Identify and discuss the effective system design to achieve effective vertical networking including:

Vertical networks are confining, imposed and physical. (Haskins, 2007) Vertical integration networks goes beyond traditional production hierarchy levels – from the sensor to the business level of the company. (Industry 4.0: Networking, Communication, Efficiency, n.d.).

There are several vertical networking solutions to achieve effective vertical networking. **IT Integration** – Existing it infrastructure are very fragmented and result in poor networking. New design must be developed from a range of components such as sensors, modules, control systems, communication networks, business applications and customer-facing applications. If these components are used appropriately and adapted and integrated, it will give benefit of long-term market advantage. **Cloud Based Applications –** Vertical networking of cloud based solutions offer excellent opportunities to host and make efficient use of the big data generated by industry 4.0. De-centrally networked smart-production systems must be implemented, it will enable cloud-based applications to deliver universally and access to key data at any time. This will make It simpler to gather, monitor, distribute and analyse data between factories and across the entire global value chain network. **Operational Efficiency 2.0 –** Vertical network integration offers new opportunities to drive forward operational efficiency. The effective analysis, assessment and application of the data collected from machines and sensors enable rapid decision making to improve operational safety work process and maintenance. (Deloitte , n.d.)

Discuss the impact of Vertical Networking on Industrial system optimisation:

Impact of vertical networking on Industrial system include optimisation of machine, lasers and laser systems. Different sensors in products support the acquisition of status data and parameters. These sensor data can be read out, analysed and used to optimize production processes in a Smart Factory.

User-friendliness - In the Smart Factory, innovative concepts improve user-friendliness. For example, create laser welding and cutting programs by using a high-resolution camera image to teach component directly on the tablet. Can also use the mobile device to keep an overview of all work steps during further applications.

Connectivity - Various modules for a stable and secure networking infrastructure is available. These range from data interfaces at the laser, machine and system level to superordinate networking solutions at the factory level, which enable secure data exchange within production and beyond.

Transparency - Use graphical dashboards to keep track of the current operating statuses of lasers and machines. Not only the straight operating statuses can be displayed, but also more detailed information, such as message histories, program changes and maintenance information, can be called up. Based on this consolidated information, derive measures to increase availability and productivity.

Availability - The Smart Factory uses intelligent evaluation algorithms to consolidate and evaluate the collected data. On this basis, defined intelligent maintenance and repair strategies. This ensures maximum technical availability of machines and lasers throughout the entire product life cycle. (TRUMPF, 2018)

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