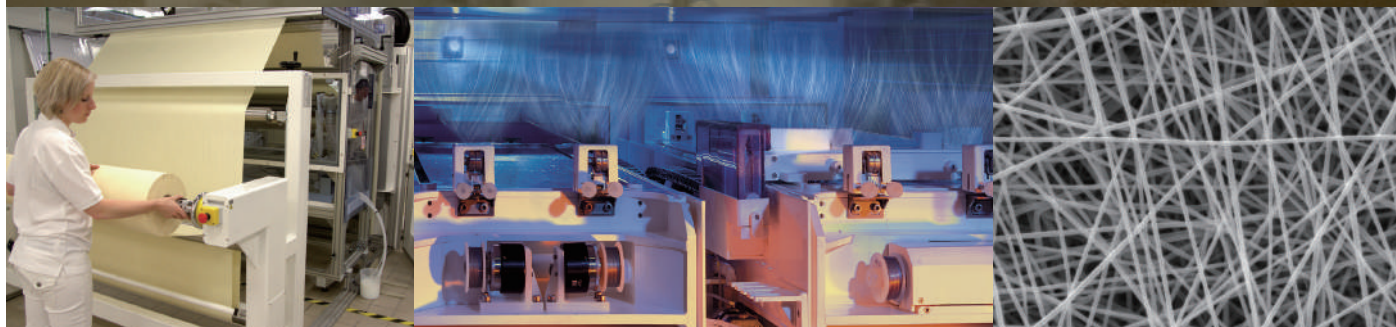


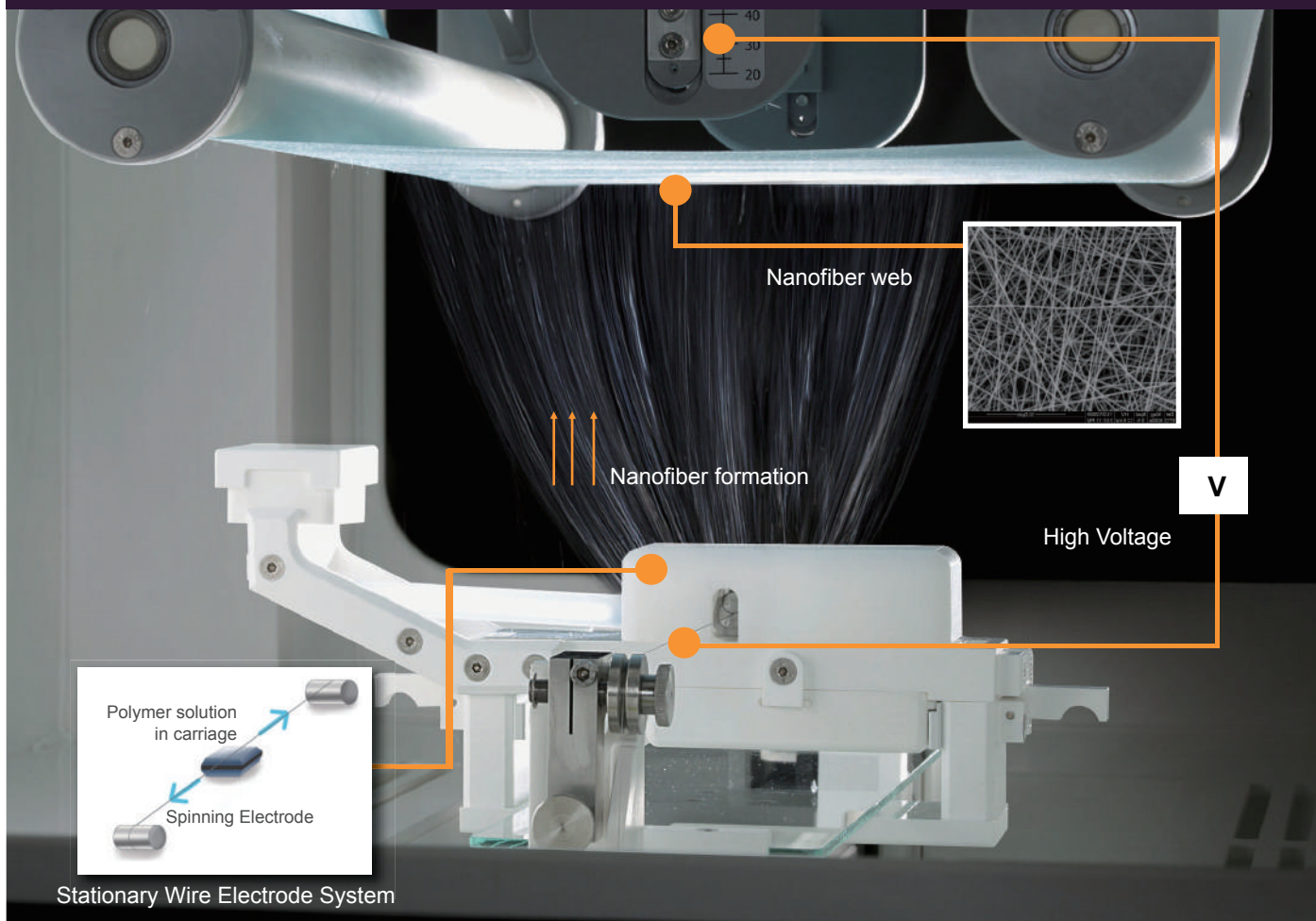
The leading manufacturer of industrial scale nanofiber production equipment

Nanospider™ for nanofiber production

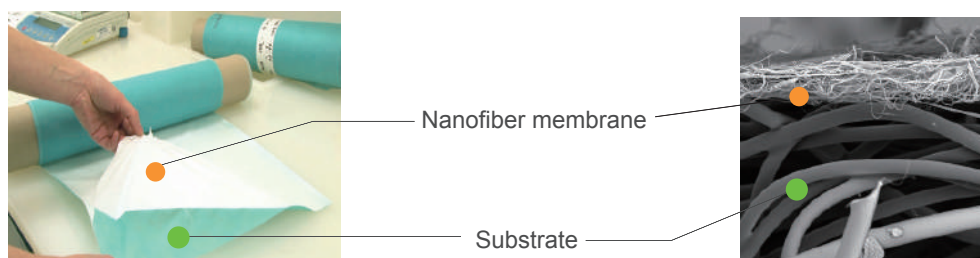


Nanospider™ Technology

- Needle-free technology of electrospinning
- Excellent web uniformity
- Superior fiber uniformity
- Higher productivity
- Easy operation
- Safety - meets CE requirements



Nanospider™ - Material Flexibility



Polymers

Organic

PA6, PA6/12
PAI, PUR
PES, PVA
PAN, PEO,
PS, PVDF,
PVP, PVP - I

Inorganic

TiO₂
SiO₂
SnO₂
WO₃
Al₂O₃
Li₄Ti₅O₁₂

Biopolymers

Gelatin
Chitosan
Collagen
PAA, PVA
PLA, PCL

Substrates

Glass
Metal
Paper
Nonwoven



Nanospider™ - Product Series



NS LAB

Basic and applied research tool

NS 1S500U

• Mid-volume production line
• Low-volume production line

NS 4S1000U

High-end research and product development tool

NS 8S1600U

High-volume production line

Nanospider™ series	NS LAB	NS 1S500U	NS 4S1000U	NS 8S1600U	NS 8S1600U x 4 units
Nanofiber coating width (m)	0.3 m	0.5 m	1.0 m	1.6 m	1.6 m
Number of Spinning Electrodes	1	1	4	8	32
Production Speed (m/min) *	1.1 m/min	1.7 m/min	6.8 m/min	11.0 m/min	38.0 m/min

*under the following conditions

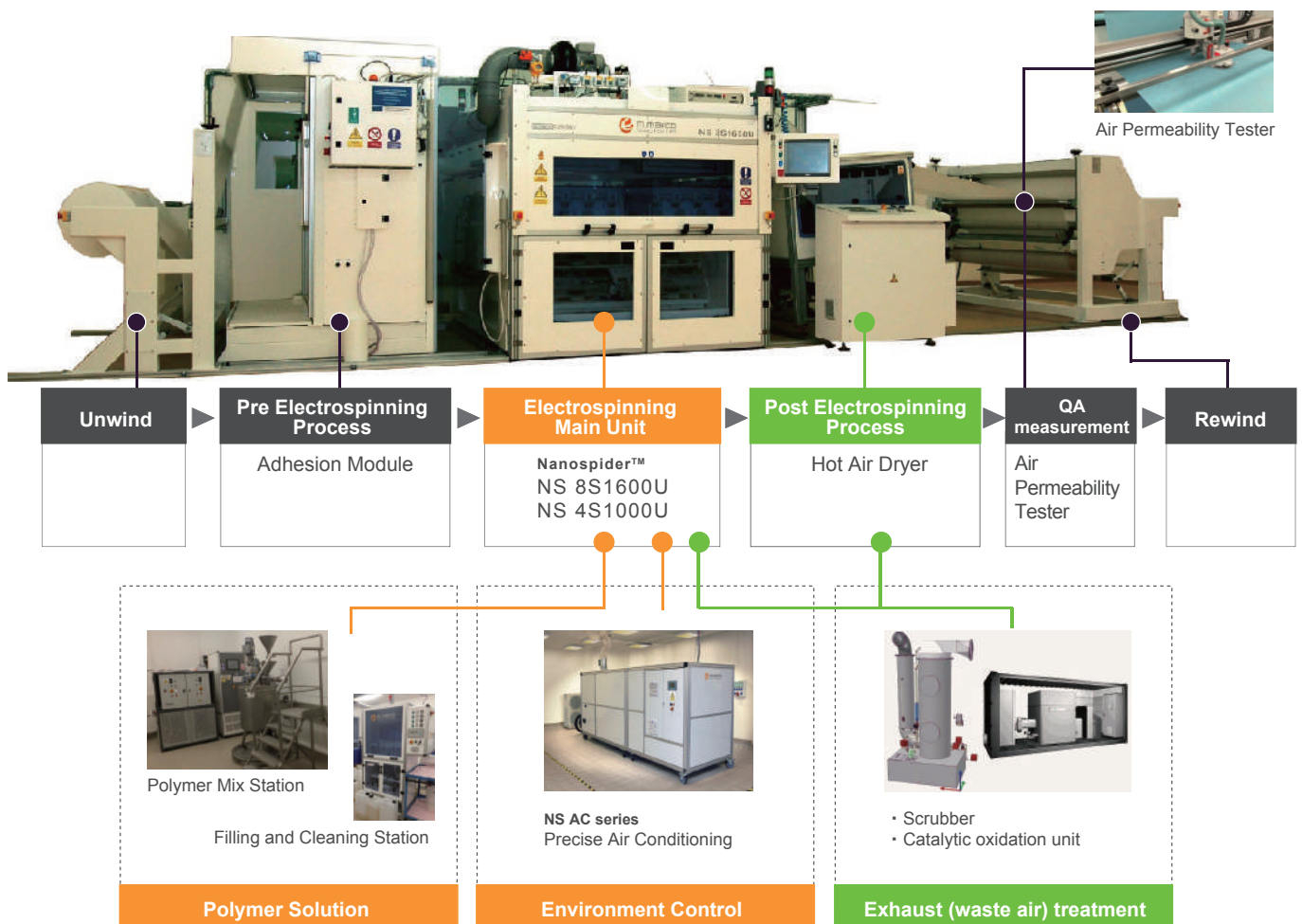
Polymer: PA6 (Nylon 6)

Substrate: PP spunbond with anti-static treatment

Basis weight: 0.1 gsm

Mean Fiber Diameter: 150 nm ± 30%

Nanospider™ - Production Line Configuration



Nanofiber Applications

Air filtration

- High efficiency HVAC filters
- Engine air intake filters
- Cabin air filters
- Cleanroom (HEPA) filters
- Vacuum cleaners
- Gas turbine air inlet filters
- Industrial dust collectors

Liquid filtration

- Drinking water purification
- Fuel and oil filtration
- Processing filtration
- Waste water treatment
- Seawater treatment

Energy

- Battery separators
- Battery electrodes
- Fuel cells

Life Science

- Wound care
- Tissue engineering
- Drug release
- Surgical drapes
- Face masks
- Cosmetics

Acoustic materials

- Transportation
- Room acoustics
- Home appliances
- Industrial equipment

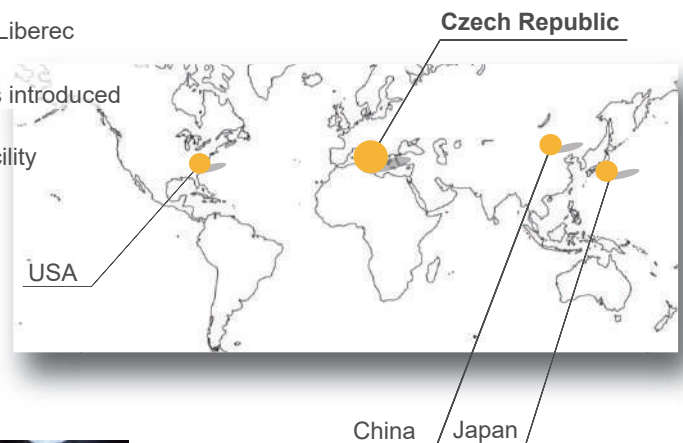
Performance apparel

- Outdoor sportswear
- Protective clothing
- Footwear



About Elmarco

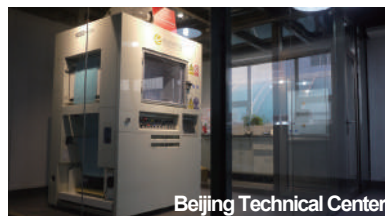
- 2000** Elmarco was founded as semiconductor wet processing equipment manufacturer in Liberec, Czech Republic
- 2004** Nanofiber division was formed
First Nanospider™ lab prototype developed for water soluble polymers
- 2005** The first Nanospider™ line for solvent based polymers was unveiled
- 2006** The first industrial Nanospider™ line was sold
- 2008** New World-class Technology Center was opened in Liberec
New offices in USA and Japan were opened
- 2010** The second generation Nanospider™ technology was introduced
- 2011** Tokyo showroom opened
First Nanospider™ line was installed in cleanroom facility
- 2014** Beijing Technical Center opened
- 2015** The 150th machine is sold
- 2017** More than 200 installations globally



Visit Elmarco in Asia



Tokyo Showroom



Beijing Technical Center

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