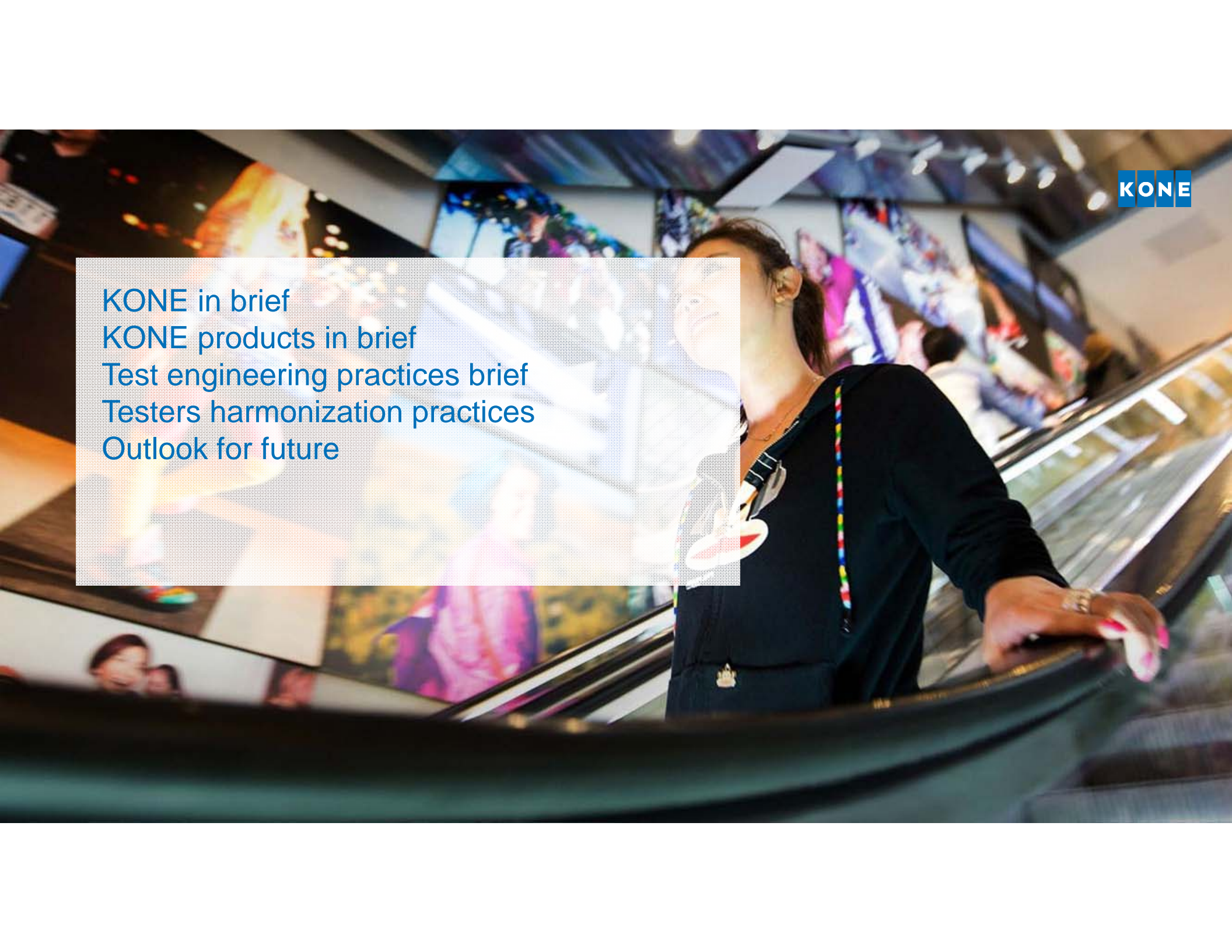


Module Functional Testing outlook

JANI ANGERVUO, COMPONENT MANAGER, QUALITY ASSURANCE TOOLS
NORDIC TEST FORUM 2017

The background of the slide is a photograph of a woman with dark hair tied back, wearing a black zip-up hoodie and a colorful lanyard. She is standing on an escalator, looking upwards and to the right with a slight smile. The escalator is moving upwards. The background is slightly blurred, showing other people and the interior of a modern building with large windows and colorful lighting.

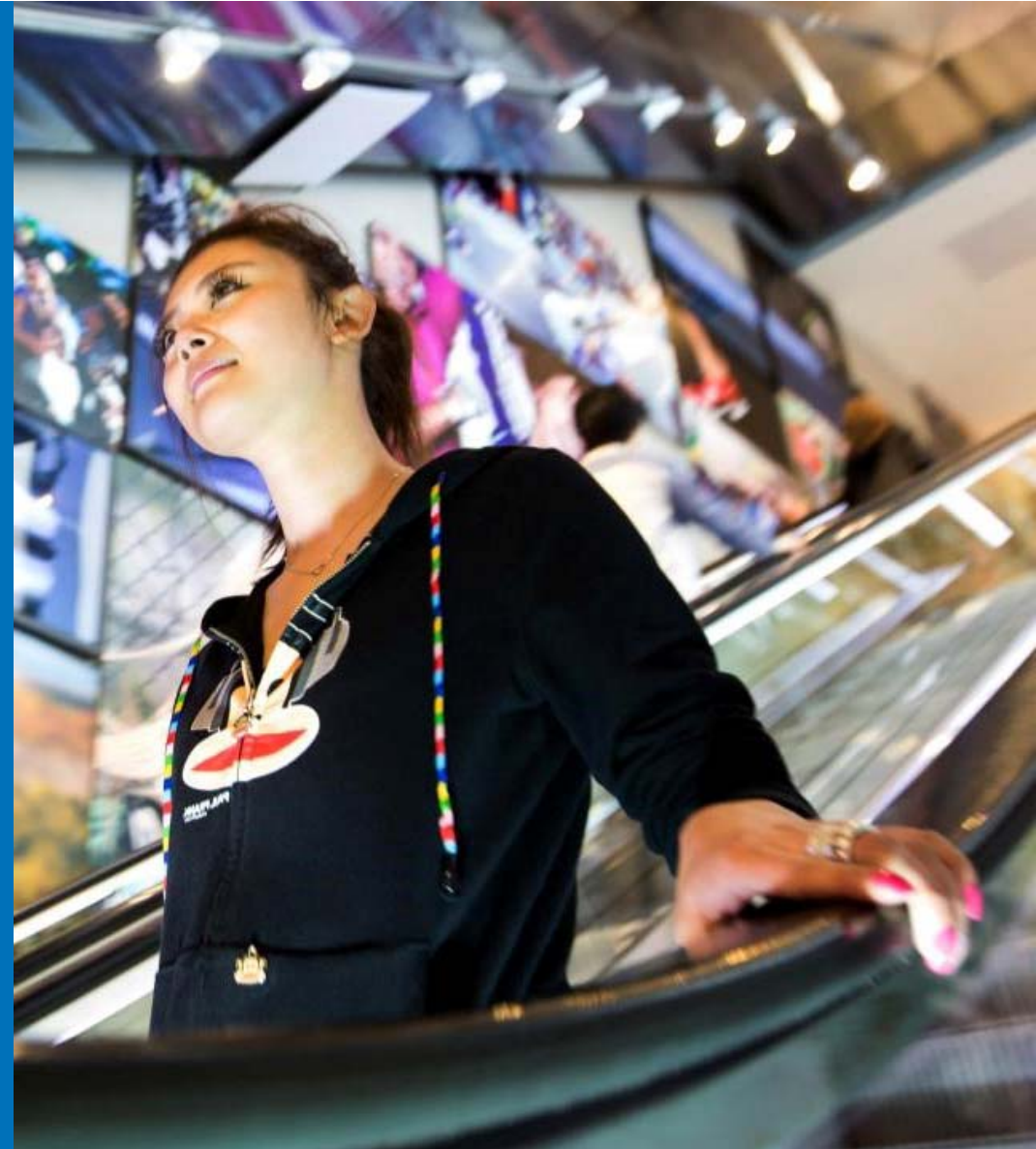
KONE in brief
KONE products in brief
Test engineering practices brief
Testers harmonization practices
Outlook for future

More than 100 years in business



KONE today

- KONE is a global leader in the elevator and escalator industry. We are here to make cities better places to live
- We provide value for our customers at every step of the way for the entire lifespan of a building
- We offer innovative and sustainable new equipment solutions, ensure the safety and availability of equipment in operation and offer modernization solutions for aging equipment
- Founded in Finland in 1910
- Over 52,000 employees
- 450,000 customers
- Net sales EUR 8.8 billion in 2016
- Listed on the NASDAQ Helsinki since 1967



KONE has a broad global coverage: we have our own operations in more than 60 countries



MEGATRENDS

URBANIZATION

TECHNOLOGICAL
DISRUPTION

OUR MISSION
IS TO IMPROVE
THE FLOW OF
URBAN LIFE

WAYS TO WIN

CULTURE



VISION

KONE DELIVERS THE BEST
PEOPLE FLOW® EXPERIENCE

STRATEGIC TARGETS

- Most loyal customers
- Great place to work
- Faster than market growth
- Best financial development
- Leader in sustainability

WINNING WITH CUSTOMERS

Collaborative innovation
and new competencies



Customer-centric
solutions and services



True service
mindset



Fast and smart
execution



SAFETY

QUALITY

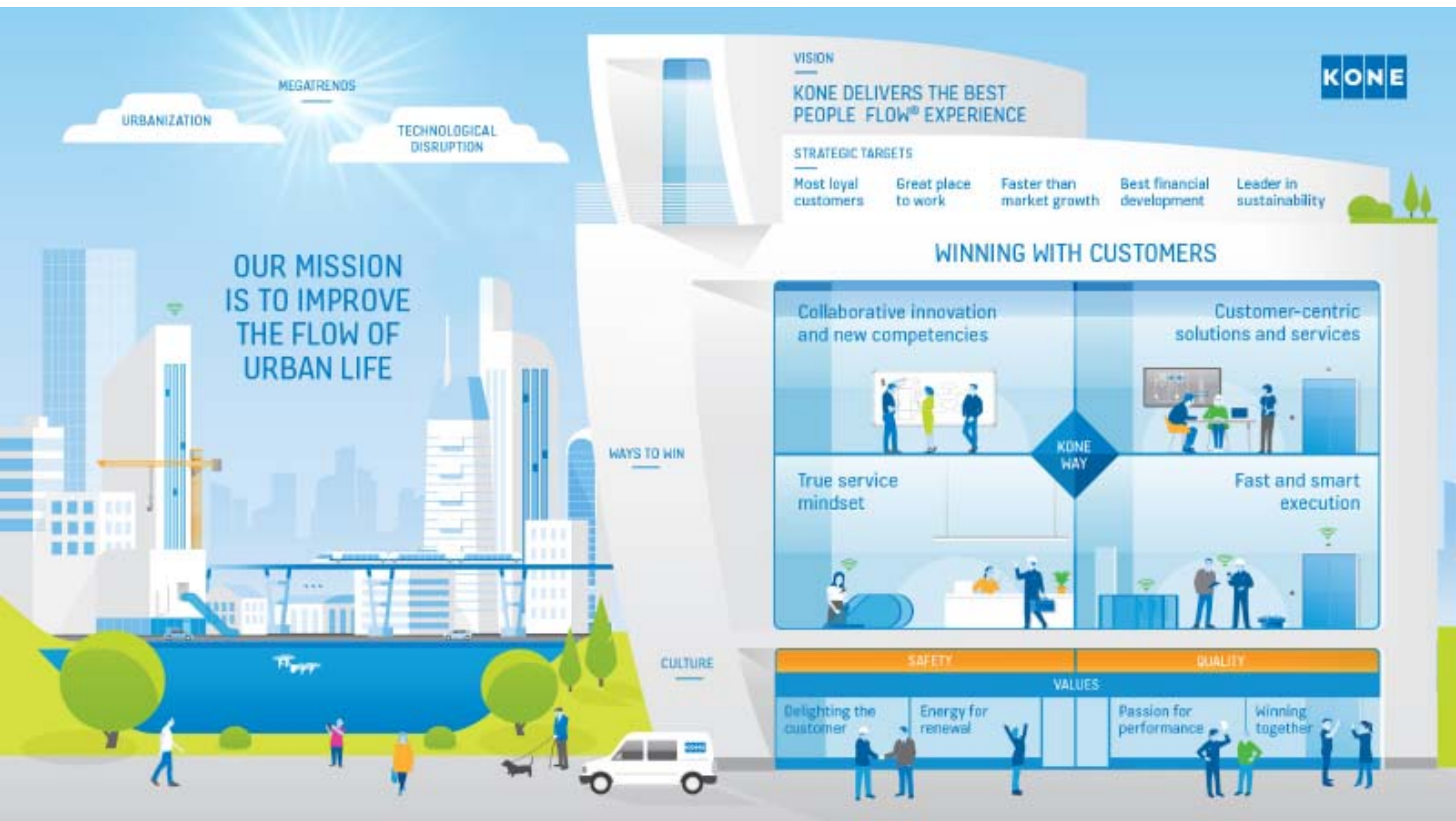
VALUES

Delighting the
customer

Energy for
renewal

Passion for
performance

Winning
together





KONE

KONE

joined forces with

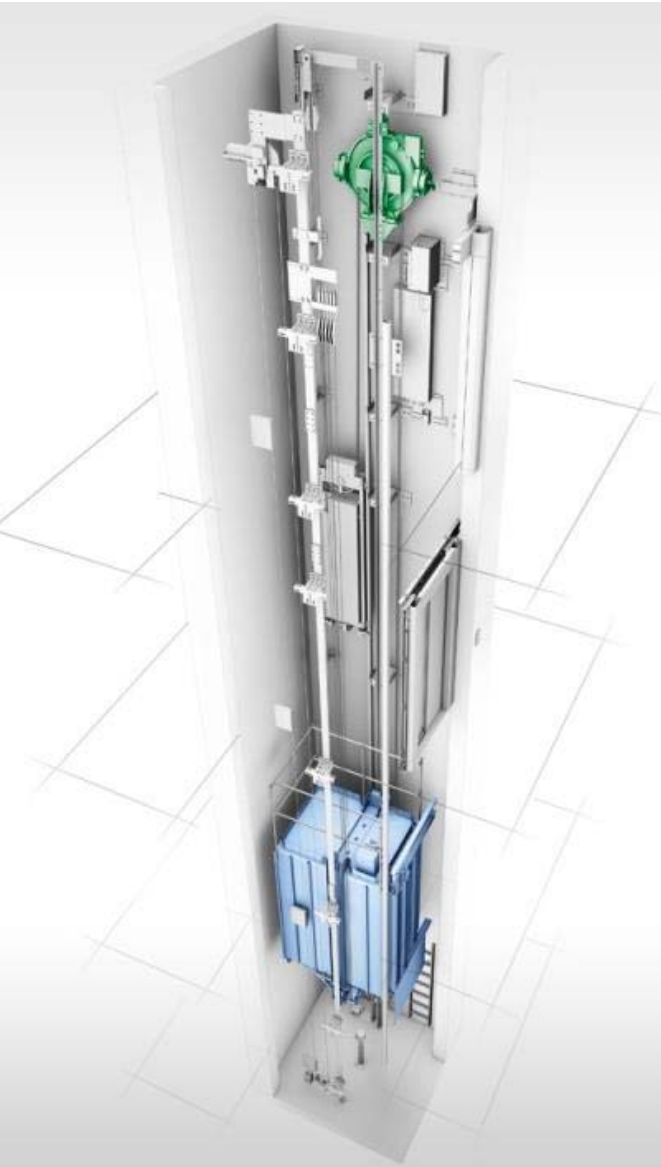
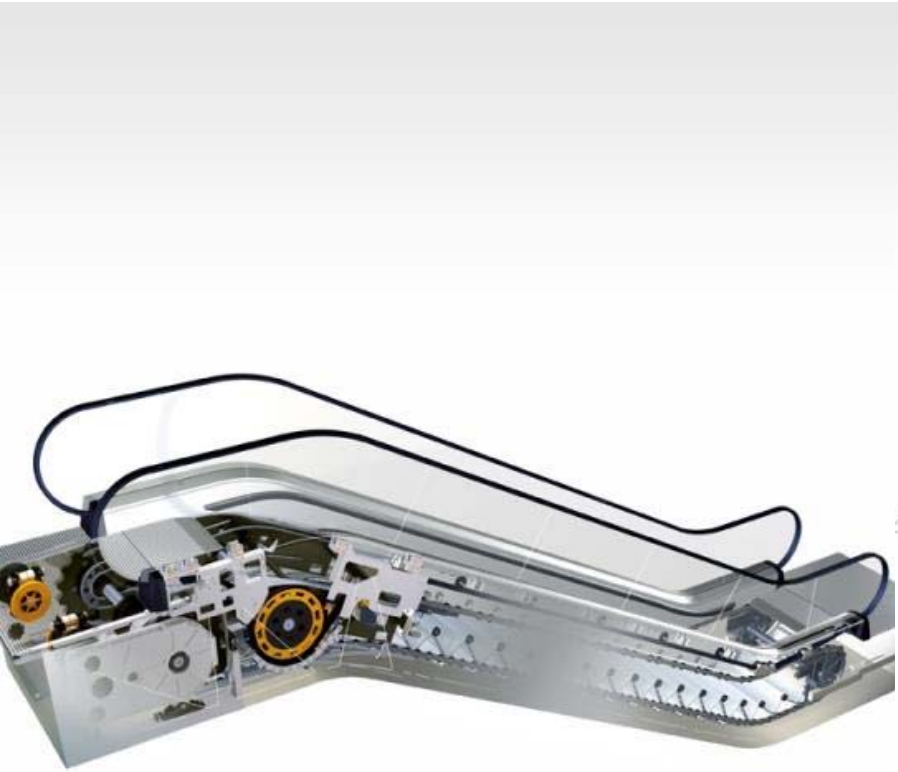
IBM



With
Watson

The image is a composite of two aerial cityscape photographs. The left half is a halftone (dotted) version of a city skyline, with the sun low on the horizon creating a bright, hazy glow. The right half is a clear, high-angle photograph of a dense urban area, likely New York City, showing a grid of streets and numerous skyscrapers under a clear sky. The text 'KONE Products in brief' is overlaid on the bottom left of the halftone image.

KONE Products in brief



KONE test engineering
practices brief



Test engineering practices



Test Technology	Design with Test	Deploy	Financial	Organization
Test Architectures	Test Development	Operations	Asset Management	Quality
Obsolescence Planning	Standardization	Maintain	Supplier Relationship	People
Test Technologies & Architectures	System Development	Deployment Life Cycle	Business Planning	Enterprise Alignment

Originally from National Instruments:
Test Outlook / Test Leadership forum

KONE module testing standardization



System development Standardization



Test Software

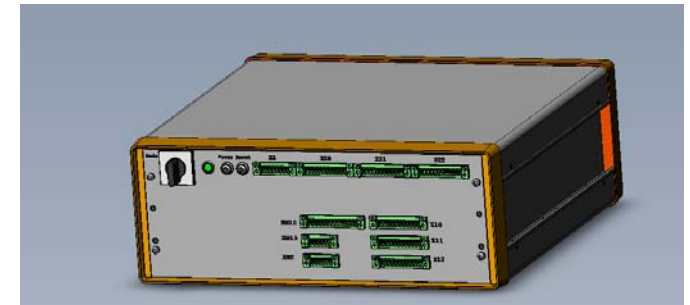
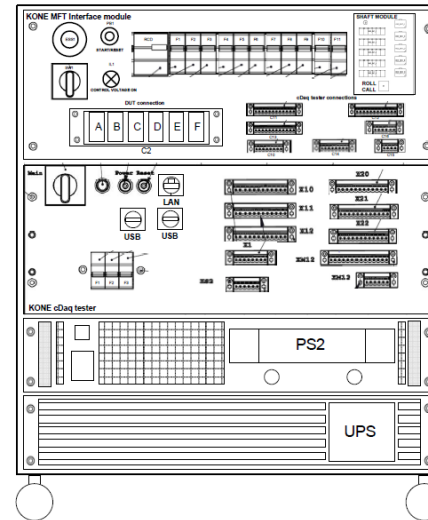
- ✓ Input data module
- ✓ Tester core
- ✓ Tester reporting and database communications

Test Hardware

- ✓ Standard interface
- ✓ Extensions possible, base is always same
- ✓ Modular units / measurement devices

Life-cycle planning

- ✓ Documentation
- ✓ Delivery chain – production testers assembly to end user
- ✓ Support for delivery chain and end users



Deployment Life Cycle Standardization



- **Better maintenance and support service**

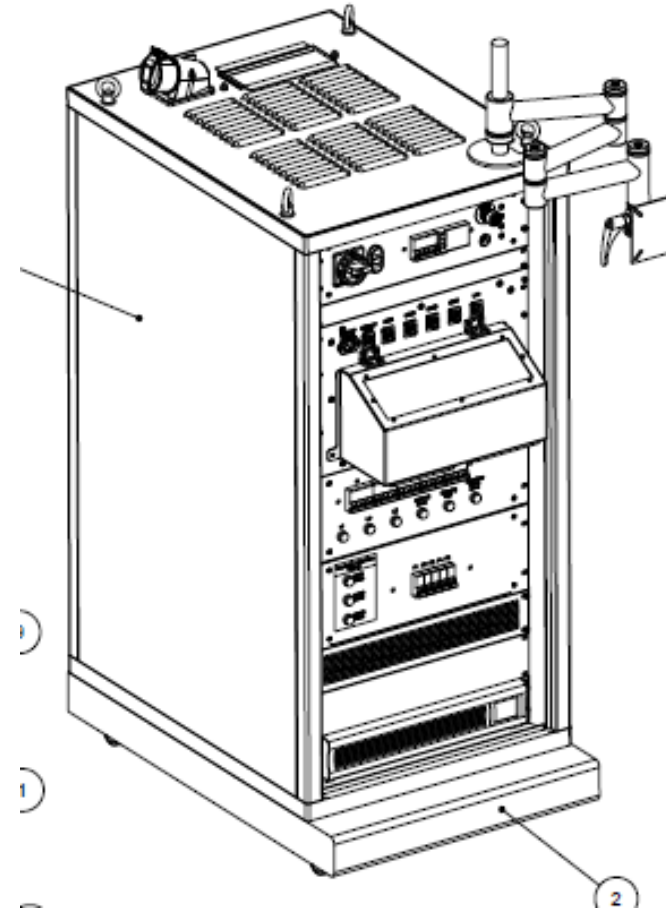
- ✓ Platform harmonization
- ✓ Automatic test sequence updates
- ✓ Checklists and planned follow-up
- ✓ Test data collection and follow-up resources
- ✓ Resources for testers maintenance and support services

- **Better and Easier data gathering**

- ✓ Test data analysis tool to implement
- ✓ Data gathering tool for testers
- ✓ Reporting to same format on all testers

- **Better utilization of tester capacity**

- ✓ Manufacturing estimation information in standard format
- ✓ Test data collection and follow-up
- ✓ Estimation and capacity calculations tool

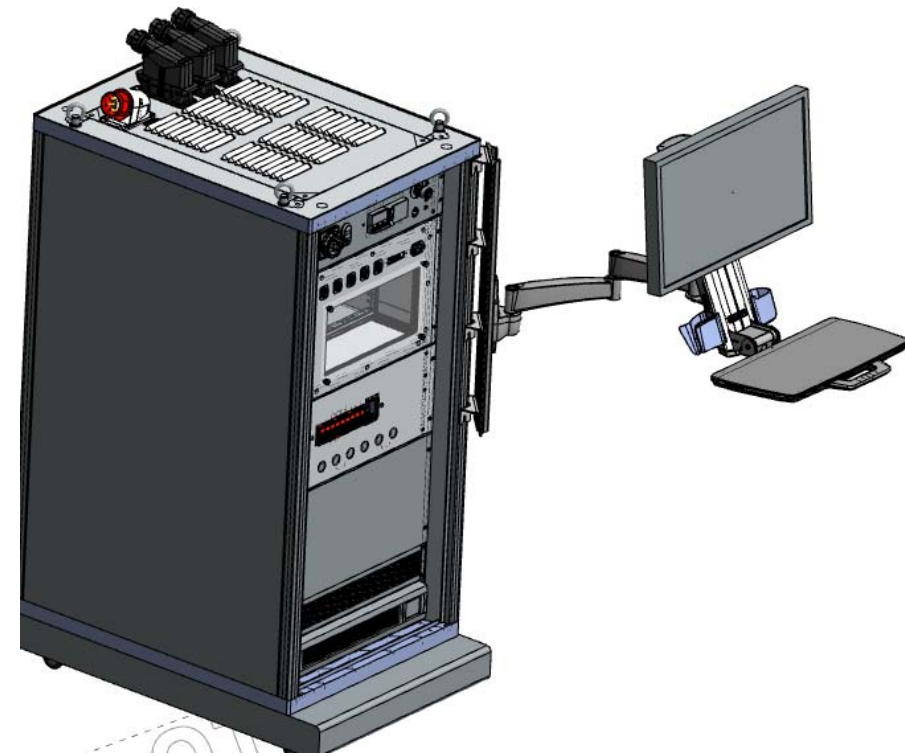


Focus areas

Standardization



- ✓ Organization
- ✓ Business planning
- ✓ Product development - Design for Testing & Manufacturing
- ✓ Test specifications
- ✓ Test hardware
- ✓ Test software
- ✓ Test development
- ✓ Documentation
- ✓ Delivery
- ✓ Maintenance
- ✓ Support
- ✓ Data collection and analysis
- ✓ Re-use



Production testing outlook



System development

Outlook for future of production testing

- **Robotics & Machine vision for modules testing**
 - Human Robotics Collaboration
 - Automatic checking of visual outlook
 - Camera + 3D imaging / scanning
- **Data collection and comparison for life-cycle of product**
 - Harvesting production testing data and comparing to field data/field returns
 - Test limits adjusting according to returned material analysis
- **Connectivity**
 - Data security
 - Securing products
 - Cloud systems
 - Automatic test softwares update to production lines
- **PCM for testers and tester softwares management**
 - Testers as products with life cycle management
 - Test stations as measurement devices with calibration
- **Testing the assembly**
 - To prove assembly is made correctly, separate more from R&D
 - Product interfaces in specification
 - Testing in semifinished modules in the assembly

An aerial photograph of a city highway interchange. The highway has multiple lanes and is filled with cars. In the background, there is a dense urban skyline with many skyscrapers. The sky is blue with some clouds. The lighting suggests it might be late afternoon or early morning.

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