Britain’s 4th Industrial Revolution
Challenges & Skills
Skills of the Past
(1978)

Filing
Drilling
Milling
Welding
Soldering
Sheet Metalwork
Wiring
Painting
Testing
Technical Drawing
Lathework
4 Industrial Revolutions
Revolution or Evolution?

First Industrial Revolution
Based on the introduction of mechanical production equipment driven by water and steam power

1784: First mechanical loom

Second Industrial Revolution
Based on mass production achieved by division of labor concept and the use of electrical energy (electrification)

1870: First conveyor belt, Cincinnati slaughterhouse, 1908: Ford T-Model

Third Industrial Revolution
Based on the use of electronics and IT to further automate production (automation)

1969: First programmable logic controller (PLC) Modicon 084,

Fourth Industrial (R)Evolution
… driven by Digitalisation, Integration and enhanced Flexibility

Digitalisation Technologies

• Virtual/Augmented Reality
• Digital Twin
• Cyber-Physical Systems
• Big Data/Smart Algorithms
• Internet of Things
• Advanced Robotics
• Cloud Technology
• 3D Printing/Additive Manufacturing
Smart Innovations for a Competitive Edge

Reduce time to market
Shorter innovation cycles with more complex products

Enhance flexibility
Individualised production with higher productivity

Increase efficiency
Energy and resource efficiency with global operations
Big Data > Smart Data > Business Data

Ecosystem for Apps Developers

- Siemens Apps and analytics
- Customer apps and analytics
- 3rd party apps and analytics
- Partner apps and analytics

Mindsphere - Siemens Open Cloud for Industry powered by SAP HANA

Secure and Easy Connectivity via ISB Agents

- Open standard (OPC) for connectivity to Siemens and third-party products
- Plug-and-play connectivity of Siemens products (engineering via TIA portal)
- Cloud for Industry with open application interface for individual customer applications
- Enablement of new business models (e.g. selling machining hours instead of assets)
- Transparent pay-per-use pricing model
- Siemens and SAP partner network for integration of existing data pools

IAAS – Infrastructure as a Service; ISB – Industry Service Backbone

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The Factory of the Future
Cyber-Physical Systems - Complete Digital Model

Cyber-physical system (CPS)

Contains all information …

- Software / Informatics
- Mechanics
- Electrics, Electronics
- Automation, HMI
- Safety, security
- Maintenance
- Location, identity…
- Status
- SW version
- Interfaces
- …

The digital model always up-to-date and is extended over the entire lifecycle

- Product design
- Production planning
- Production engineering
- Production execution
- Services
Real World Skills
Variable Speed Drive Fan Subassembly

Last Year the Junior Factory supplied over 270,000 built assemblies to the line
What is the Junior Factory?

- Started in 2010
- Factory within a Factory
- Involves all apprentices & graduates
- Manage two projects
  - Supplying the factory with parts
  - Supplying the factory with pick-to-light assemblies

Development Area for Traditional & Future skills
The Manufacturing Relevance?

• Real world manufacturing experience
  • Skills outside of any institution
  • Its down to the young talent!

• Importance of responsibilities;
  • Supply Chain
  • Planning & Budgeting
  • People Management

• You don’t learn that without doing it!
Traditional Skills - Junior Factory Conception

- Lean Cell Design - Physical prototype
- 1st implementation of ‘Lean’
- Trial and error
- Prolonged period of design & testing
What does the Business Get?

- Real Life Manufacturing Skills
- Responsibility - Delivery of KPI’s
- Lean Manufacturing
- Communication & People Skills

- Productivity! (£50k per year savings)
  - In-sourced **13 different** assemblies
  - Instant response to customer demand
  - Reduced carbon footprint

- Empowers and builds trust in our people

KPI- Key Process Indicators
Responding & Adapting to Variable Demand

Yearly Forecast Vs. Monthly Forecast Vs. Actual Built

- **NFY Forecast** (Nov’15 to Nov’16)
- **Monthly Forecast**
- **Actual Build**
Preparing for Industry 4.0 - Future Strategy for Junior Factory

- Digitisation Skills
  - 3D modelling
  - Simulation of systems

- Intelligent manufacturing
  - Customisation
  - Reducing operator complexity
  - Smart Devices

- Industry 4.0 wasn’t commonly understood until after 2011
Development of Real & Virtual Skills

• Digitised & Modified
  • Pick to Light Unit
  • Lean Cell Design

• Simulate
  • Entire work cell (JACK)

• Additive Manufacturing

• Built the final design!
Future Real & Virtual Skills

- Ability to customise the design for any customer
- Integrating intelligent tools into the System
  - Reducing product build errors
- Ability to link the system in the MES
  - Live information for supply chain
  - Live Stock Reporting
  - Pathway for customised products
Enough from Me

• My Time in the Junior Factory is now finished

• New Managing Director (Olivia) & Finance Director (Rachel) are in the Audience

• What the Junior Factory given me;
  • Responsibility of delivering to my customer
  • Importance of people and leadership skills
  • Exposure to new emerging technologies
  • Dealing with Senior Managers...!
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(1978)

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Future Skills
Changing Technology Demands New Skills

IoT
Robotics
Big Data
Apps
AM/3DP
VR
Cloud
Digitalisation
AR
NDT
Cyber-Security
Gamification
RFID
Thank you