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塑造智慧变革

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

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XX, September, 2018

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- History of first's:
  - TC1 – First recording total station – WILD Tachymat
  - DISTOMAT DI4 – The world's smallest mounted distance meter
  - TC2000 – World premiere of the computerized theodolite
  - WM101 – First civil high-precision GPS system

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- History of first's:
  - First coaxial relflectorless EDM
    - First 0.5" total station
      - First SmartStation – combining total station and GNSS
        - First MultiStation – combining total station, scanning, imaging and GNSS

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- History of first's:
  - First future proof GNSS system
  - The fastest robotic imaging total station
  - First self-learning total station
  - First GNSS tilt pole - Immune to magnetic disturbances and calibration-free

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- The world's first self-learning total station (TS16 & TS60) and MultiStation (MS60)
  - Incredible automation
  - Featuring ATRplus

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- What's self-learning?
  - Environmental conditions are continually monitored and learnt ...
  - Sun
  - Rain
  - Clouds
  - Dust
  - Poor visibility
  - Good visibility

Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- What's self-learning?
  - Foreign reflections are recognised and ignored ...
  - Shinny surfaces
  - Bright lights
  - Reflective vests





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- What's self-learning?
  - The range is learnt…
  - Close to the instrument,
  - Far away,
  - Anywhere in between

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- What's self-learning?
  - The dynamics of the target are learnt…
  - Static,
  - Highly dynamic,
  - Anywhere in between

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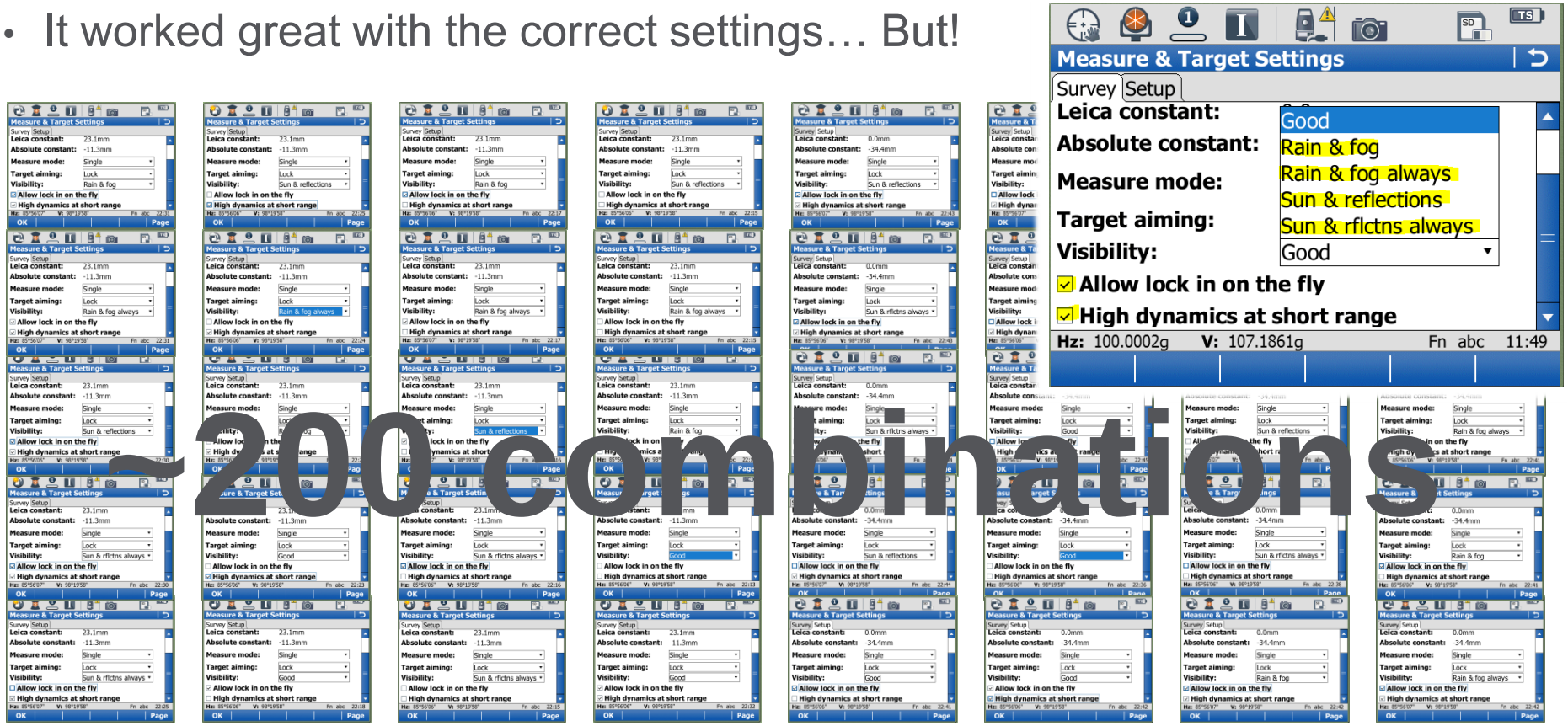
- What's self-learning?
  - It worked great with the correct settings… But!



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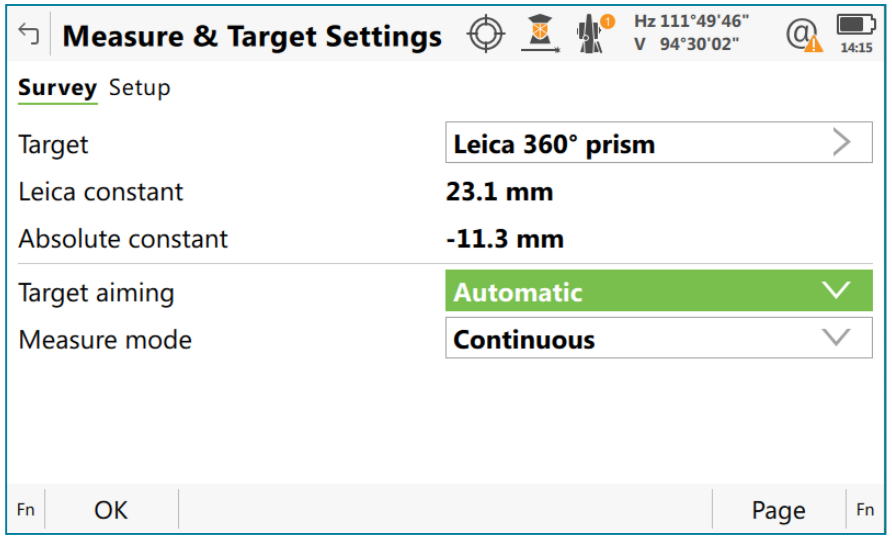
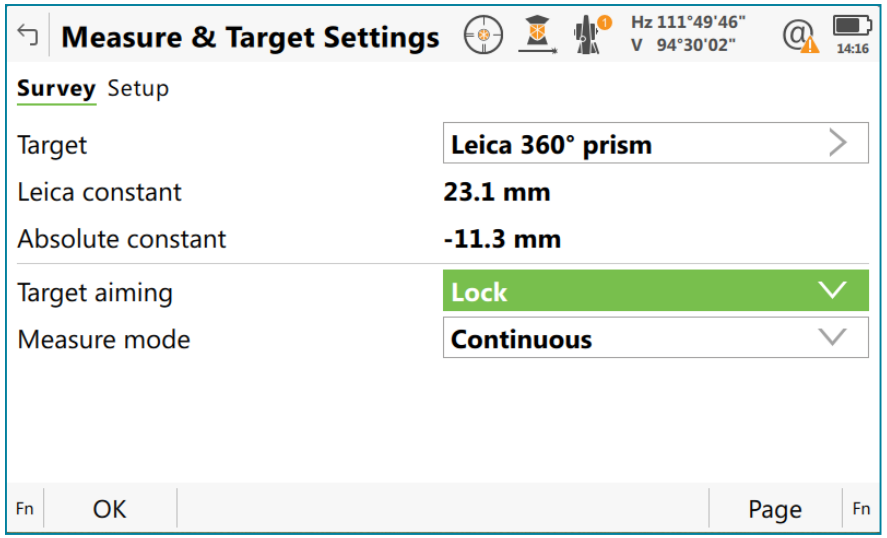
- What's self-learning?
  - Now with Leica Captivate and self-learning, it always works… with only one setting!





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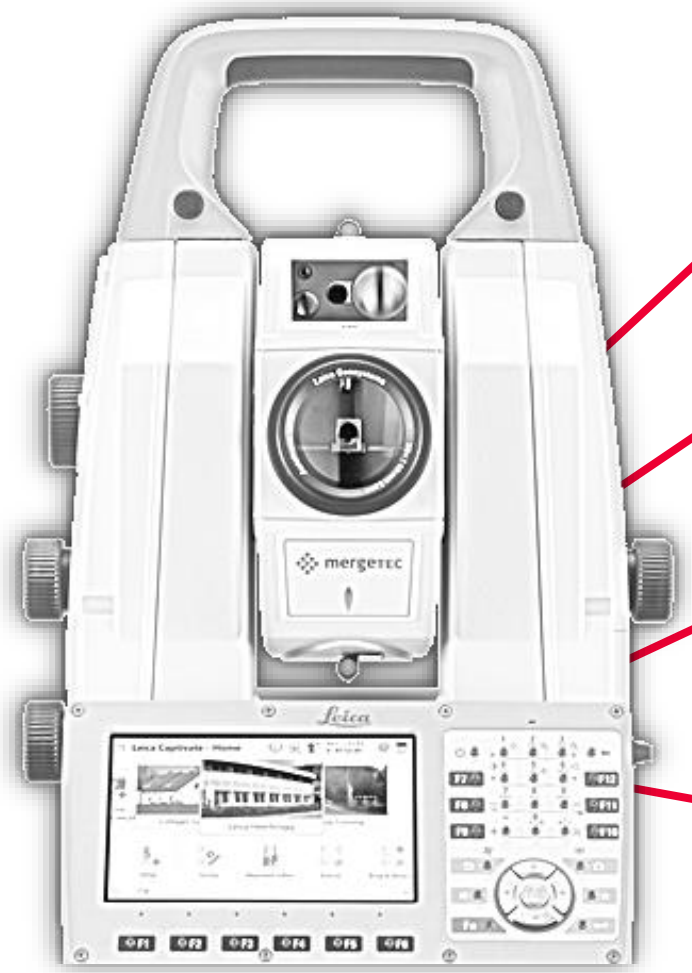
Leica TPS & GNSS technology – leading yesterday, today and tomorrow

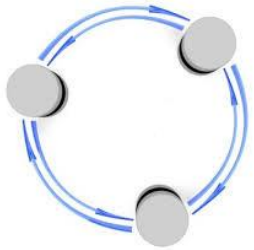
- How we created new self-learning automation



- New fast OMAP4 (4430) dual core processor (1GHz)

- Extended Memory 1GB Memory (RAM)

- New clever algorithms



- Excellent sensor synchronization

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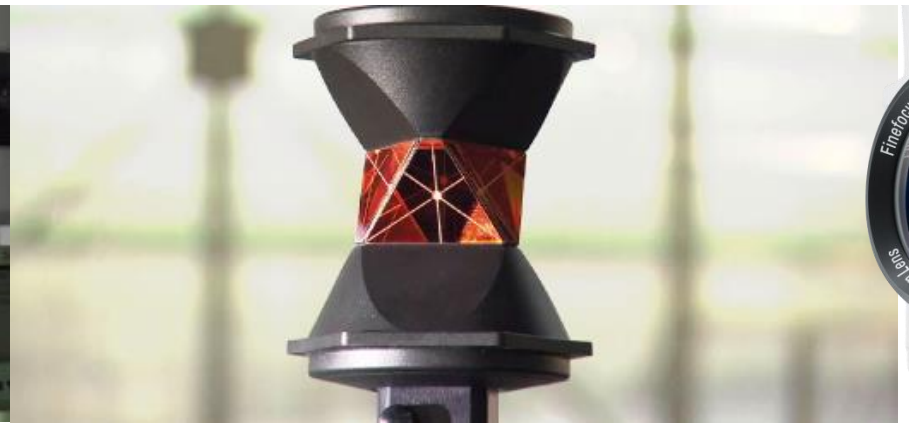
- Lots and lots of testing in all conditions!!

Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- ATRplus – Aiming & Locking cycle

Aiming → **Locking**

Initial PowerSearch | **Lock** | **Re-Lock**



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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- The world’s first Self-learning total stations

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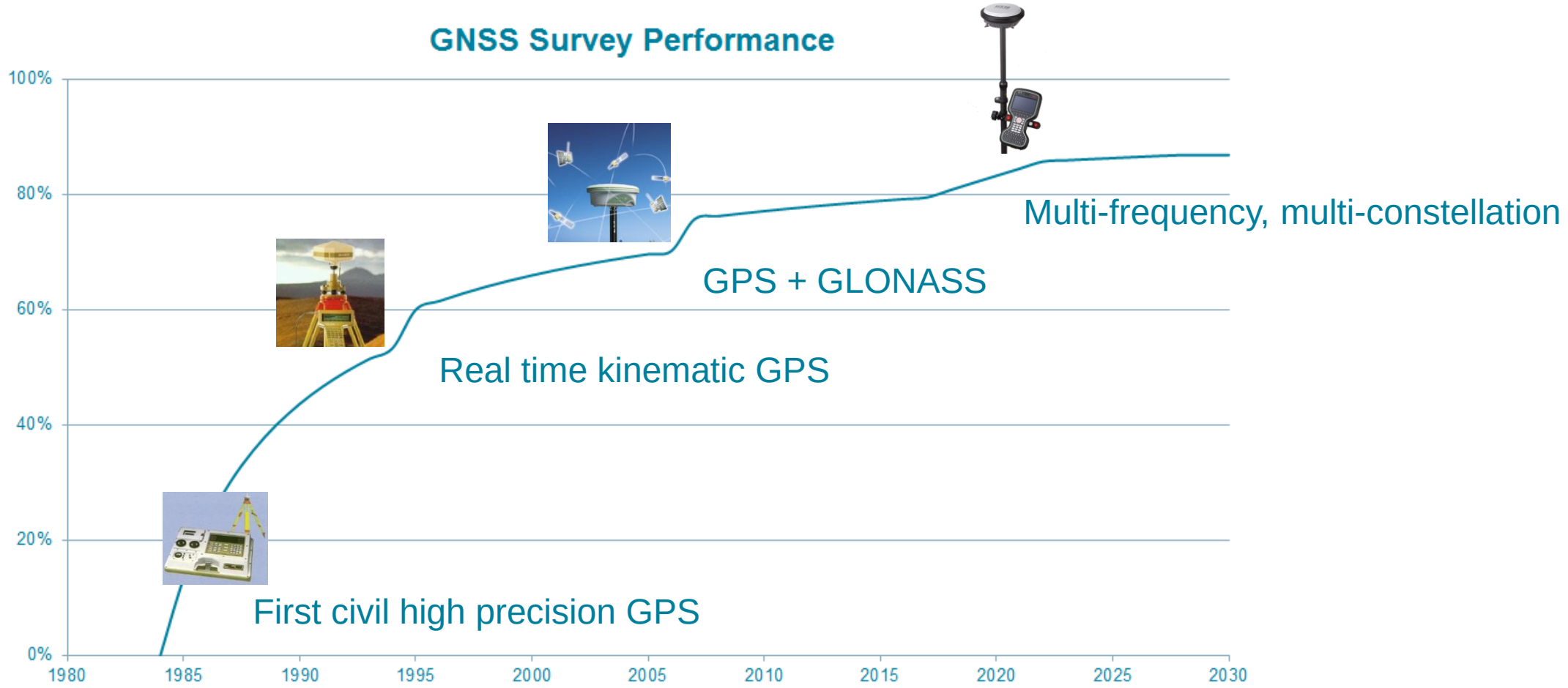
Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- GPS/GNSS Development and Milestones



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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- GNSS modernisation is highly dynamic, which requires a flexible and sustainable strategy.

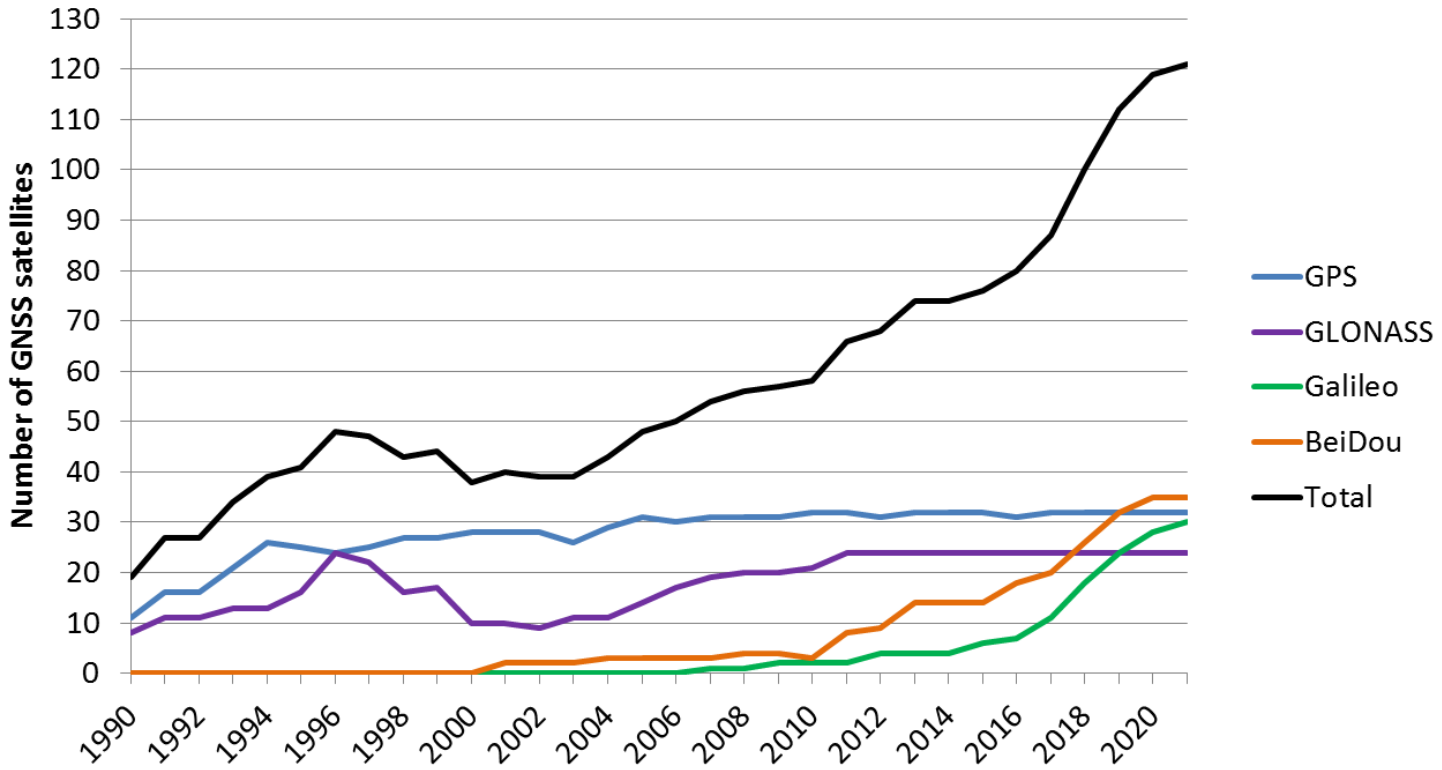
- In 2006 Leica Geosystems introduced the Future Proof concept.
  - Leica Geosystems is the only manufacturer that provides a drop-in replacement of the GNSS engine if needed.
  - Signal structures are subject to change.
  - A new GNSS engine is required if the signal structure changes.
  - Our GNSS cards always have the same footprint, the same fixing and the same connections.

- In order to take full benefit from GNSS modernisation, a high channel count is needed.

Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- A high channel count is needed due to
  - Rapidly increasing number of GNSS satellites

About 100 satellites are usable in 2018



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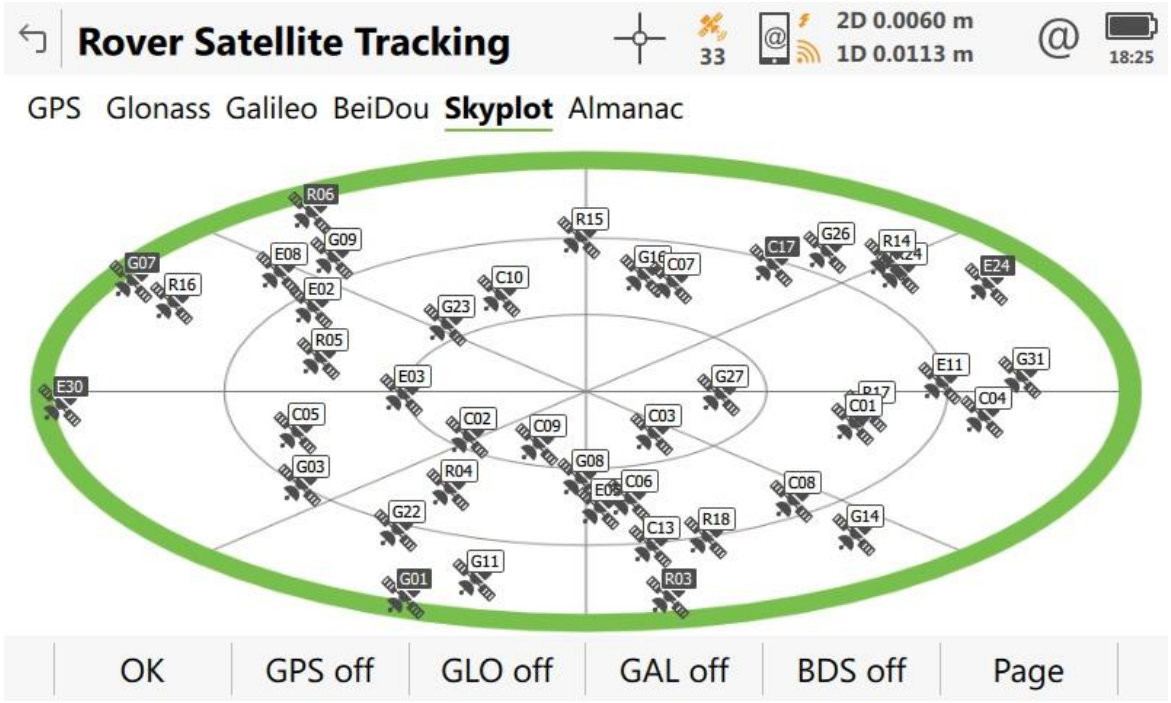
- A high channel count is needed due to a large number of available satellites
  - Example of GNSS satellites used for RTK positing



Location: Bangkok

Date: 2018-01-11

Open sky condition

GPS+GLO+GAL+BDS

Cut-off angle: 10˚

33 satellites used for RTK fixed solutions

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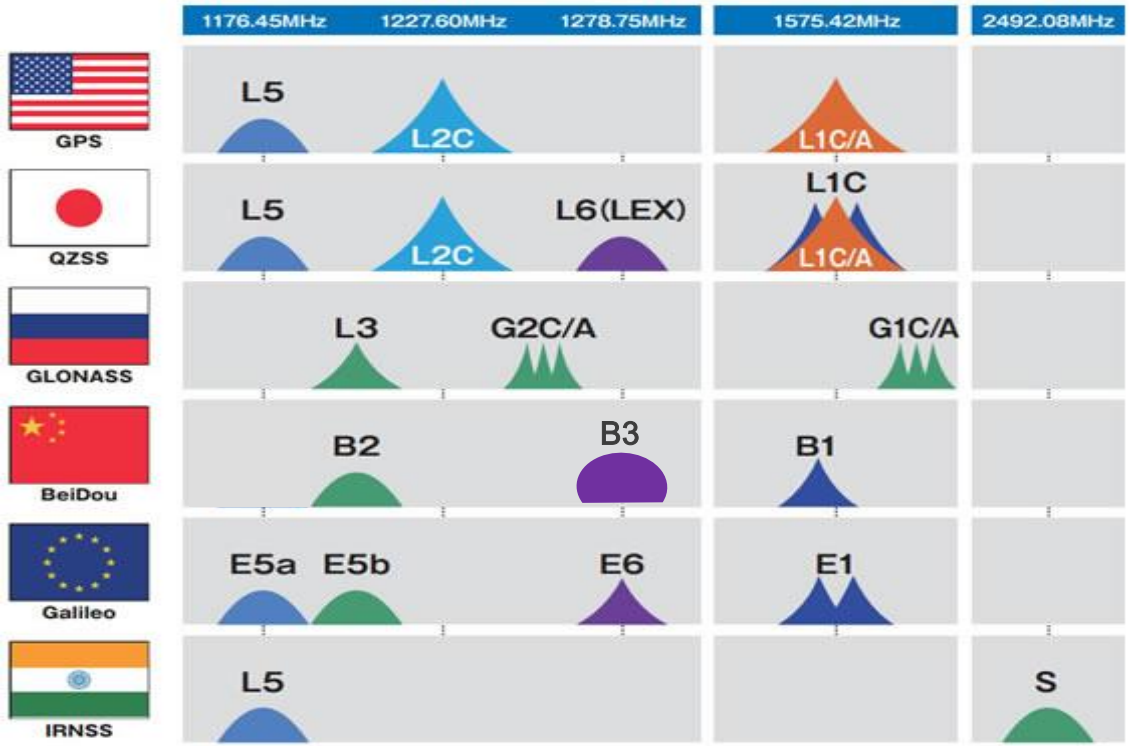
- A high channel count is needed due to
  - Availability and usability of multi-frequency GNSS signals



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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- The latest generation of GNSS engine in GS10, GS15, GS16, GS18 T and GS25 tracks all existing and future planned GNSS signals:
  - A high channel count of 555
  - Improved signal acquisition speed and sensitivity

- Leica Future Proof is the best modernisation strategy since it accounts for the highly dynamic changes of GNSS and fulfils customer needs:
  - Latest equipment that tracks all available signals today and tomorrow
  - Latest equipment that keeps its value (secured investment)
  - Top performance

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- How we created new Self-learning GNSS
  - Smart and adaptive selection of signals (RTKplus)
  - Smart use of RTK corrections (SmartNet) and PPP corrections (SmartLink)

RTKplus

HxGN SmartNet

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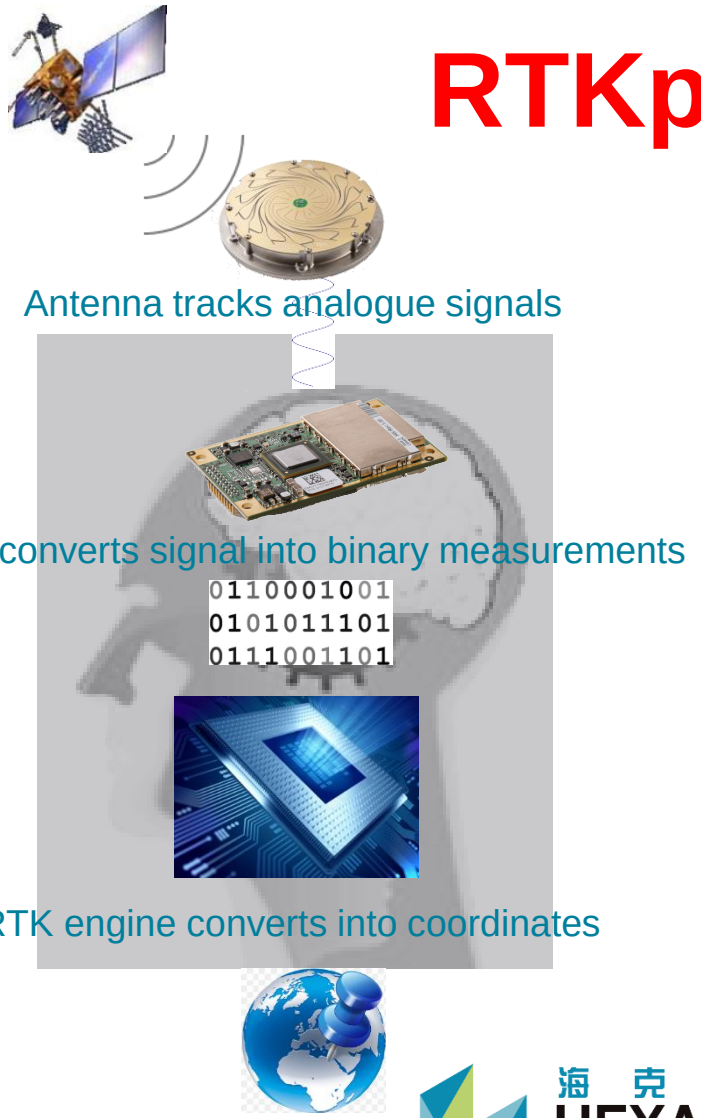
- What's RTKplus?
  - A marketing buzzword with a lot behind
  - Like RTK but better
  - The intelligent use of all signals of all GNSS systems
  - A powerful 555 channel measurement engine (ME7) tracking all signals
  - New engines working in harmony
  - Ensuring a certain future
  - Another milestone of high precision GNSS technology



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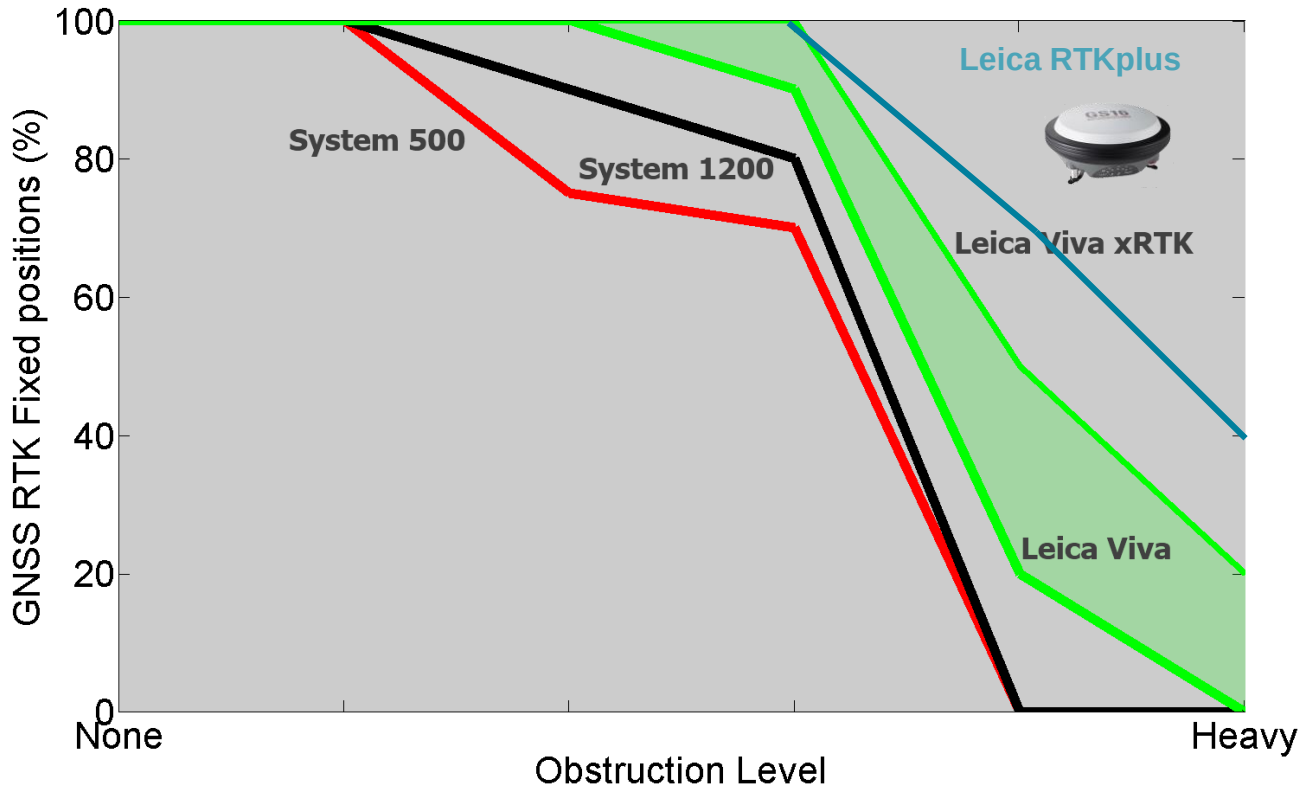
- RTKplus pushes the boundaries in performance



Leica Viva RTKplus

2016 -

Leica Viva

2009 - 2016

GPS1200

2004 - 2009

GPS500

1999 - 2004

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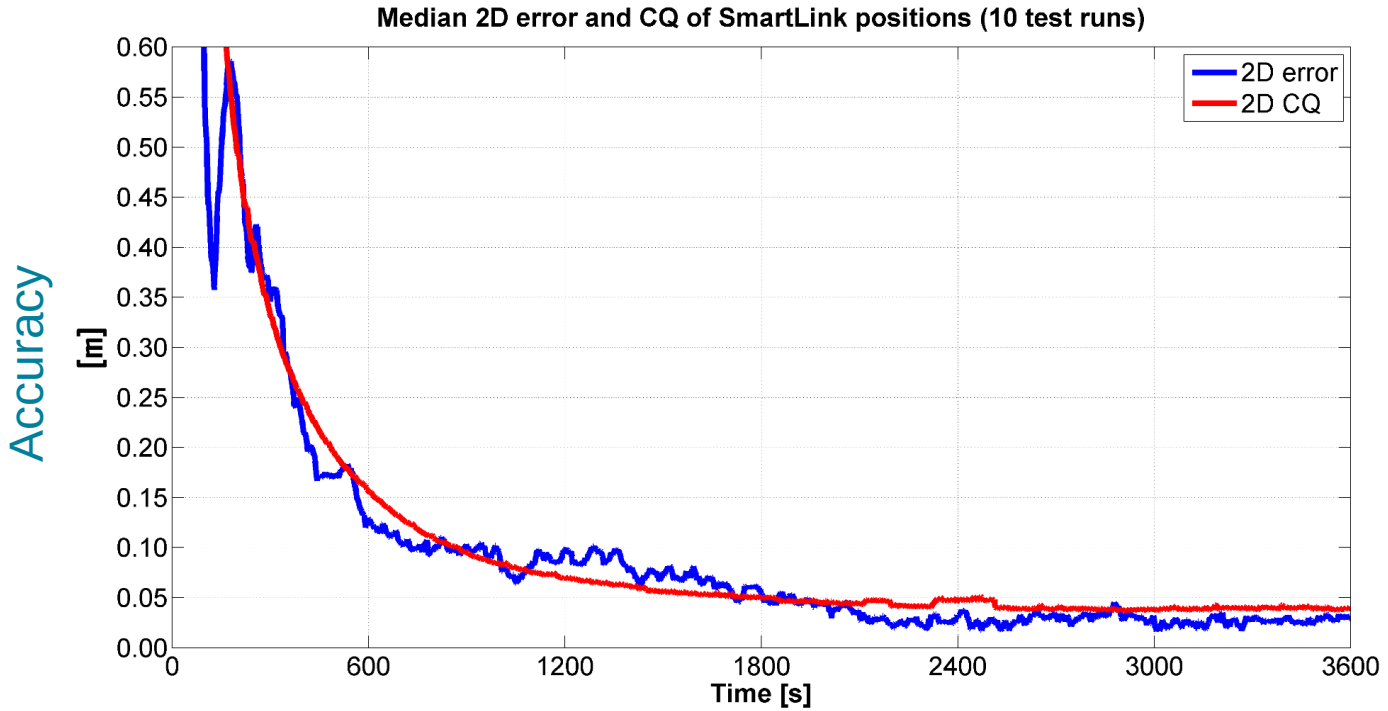
- What's SmartLink?
  - Precise point positioning (PPP) – corrections are provided by a geostationary satellite(s)
  - Allows cm-level positioning within minutes – everywhere
  - Works fully remotely and can be a backup solution for RTK (SmartNet or local)



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- What's SmartNet?
  - Any GNSS-device enabled – an open-standard correction service and is constantly monitored for integrity, availability and accuracy
  - World's largest reference station network – GNSS correction service built on the world's largest reference station network
  - Continuous availability – provided 24/7 by a highly-available infrastructure and professional support team with more than 10 years of experience reliably delivering the service
  - Trusted technology – with more than 4,000 reference stations based on Leica Geosystems technology that ensure position accuracy in any application

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- Leica GS18 T – First GNSS tilt pole – Immune to magnetic disturbances and calibration-free

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Leica TPS & GNSS technology – leading yesterday, today and tomorrow

- Leica TPS & GNSS technology – powered by Leica Captivate software

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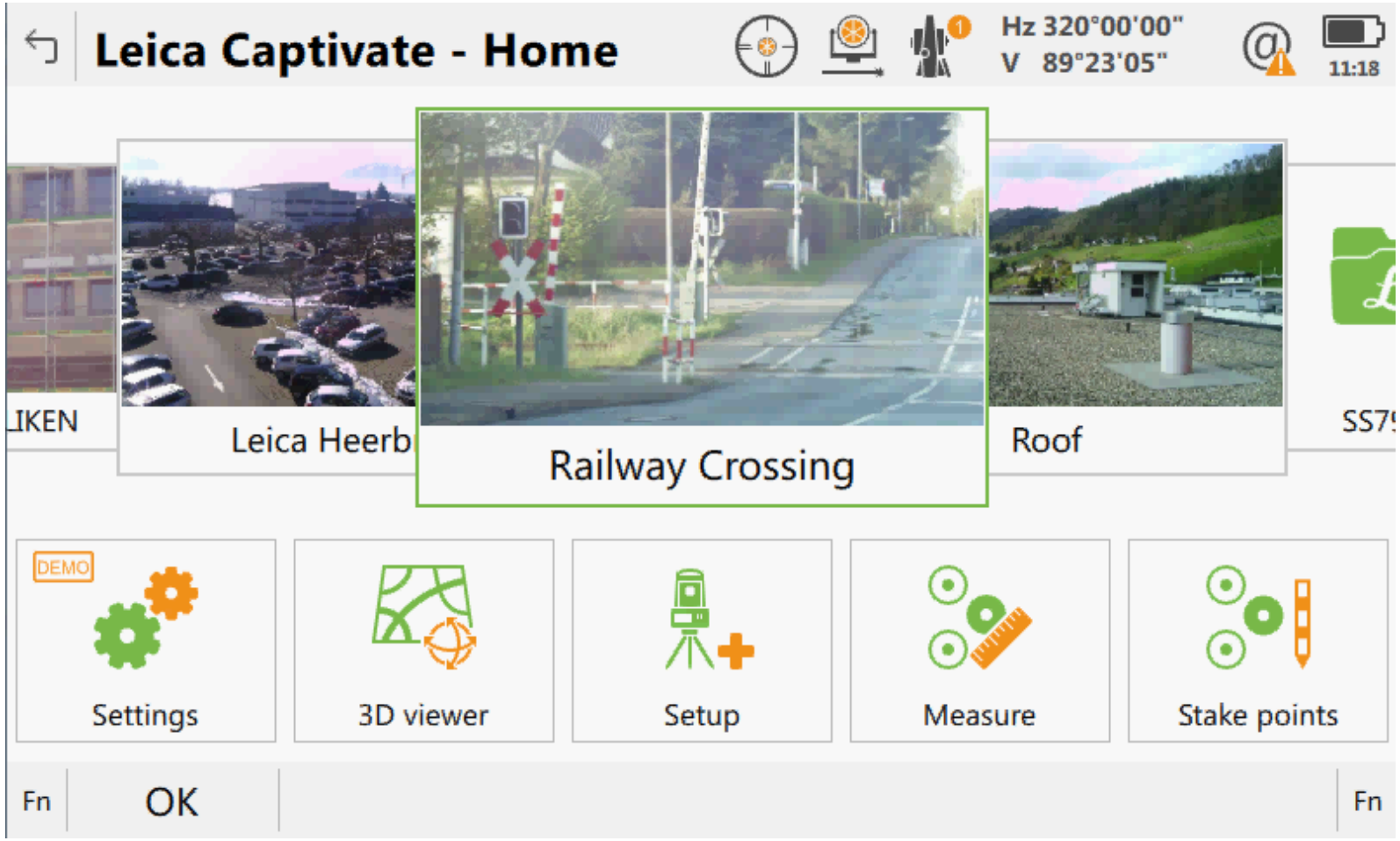
- Leica TPS & GNSS technology – powered by Leica Captivate software



Captivate

3D Everything
3D Everywhere

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谢 谢