Global market presence
-
strategy for innovation and growth

Aerospace Technology Congress 2016
Folke Brundin
RUAG Space AB
The challenge

Sweden is small.

- Sweden at 2% of European government space investment.
- Europe is at 10-15% of US level.
- Russia, China, Japan, etc.
RUAG Space

We have succeeded to become global supplier to system integrators

- Earth Observation
- Navigation
- Meteorology
- Telecom
- Science
- Launchers
RUAG Space, Operations in Sweden

Sales (2015): 775 MSEK (~92 MUSD)

Employees (2015): 400 (Gothenburg 325, Linköping 75)
# Our Customers

## North America
- Boeing
- International Launch Services
- Jet Propulsion Laboratory
- Lockheed Martin
- MDA
- NASA
- Northrop Grumman
- Orbital Sciences
- Sea Launch
- Space Systems/Loral
- SpaceX
- United Launch Alliance

## Europe
- Airbus
- Arianespace
- Dutch Space
- ESA/Estec
- Khrunichev
- Mier
- Norspace
- OHB
- RSC Energia
- SSTL
- SIS/Land Launch
- TESAT
- Thales Alenia Space

## Asia
- ISRO
- Mitsubishi
- NEC Space Systems
- Hanwha Thales
Sales development over time
RUAG Space AB

MSEK

Governmental  ESA  Commercial


66%
33%
Innovation and growth - Our strategies

- Niche supplier, portfolio in relation to R&D resources on home market
- Broad customer base – high market share in selected niches
- Partnership with customers - strategy in line with their

- Strategy in line with Swedish space objectives
  User and societal benefits, European cooperation
  Leverage developments in ESA user driven missions to commercial market
  Leverage commercial sales to efficient supply for ESA/EC/Eumetsat missions

- Strategy for innovation making best use of technological strengths
  Cooperation with world-class universities in Sweden
  Continuous innovation of our existing technological strengths, ”all” TRL levels
OneWeb Dispenser

Megaconstellation of 900 satellites

- Supplier of Dispensers to Arianespace, 500 MSEK
- Launch from French Guyana or Baikonour
- System to accommodate and separate 32 satellites
- Cylinder Structure in CFRP

Success factors
- Innovative rail solution to solve logistics at satellite factory and launch base – customer partnership
- Heritage – separation sequence of 32 S/C
- New CFRP, cost efficient, developed in ESA satellite program
Supply of Microwave electronics

Preferred supplier of frequency receivers to world largest telecom satellite prime contractor, SSL in Palo Alto.

10-50 equipment per satellite, depending on service offered, 1-5 MUSD value

- Success factors
  - Use of technology developed at/with Chalmers University
  - World-class MMIC chips – GaAs, GaN
  - Product development and qualification in ESA programs
  - Niche product – broad customer base - high market share
Supply to Iridium Next

Supplier of Payload Interface Unit to Iridium Next, 10 kg electronics.

Constellation of 80 satellites, mobile communication. Customer Thales Alenia Space, France.

- Success factors
  - Use of COTS technology, innovative design choices
  - COTS technology proven in ESA feasibility study
  - Fault-tolerance state-of-the-art heritage, based on 40 years of cooperation with Chalmers
  - Industrialisation for series production
Antennas to James Webb Telescope

- Successor to Hubble, 9 BUSD budget
- RUAG antennas downlink all measurement data to ground
- RUAG selected as supplier on pure commercial basis, Northrop Grumman, LA

Success factors
- Heritage from ESA programs (eg Rosetta)
- CFRP Technology for Hi frequency communication
- Cooperation with universities

- Multipaction, Corona
- Accoustical noise
- Electromagnetics
Radio Occultation instrument

Atmospheric sounder probing the atmosphere with GNSS signals. Temperature and humidity profiles.

- Numerical Weather Prediction (NWP), (RO has in a few years made a major impact)
- Climate research (accuracy to within a decade detect global warming)
- Space weather monitoring (power grids, communication …)

RUAG Supplier of complete instrument, GRAS
To MetOp, the present operational polar system of Eumetsat
To MetOp Second Generation, 6 satellites, service until 2035; contract of >300 MSEK

Success factors:
- Studies over many years with Meteorology institutes, Eumetsat, ESA
- Pre-developments in ESA studies
- Cooperation with Chalmers and Blekinge Högskola: atmospheric models
- Technologies based on our equipment strengths (computer, RF receivers, antennas)
Summary - Innovation and growth

- **European cooperation**
  - Synergies of funding between user/society benefit and product developments
  - Develop customer trust
  - R&D together with customers

- **Use technological strengths – university cooperations**
  - State-of-the-art technology giving competitiveness
  - Focus R&D investments in strength areas with commercial market potential

- **Broad customer base – high market share in selected niches**