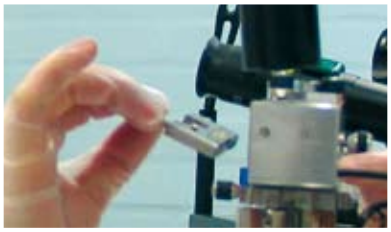
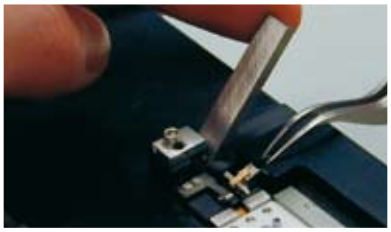
DFM

ANNUAL REPORT AND STATEMENT OF INCOME FOR 2005

DANISH FUNDAMENTAL METROLOGY


DFM

In 1981 a Parliamentary report concluded that Danish export was suffering from the lack of metrological expertise in Denmark. Following the passing of a law on metrology in 1983, this led in 1985 to the formation of Danish Fundamental Metrology – DFM. Today DFM is the core institute in the decentralised Danish metrological system, encompassing nine companies and institutions.

In addition to summarising the achievements during 2005, this annual report gives a retrospective view of DFM over its 20 years of existence.

Annual Report and Statement of Income for 2005
Danish Fundamental Metrology
February 2006

Edited by
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The Danish reference standard for volume is developed and maintained in a collaboration between DFM and FORCE Technology.

1 MANAGEMENT REPORT

2005 marked a crossroad for DFM. After 20 years as a self-owned foundation, it was decided to transform the institute into a public limited company, fully owned by the Technical University of Denmark, DTU. The changes, effective as of 1 January 2006, are the results of a dialogue with the Ministry for Science, Technology and Innovation on an appropriate structure; and the solution reflects the wish to embed DFM into a larger scientific organisation while maintaining its scope as a knowledge transfer institute for metrology within the Advanced Technology Group, GTS.

As a non-profit company, owned by DTU, DFM Ltd. will pursue its user driven knowledge dissemination with broader scientific basis than hitherto. It will get better access to funding opportunities for expensive instrumentation, as well as better collaboration opportunities for the limited scientific research that DFM itself can perform. The board of governors and management is therefore happy to hand over a well operating institute to DTU with a hope of continued prosperity for DFM and Danish metrology.

The activities of the year 2005 reflect the strategy for the period 2004-2006. Based on a few scientific disciplines DFM pursues research, which is transformed into primary metrology services, and these have developed satisfactorily during the year. Our calibration services continue to increase, the most popular being electrochemistry, length, and mass. During the year, acoustic metrology has been transferred from DTU to DFM, as a first example of the new type of collaboration with our owner. Further, focus on education and the development of an efficient internet-based teaching concept, lead to increased teaching activities.

Research efforts improved by one person-year within DFM's four competences: Electricity, Optics, Nanotechnology, and Mathematics, leading to 12 refereed publications with a citation impact factor of 2.

DFM's international engagement was maintained during 2005. Organisational work in EUROMET and in the Meter Convention was maintained and importantly, DFM joined the European project iMERA, which aims at developing a coordinated metrology approach for funding in EU´s seventh framework programme, starting in 2007. Also commercially, DFM was active abroad assisting Lithuania and Turkey in their establishment of EU-compatible metrology structures.

Nationally, the "strategy group on Danish metrology" that issued the vision report in 2004 continued to pursue the objectives of the plan. A successful meeting was held in connection with World Metrology Day on 20 May in collaboration with the Confederation of Danish Industries. The theme was the impact of globalisation on national metrology organisations.

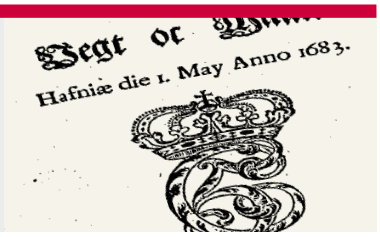
In summary, DFM has developed satisfactorily during 2005, and with the new opportunities, we expect the positive trends to continue in the coming years. Based on a sound scientific approach DFM will develop services that are optimised to serve Danish needs and at the same time are globally competitive. We will also work for improved working conditions for Danish metrology at large, including strengthening the cohesion within its decentralised organisation.

Steen Konradsen
Chairman

Kim Carneiro
Director

1683

The first national metrology service is established in Denmark



1985

The decision to establish a Danish metrology institute is made

1986

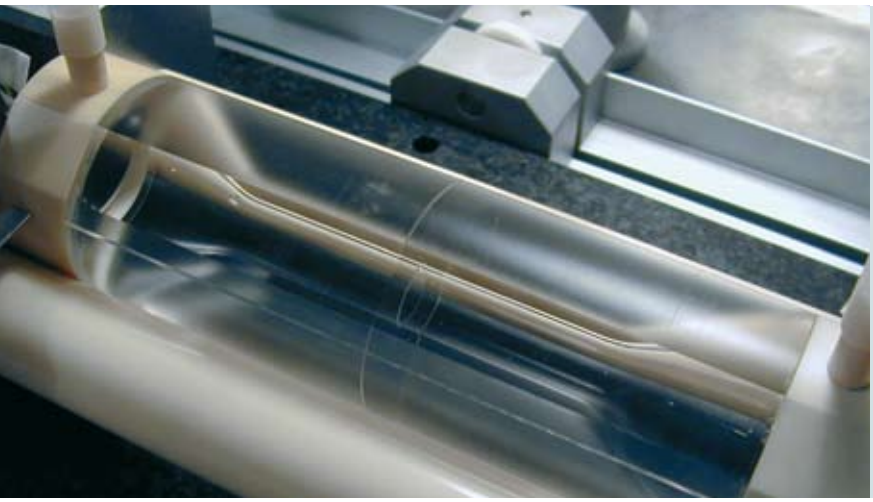
DFM begins its activities in building 322 at the Technical University campus, and takes over the Danish standards for mass and length

2 DFM AND THE SI SYSTEM

Modern society depends on the ability to perform precise measurements of physical quantities, and to express the results in units which are recognized worldwide. In the SI system the foundation is established by seven base units, and the objective of national metrology institutes is to ensure that measurements performed throughout the community are solidly linked to the definitions of these units.

The first primary standard at DFM – a Josephson standard for DC voltage – was established in 1989, and it was followed in rapid succession by primary standards for length, mass, electrical resistance and optical power. Following a period of consolidation, emerging needs in society motivated the establishment of standards for nano metrology – the measurement of dimensions in the range below 0,1 µm. Also, standards in acoustics are at present being transferred to DFM from the Technical University of Denmark.

The most recent addition is a primary standard for electrolytic conductivity, a parameter used for validating the purity of water, and hence of vital importance for sectors as diverse as the pharmaceutical industry and microelectronics. DFM took up research in this field more than 10 years ago. The crowning achievement was the successful evaluation in 2005 by an international panel, recognizing DFM as one of the world leaders in the field.

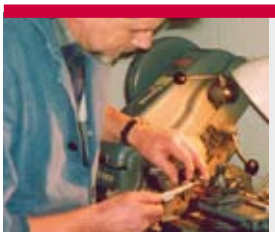


Drill a hole in a solid glass rod. Measure its dimensions to less than a micrometer with traceability to the wavelength of a red HeNe laser. Fill it with a conducting liquid and pass a current through. Then measure the resistance with traceability to a quantum Hall standard – and you have a primary standard for electrolytic conductivity.

1987

PhD projects initiated in collaboration with Danish universities

1988



Construction of calibration facilties initiated. A Josephson array voltage standard is established

1989

Primary length standards, developed at University of Århus, are installed at DFM. Prototype quantum Hall standard established at University of Copenhagen

3 DFM SERVING COMMUNITY

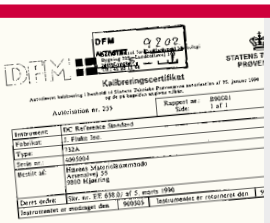
For a newcomer in the field of metrology the issue of confidence is of paramount importance. For this reason it was decided that all of DFM's calibration services were to be performed under an internationally recognized accreditation. In 1992 DFM received its first DANAK accreditation in the field of length, and the scope was expanded as the number of services steadily increased. For a national metrology institute this policy was at the time exceptional, but driven by the requirements of globalisation it has now been widely adopted.

In 1993 DFM initiated the formation of DANIAmet, an umbrella organisation covering all Danish primary and reference laboratories. DFM had its own quality system ISO 9001 certified in 1994, and when the CIPM multilateral recognition arrangement, usually referred to as the CIPM-MRA, was instigated by BIPM in 1999 in order to ensure world wide equivalence between national metrology institutes, the quality system of DANIAmet was the first to be recognized by the QS-Forum in 2001.

Other metrological competences have been brought to use through international consultancy tasks, funded mainly by the European Community and the Danish Ministry of Foreign Affairs. A main target has been states seeking accession to the EU, and the overall goal has been to assist in the development of a metrological infrastructure meeting the demands of an open market. Under a variety of programs this has created links to the metrological communities in a number of countries, notably Bulgaria, Latvia, Lithuania, Cyprus, and Turkey.

Calibration technician Bo Bengtsen operates DFM's most advanced balance

1990

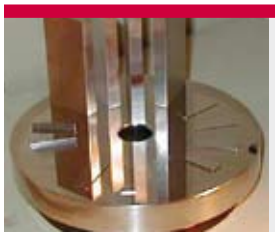


The Danish accreditation service is outsourced to DFM. First accredited calibration certificate is issued

1991

DANAK is formed and signs the WECC multilateral agreement. DFM moves to building 307. DFM conducts DC-voltage comparisons in seven countries from 1991 to 1994

1992



DANAK signs the multilateral WELAC agreement. Gauge block interferometry is accredited

4 RESEARCH AT DFM

Fundamental metrology stands for the highest level of accuracy. It is therefore intimately related to research, and when the institute was founded in 1985 it faced the challenge of establishing from scratch a spectrum of research activities wide enough to form a trustworthy basis for international collaboration. One element in the strategy adopted was to launch PhD projects, and five topics were chosen according to what was at the time assessed to be pointing towards the needs of the future. The five candidates graduated in 1990 with thesis subjects in electrical quantum metrology, non-linear optics, and scanning tunnelling microscopy. There is a direct line from these topics to today's focus on electrolytic conductivity, mathematical methods, optical fibre measurements, and nano metrology.

Throughout its existence DFM has benefited from its location at the Danish Technical University campus with its scientific environment and infrastructure. In 2002 DFM's laboratory facilities underwent a major renovation, and in combination with an extended collaboration with the Physics Department of the Technical University, this has provided working conditions fully adequate at the entrance of the 21st century.

In line with the scientific basis of DFM being strengthened, the institute has engaged in EU funded projects as partner or coordinator, as well as in nationally funded programs aimed at providing research opportunities for small and medium-sized enterprises.

Collaboration with the Physics Department of the Technical University provides DFM with up-to-date facilities.

1993

DANIAmet is formed. Accreditation is obtained for mass, electrical resistance, and optical radiometry. DANAK is deprivatised

1994

DFM holds the chair of EUROMET

1995

Work towards a primary standard for electrolytic conductivity is initiated

1996

Radiometry is upgraded to primary level with a cryogenic radiometer

5 AMBASSADORS OF METROLOGY

Research at DFM was kick-started with five PhD projects, and the strategy of building on this tool has been upheld. It serves a dual purpose since it enables exploration of novel ideas at the same time as it creates solid links to the academic institutions, primarily University of Copenhagen and Danish Technical University. Over the years 20 PhD and 10 MSc have performed a major part of their research at DFM, and although only a minority have stayed within the field of metrology, they all carry along with them the concepts of proper measurements.

Henrik Bruus (PhD) 1990
Henrik is a professor at the Department of Micro and Nanotechnology at the Technical University of Denmark. He is head of the section for Bio/Chemical Microsystems and his research focuses on microfluidics theory and simulations.

Jan Friis Jøgensen (PhD) 1993
Based on his PhD work Jan founded the company Image Metrology A/S, and his SPIP software now sets the de facto standard for nanoscale image processing and 3-D visualization.

Line Lundsberg-Nielsen (PhD) 1995
Line did her PhD work in near-infrared spectroscopy, using diode lasers which at the time represented a novel spectroscopic tool. From her London-based company Lundsberg Consulting she now gives advice on the use of process analytical technologies.

Carsten P. Jensen (PhD) 1998
Carsten did his PhD work in the field of nano metrology and now uses his skills at the Danish National Space Center. He was among the final contenders for becoming the first Danish astronaut.

Valentina Ruseva (PhD) 2005
Valentina came from Bulgaria and did her PhD work within the frameworks of a EU funded research training network. She worked with ultrastable lasers intended for atomic clocks, and she continues her research as a post-doc at University of Umeå in Sweden.

1987 Lars Lihén Madsen (MSc)
Ole Albrectsen (MSc)

1990 Henrik Bruus (PhD)
Tommy Geisler (PhD)
Lars Lithén Madsen (PhD)
Hans Dalsgaard Jensen (PhD)
Anders Larsen (PhD)

1991 Steen Suurballe (MSc)

1992 S. Abdali (MSc)
B. R. Christensen (MSc)
T. Mygind (MSc)

1993 Harald Roager Simonsen (PhD)
Jan Friis Jørgensen (PhD)

1995 Line Lundsberg-Nielsen (PhD)
Mazdak Maleki (MSc)

1998 Carsten P. Jensen (PhD)
Nikolaj Melander (PhD)
Niels Asger Mortensen (PhD)

1999 Ane Jensen (MSc)

2000 Jeanett Norbohm Sørensen (PhD)
Marie Wandel (MSc)
Kai Dirscherl (MSc)
Søren Jensen (MSc)

2001 Jonathan Kutchinsky (PhD)
Michael W. Mortensen (PhD)

2002 Niels Kofoed (PhD)

2003 Susanne Søgaard (PhD)
Maria Holmberg (PhD)

2004 Francesca Borsetti (PhD)
Johnny Hartvig Olsen (MSc)

2005 Valentina Ruseva (PhD)
Irene Davi (MSc)
Ramona Matieu (PhD)

1997

DFM assesses the metrological infrastructure in Central- and Eastern European countries. First primary standard for electrolytic conductivity is established

1998

First edition of "Metrology in Short" is published

1999

Twinning project Cyprus starts. Electrolytic conductivity is accredited

6 DFM IN INTERNATIONAL FORA

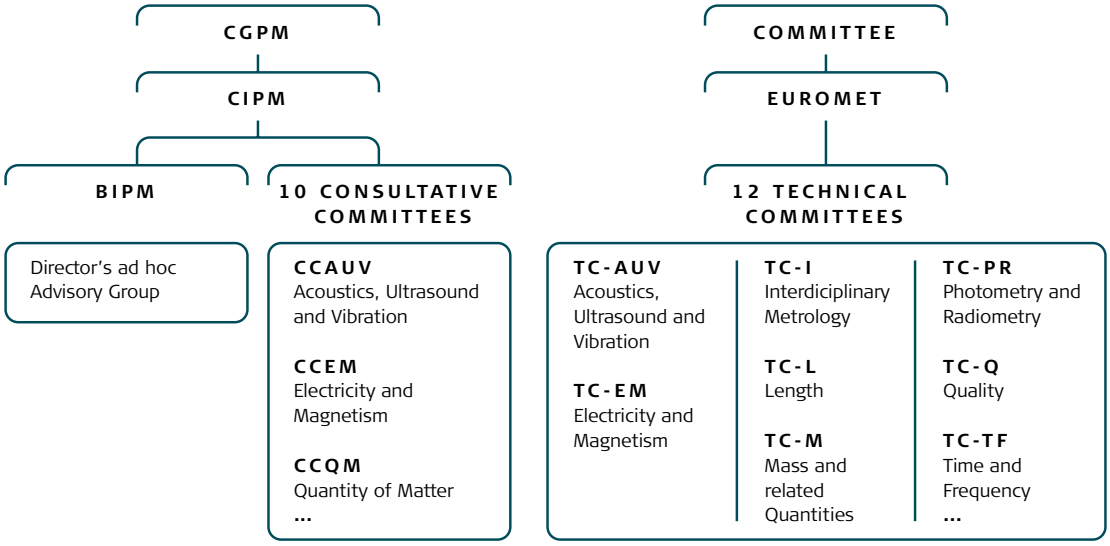
The highest authority of the metre convention rests with CGPM – Conférence Générale de Poids et Mesures – which meets every four years. It appoints members of CIPM – Comité International de Poids et mesures. Membership of CIPM is lifelong, and the director of DFM, Kim Carneiro, was appointed in 2004.

The BIPM – Bureau International de Poids et Mesures – is responsible for the scientific implementation of the decisions made by CGPM, and executes its work under the supervision of CIPM. Currently a DFM staff member, Jan Hald, spends 6 months at BIPM, implementing a weighing procedure developed at DFM, which will now be adopted by BIPM.

CIPM has established 10 consultative committees for the different subject fields of metrology. Hans Dalsgaard Jensen has been a delegate to the committee for electricity and magnetism CCEM since 1998, and of the committee for quantity of matter CCQM since 2003. Knud Rasmussen has as DFM staff member continued to serve as delegate to CCAUV during 2005.

The individual national metrology institutes are responsible for compliance with the metre convention at the national level, and collaborate in the umbrella organisation EUROMET. Kim Carneiro has been a member of the EUROMET committee from 1988, and chairman from 1994 to 1998. The practical work is carried out in 12 technical committees. Five DFM staff members have been members of these since 1990, and Lars Nielsen was chair of the technical committee for mass and related quantities TC-M from 2001 to 2005.

In addition, DFM participates in working groups such as BIPM director's ad hoc advisory group on uncertainty, and in projects such as iMERA, directed towards the future of European metrology.



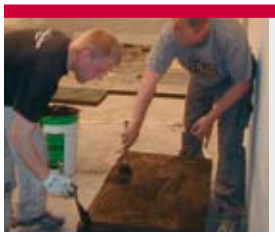
2000

DFM coordinates the EU Research Training Network CAUAC – Cold Atoms and Ultra-Precise Atomic Clocks

2001

DFM offers calibration of DC-voltage directly against a Josephson standard. DFM holds the chair of euspen, European Society for Precision Engineering and Nanotechnology

2002



DFM's laboratory facilities receive a major upgrade. DFM becomes accredited in nanometrology

7 FORMER CHAIRMEN'S OPINION

Creating DFM. Christian Buhl, chairman of DFM 1985 to 1986:

..."When I became chairman of the Metrology Council, there were different opinions on whether or not to create an Institute of Fundamental Metrology. Nobody questioned the need for the establishment and coordination of national reference standards. However, the issue of research was more controversial since it was felt that available resources were insufficient for reaching a critical mass and subsequent international recognition. In the end, however, it was decided to embark, and Kim Carneiro was accommodated as director in a small room at Tagensvej, charged with developing what is today known as a business plan. One of his first practical tasks was to take responsibility for the key to the vault housing the platinum meter – this key having resided until then safely in my bedside drawer. With this humble beginning in mind, one recognizes with pleasure and pride DFM´s central role in Danish metrology, and its standing in the international metrological collaboration."

Getting started with research. Torkild Andersen, chairman of DFM from 1986 to 1992:

..."It has been a pleasure to follow how DFM has been able to reach its present position starting from scratch in 1986 to its 20 years anniversary in 2006. The main purpose for the first board of DFM was to establish the foundation for future activities. The focus was on research in metrology, so that DFM could be prepared for its services to Danish industry. Due to limited financial resources only a few research projects could be initiated, but it was the goal that within three selected areas of metrology DFM should reach the front line of metrology and thereby be accepted as an equal partner of the larger countries in Europe – countries in which metrology had been established long ago. A look through the annual reports since 1986 shows that this goal was reached. Congratulations to the 20 years anniversary!"

Getting organised: Kim Hueg, chairman of DFM from 1993 to 1999:

..."When I took over the chair, DFM was facing several challenges. Although being recognised for its research in metrology, income came from the operation of DANAK, which DFM had successfully brought to international recognition. However, the activities of DANAK were to be transferred back to the Agency, from where it had been privatised in 1990. The task was therefore to shrink DFM to half its size in a way that it could focus on metrology only, with purpose of getting a satisfactory balance between the government metrology grant and income from competitive funds, including clients. I am happy to say that when I left DFM, it had regained it initial size, the economy was in order, publications were at an all time high; and from the chair of EUROMET DFM had lead the reunification process of European metrology."

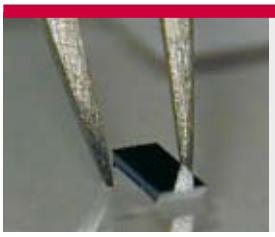
2003

DFM coordinates CEMOST Center for Micro-Optics Structures. DFM staff members are stationed in Vilnius under the project Twinning Lithuania

2004

DFM's director is appointed member of CIPM

2005



DFM is assessed as primary laboratory for electrolytic conductivity. DFM coordinates the BIPM comparison NANO-5 and the CCQM-K36 comparison for electrolytic conductivity

8 A VIEW TO THE FUTURE

Since ancient times metrology has been based on comparing objects with a material standard defining the unit of measurement, but the introduction of the metre at the end of the 18th century marked a radical new way of thinking.
A definite value was assigned to a constant of nature: the distance from the North Pole to the equator. For practical reasons, however, the length bar constructed to best represent the metre, also became the de facto definition. Thus, when the Metre Convention was adopted in 1875, the primary standard for length was the platinum bar kept in the French National Archive, just as even today the primary standard for mass is the platinum-iridium kilogram kept at Bureau International de Poids et Mésures in Sèvres near Paris. It was not until the mid 20th century that optical sciences paved the way for adopting a novel strategy: assigning a defined value to the speed of light, equivalent to defining the metre as the distance propagated by light during a definite fraction of a second.

As a signatory of the Metre Convention Denmark was among the first countries to receive – in 1889 – a copy of the international kilogram prototype K. The present Danish standard is copy number 48, dating back to 1946.

The idea of assigning defined values to constants of nature, and deriving the units of the SI system from these constants, in combination with time or frequency measurements, is at the core of modern scientific metrology. Based on quantum effects it has already been adopted for the most precise measurements of electrical quantities, and the goal is to extend the concept to the full SI system. But mechanical energy still depends on the unit of mass, and since we have to insist on equivalence between electrical and mechanical energy, there is no way around it: the kilogram definition must be detached from the platinum-iridium weight.

Several concepts are being tested around the world, the most promising being the construction of a Watt-balance, where the pull of gravity on a weight is balanced by a magnetic force. The accuracy still does not match that with which conventional weighing can be performed, although it is getting within an order of magnitude. Since the mass community is not willing to sacrifice accuracy in return for aesthetics, the SI system will remain incoherent for the time being. However, at the recent meeting of the CIPM in November 2005, it was announced that the kilogram definition will be up for revision in 2011. So the use of material artefacts for defining units of the SI system is coming to an end.

Ledelsespåtegning
Bestyrelse og direktion har dags dato godkendt årsrapporten for 2005 for Dansk Fundamental Metrologi.

Årsrapporten er aflagt i overensstemmelse med Årsregnskabsloven under hensyn til de særlige forhold, som gælder for Dansk Fundamental Metrologi.

Vi anser den valgte regnskabspraksis for hensigtsmæssig, således at årsrapporten giver et retvisende billede af Dansk Fundamental Metrologis aktiver og passiver, finansielle stilling samt resultatet.

Kgs. Lyngby, den 23. februar 2006

Direktion

Kim Carneiro
Direktør

Bestyrelse

Knut Conradsen
Næstformand

Hans Dalsgaard Jensen
Medarbejderrepræsentant

Ole Bjørn-Jensen

Steen Konradsen
Formand

Anders Kühle
Medarbejderrepræsentant

Søren Stjernqvist

Ernst Tiedeman

9.1 REVISIONSPÅTEGNING

Til bestyrelsen i Dansk Fundamental Metrologi
Vi har revideret den finansielle del af årsrapporten for Dansk Fundamental Metrologi for regnskabsåret 2005 bestående af ledelsesberetning (afsnit 1) ledelsespåtegning, anvendt regnskabspraksis, resultatopgørelse for perioden, balance pr. 2005-12-31, pengestrømsanalyse og noter, siderne 5 og 13-19. Vor revision har ikke omfattet siderne 6-12. Årsrapporten er aflagt i overensstemmelse med Årsregnskabsloven.

DFM's ledelse har ansvaret for årsrapporten. Vort ansvar er på grundlag af vor revision at afgive en konklusion om årsrapporten.

Den udførte revision
Revisionen er udført i overensstemmelse med Ministeriet for Videnskab, Teknologi og Udviklings retningslinier for Godkendt Teknologisk Service i Danmark 2005 og under iagttagelse af god offentlig revisionsskik.

Vi har udført vor revision i overensstemmelse med danske revisionsstandarder. Disse standarder kræver, at vi tilrettelægger og udfører revisionen med henblik på at opnå høj grad af sikkerhed for, at årsrapporten ikke indeholder væsentlig fejlinformation. Revisionen omfatter stikprøvevis undersøgelse af information, der understøtter de i årsrapporten anførte beløb og oplysninger. Revisionen omfatter endvidere stillingtagen til den af ledelsen anvendte regnskabspraksis og til de væsentlige skøn, som ledelsen har udøvet, samt vurdering af den samlede præsentation af årsrapporten. Det er vor opfattelse, at den udførte revision giver et tilstrækkeligt grundlag for vor konklusion.

Revisionen har ikke givet anledning til forbehold.

Konklusion
Det er vor opfattelse, at årsrapporten giver et retvisende billede af Dansk Fundamental Metrologis aktiver, passiver og den finansielle stilling pr. 31. december 2005 samt af resultatet af selskabets aktiviteter og pengestrømsanalyse for regnskabsåret 2005 i overensstemmelse med Årsregnskabsloven.

Forvaltningen af de bevilgede midler er varetaget tilfredsstillende af Dansk Fundamental Metrologi.

København, den 23. februar 2006

Juul & Partnere
Statsautoriseret RevisionsPartnerSelskab

Niels Bjerregaard
statsautoriseret revisor

9.2 ANVENDT REGNSKABSPRAKSIS

Generelt
Årsrapporten for Dansk Fundamental Metrologi for 2005 er aflagt i overensstemmelse med årsregnskabslovens bestemmelser for klasse B-virksomheder.

Regnskabet er baseret på instituttets bogføring, men tallene er angivet i hele kroner (tusinde kroner for foregående år). Der kan derfor forekomme tilsyneladende afrundingsfejl ved sammentællingerne.

Ændring af anvendt regnskabspraksis
Der ingen ændringer i forhold til sidste års regnskabspraksis.

Indtægter
Indtægterne medtages i resultatopgørelsen i takt med arbejdets udførelse efter produktionskriteriet, hvilket medfører, at avancen på solgte ydelser medtages i resultatopgørelsen i takt med udførelsen af arbejdet, jævnfør nedenfor under igangværende arbejder.

I projekter, hvor DFM er tilskudsmodtager på vegne af et konsortium, indregnes tilskudsbeløbet som omsætning, i det omfang DFM på vegne af konsortiet er økonomisk ansvarlig over for tilskudsgiver; partneres omkostninger fradrages i udlæg. I projekter hvor DFM ikke er ansvarlig for partneres ydelser indregnes kun den forholdsmæssige andel af kontraktsummen, som direkte tilfalder DFM, i omsætningen.

Bevillinger forbrugt til udstyr, som regnskabsmæssigt afskrives, er indtægtsført i resultatopgørelsen.

Igangværende arbejder
Igangværende arbejder er optaget til salgsværdi omfattende medgået tid til salgspris med tillæg af afholdte udlæg.

Materielle anlægsaktiver
Småanskaffelser med en anskaffelsessum på under 20 000 kr. udgiftsføres i resultatopgørelsen.

Udstyr med begrænsede anvendelsesmuligheder, fremstillet af underleverandører, udgiftsføres.

Mindre kontorinventar udgiftsføres.

"EDB-udstyr" afskrives lineært over 3 år.

"Andet udstyr", anvendt til forskning og kalibrering afskrives lineært over 4 år.

Indretning af lejede "lokaler" pågået i 2002 måles til kostpris med fradrag af akkumulerede afskrivninger. Der foretages lineære afskrivninger baseret på aktivernes forventede brugstid, som for indretning af lejede lokaler er 15 år.

9.3 RESULTATOPGØRELSE OG BALANCE

RESULTATOPGØRELSE FOR PERIODEN

Noter	Kategori	2005	2004
	Kundeomsætning	5 152 281	4 712
1	Projektomsætning	3 817 727	6 191
	Resultatkontrakt	9 300 000	9 300
	Bruttoindtægter i alt	**18 270 008**	**20 203**
	Projektpartnere	657 448	5 034
	Rejseomkostninger	989 957	847
	Andre udlæg	1 575 282	772
	Udlæg i alt	**3 222 686**	**6 653**
2	**Nettoindtægter**	**15 047 322**	**13 550**
3	Personaleomkostninger	10 190 028	9 249
	Andre omkostninger	3 151 048	2 724
	Omkostninger i alt	**13 341 076**	**11 973**
	Resultat af ordinær drift	**1 706 246**	**1 576**
	Afskrivninger	1 075 363	1 182
	Resultat før renter	**630 884**	**395**
4	Nettorenter	(66 080)	23
	Årets resultat	**564 803**	**418**
	Årets resultat overføres til næste år.		

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Noter	Aktiver	2005	2004
	Deposita	373 166	391
	DFM A/S	499 830	0
4	**Finansielle anlægsaktiver i alt**	**872 996**	**391**
	Edb udstyr	75 261	40
	Andet udstyr	1 197 227	1 102
	Indretning af lejede lokaler	3 549 241	3 851
5	**Materielle anlægsaktiver i alt**	**4 821 729**	**4 993**
	Anlægsaktiver i alt	**5 694 725**	**5 384**
6	**Igangværende arbejder**	**1 905 189**	**806**
	Debitorer	1 270 046	934
	Andre tilgodehavender	321 330	237
	Periodeafgrænsninger	0	8
	Tilgodehavender i alt	**1 591 375**	**1 178**
7	**Likvide midler**	**3 815 127**	**6 492**
	Omsætningsaktiver i alt	**7 311 691**	**8 476**
	Aktiver i alt	**13 006 416**	**13 860**
	Passiver	**2005**	**2004**
	Overført resultat	9 360 545	8 796
8	**Egenkapital i alt**	**9 360 545**	**8 796**
	Forudbetalinger	1 280 099	3 114
9	Kreditorer og skyldige omkostninger	1 281 071	857
	Feriepengeforpligtelse	1 084 700	1 094
	Kortfristet gæld i alt	**3 645 871**	**5 064**
	Passiver i alt	**13 006 416**	**13 860**

9.4 PENGESTRØMSANALYSE FOR PERIODEN

Noter	Kategori	2005	2004
	Periodens resultat før renter og afskrivninger	1 706 246	1 576
	Ændring i igangværende arbejder	(1 098 988)	2 815
	Ændring i debitorer	(336 448)	(192)
	Ændring i tilgodehavender og periodeafgrænsninger	(76 539)	1 142
	Ændring i kortfristede gældsforpligtelser	(1 418 615)	234
	Pengestrømme fra driften	**(1 224 344)**	**5 575**
4	Køb og salg af finansielle anlægsaktiver	(581 830)	(17)
5	Køb og salg af materielle anlægsaktiver	(904 299)	(915)
	Pengestrøm fra investeringsaktivitet	**(1486 129)**	**(932)**
	Renteindtægter og udgifter	33 920	23
	Pengestrøm fra finansieringsaktivitet	**33 920**	**23**
	Periodens likviditetsforskydning	**(2 676 554)**	**4 666**
	Likvide beholdninger - primo	6 491 681	1 825
	Likvide beholdninger ultimo	**3 815 127**	**6 492**

9.5 NOTER

1 **Specifikation af projektomsætning**

Internationalt finansieret	**699 722**
Evigem	32 474
Evigem (euspen)	8 513
Regmet	(39 055)
Imera	305 607
Incolab	200 997
Vision online	16 417
Kalibrering af vands ledningsevne	25 920
Kalibering af si detektorer	88 202
Virtuelt institut for fiber optisk måleteknik	39 830
Øvrige tilskud, rejserefusioner mm.	20 816
Innovationskonsortier	**1 174 725**
Cemost	1 174 725
VTU puljemidler	**1 200 000**
Biologiske mikro- og nanostrukturer	750 000
Kompetencecenter for nanodesign	450 000
Danske forskningsråd	**705 563**
Diffusfelt mikrofonkalibrering	311 512
Fibretech	285 763
Physics of very cold atoms	108 288
Andre danske tilskud	**37 717**
Erhvervs-phd, VTU	20 000
Øvrige tilskud, rejserefusioner mm.	17 717
Projektomsætning i alt	**3 817 727**

2 Efterkalkulerede egenfinansierede forsknings- og udviklingsomkostninger er opgjort til kr. 517 454.

3

Specifikation af personaleomkostninger	**2005**	**2004**
Løn og gager	9 812 074	8 916
Pensioner	239 889	204
Andre udgifter til social sikring	89 009	84
Øvrige personaleomkostninger	49 056	45
Personaleomkostninger i alt	**10 190 028**	**9 249**

Dfm har i 2005 i gennemsnit beskæftiget 18 medarbejdere opgjort efter antal årsværk inklusive udstationeret medarbejder i 10½ måned og en erhvervs-phd studerende i 2 måneder. Den udstationerede medarbejder var ikke indregnet i løn og gager i 2004.

4 **Finansielle anlægsaktiver**

Anskaffelsessum	**Qmet**	**LuKa**	**DFM A/S**	**deposita**	**i alt**
Saldo 2005-01-01	211 913	0	0	391 166	603 079
Tilgang 2005	-	100 000	499 830	-	599 830
Afgang 2005	-	-	-	18 000	18 000
Saldo 2005-12-31	211 913	100 000	499 830	373 166	1 184 909
Nedskrivninger					
Saldo 2005-01-01	211 913	0	0	0	211 913
Tilgang 2005	-	100 000	-	-	100 000
Afgang 2005	-	-	-	-	
Saldo 2005-12-31	211 913	100 000	0	0	311 913
Bogført værdi	**0**	**0**	**499 830**	**373 166**	**872 996**

Dfm er fortsat engageret i Qmet Aps og LuKa OptoScope Aps selvom anparterne er opført til kr. 0. Nedskrivning af anparter i LuKa OptoScope Aps indgår i nettorenter.

5 **Materielle anlægsaktiver**

Anskaffelsessum	**EDB-udstyr**	**Andet Udstyr**	**Lokaler**	**Ialt**
Saldo 2005-01-01	3 419 073	24 980 833	4 530 949	32 930 855
Tilgang 2005	114 847	790 252	-	905 099
Afgang 2005	194 259	-	-	194 259
Saldo 2005-12-31	3 339 661	25 771 086	4 530 949	33 641 696
Afskrivninger				
Saldo 2005-01-01	2 990 611	23 879 291	679 644	27 549 545
Afskrivning aktiver 2005	79 531	694 568	302 064	1 076 163
Afskrevet årets afgang	194 259	-	-	194 259
Saldo 2005-12-31	3 264 401	24 573 859	981 708	28 819 967
Bogført værdi	**75 261**	**1 197 227**	**3 549 241**	**4 821 729**
Vinding ved køb/salg	800			800
Afskrivning 2005 i alt	**78 731**	**694 568**	**302 064**	**1 075 363**

"Lokaler" har tidligere været opført under immaterielle anlægsaktiver

6	**Igangværende arbejder**	**2005**	**2004**
	Offentlige danske institutioner	310 155	379
	Udenlandske institutioner	1 546 283	389
	Danske virksomheder	48 750	39
	Udenlandske virksomheder	-	-
	Igangværende arbejder i alt	**1 905 189**	**806**

7	**Likvide midler**	**2005**	**2004**
	Indestående i bank	3 276 907	6 348
	Giro	538 220	144
	Likvide midler i alt	**3 815 127**	**6 492**

8	**Egenkapital**	
	Overført resultat 2004	8 795 742
	Årets resultat	564 803
	Overført resultat 2005	**9 360 545**

9 Der er søgt om fritagelse for told i alt kr. 6 479 for udstyr købt i 2001.
Denne eventualforpligtelse er ikke medtaget som skyldig omkostning.

10.1 ACCOUNTS OF PARTICULAR ACTIVITIES

Participation in committees and working groups under the Metre Convention and EUROMET

+ EUROMET General Assembly
+ EUROMET Technical Committee for Acoustics, Ultrasound, and Vibrations (TCAUV)
+ EUROMET Technical Committee for Mass (TCM)
+ EUROMET Technical Committee for Electricity and Magnetism (TCEM)
+ EUROMET Technical Committee for Length (TCL)
+ EUROMET Technical Committee for Photometry and Radiometry (TCPR)
+ EUROMET Technical Committee for Time and Frequency (TCTF)
+ EUROMET Technical Committee for Interdisciplinary Metrology (TCIM)
+ EUROMET Technical Committee for Quality (TCQ)
+ BIPM Director´s Meeting
+ BIPM Director's ad hoc Advisory Group on Uncertainty
+ Joint Committee on Guides in Metrology – Working Group 1(GUM)
+ Comité International des Poids et Mesures (CIPM)
+ Consultative Committee for Electricity and Magnetism (CCEM)
+ Consultative Committee for Amount of Substance (CCQM)
+ Consultative Committee for Mass (CCM)
+ Consultative Committee for Acoustics, Ultrasound, and Vibrations (CCAUV)
+ Working Group on Nanometrology under the Consultative Committee for Length (CCL)
+ Working Group on Electrochemistry under the Consultative Committee for Amount of Substance (CCQM)

Participation in national and international projects

+ INCOLAB: Initiative and coordination to prepare laboratories in newly associated states for full implementation of the low voltage directive (EU)

+ SoftTools Metronet: Network on the advanced mathematical and computational tools in metrology (EU)

+ Twinning Project Lithuania (EU)

+ VisionOnline: A virtual institute supporting industry online in precision engineering (EU)

+ IMERA: Implementation of metrology in the European research area (EU)

+ EVIGeM: European virtual institute for geometry measurements (EU)

+ CEMOST: Centre for microoptical structures (Ministry of Science, Technology and Innovation)

+ State-of-the-art calibration with silicon detectors (Nordic Innovations Center NICE)
+ The physics of very cold atomic systems (Danish Natural Science Research Council)

+ FiberTech: Advanced optical fibre technology (Danish Research Council for Technology and Production Sciences)

+ DiffusFelt: Diffuse-field calibration of microphones (Danish Research Council for Technology and Production Sciences)

+ NanoFAB Centre of competence in nano-design, fabrication and metrology (Ministry of Science, Technology and Innovation)

+ MikroMed: Biotechnological micro- and nanostructures (Ministry of Science, Technology and Innovation)

+ VIFOM: Virtual Institute for Fibre Optical Metrology (Nordic Innovations Center NICE)

+ Primary calibration of electrolytic conductivity for measurement of the purity of water (Nordic Innovations Center NICE)

Calibration certificates and measurement reports

+ DC voltage and resistance	7
+ Electrolytic conductivity	95
+ Length	15
+ Radiometry	33
+ Mass/volume	17
+ Nano	5
+ Acoustics	9
+ Total	181

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+ Irene Davi, "Characterization of deep, nanometer scale diffraction grating with Atomic Force Microscope", DFM -2005-PhD2

+ Valentina Ruseva, "Design of high-power frequency-doubled diode laser systems for experiments on laser-cooled Magnesium", Ph.D. thesis, DFM-2005-PhD3

+ Ramona V. Mateiu, "Controlled Positioning of Carbon Nanotubes for Mass Sensing", Ph.D. thesis, DFM-2005-PhD4

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+ Reiner Jensen, "Heat meters", Mission report A23, Twinning LT/03/IB/FI/05, DFM-2005-R21
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+ J. Gran, A. Hallèn, T. E. Hansen, and J. C. Petersen, "Fractional Self-Calibration of Silicon Photodiodes", NEWRAD 2005, October 17-19, 2005, Davos, Switzerland.
+ J. Hald and J. C. Petersen, "UV Detector Calibration based on an IR Reference and Frequency Doubling", NEWRAD 2005, October 17-19, 2005, Davos, Switzerland.
+ L. Nielsen, "Is it possible to reduce costs and increase benefits of key comparisons?", NMIJ-BIPM Workshop on the Impact of Information Technology in Metrology, May 16, 18-20, 2005, Tsukuba, Japan
+ Hans D. Jensen, "Precision measurement and traceability of electrolytic conductivity", Poster presentation at 12th Congrés International de Métrologie, June 20-23, 2005, Lyon, France.
+ J. Henningsen, "Hollow core fibre waveguides for molecular spectroscopy", 19th Colloquium on High Resolution Molecular Spectroscopy, Poster B30, September 11-16, 2005, Salamanca, Spain.
+ J. Henningsen, "Line strengths and collisional broadening parameters for the n3 band of SO2", 19th Colloquium on High Resolution Molecular Spectroscopy, Poster H19, September 11-16, 2005, Salamanca, Spain.
+ T. Cours, J. Henningsen, "SO2: New analysis of the n3 band from high resolution spectra", 19th Colloquium on High Resolution Molecular Spectroscopy, Poster N20, Salamanca, Spain, September 11-16, 2005
+ Jan Hald, Jørgen Garnæs and Jes Henningsen, "Traceability in nanometrology by direct coupling of an Atomic Force Microscope and an optical interferometer", Trends in nanometrology, TC-Length Meeting, October 18-19, 2005, Bucharest, Romania.
+ Poul-Erik Hansen , N. Agersnap, J. C. Petersen, J. Garnæs, Jes Henningsen, Nathalie Destouches, Olivier Parriaux, "Critical dimension metrology using optical diffraction microscopy", Trends in nanometrology, TC-Length Meeting, October 18-19, 2005, Bucharest, Romania.
+ J. Henningsen, Jan Hald and Jan C. Petersen, "Saturated absorption in photonic bandgap fibres", Danish Optical Society Annual Meeting, November 17-18, 2005, Risø, Denmark.
+ J. Henningsen, "Web-supported training" (presented by Kim Carneiro), i-MERA Workshop on Knowledge Transfer, December 1, 2005, Berlin, Germany.
+ Kim Carneiro, "What Denmark does to fulfill international requirements Role of Metrology" in "Research, Innovation and Global Trade" May 20, 2005, Danish Confederation of Industries.
+ Kim Carneiro, "Nanometrology and the CIPM", 94th Meeting of the Comité International de Poids et Mesures, October 3-7, 2005, BIPM, Paris, France.
+ Kim Carneiro, "Beyond Europe, addressing the wider needs for metrology", iMERA status workshop, October 20 , 2005, Ljubliana, Slovenia.
+ Kim Carneiro, Etienne Dupont, Merih Malmquist, Bertil Sjöberg, "Evolution on the Conformity Assessment Scene in Turkey over a 3-year period", 14th Quality Conference, November 14, 2005, Istanbul, Turkey.

Other talks

+ L. Nielsen, DFM lectures "Evaluation of measurement uncertainty on advanced level", June 28-29, 2005, Vilnius, Lithuania.
+ L. Nielsen, DANAK lecture "Præstationsprøvning", November 15, 2005, Skovlunde, Denmark.
+ Hans D. Jensen, "Status of K36", Presentation at CCQM WGEA, April 12, 2005, Paris, France.
+ Hans D. Jensen, TWINLIT, "Training in validation of software", June 1-2, 2005, Vilnius, Lithuania.
+ Hans D. Jensen, "Results from K36", Presentation at CCQM WGEA, October 20, 2005, Berlin, Germany.
+ J. Garnæs, "Investigation on surface analysis and functionality with AFM", Half day with lectures and exercises in course 42215 – Geometrical metrology and machine testing, April 6, 2005, The Technical University of Denmark.
+ J. Henningsen, "Sporparhed i gasanalyse", Dansk Standard S-154, May 18, 2005.

10.2 DANIAMET

DANIAmet is the umbrella organisation of Danish primary laboratories and national reference laboratories. These laboratories have been appointed by DANAK on behalf of the Danish Safety Technology Authority. At present DANIAmet includes the following members, with primary status and reference status indicated by (P) and (R) respectively:

DFM
Subfield: Mass measurement (P)
Contact: Lars Nielsen, DFM
Matematiktorvet 307, 2800 Kgs. Lyngby
Telephone: 4525 5866. Telefax: 4593 1137
E-mail: ln@dfm.dtu.dk

DFM
Subfield: Length measurement (P)
Contact: Jes Henningsen, DFM
Matematiktorvet 307, 2800 Kgs. Lyngby
Telephone: 4525 5865. Telefax: 4593 1137
E-mail: jh@dfm.dtu.dk

DFM
Subfield: Optical radiometry (P)
Contact: Jan C. Petersen, DFM
Matematiktorvet 307, 2800 Kgs. Lyngby
Telephone: 4525 5864. Telefax: 4593 1137
E-mail: jcp@dfm.dtu.dk

Danish Primary Laboratory for Acoustics (DPLA)
Subfield: Acoustical measurements in gases and solids, vibrations (P)
Contact: Erling Frederiksen (Microphones) and Torben R. Licht (Accelerometry), Brüel&Kjær
Nærum Hovedgade 18, 2850 Nærum.
Telephone: 4580 0500. Telefax: 7741 2013.
Email: erlingfred@bk.dk and trlicht@bk.dk

Contact: Knud Rasmussen,
Danish Fundamental Metrology,
Matematiktorvet 307, 2800 Kgs. Lyngby
Telephone: 4593 1144. Telefax: 4593 1137
E-mail: kra@dfm.dtu.dk

Radiometer Medical A/S
Subfield: pH measurement (P)
Contact: Hans Bjarne Kristensen, Radiometer Medical A/S, Åkandevej 21, 2700 Brønshøj
Telephone: 3827 3827. Telefax: 3827 2727
E-mail: hans.bjarne.kristensen@radiometer.dk

National Laboratory for Geometrical Metrology (NGM)
Subfield: Dimensional metrology (P)
Contact: Leonardo De Chiffre
Produktionstorvet 425, Technical University of Denmark, 2800 Kgs. Lyngby
Telephone: 4525 4760, Telefax: 4593 0190
E-mail: ldc@ipl.dtu.dk

Danish Primary Laboratory for Electricity (DPLE)
Subfields: DC-electricity (P), AC-electricity (P), HF-electricity (R)
Contact: Hans D. Jensen, DFM
Mads Clausens Vej 12, 8600 Silkeborg
Telephone: 8720 6969. Telefax: 8681 2654
E-mail: hdj@dfm.dtu.dk

Danish Technological Institute
Subfield: Water flow (P)
Contact: John Frederiksen, Teknologisk Institut, Teknologiparken, 8000 Århus C
Telephone: 7220 1235. Telefax: 7220 1212.
E-mail: john.frederiksen@teknologisk.dk

Danish Technological Institute
Subfield: Temperature measurement by contact (R)
Contact: Anette Brønnum, Teknologisk Institut, Teknologiparken, 8000 Århus C
Telephone: 7220 1228. Telefax: 7220 1212
E-mail: anette.bronnum@teknologisk.dk

FORCE Technology
Subfield: Force and pressure (R)
Contact: Lene Schou, Force Technology
Park Allé 345, 2605 Brøndby
Telephone: 4326 7000. Telefax: 4326 7011
E-mail: lss@force.dk

FORCE Technology
Subfield: Gaseous flow (volume) (R)
Contact: Jesper Busk, Force Technology
Navervej 1, 6600 Vejen
Telephone: 7696 1600. Telefax: 7536 4155
E-mail: jrb@force.dk

FORCE Technology
Subfield: Flow of liquids other than water (R)
Contact: Lene S. Kristensen, Force Technology
Park Allé 345, 2605 Brøndby
Telephone: 4326 7000. Telefax: 4326 7011
E-mail: lsk@force.dk

FORCE Technology
Subfield: Volume and density (R)
Contact: Lene S. Kristensen, Force Technology,
Park Alle 345, 2605 Brøndby
Telephone: 4326 7000. Telefax: 4326 7011
E-mail: lsk@force.dk

DELTA Danish Electronics, Light and Acoustics
Subfield: Humidity (R)
Contact: Anders B. Kentved, Delta
Venlighedsvej 4, 2970 Hørsholm
Telephone: 7219 4000. Telefax: 7219 4001
E-mail: abk@delta.dk

Forskningscenter Risø
Subfield: Non-contact temperature measurement (R)
Contact: Sønnik Clausen,
Forskningscenter Risø,
Frederiksborgvej 399, 4000 Roskilde
Telephone: 4677 4523. Telefax: 4677 4565
E-mail: sonnik.clausen@risoe.dk

10.3 REFERENCE LABORATORIES OUTSIDE DANIAMET

A number of laboratories outside DANIAmet work for ministries and governmental agencies. The list below includes laboratories with a formal status as reference laboratory as well as laboratories doing similar work without a formal nomination.

The National Institute of Occupational Health
Sub field: Environmental Chemistry
Contact: Jesper Kristiansen,
Lersø Parkallé 105, 2100 København Ø
Telephone: 3916 5200. Fax: 3916 5201
www.ami.dk
Ministry: Ministry of Occupation

Danish Institute for Fisheries Research
Sub field: Food Chemistry
Contact: Maike Timm Heinrich, DTU
Søltofts Plads, Building 221,
DK-2800 Kgs. Lyngby
Telephone: +45 4525 4925
Fax: +45 4588 4774. www.dfu.min.dk
Ministry: Ministry of Food, Agriculture and Fisheries

Danish Institute of Agricultural Sciences
Sub field: Environmental Chemistry (soil and water)
Contact: Niels Henrik Spliid
Forsøgsvej 1, Flakkebjerg, DK-4200 Slagelse
Telephone: +45 8999 1900
Fax: +45 8999 3501. www.agrsci.dk
Ministry: Ministry of Food, Agriculture and Fisheries

Danish Institute for External Quality Assurance for Laboratories in the Health Care, DEKS
Sub field: Laboratory Medicine
Contact: Inger Plum, 54M1,
University Hospital Herlev,
Herlev Ringvej 75, DK-2730 Herlev
Telephone: +45 4488 3454
Fax: +45 4453 5369. www.deks.dk
Ministry: Ministry of Interior Affairs and Health

Eurofins A/S
Sub field: Environmental Chemistry (Water, soil, sludge and waste)
Contact: Ulla O. Lund
Strandesplanaden 110,
DK-2665 Vallensbæk Strand
Telephone: +45 7022 4230
Fax +45 7022 4255. www.eurofins.dk
Ministry: Ministry of Environment

Eurofins Denmark A/S
Sub field: Environmental Microbiology
Contact: Inger Guldbæk Andersen
Strandesplanaden 110,
DK-2665 Vallensbæk Strand
Telephone: +45 7022 4266
Fax: +45 7022 4255. www.eurofins.dk
Ministry: Ministry of Environment

FORCE Technology – Division of Energy and Environment
Sub field: Air emission monitoring
Contact: Lars Gram,
Park Alle 345, DK-2605 Brøndby
Telephone: +45 4326 7000
Fax: +45 4326 7011. www.force.dk
Ministry: Ministry of Environment

10.3 REFERENCE LABORATORIES OUTSIDE DANIAMET

National Environmental Research Institute, Department of Atmospheric Environment
Sub field: Ambient air pollution measurements
Contact: Lone Grundahl
Frederiksborgvej 399, DK-4000 Roskilde
Telephone: +45 4630 1134
Fax: +45 4630 1114. www.dmu.dk
Ministry: Ministry of Environment

National Environmental Research Institute, Department of Environmental Chemistry and Microbiology
Sub field: Environmental Chemistry and Microbiology
Contact: Pia Lassen
Frederiksborgvej 399, DK-4000 Roskilde
Telephone: +45 4630 1200
Fax: +45 4630 1114. www.dmu.dk
Ministry: Ministry of Environment

Danish Institute for Food and Veterinary Research
Sub field: Food chemistry/food microbiology
Contact: Inge Meyland
Mørkhøj Bygade 19, DK-2860 Søborg
Telephone: +45 7234 7051
Fax: +45 7234 7541. www.dfvf.dk
Ministry: Ministry for Family and Consumer Affairs

Danish Medicines Agency, Medicines Control Division
Sub field: Microbiology, Biology Chemistry, Radiopharmacy
Contact: Finn H. Clemmensen
Frederikssundsvej 378, DK-2700 Brønshøj
Telephone: +45 4488 9111
Fax: +45 4488 9195.
www.laegemiddelstyrelsen.dk
Ministry: Ministry of Interior Affairs and Health

Danish Plant Directorate
Sub field: Food Chemistry/ Environmental Chemistry
Contact: Ole P. Kristensen
Skovbrynet 20, DK-2800 Kgs. Lyngby
Telephone: +45 4596 6603
Fax: +45 4596 6610. www.plantedir.dk
Ministry: Ministry of Food, Agriculture and Fisheries

Department of Forensic Chemistry, Institute of Forensic Medicine
Sub field: Forensic Chemistry
Contact: Henning Willads Petersen
University of Copenhagen
Frederik V's vej 11, DK-2100 København Ø
Telephone: +45 3532 6104
Fax: +45 3532 6085. www.sund.ku.dk
Ministry: Ministry of Law

National Institute of Radiation Hygiene
Sub field: Ionising radiation and radioactivity
Contact: Klaus Ennow
Knapholm 7, DK-2730 Herlev
Telephone: +45 4454 3454
Fax: +45 4454 3450. www.sst.dk
Ministry: Ministry of Interior Affairs and Health

Statens Seruminstitut
Sub field: Microbiology
Contact: Helle Bruhn-Rasmussen
Artillerivej 5, DK-2300 København S
Telephone: +45 3268 8103
Fax: +45 3268 8124. www.ssi.dk
Ministry: Ministry of Interior Affairs and Health

10.4 THE 12 SUBJECT FIELDS OF METROLOGY

Fundamental metrology in Denmark follows the EUROMET division into 12 subject fields, while the subfields reflect metrological activities in Denmark. Plans of action drawn up for each subject field serve as guidelines in the nomination of primary and reference laboratories and give suggestions for other initiatives. The years in which plans of action have been published are shown in parenthesis. Primary and reference laboratories are designated (P) and (R) respectively.

Subject field	Subfield	Laboratory
MASS AND RELATED QUANTITIES (1989, 1997)	Mass measurement Force and Pressure Volume and Density	Danish Fundamental Metrology (P) FORCE Technology (R) FORCE Technology (R)
ELECTRICITY AND MAGNETISM (1989, 1994, 2002)	DC electricity AC electricity HF electricity	DPLE (P) DPLE (P) DPLE (R)
LENGTH (1989, 1998)	Length measurement Dimensional metrology	Danish Fundamental Metrology (P) National Laboratory for Geometrical Metrology (NGM) (P)
TIME AND FREQUENCY (1992, 2000)	Time measurement Frequency	
THERMOMETRY (1992, 1999)	Temperature measurement by contact Non-contact temperature measurement Humidity	Danish Technological Institute (R) Risø National Laboratory (R) DELTA Danish Electronics, Light & Acoustics (R)
IONISING RADIATIONS AND RADIOACTIVITY (1992, 2000)	Absorbed radiation dose – Industrial products Absorbed radiation dose – Medical products Radiation protection Radioactivity	
PHOTOMETRY AND RADIOMETRY (1990, 1996, 2004)	Optical radiometry Photometry Colorimetry Optical fibres	Danish Fundamental Metrology (P)
FLOW (1990, 1999)	Gaseous flow (volume) Water flow (volume, mass and energy) Flow of liquids other than water Anemometry	FORCE Technology (R) Danish Technological Institute (P) FORCE Technology (R)
ACOUSTICS, ULTRASOUND AND VIBRATION (1992, 2000)	Acoustical measurements in gases Acoustical measurements in solids Acoustical measurements in liquids	DPLA (P) DPLA (P)
AMOUNT OF SUBSTANCE (1992, 1995, 2004)	Environmental chemistry Clinical chemistry Material chemistry Food chemistry Biochemistry Microbiology pH measurement	Radiometer Medical A/S (P)
INTERDISCIPLINARY METROLOGY	No subdivisions	
QUALITY	No subdivisions	

10.5 DETAILS OF PERSONNEL

Board of Governors
Knut Conradsen, Vice President, Technical University of Denmark (Vice Chairman)
Hans Dalsgaard Jensen, Staff Scientist, PhD, DFM
Ole Bjørn Jensen, Managing Director, SCANPHARM A/S
Steen Konradsen, AREPA Test & Calibration A/S (Chairman)
Anders Kühle,Staff Scientist, PhD, DFM
Ernst Tiedemann, Managing Director, FORCE Technology
Annette Dragsdahl, Chief Consultant, DANISH INDUSTRY (till September 30)
Søren Stjernqvist, Managing Director, DANISH TECHNOLOGICAL INSTITUTE

Management
Kim Carneiro, MSc (EE), PhD

Accountant
Juul & Partnere, Certified Accountant

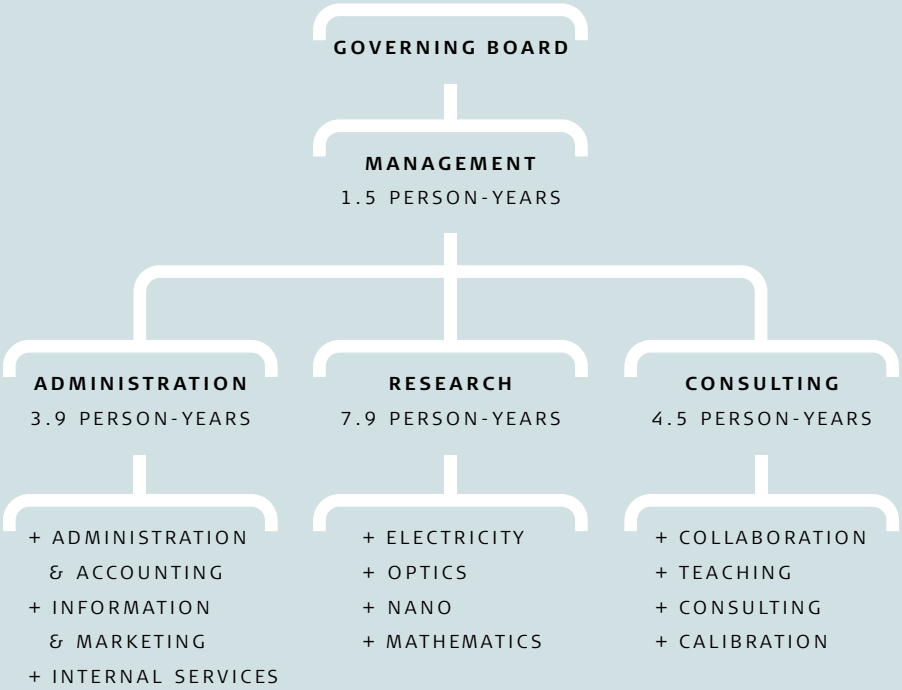
Permanent Staff
Kim Carneiro, MSc (EE), PhD
Grethe Bjørndal Jensen, Secretary (till June 30)
Lars Nielsen, MSc (EE), PhD
Steen Rahbek, Technician
Hans Dalsgaard Jensen, MSc (EE), PhD
Jan Conrad Petersen, PhD
Jes Henningsen, PhD, Dr.scient.
Jørgen Garnæs, PhD
Preben Howarth, MSc (ME), BSc (Economy)
Peter Høgh Hyllested, Technician
Anders Kühle, MSc (EE), PhD
Henrik Blichfeldt, MSc
Jan Hald, PhD
Isabella Stendal, Secretary
Bo Bengtsen, Technician
Niels-Ebbe Dam , MSc, PhD (till February 28)
Salvador Barrera Figueroa, MSc, PhD
Anne Lumholdt, Secretary (from June 1)
Lars Kildemark Nielsen, MSc, PhD (from June 1)
Lis Lilleballe, Technician (from October 1)

Non-Permanent Staff including research students
Jørgen G. Blom, MSc (till November 15)
Niels Gregersen, PhD student
Ramona Matieu, PhD student (till December 14)
Olga Pozlevi, Consultant, (till November 15)
Irene Davi, student (till January 31)
Morten Hesselholdt Lang, PhD student (from July 1)
Thorkild Sørensen, student (till July 5)
Simon Enghoff, student (from September 1 till December 31)
Troels Peter Rørdam, student (from November 1)
Holger J. Hansen, Technician (from December 12)

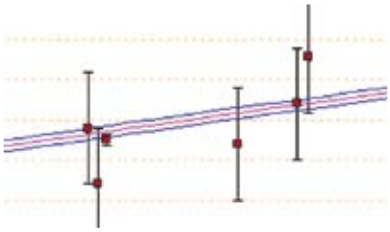
10.6 KEY FIGURES

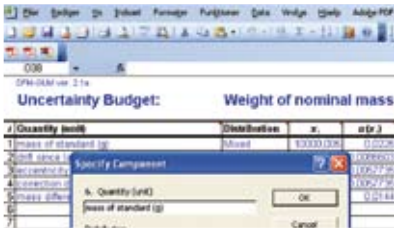
NØGLETAL I MILLIONER KR.	2001	2002	2003	2004	2005
Bruttoomsætning	16,9	18,0	21,7	20,2	18,3
Nettoomsætning	13,9	12,2	14,5	13,6	15,0
Årets resultat	0,3	-1,6	0,3	0,4	0,6
Egenkapital	9,1	8,2	8,4	8,8	9,4
Kommerciel omsætning	3,8	3,4	7,0	4,7	5,2
+ heraf små virksomheder (under 50 ansatte)	0,7	0,3	0,8	0,7	0,4
+ heraf mellemstore virksomheder (50-250)	0,3	0,2	0,3	0,5	0,5
+ heraf store virksomheder (over 250 ansatte)	0,2	0,3	0,6	0,3	0,2
+ heraf offentlige danske institutioner	1,8	1,7	2,0	0,5	0,3
+ heraf udenlandske virksomheder og institutioner	0,8	0,9	3,3	2,7	3,8
Udenlandsk bruttoomsætning	3,0	4,5	7,4	7,6	4,5
FORSKNING OG UDVIKLING					
Antal forskning og udvikling samarbejdsprojekter	15	15	13	13	15
+ heraf centerkontrakter og innovationskonsortier	2	2	1	1	1
+ heraf internationale projekter	7	8	11	11	8
Forskning og udvikling omsætning (millioner kr.) 1)	13,2	14,6	15,7	16,5	13,6
+ heraf egenfinansieret 2)	1,0	2,0	0,8	1,0	0,5
Forskning og udvikling indsats (årsværk)	9,7	8,0	8,1	8,2	8,7
ANTAL KUNDER					
Danske private virksomheder	38	32	32	28	27
+ heraf små virksomheder (under 50 ansatte)	22	13	14	8	10
+ heraf mellemstore virksomheder (50-250)	7	8	7	8	8
+ heraf store virksomheder (over 250 ansatte)	9	11	11	12	9
Offentlige danske institutioner	8	7	3	2	3
Udenlandske virksomheder og institutioner	29	19	28	17	19
Samlet kundemasse	75	58	63	47	49
ANTAL MEDARBEJDERE EFTER UDDANNELSE (ÅRSVÆRK)					
Dr. & ph.d.	9	10	9	10	10
M.sc.	6	4	5	3	3
Øvrigt teknisk personale	3	3	3	3	3
Administrativt personale	3	3	2	2	2
Gennemsnitligt antal medarbejdere	21	20	19	18	18
ANTAL PUBLIKATIONER					
Publikationer med bedømmelse	17	5	7	8	12
Afsluttede ph.d. - og eksamensprojekter	2	1	2	1	4
Andre rapporter	52	30	78	67	60
Indlæg ved konferencer	26	17	22	20	23
Bedømmelser for internationale tidsskrifter	54	21	10	6	31
Kalibreringscertifikater og målerapporter	78	92	130	151	181
Presseklip	25	27	17	12	36
UNDERVISNING					
Undervisning (antal dage)	25	25	60	11	33
Undervisning (antal deltagere)	232	242	141	63	161
Vejledere/undervisere på universiteter	6	2	2	3	3
Eksternt fagligt arbejde (antal udvalg)	3	18	20	20	31
+ heraf internationalt fagligt arbejde	3	6	14	14	24
EFFEKTIVITET					
Omsætning pr. medarbejder (1.000 kr.)	805	900	1174	1122	1021
Overskud pr. medarbejder (1.000 kr.)	15	-80	15	23	32
Kommerciel omsætning pr. resultatkrone	0,4	0,4	0,8	0,5	0,6
FoU-omsætning pr. resultatkrone	1,4	1,7	1,7	1,8	1,5

1) Fra 2004 medtages også nationalt og internationalt samarbejde om metrologi
2) Fra 2005 er egenfinansieringen den efterkalkulerede egenfinansiering


GOVERNING BOARD
MANAGEMENT
1.5 PERSON-YEARS
ADMINISTRATION
3.9 PERSON-YEARS
RESEARCH
7.9 PERSON-YEARS
CONSULTING
4.5 PERSON-YEARS
+ ADMINISTRATION & ACCOUNTING
+ INFORMATION & MARKETING
+ INTERNAL SERVICES
+ ELECTRICITY
+ OPTICS
+ NANO
+ MATHEMATICS
+ COLLABORATION
+ TEACHING
+ CONSULTING
+ CALIBRATION

Danish Fundamental Metrology
Matematiktorvet 307
DK-2800 Kgs. Lyngby
Tel +45 4593 1144
Fax +45 4593 1137
info@dfm.dtu.dk
www.dfm.dtu.dk





MISSION

As Centre of Excellence in metrology Danish Fundamental Metrology ensures that measurement knowledge in Denmark is continually developed and maintained at an international scientific level and that the Danish effort in fundamental metrology is coordinated.