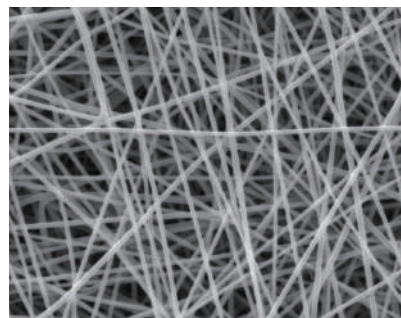
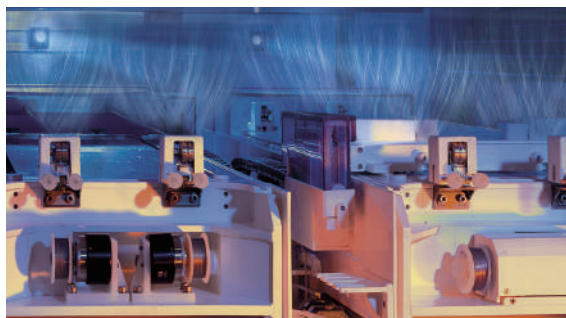


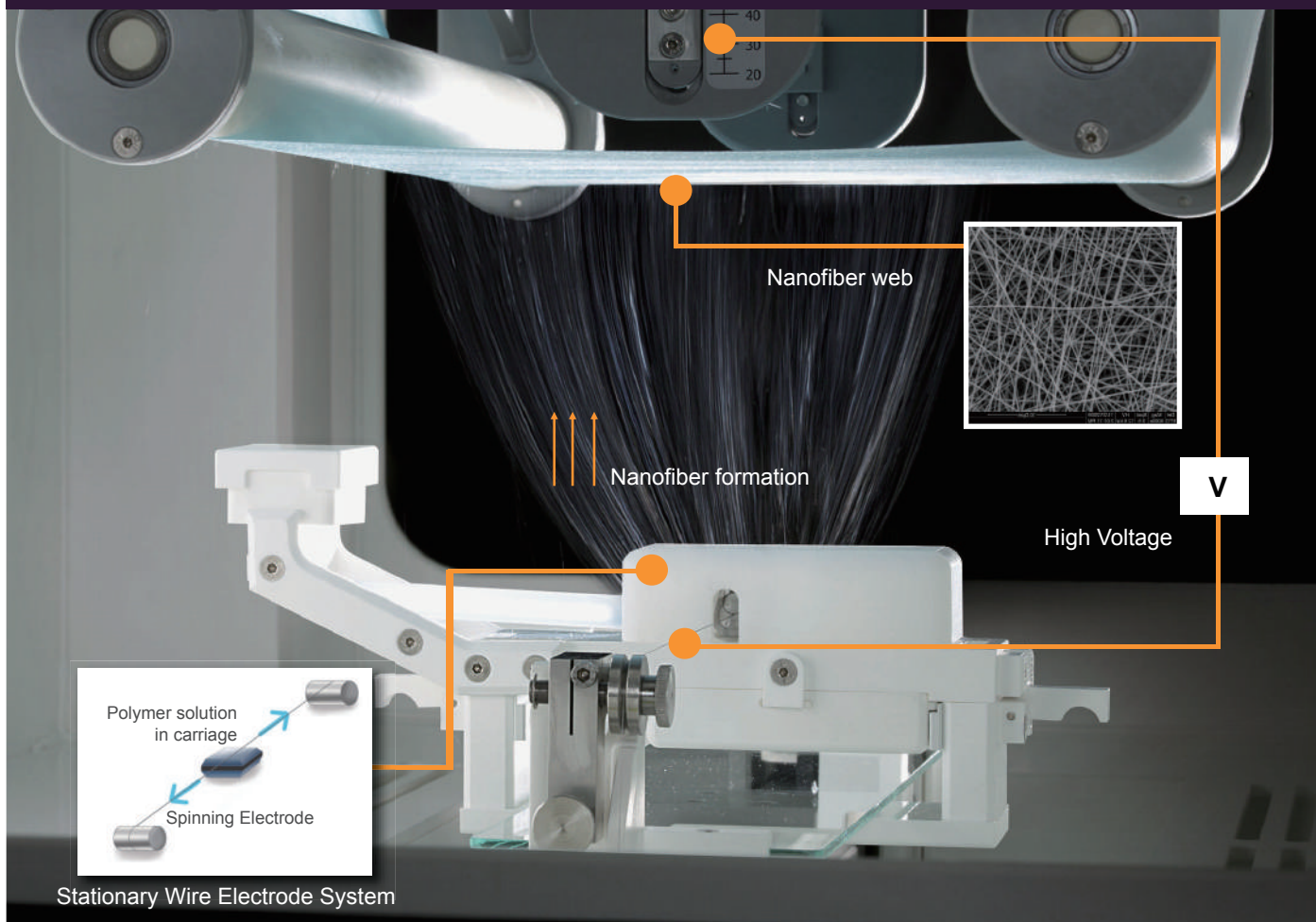
The leading manufacturer of industrial scale nanofiber production equipment

# Nanospider™ for nanofiber production

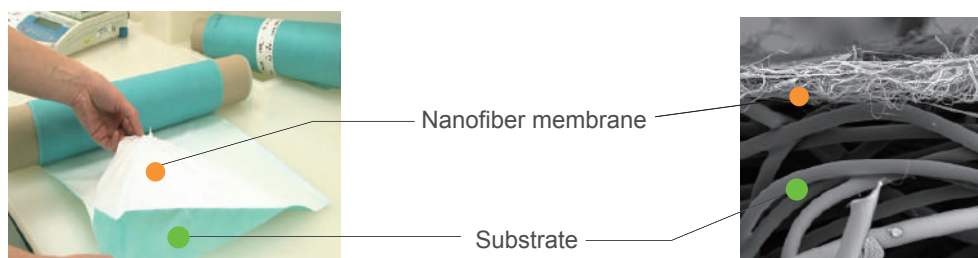


# Nanospider™ Technology

- 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

TiO<sub>2</sub>  
SiO<sub>2</sub>  
SnO<sub>2</sub>  
WO<sub>3</sub>  
Al<sub>2</sub>O<sub>3</sub>  
Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>

#### 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

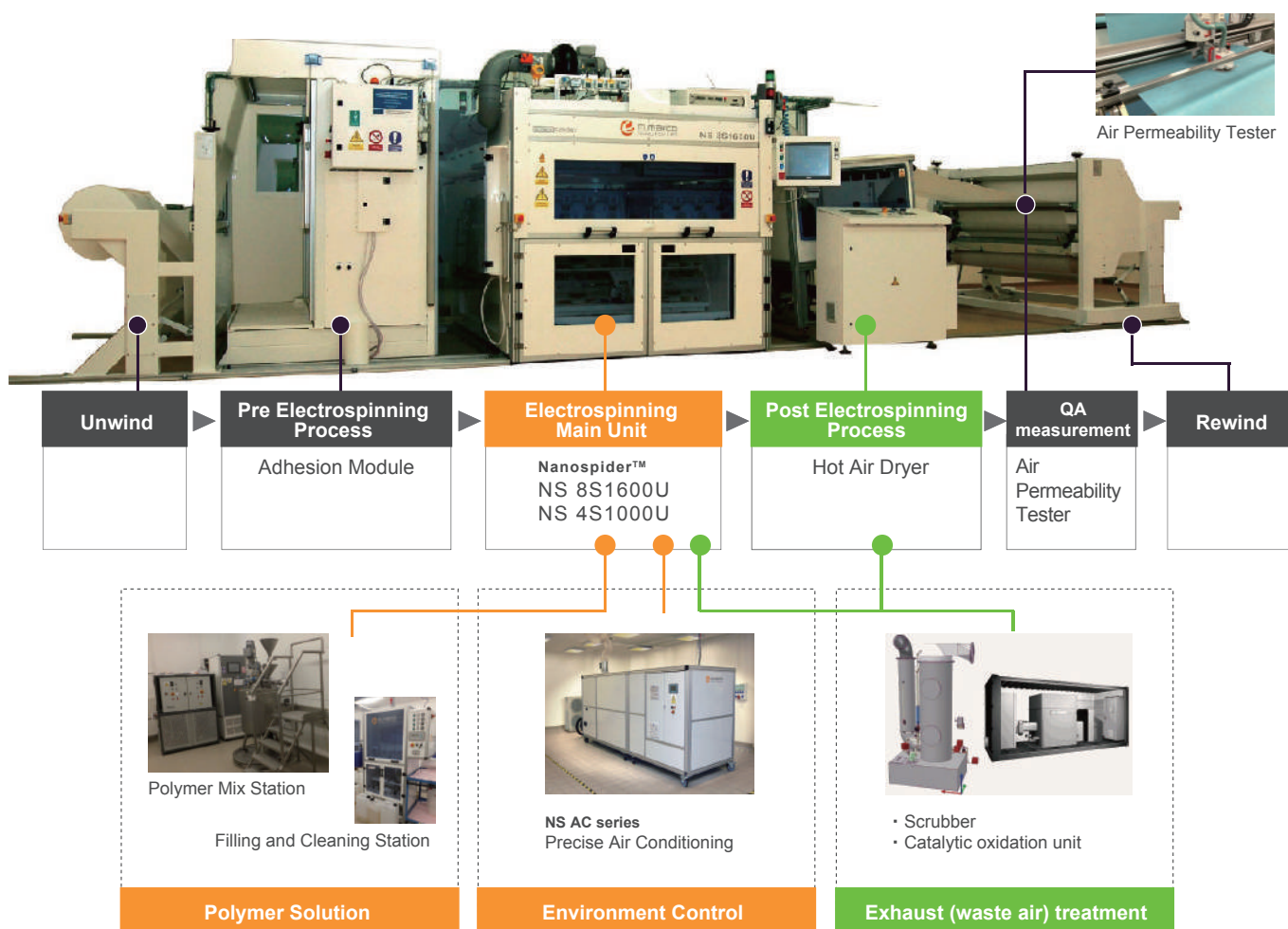
Polymer: PA6 (Nylon 6)

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

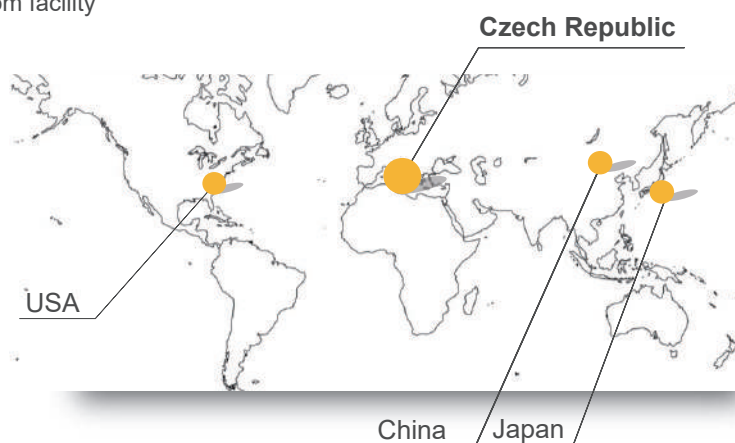
## Performance apparel

- 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



**ELMARCO**

**KAZELFA CORPORATION**

1-14-2 Renkoji Tama Tokyo 206-0021 JAPAN

Tel: +81 42 372 8860 email: sales-asia@elmarco.com

www.elmarco.com