹
  - JAR 21 Production certification :
    - Mutual recognition from FAA and DGAC ☺
    - Product certifications : JTSO, TSO ☺
  - Maintenance certification :
    - FAA / DGAC : turnover FAR145 ☺
      (FAR 145 survey by DGAC)
    - CAA (China) and TCCA (Canada) certifications (audits and supplemental costs) ☹
- **Certification Body (BVQI)**
  - Today : ISO 9001 & AQAP-110 certifications
  - Next future : AS/EN 9100 assessment ?

Quality requirements from Customers

Customers' audits, results and approvals

AUDIT FIELD	CUSTOMER	Standard	Result	Comments
QUALITY SYSTEM AUDITS	QUALIFAS AECMA-EASE	• EN 9000-1 *	**19,2** / 20	New standard EN 9100 *
	BOEING	• D1-9000 rev. A *	**7,8** / 10	New standard BQMS (AS 9100) *
	AIRBUS UK	• EFQM model • BAe/AG/QC/SC1 *	"**Silver**" level No scoring	New : AUK/SA/001-3 *
	BOMBARDIER CANADAIR	• QD4.6-40 *	No scoring	
	LIEBHERR-AEROSPACE	• LTS-AQ-INS-06-0032 *	**18,9** / 20	New : LTS-AQ-INS-06-0276 *
	SAAB	• 80-V-10.1E	**89** / 100	
	GULFSTREAM	• SQAR 0001	No scoring	
MAINTENANCE QUALITY SYSTEM	AIRBUS INDUSTRIE	• EN-9110 *	**16,4**/20	
	FEDEX, DHL, SAS	• CASE *(North America)*	No scoring	

* : documents based on the ISO 9001 standard

Quality requirements from Customers

Customers' audits, results and approvals

- **Quality System** : Harmonized requirements ☺
  - in France : through **QUALIFAS** ⇨ RG.Aéro 000 83 in 1994
  - in Europe : through **AECMA-EASE** ⇨ EN 9000-1 in Feb. 1999
  - At the international level : through **IAQG** ⇨ AS/EN 9100 in Feb. 2001
- **Maintenance activities** : Requirements to be harmonized ☹
  - EN 9110 *(every 3 years)* *(applicable in Europe since 2001)*
  - CASE *(every 2 years)*
- **Scoring** : Quality System scorings to be harmonized ☹
  - **Several quality system scoring methods** *(6 for Intertechnique)*
  - Scoring is an **incentive element for improvement** : it enables to rate the progress achieved

Types of Scoring

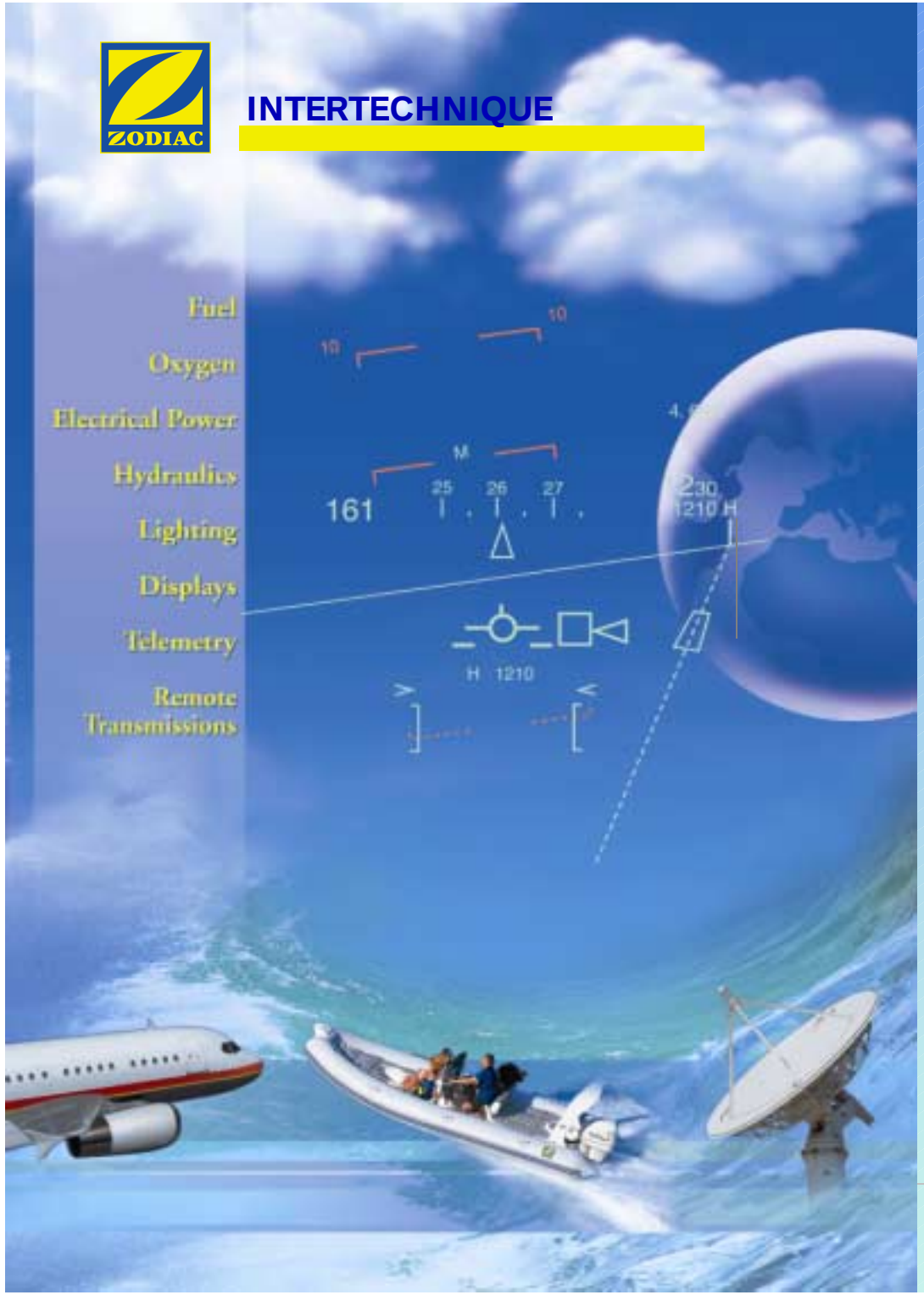
Several levels of scoring

with various calculation methods

- **Quality System**
  Examples :
  - ../20, ../10, ../100, Approved / Not approved
- **Delivery indicators**
  - **New products or repairs**
    % delivered on time, delayed deliveries, TAT, …
- **Product quality**
  Examples :
  - Rejection rates, QN, R_1, R_2, IF, IE
- **Overall scoring**
  Examples :
  - NCC, IP, Q100, quartiles, Gold/Silver/bronze

Expected objectives

- A simple calculation method
- Indicators to be easily understood by the General Management of companies
- Indicators jointly checked by the customer and the supplier



INTERTECHNIQUE

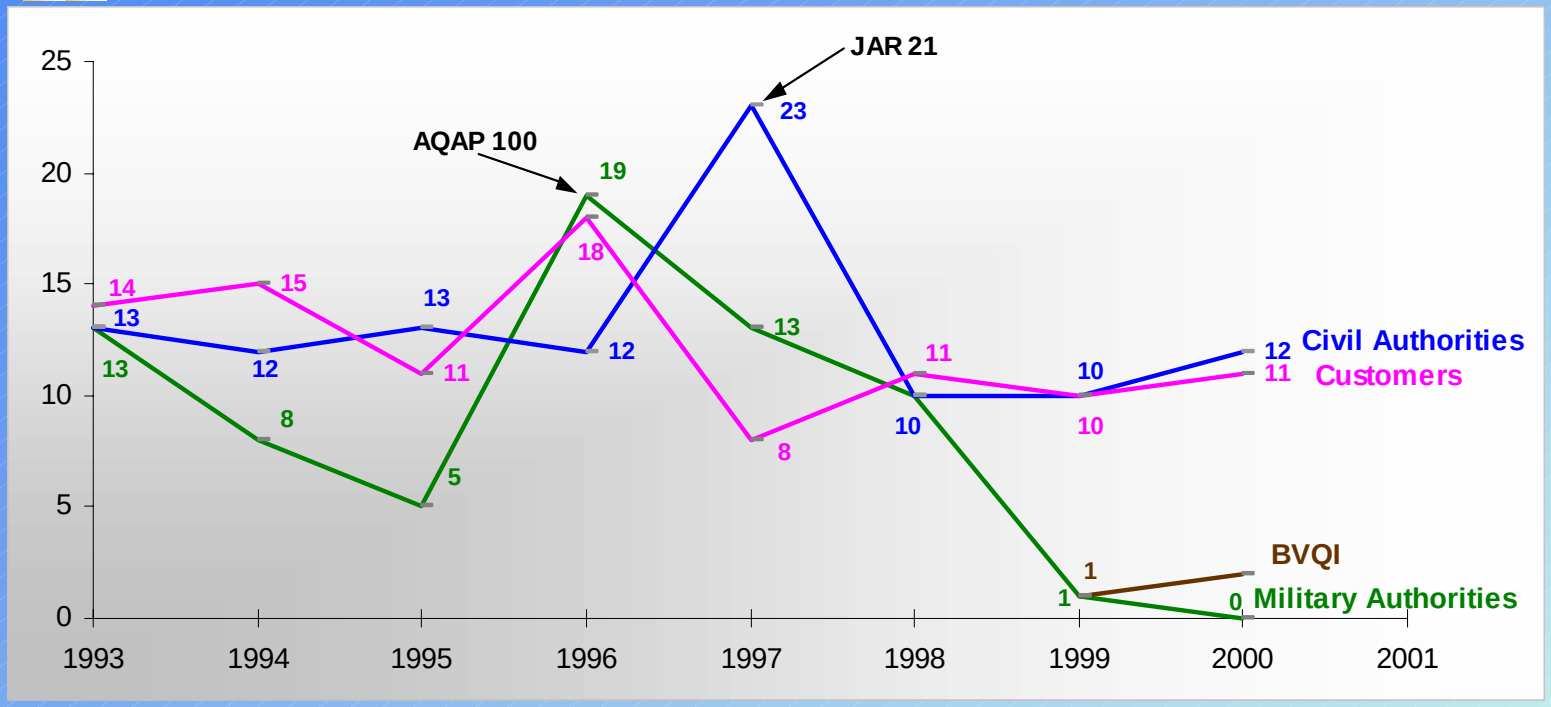
Audits

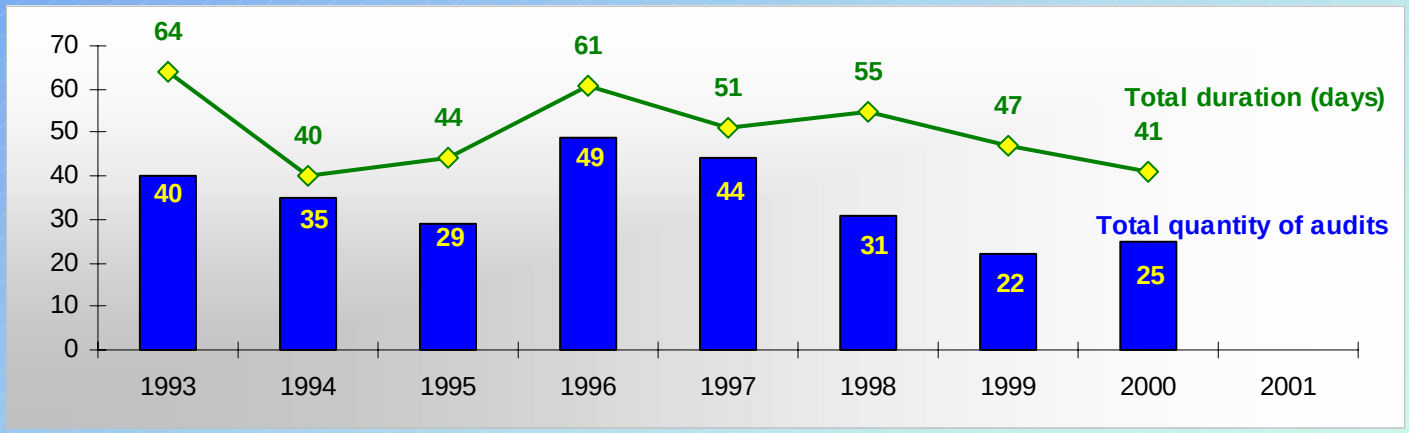
I.A.Q.G., 26th-29th June 2001 in Berlin

Audits

Quality system audits performed by Customers / Authorities at Intertechnique's

(Products audits not included)





Substantial quantities of audits

- Audit periodicities linked to the certifications
- Decrease trend

Audits

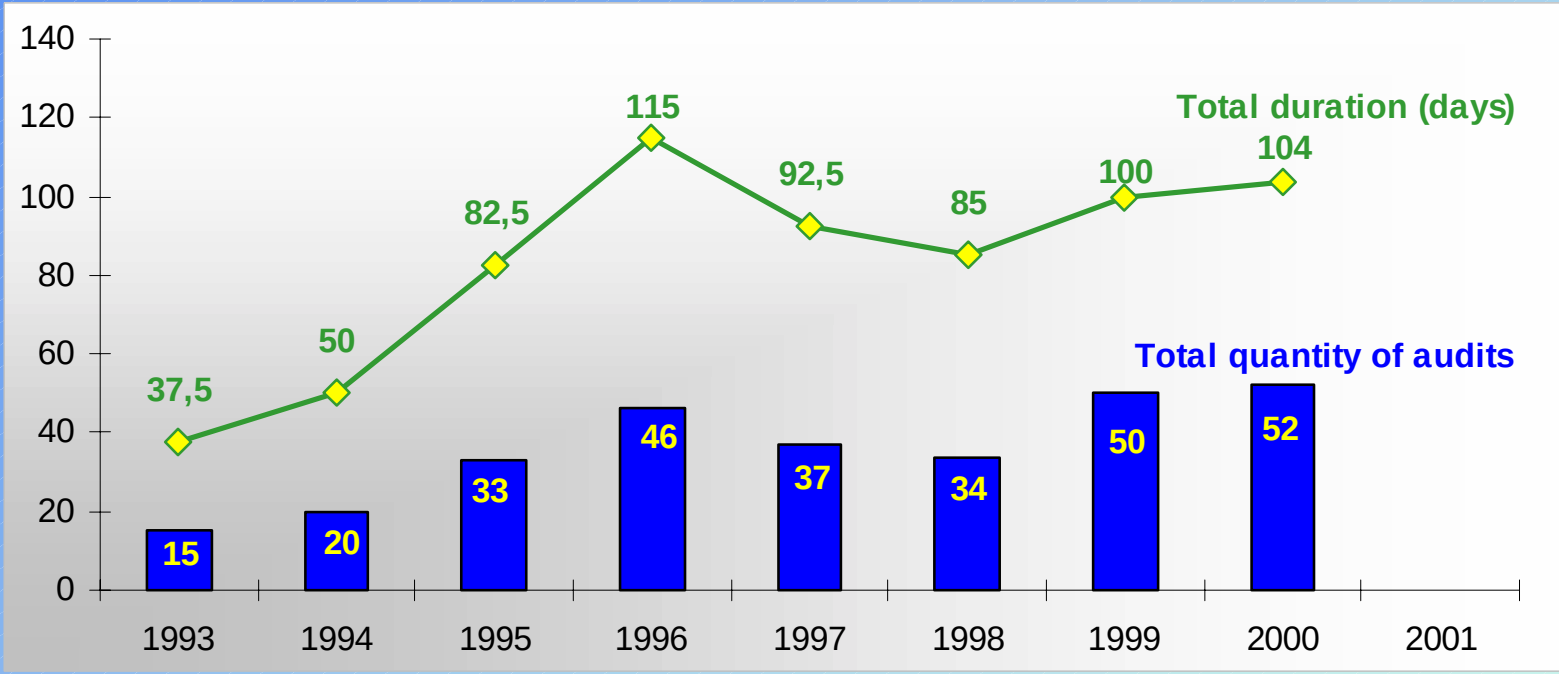
Quality system audits performed by Customers / Authorities at Intertechnique's

(Products audits not included)

- **Expected objective** :
  - 1 quality system audit every 3 years based on the international aerospace standard, performed either by customer association or certification body
- **What may allow customers to concentrate their efforts on other audits** :
  - Logistics *(management or customer orders, follow-up of delivery dates; purchase control ; cost management ; leadtime control, …)*
  - Product audits *(FAI, Source Inspections, …)*
  - Process audits *(EMPI, EMPF, …)*
  - Design reviews *(PDR, CDR, …)*
- **To give a greater importance to internal audits** :
  - Self-assessment : more motivating
  - Best conditions to set up improvement actions

Audits

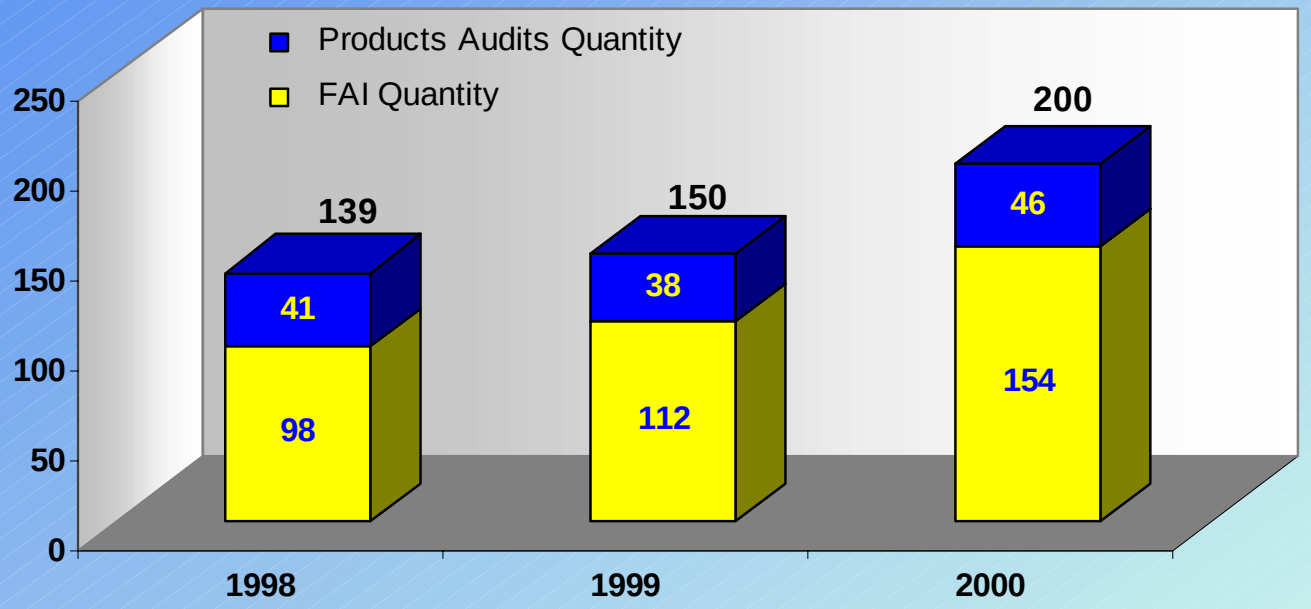
Internal quality system audits



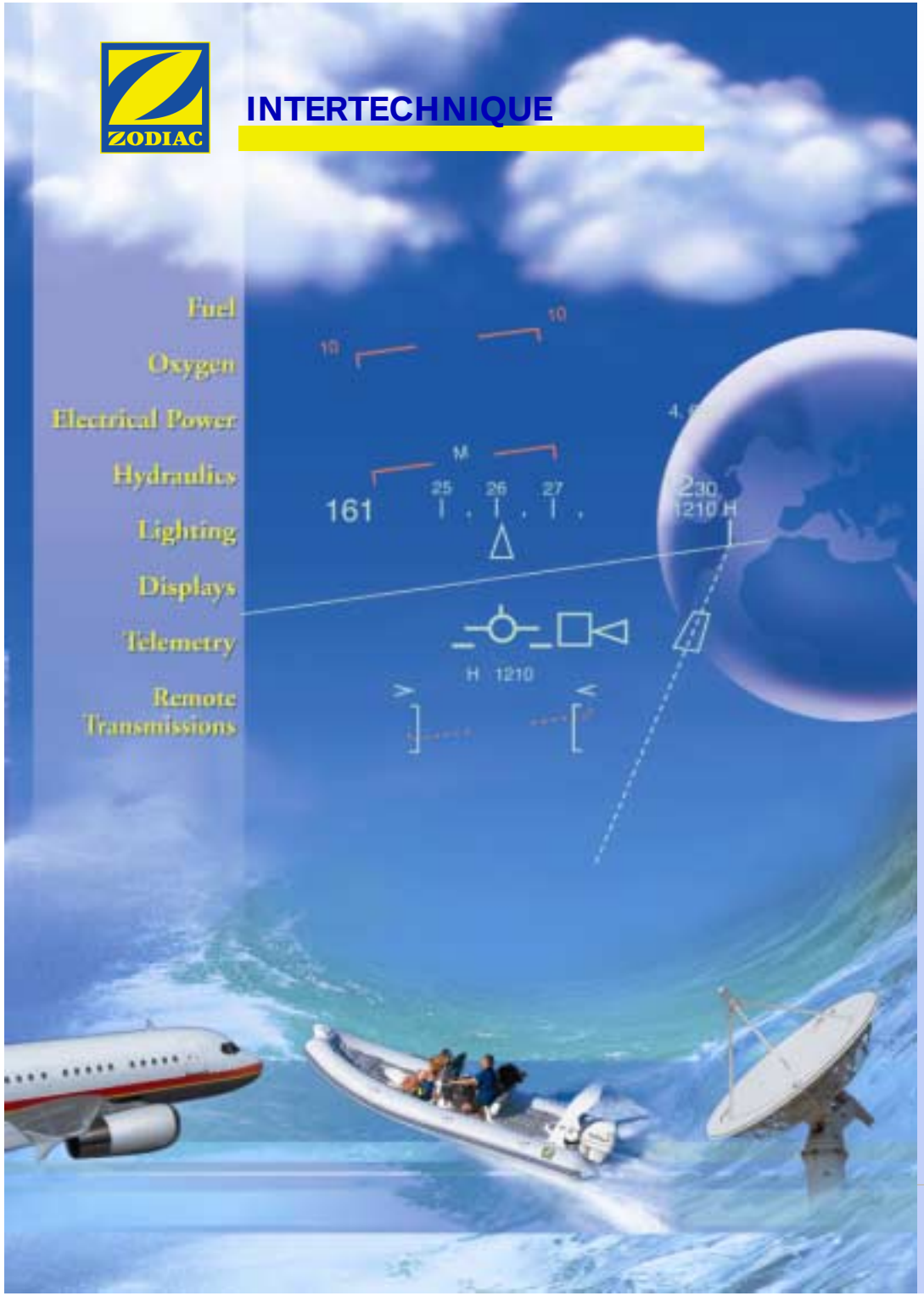
- Quantity of audits : increase trend
- Audit duration : shorter *(since 1999)* :
  - using check-sheets, *(41 audit check-sheets for « system » and « process » audits)*
  - standardising the minutes,
  - improving the corrective action follow-up

Audits

Internal products audits



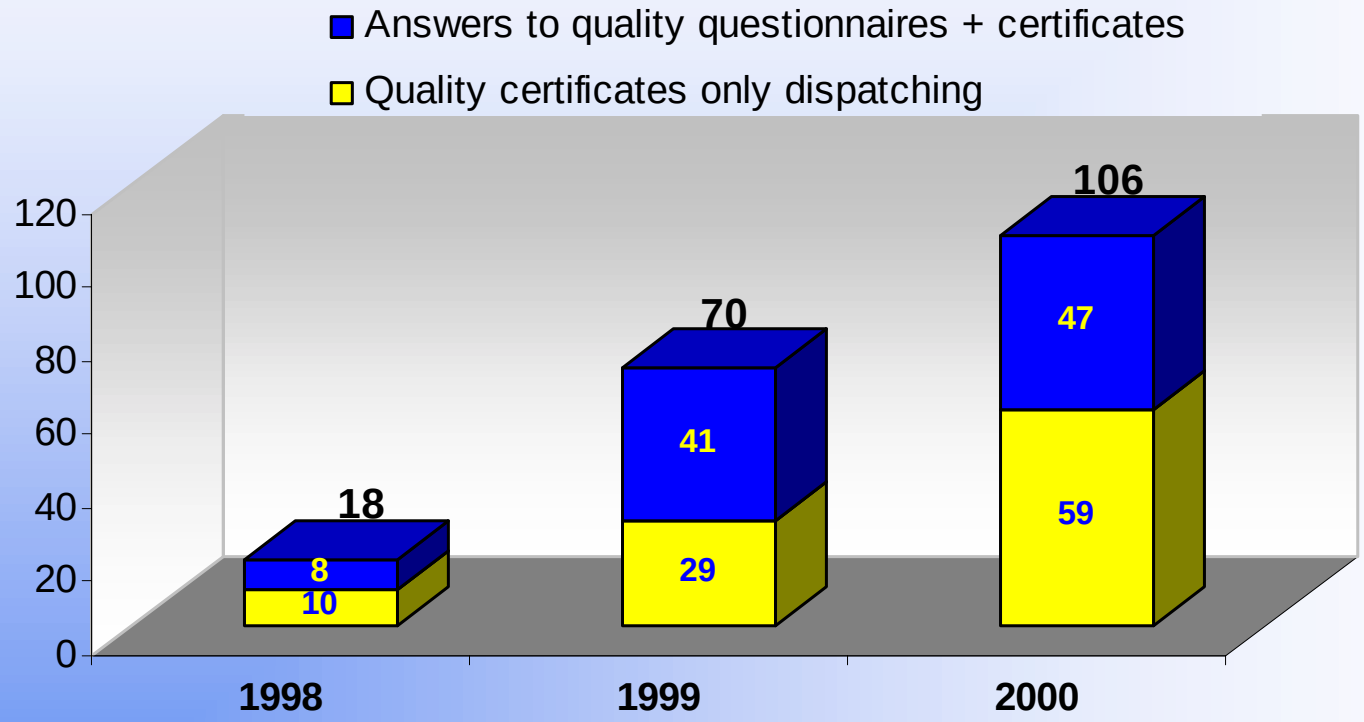
- FAI (First Article Inspection)
  - performed at the beginning of serial production or for equipment changes *(the quantity depends on the quantity of new products)*
- Products audits
  - Performed on equipment in production *(the quantity depends on the quantity of product families)*



Other fields

Other fields

Answers to customers quality questionnaires and surveys



Necessary standardisation of the answer process

Other fields

Quality Tools

- **Tools often recommended** by the customers, sometimes mandatory :
  - Self assessment (EFQM model) ⓘ
  - 6 Sigma
  - Lean Manufacturing
  - Key characteristics
  - Fracas
  - HALT, HASS
- Do not require, but **promote their implementation**

Accompanying Documents

JAA Form One

BL/DC
Delivery Note
Declaration
of Compliance

FAA Form 8130-3

Yellow Tag

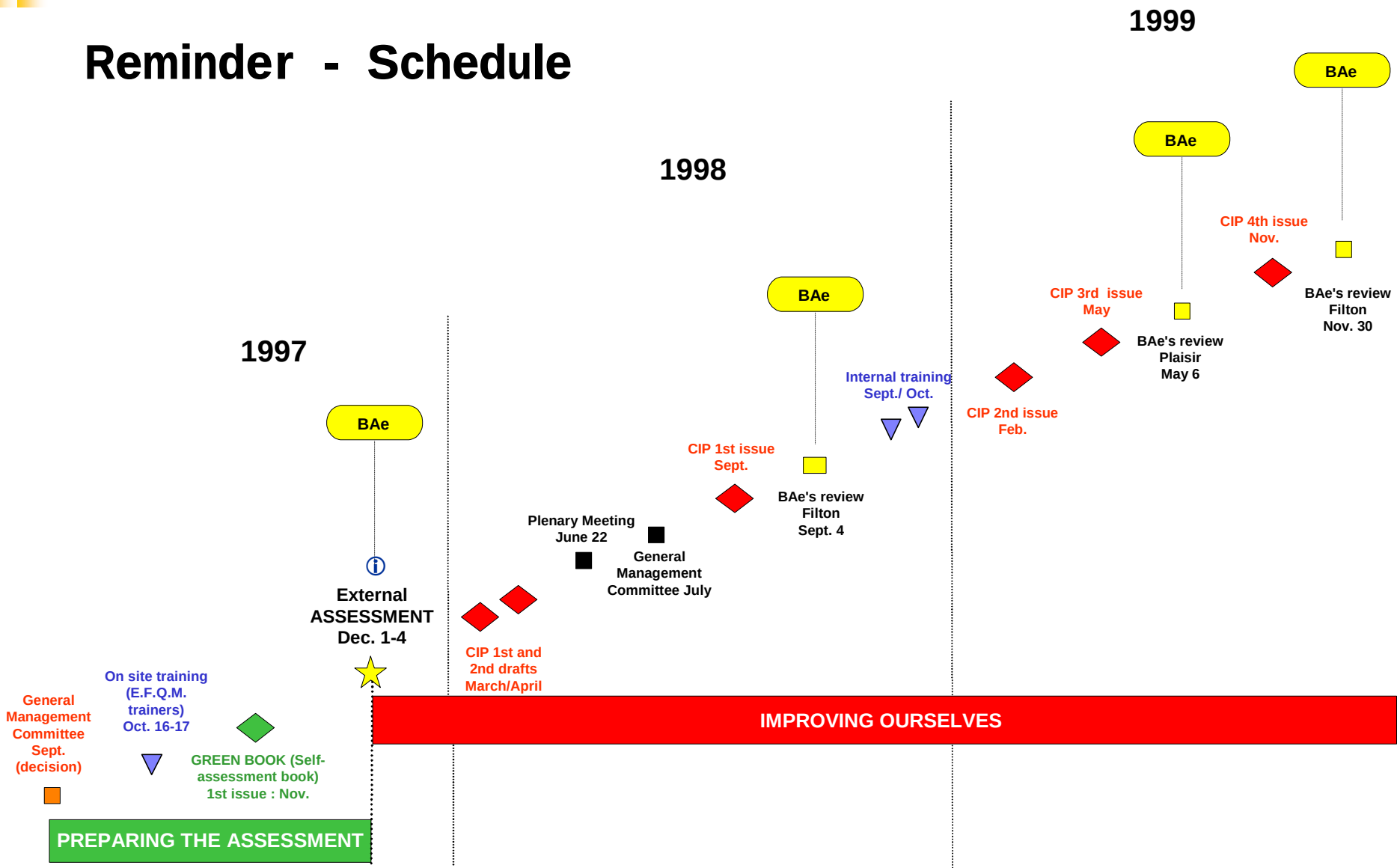
Yellow Tag

Chinese Certificate

Log Card

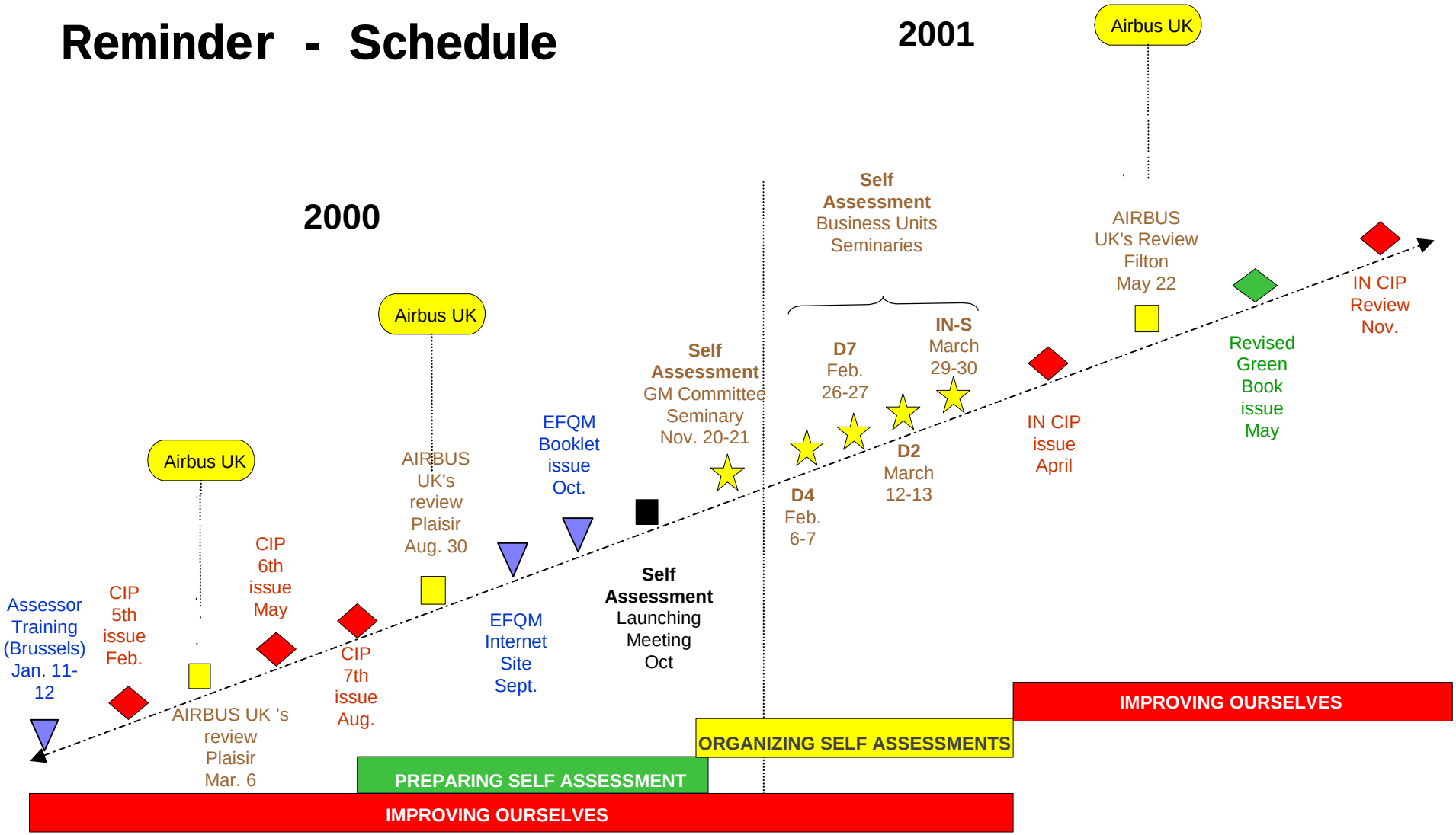
Quality tools : E.F.Q.M. Model Self-assessment

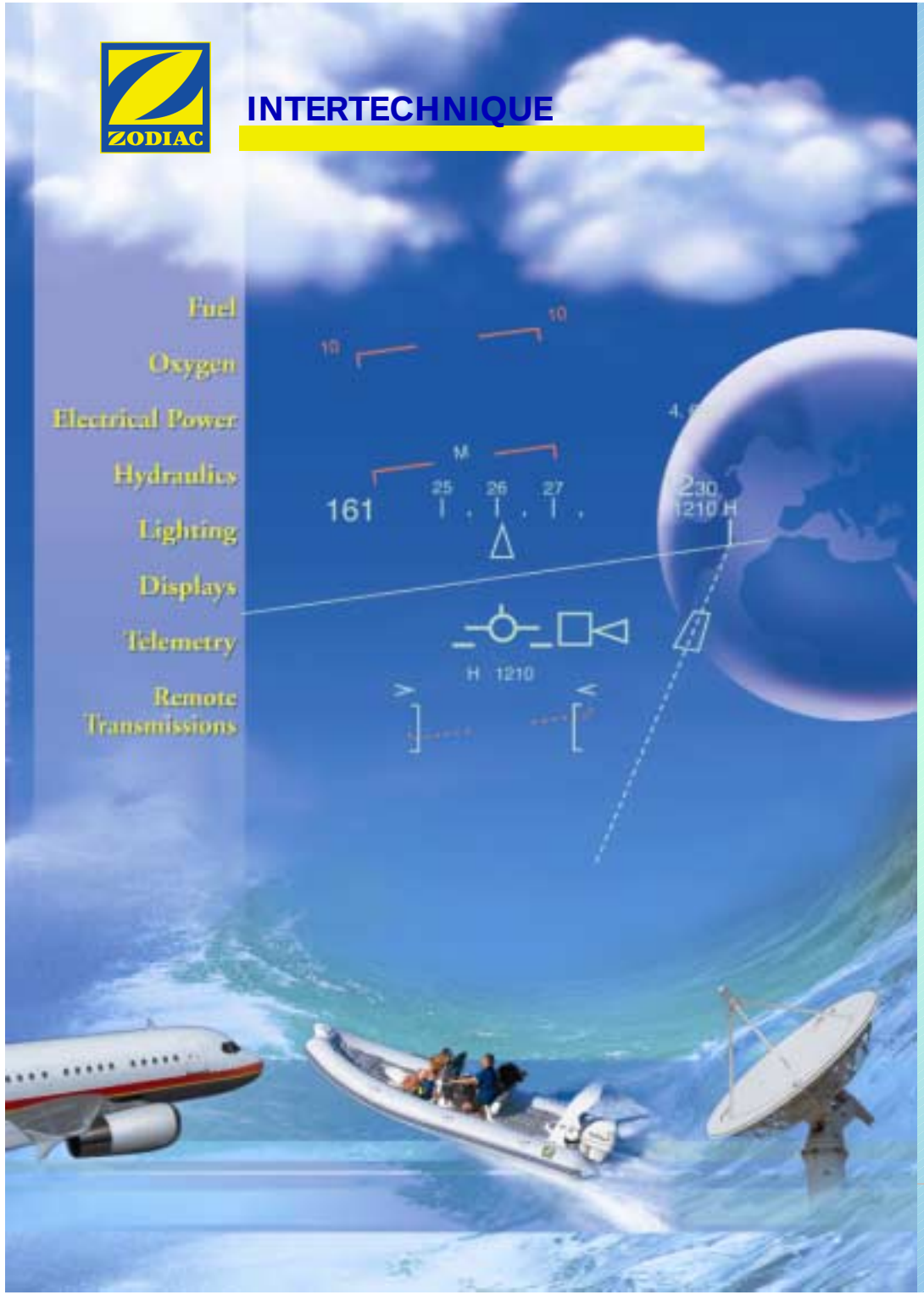
Reminder - Schedule



Quality tools : E.F.Q.M. Model Self-assessment

Reminder - Schedule




INTERTECHNIQUE
ZODIAC
Fuel
Oxygen
Electrical Power
Hydraulics
Lighting
Displays
Telemetry
Remote
Transmissions

Conclusion

Conclusion

Consequences to the Intertechnique Quality Organization

- **Quality System staff**
  - 0,5 person in 1995 ⇨ Today : 3 people
- **General documents and Standards**
  - Complexicity of the document management (Quality Manual, Production Organization Exposition, Maintenance Organization Exposition, Inspection Procedure Manual, …)
  - Procedures (Quality Intranet)
- **High quantity of external audits**
  - Repetition of the same audits (some departments are audited several times per year)

Conclusion

Our reflections

- **Quality System**
  - May be unique and can cover 90 % of the requirements from :
    - Civil Authorities / Military Authorities / Certification Body / Aerospace Customers
  - ISO 9001 and international standard AS/EN/SJAC 9100 must be fully deployed
- **Scoring** is a **progress factor**
  - Simplification
  - Concensus
- **Self-assessment** is the basis of the **continuous improvement**
  - To be promoted, but not be imposed by customers
- Focus on **products** and **processes**
- Any new requirement setting-up should be done only after consultation of the supply chain