Trends in Substation Automation
About Myself

P. V. Sivaram
Managing Director
B&R Industrial Automation Pvt Ltd
Pune
About B&R

Company Headquarters and Factory at Eggelsberg, Austria
Revenue / Employees

- Privately owned company
- Established in 1979
- 300 million Euro revenue
- 1,780 employees
- 700 B&R experts at partner companies
Global Presence

155 offices in 60 countries worldwide

with sales, marketing, application, training, support and service

- Argentina
- Australia
- Austria
- Belarus
- Belgium
- Botswana
- Brazil
- Bulgaria
- Canada
- Chile
- China
- Colombia
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Egypt
- Finland
- France
- Germany
- Greece
- Hungary
- India
- Indonesia
- Ireland
- Israel
- Italy
- Japan
- Korea
- Kyrgyzstan
- Luxemburg
- Malaysia
- Mexico
- Mozambique
- Namibia
- The Netherlands
- New Zealand
- Norway
- Pakistan
- Poland
- Portugal
- Romania
- Russia
- Serbia
- Simbabwe
- Singapore
- Slovakia
- Slovenia
- South Africa
- Spain
- Sweden
- Switzerland
- Taiwan
- Thailand
- Turkey
- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- Venezuela
- Vietnam
B&R India - Offices

- **B&R Headquarters: Pune**
  B&R Industrial Automation Pvt Ltd
  8, Tara Heights
  Mumbai Pune Road
  Wakdewadi
  Pune 411003
  Phone: +91 (0)20/66011522
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- **B&R Ahmedabad**
  B&R Industrial Automation Pvt Ltd.

- **B&R Bangalore**
  B&R Industrial Automation Pvt Ltd.

- **B&R Delhi**
  Caterpillar Electric Pvt. Ltd.

- **B&R Baroda**
  B&R Industrial Automation Pvt Ltd.

- **B&R Mumbai**
  B&R Industrial Automation Pvt Ltd.

- **B&R Chennai**
  B&R Industrial Automation Pvt Ltd.
B&R India - Strategy

- no. 1 supplier for Indian machine industry
- major supplier to process industry with partners (Power Distribution, Water treatment, Waste water, Cement, …)
- Distributor sales to end customers
Customer Structure

- **Sales distribution**
  - 70% Europe
  - 15% America
  - 15% Asia

- **Customers**
  - More than 2,000 OEM machine manufacturers
  - Installation at more than 60,000 end user sites
  - More than 2,400 customers use B&R plant automation
Optimal solutions for every Industry

- Standard products independent of any one industry
- Innovation potential for all branches of industry
- Integrated automation
  - Fast processing times
  - Shortest reaction times
  - Open fieldbus technology
  - Flexible I/O handling
  - Scalable, high potential visualizations
  - Dynamic positioning
  - All functions integrated in a project using a single tool
Our Customers are our best reference
Portfolio - Industrial Automation

Complete product portfolio for industrial automation

- Industrial PCs
- Microsoft Windows
- Operator panels
- Mobile panels

- PLC / Soft PLCs
- I/O systems / safety
- Fieldbuses
- Power supplies

- Servo drives / safety
- Linear motors
- Servo motors
- Direct drives
- CNC / robotics
The Integrated, Scalable Solution
International Standards

- **Certifications**
  - ISO 9001 certification since 1992
  - UL and c-UL listing since 1991
  - GOST-R certification since 2000

- **Standards**
  - EN 61000-6 (emissions + immunity)
  - IEC 61131 (PLC and IPC)
  - IEC 61800 (drives)
  - UL 508 (industrial control equipment)
  - UL 508c (power conversion equipment)
Expansion Goals

- Product innovations for OEM automation applications

- Solutions for process control applications

- Further internationalization

- Company growth of at least 15% per anno
B&R as a Partner

- Total solutions from one source
- One tool for all products
- Scalable, compatible products
- Constant product innovations
- Continuity and investment security
- Flexibility in support
- Expertise at hand
B&R India - Services

- most innovative products
- full application support
- training on site
  - standard or customer specific training,
  - in all our B&R offices or at customers site
- large stock maintained at Pune
  - lead time for spare part delivery < 48h (within India)
B&R India – Training facilities

- Best technology is the key to get the best people
- Offering the best education in the industry
- Result orientated payment
- Team spirit
B&R India – In all Industries

- Paper and Printing
- Food and Beverage
- Packaging
- Handling and Robotics
- Energy
- Metal and Mining
- Textile
- Plastics
- Special Machinery
- Automotive
Power monitoring

- > 480 substations
- B&R system 2005
- in future with Aprol
Vienna City – Power Management

- nighttime-produced electricity, street light,...
- Aprol supervisor station
- 50 control stations B&R system 2005
- 10,000 dig. I/Os
B&R has a wide variety of solutions for Substation Automation.
Here we share a few solutions as implemented in China.

In China, the implementation is done by the partner CEPRI { China Electric Power Research Institute }.

B&R Supplies the hardware, and provides training to engineers of CEPRI as well as the utility.
Facts and Figures

- Till date there are nearly 500 substations implemented by CEPRI using B&R solution

- The Category – 35kV, 110 kV, 220 kV and 500 kV

- Functions implemented: remote measurement, regulation and control with SCADA
What is appropriate?

- The choice of Automation is dictated by the criticality of the application.
- The choice of Automation is dictated by future growth expectation.
- It should not be necessary that we buy equipment suitable for five years hence, already today.

- The choice should have a protection against obsolescence.

- Modularity so that expansion is easily possible for future data requirement.

- Software platform should be such that application and engineering effort is portable.
The business model is also to be chosen carefully.

By this it is meant that the hardware should be sourced from the best manufacturer.

The implementation should involve local knowledge and presence.

With this means, one can get the best of both worlds.

For the model to succeed, the SW platform has to be flexible enough.
The type of data to be collected and transmitted is quite variable, depending on the focus of the utility at the given point of time.

A complete flexibility in data point choice is needed.

So we must look for centralised configuration and download possibilities.

In Transmission, as well as in the local area, the choice of protocol makes a big difference in the life-cycle cost of the system.
Typical Solutions for Substation Automation

- Concept 1: field bus PROFIBUS
- Concept 2: field bus CAN BUS
- Concept 3: field bus CAN BUS
- Concept 4: dual field bus CAN BUS + dual industry Ethernet
- Concept 5: dual industry Ethernet
Layout of substation automation system

- PLC
- Remote transfer
- Ethernet (10M/100M bps)
- PROFIBUS (500K bps)
- SCADA server
- Print Server
- supervise W/S
- GPS
- WAN / LAN
- Substation level
- Bay level
  - A/I
  - D/I
  - C/O
  - COM
Basic system configuration

- PLC
- Remote transfer
- CAN BUS (500K bps)
- Ethernet (10M /100M bps)
- Substation level
- BAY level
- A/I1
- A/I2
- A/I3
- A/I4
- D/I
- C/O
- COM

SCADA
Print Server
Supervisor
GPS
WAN/LAN
Technical feature

- distributed lower cost

- CAN BUS-suitable for small amount of data, multiple nodes, 500KBps rated.
Basic configuration
Concept 4  dual field bus-CAN BUS  + dual industry Ethernet

Technical feature

- The data of bay units gathered to concentrator unit

- With high speed Ethernet to realize data exchange among bay’s concentrator units and substation computer

- Dual network to ensure the data transfer reliability
Basic Configuration

Relay Protection
Runtime server
Engineering Station
Monitor Server 2
Monitor Server 2

Fiber Optics 1
Fiber optics 2

Dial MODEM
Remote maintenance

220kV Protection Chamber
110kV Protection Chamber
Main Control Chamber
10kV Measuring protection Chamber

Management Layer

GPS

Control Layer

Print Server

Diagnostics Network

Basic Configuration
Communication links in the Protection Chamber

- **GPS**
- **Fiber ethernet 1**
- **Fiber ethernet 2**
- **IED**
- **Protect device**
- **RS485/422/232**
- **CANBUS 1**
- **CANBUS 2**
Technical feature

- With full distributed system used for big substation automation
- With High speed Ethernet to penetrate into bay units to realize data exchange among substation and bay units
- Reduce intermediate medium to enhance communication efficiency
- Reliability of communication with Dual network system is ensured
Configuration for 110kV Substation
Your worldwide automation partner