

WAMSDO 2008

LUVATA
Partnerships beyond metals

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- Superconductors Development in Luvata

Hundreds of years of history and innovation

When Luvata began casting cannons
in Sweden in the late 16th century...

Shakespeare
was learning
to write



Mona Lisa
was a new
painting

First colonists
were landing
in America

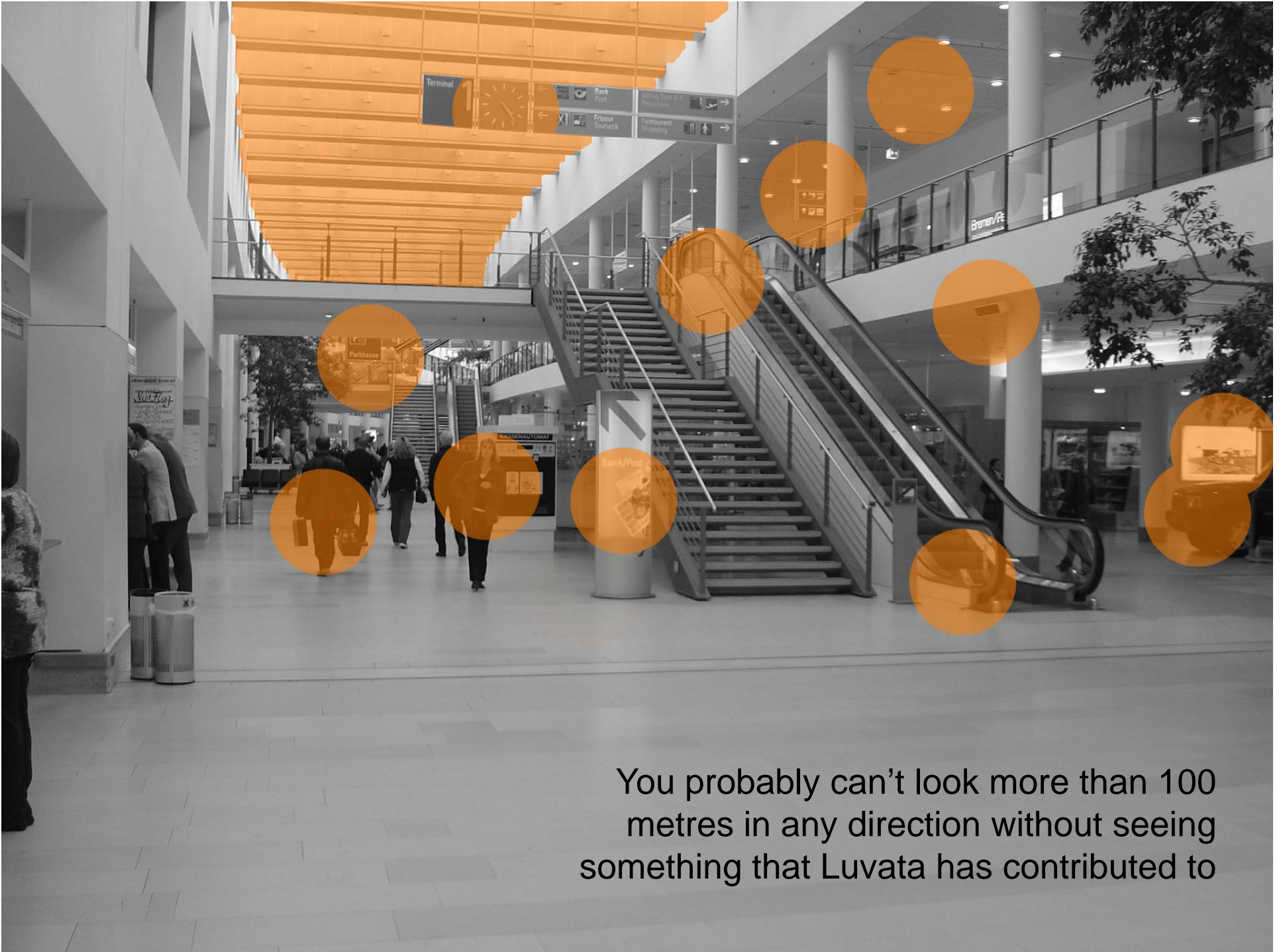


People were
still being
burned for
witchcraft

Since then, Luvata has brought together
about 40 companies and been the
pioneer of many modern technologies:

- The Eurocoin alloy
- Welding-electrode technology
- Cast and Roll™
- Cuprobrazo™
- Continuous vertical strip casting
- Photovoltaic and solar thermal energy

... and many more



You probably can't look more than 100 metres in any direction without seeing something that Luvata has contributed to

We operate in a wide range of industries



ARCHITECTURE &
BUILDING



AUTOMOTIVE



CONSUMER
PRODUCTS



ELECTRICAL



ELECTRONICS



HVAC&R



MEDICAL



METAL &
METALLURGICAL



OIL & GAS



POWER GEN. &
DISTRIBUTION



PROCESS



SUPER-
CONDUCTORS



SUSTAINABLE
ENERGY



TELECOM &
COMMUNICATION



WELDING



8,500 employees

37 production facilities

Austria
Kötschah-Mauthen
Vienna

Belgium
Gent

China
Shanghai
Suzhou
Wuxi
Zhongshan

Finland
Espoo
Pori

France
Saint Quentin Fallavier
Septème

Germany
Neuss

Italy
Amaro
Fornaci di Barga
Mortara
Pocenia
San Vito al Tagliamento
Torreglia

Korea
Soeul

Malaysia
Pasir Gudang

Mexico
Juarez
Monterrey

Poland
Warsaw

Russia
St. Petersburg

Singapore

Spain
Guadalajara
Madrid

Sweden
Finspång
Söderköping
Västerås

Thailand
Bangkok
Chachoengsao

The Netherlands
Teteringen
Zutphen

UK
London
Kingston
Welwyn Garden
Wolverhampton

USA
Appleton
Buffalo
Chicago
Delaware
Franklin
Grenada
Jacksonville
Louisville
Waterbury

Key Financial Figures (2007)

Figures include acquired ECO Group for final four months

Net Sales m€2597

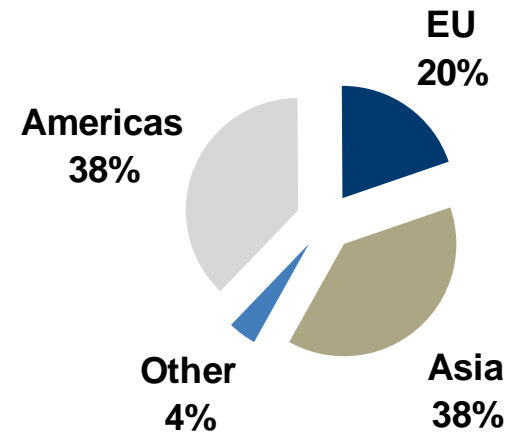
Deliveries 330 Ktonnes

EBITDA m€ 102

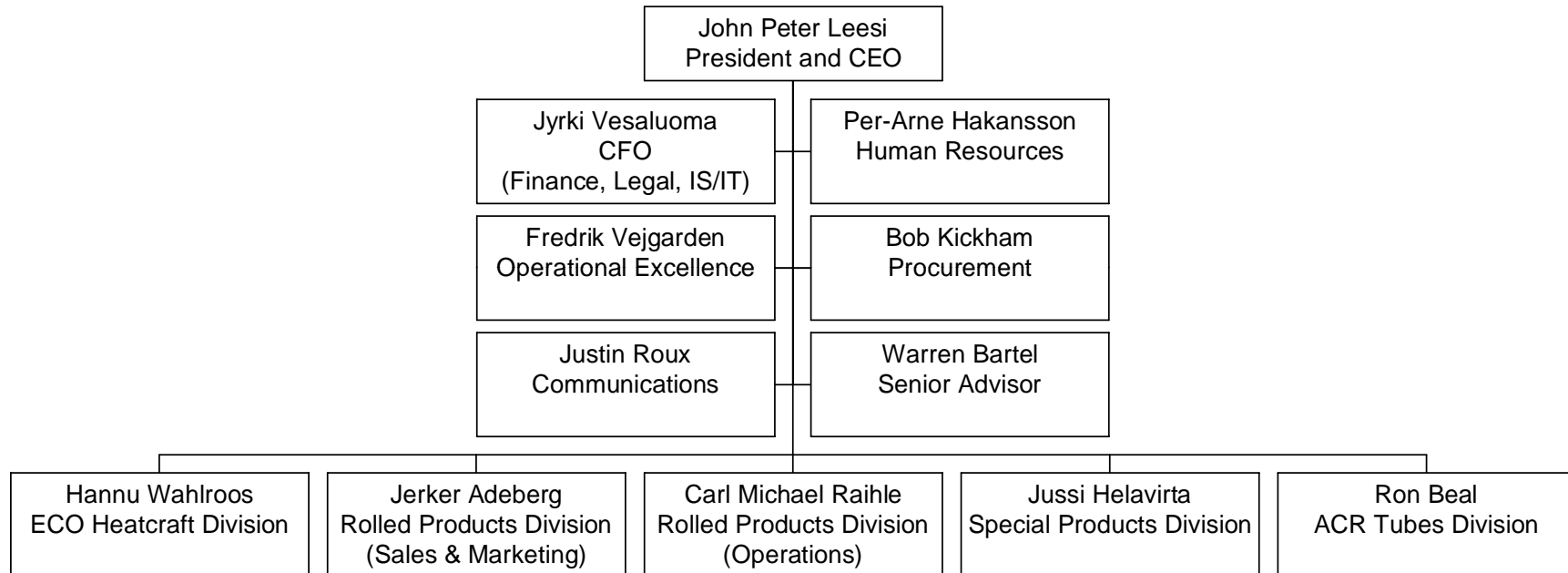
% of Net Sales 3.9%



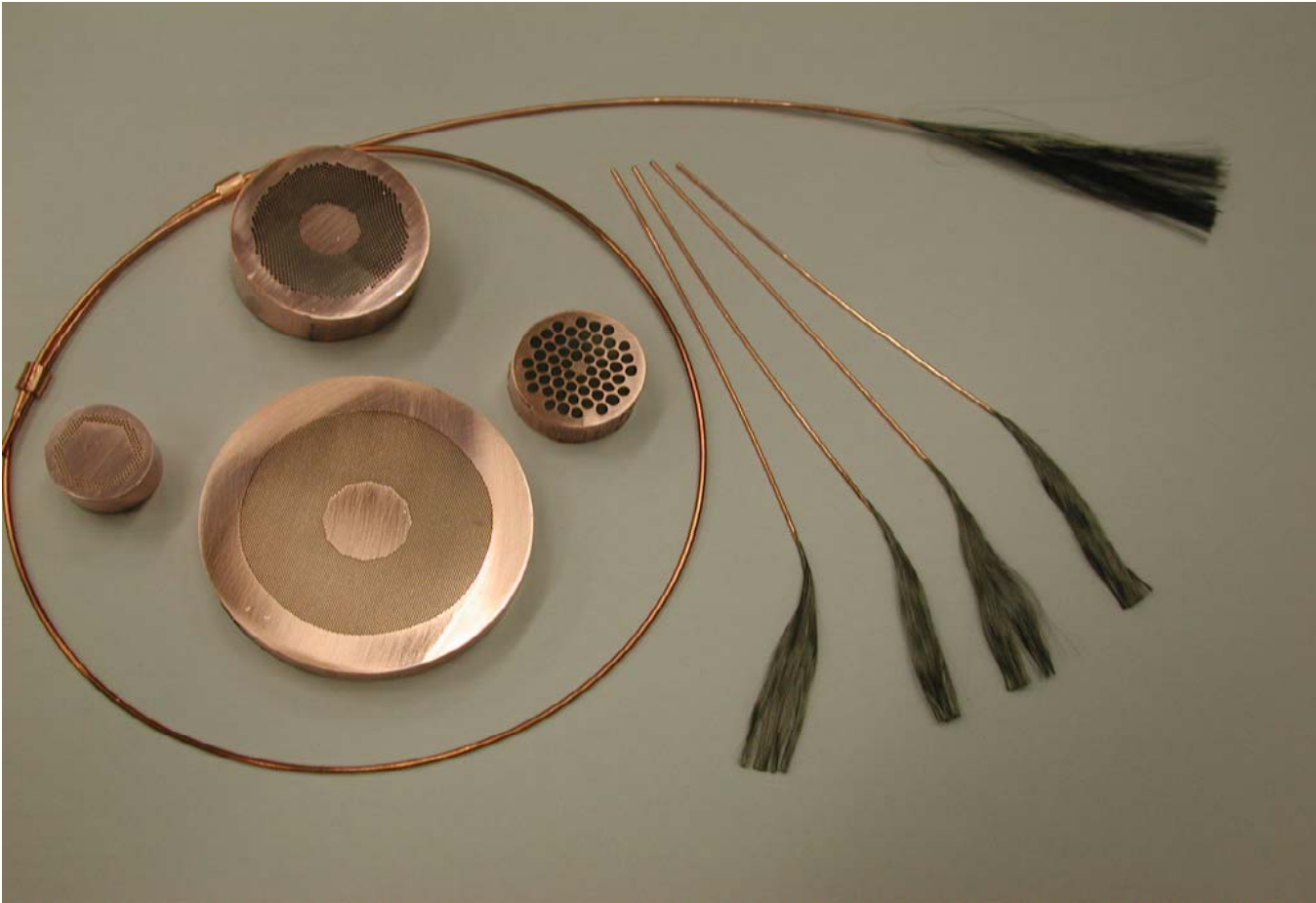
% Net Sales by region



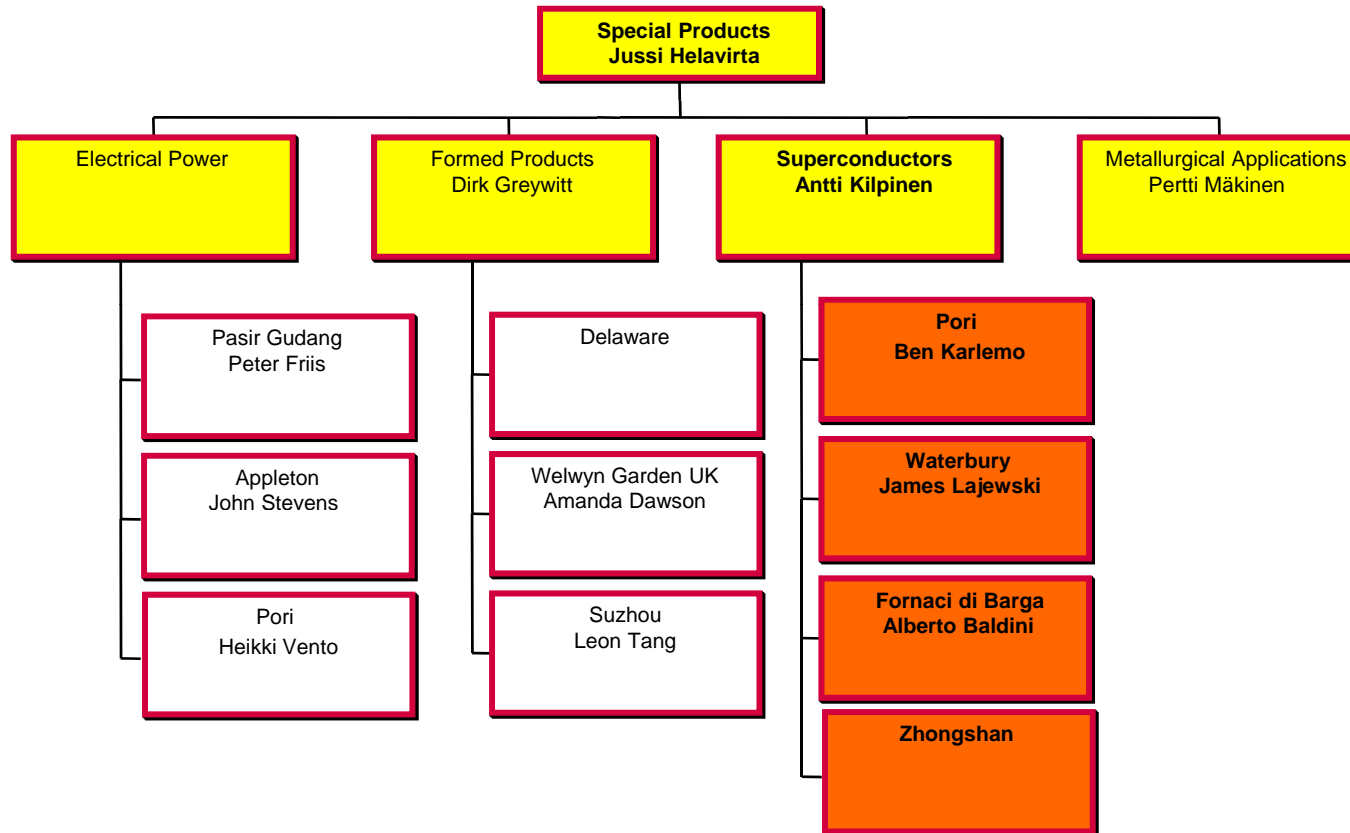
Luvata Organisation



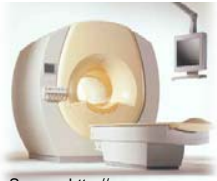
Superconductors in Luvata



Superconductors are part of Special Products Division



Luvata's role in superconductors business



Source: <http://www.pms.com>



Source: <http://www.pms.com>



Source: Toshiba



Source: BRUKER Ag



Source: CERN

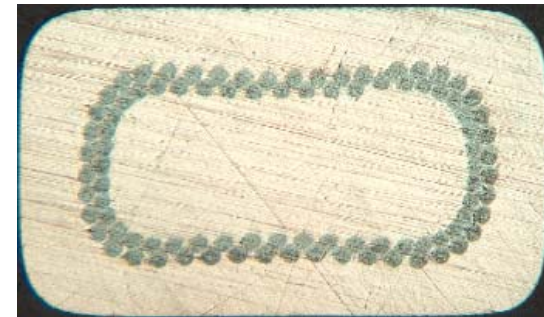
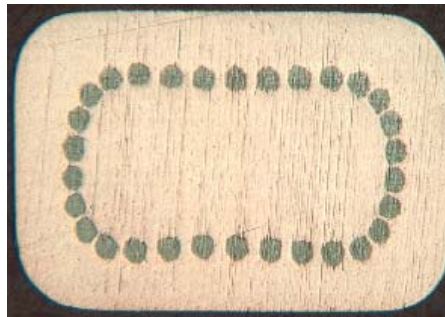
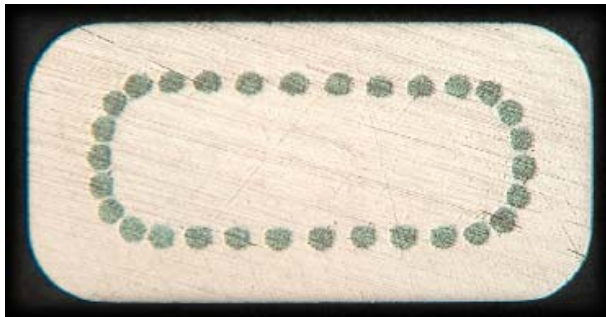
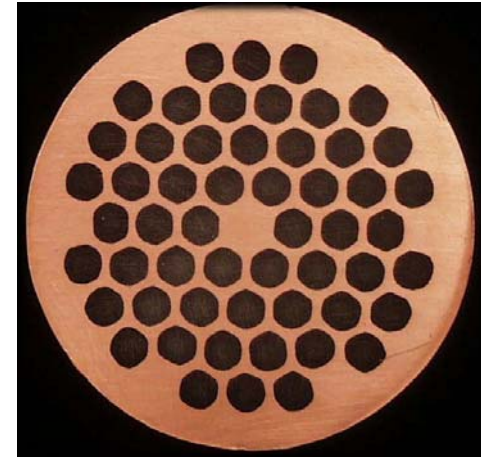
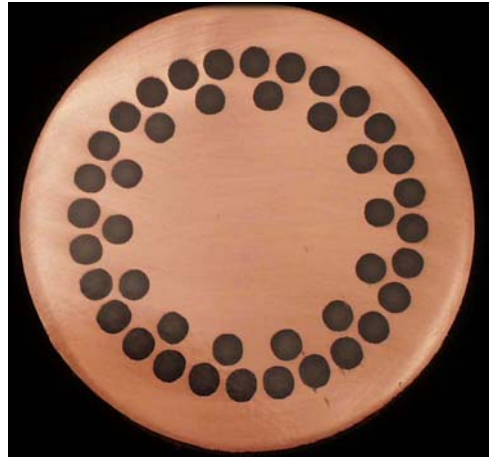
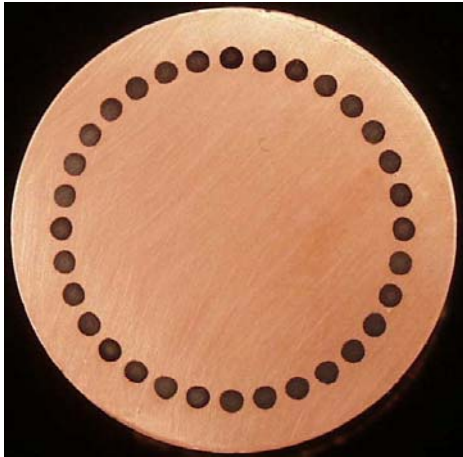


Source: CERN

- Number 1 manufacturer
 - Four facilities; Waterbury (USA), Pori and Fornaci di Barga (Europe), Zhongshan (China)
 - Capacity and capability to manufacture high volumes
 - In-house high purity Copper and advanced technology
 - more than 30 years experience
- Major source of superconductors for MRI and NMR applications
- Main supplier for e.g. commercial SMES application and Crystal Grower application plus Maglev and Nuclear Fusion projects

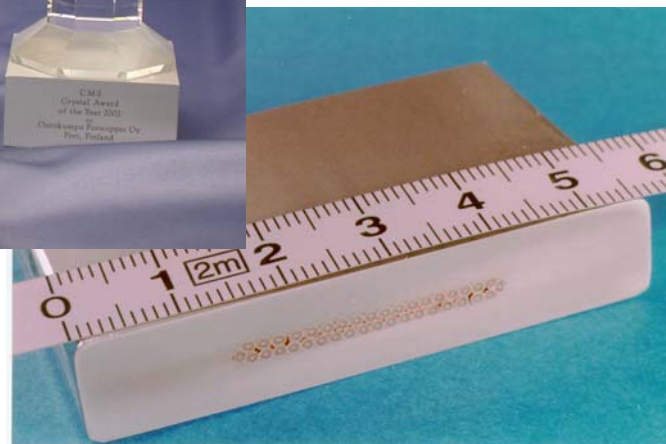
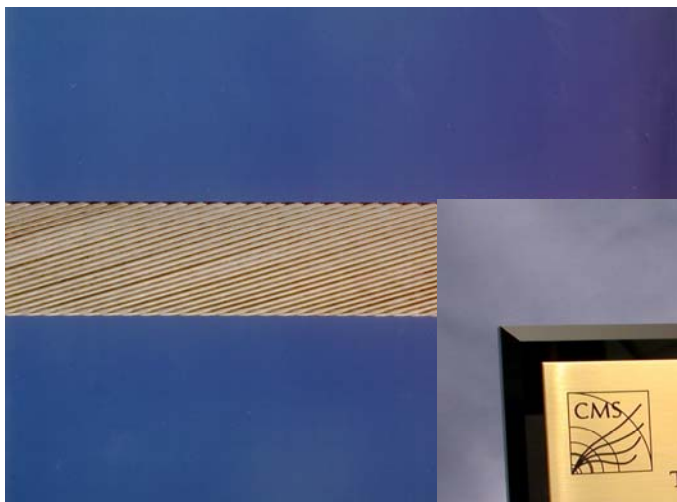


A set of typical wire designs for MRI/NMR



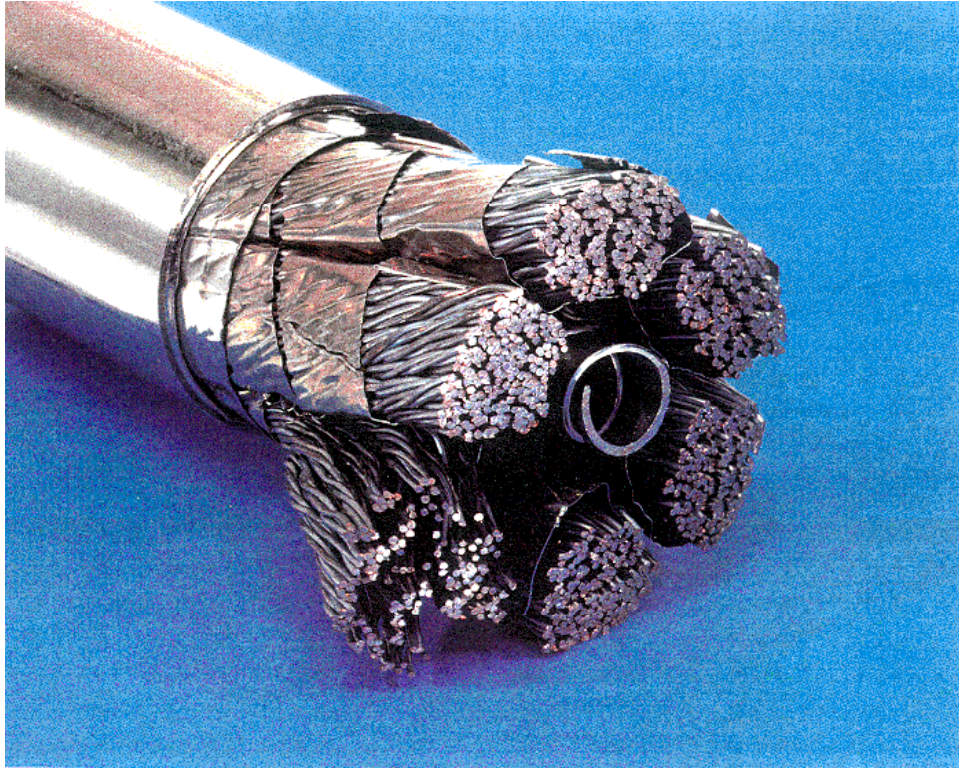
HEP SC cables

LHC dipole Outer Cable

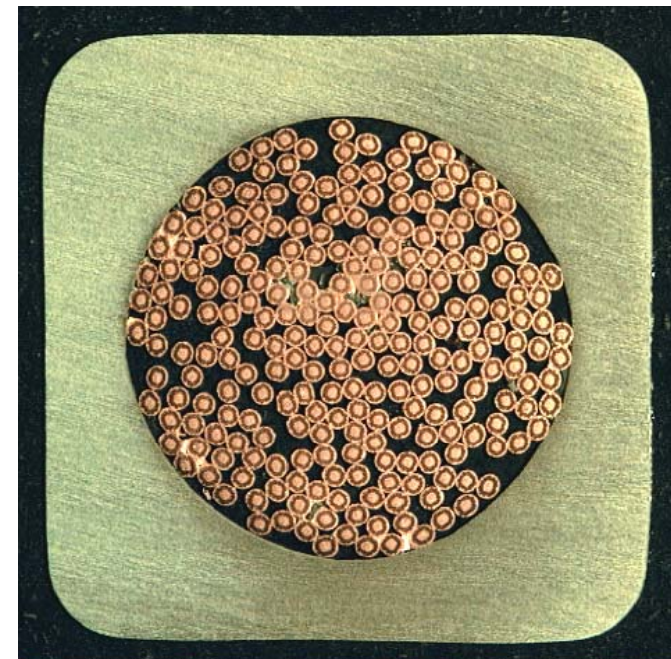


ATLAS cable

Thermonuclear Fusion SC cables



TFMC cable



W7-X cable

Superconductors development of interest for WAMSDO 2008

- NbTi fine filaments
- Nb₃Sn High Field

NbTi fine filaments – Past activities

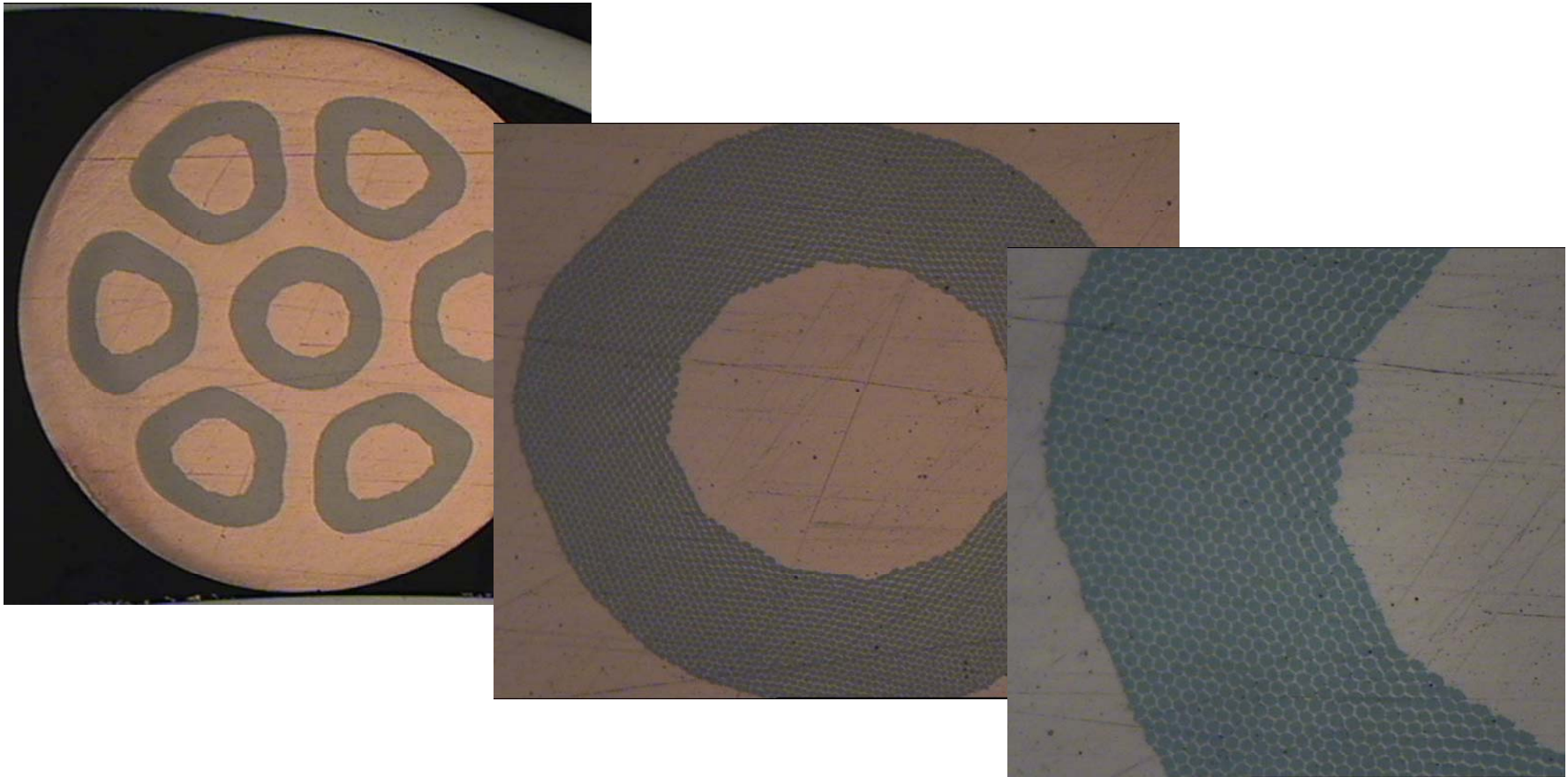
- ECOMAG 2005
- SMES wire OK3900 with CuMn matrix



OK3900	
CuMn matrix in filament area	
Cu:CuMn:Sc=1.5:0.5:1	
Number of filaments	3858
Wire diameter (mm)	0.575
Filament diameter (μm)	5.3
Matrix/Sc	2.0
Twist pitch (mm)	11
RRR	>140
I @ 5T, 4.2 K (A)	>260

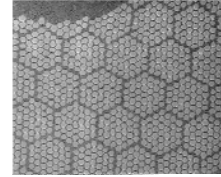
NbTi fine filaments - Past activities

- 1st assembly



NbTi fine filaments - Present activities

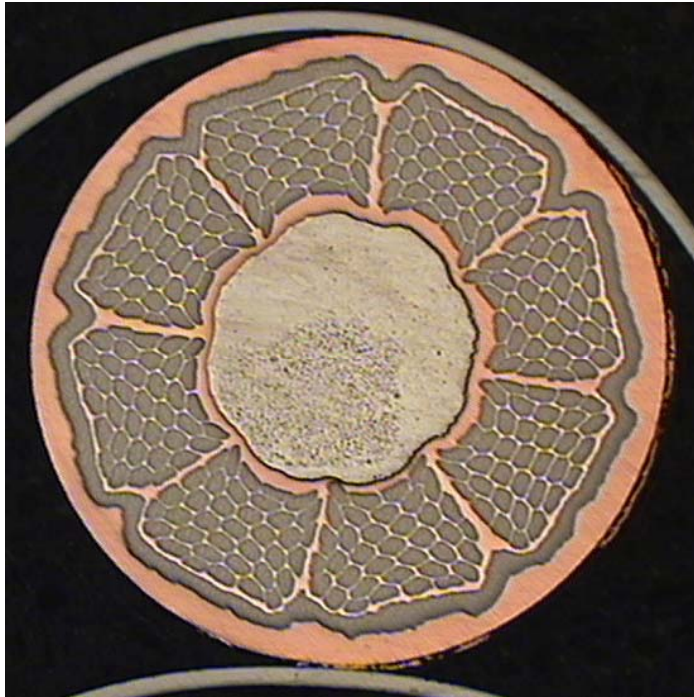
- Twisting trials on hex-cells design
t.p.: 10, 8,6,5,4,3 mm



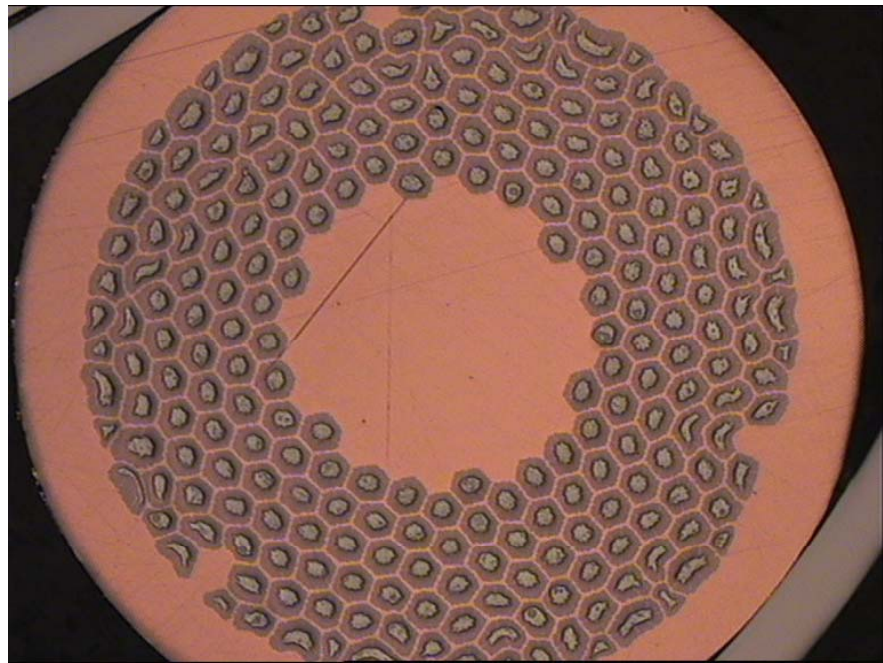
- DISCORAP contract started last March

Wire diameter (mm)	0.825 +/- 0.003
Twist pitch (mm)	5 +0.5/-0.0
Effective filament diameter (μm) – 1 st generation	3.5
Effective filament diameter (μm) – 2 nd generation	2.5
Interfilament matrix material	Cu -0.5%wt Mn
Stabilization matrix	Pure Cu
Number of filaments – 2 nd generation	> 65000
(Cu+CuMn):Sc	>1.5
n-index	>30
I @ 5T, 4.2 K (A)	>541

Nb₃Sn High Field – Past activities (NED)

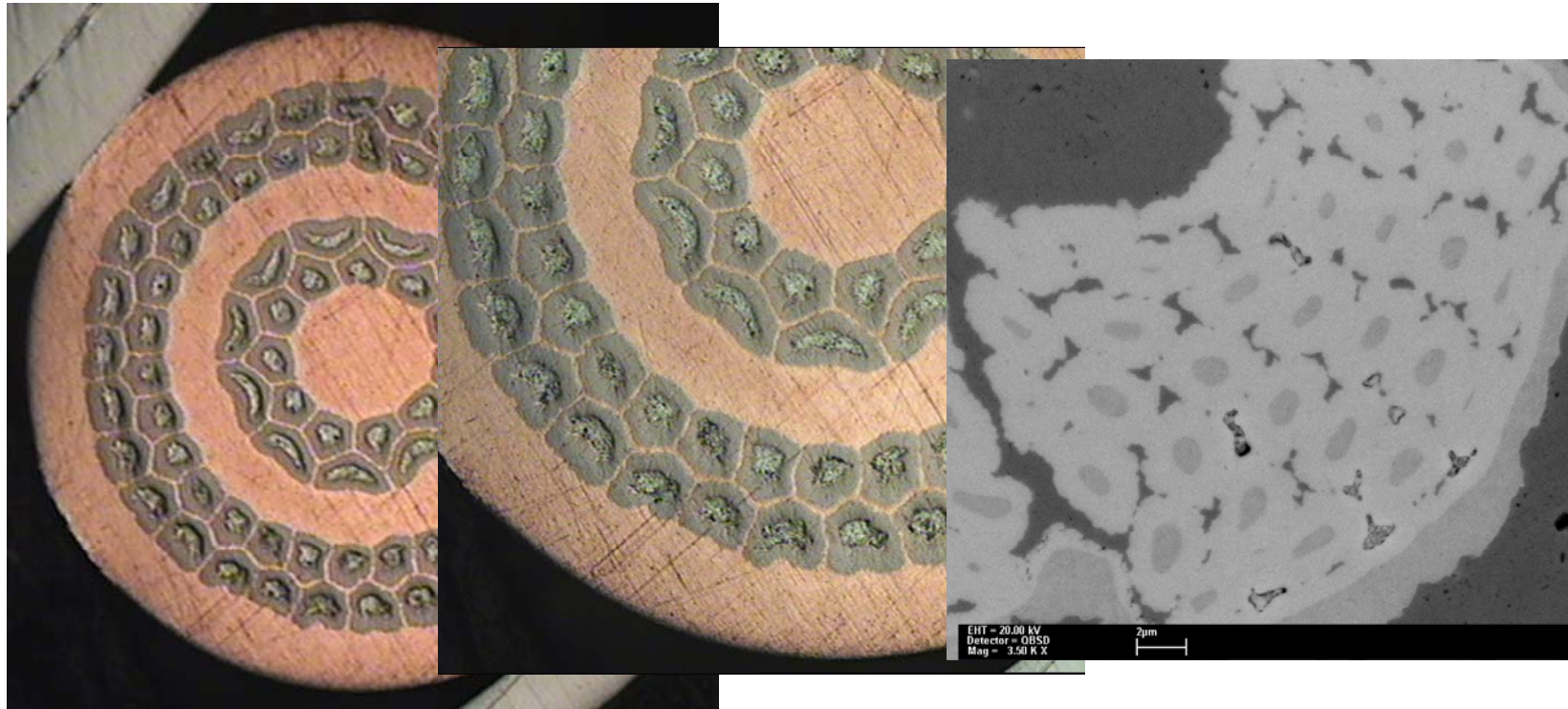


- 296 Nb filament bundle



- 252 bundles

Nb₃Sn High Field – Present activities (CANDIA)



- 296 Nb filament bundle
- 82 bundles
- > 2000 A/mm² @12T, 4.2K

Thank you.

LUVATA
Partnerships beyond metals