

Memo

Introduction to the production concept IDEAL FACTORY

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1 The Ideal Factory

Production of sophisticated products in high-tech companies is foreseen to build the competitiveness of our industrial sector of the future. “Ideal Factory” was a four year (2008-2011) research project that aimed at creating a manufacturing concept for high-tech manufacturing companies in Norway. Industrial partners were Volvo Aero Norway and Kongsberg Defence & Aerospace. In cooperation with CRI Norman (Norwegian Manufacturing Future) (2006-2013) we concluded in 2011 with the proposed manufacturing concept “IDEALFACTORY@XPS”. This memo gives an introduction to the concept and gives references to more detailed descriptions.

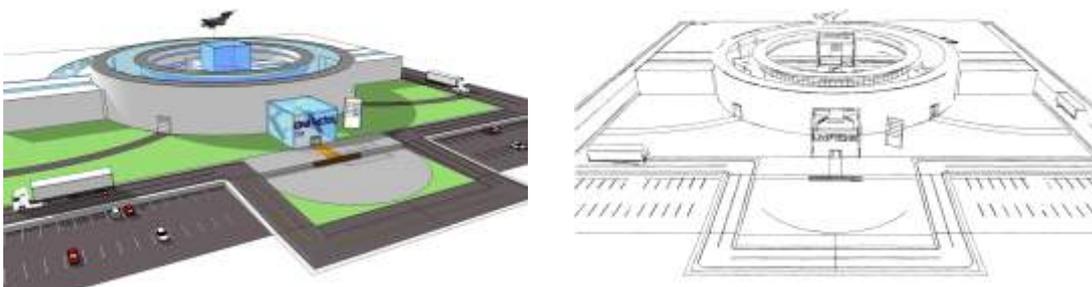


Figure 1 Sketches of an ideal factory

Early on we put forward three postulates that base the proposed concept:

- Technology is necessary, but not enough
- Advanced technology requires advanced organisations
- A new socio-technical systems perspective on high-tech manufacturing is needed.

2 The key elements of IDEALFACTORY@XPS

High-tech industry does not need another new manufacturing concept with brand new figures, models and descriptions. However, high-tech industry needs a manufacturing concept that fits better with their specific environment and conditions. Norwegian high-tech companies compete with their technology as the core competence, and this is a fact that is not well covered by lean production and other related improvement concepts. We have since the start of the research project seen how the partners struggled to live up the guidelines and requirements of becoming lean from their owners and customers. These requirements are delivered through different forms of company-specific Production Systems (XPS). The Ideal Factory manufacturing concept takes both the technology and the existing XPSs as points of departure, and develops and adjusts enhancements to them to the specific Norwegian high-tech setting. Thus, the concept IDEALFACTORY@XPS never tries to compete with or replace the technology and the XPS in place, instead we add 8 needed principles to accelerate their implementation and make them work better for the high-tech factory. Figure 1 summarizes the concept:

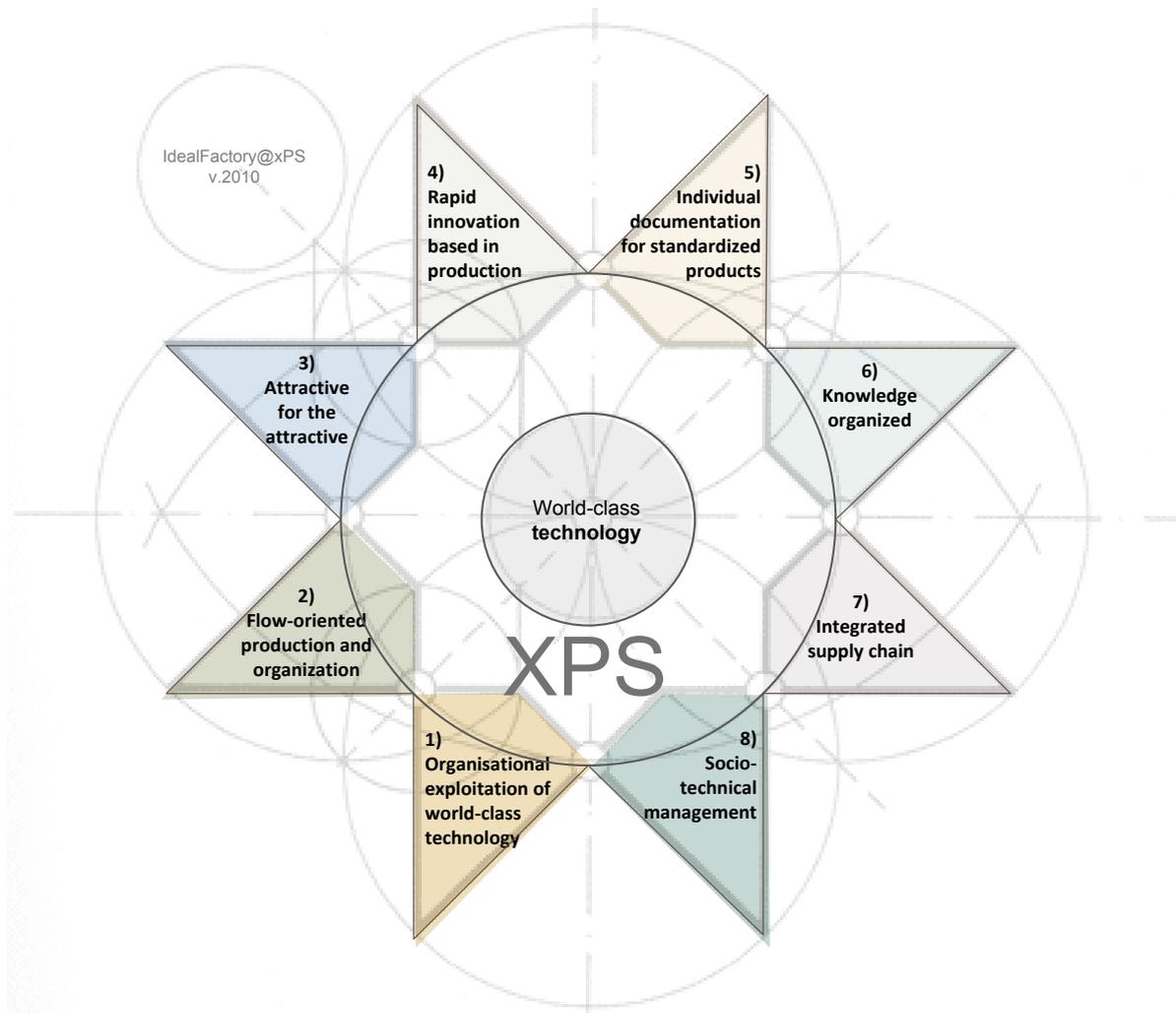
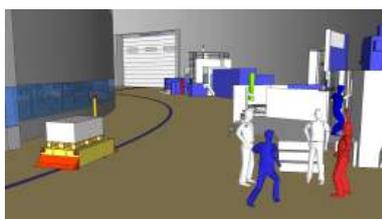
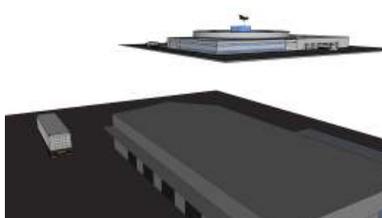
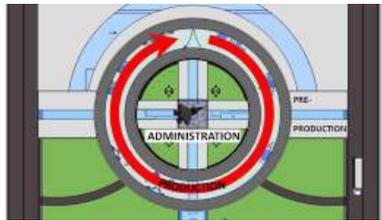
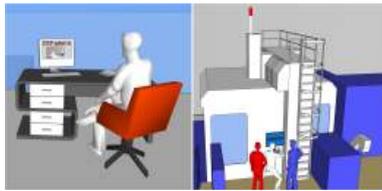


Figure 2 The manufacturing concept IDEALFACTORY@XPS

Next, the 8 principles are briefly introduced:



Organizational exploitation of world-class technology is about achieving excellence in the technology system through the use of competent individuals. Information should be centrally located and administrated, and electronically shared visually to the right persons at the right time on a need-to-know basis.

A **flow-oriented production and organization** of the factory with affiliated logistics and the inside administration with social areas. The flow-oriented layout with minimal need for transportation between processes, a high degree of automation and a team-organization with a holistic responsibility and interdisciplinary competence replace the traditional organization.

To become the best factory in the future there is a need to attract the best employees. In order to be attractive for the employees it is not enough to offer the highest salaries. The best skilled workers, engineers and managers are attracted by the possibility to develop and use personal competence; therefore an ideal factory is **attractive for the attractive**.

The ability to innovate and bring new products to the market place quickly is vital in high-tech industries in order to stay competitive. That is one of the reasons to emphasize the **rapid innovation based in production** of ideal factory.

A perfect product is not sufficient for the customer unless it is followed by a unique product documentation of its quality and the way it has been produced. That's why there is the requirement for automatic and **individual documentation for standardized products**.

A vital part of organization competence is widespread business understanding, shared responsibility and ability and willingness to participation. As a member of a cross-functional team you will learn and teach at the same time, that's why the ideal factory is **knowledge organized** to get faster, smarter and with a better learning proficiency.

The future ideal factory is a paradox if it's not part of a greater whole. The factory must be integrated in as an essential link in its supply chain and also be able to quickly join new value chains as markets and network actors change. By an "**integrated supply chain**" we refer to a much more proactive and thorough approach than the traditional supply chain function.

The ideal factory is marked by an operational level manned with highly competent staff with holistic perspective and ability to take responsibility. Solving problems or getting suggestions can be so much easier by going into the production and speaking to fellows and it is also one part of **social-technical management**.



We argue that in the Ideal Factory the next level of excellence is sought through a high-level interplay between skill (individual as well as collective), technology (parts as well as overall system) and management (hands-on management as well as leadership). It is important to understand that in order to succeed in developing and implementing the manufacturing concept IDEALFACTORY@XPS, one first has to realize that this is as much a mindset as a way of working. Developing this understanding – shared by all, and always followed up by an insisting and supportive leadership – is the basis for building the future factory.

3 References for further reading

The following publications are available upon request:

- Knutstad, G.; Buvik, M. P.; Skjelstad, L.; Netland, T.; Ravn, J.E. (2009) Attractive Manufacturing – Theoretical discussion in IDEELL FABRIKK, SINTEF Report A10394, SINTEF Technology and society, Trondheim
- Knutstad, Netland, Ravn og Skjelstad (2010) Ideell Fabrikk produksjonskonsept, v.1 (2009), SINTEF-rapport nr A15378, tilgjengelig på www.sintef.no/ideellfabrikk
- Ravn, J.; Netland, T; Knutstad, G; Buvik, M.P.; Skjelstad, L. (2011) Towards a high-tech manufacturing concept: “IdealFactory@XPS”, SINTEF-report F17699, SINTEF Technology and Society, Trondheim
- Netland, Ravn, Knutstad et al (2012) Ideal Factory production concept and roadmap. SINTEF Teknologi og samfunn, Trondheim, FORTHCOMING
- Netland, T.; Buvik, M. et al (2010) Towards the Factory of the Future in High-Tech Industries, In proceedings of the APMS 11.-13.10.2010, Como, Italy
- Netland, T. and G. Knutstad (2010). The paradox of hyper-bureaucracy and lean in high-tech manufacturing. POMS Conference 2010, Vancouver, Canada, POMS.
- Netland, T.; Knutstad, G.; Buvik, M.; Skjelstad, L. (2009) Attractive manufacturing: sociotechnical Operations Management, in proceedings of POMS 2009 conference, Orlando, USA, 1.-4.5.2009
- Skjelstad, L.; Netland, T.; Knutstad, G.; Buvik, M. (2009) Including sociotechnical aspects in value stream mapping, in proceedings of POMS 2009 conference, Orlando, USA, 1.-4.5.2009
- Netland, T.H; Knutstad, G.; Buvik, M.; Skjelstad, L. (2008) The New Importance of Socio-Technical Systems Research on High-Tech Production Systems, in proceedings of HOPS Conference, Lausanne, Switzerland, 8.-9-9.2008
- Netland, T. H. & Aspelund, A. (2012) Company-specific Production Systems and Competitive Advantage: A resource-based view on the Volvo Production System. *International Journal of Operations & Production Management*, FORTHCOMING.
- Bakkene, Ø (2011) Strategisk arbeid i VAN: En Ideell Fabrikk, Volvo Aero Global No 4, 6. Oktober 2011
- Fokusartikkel i Teknisk Ukeblad nr 19/09 ”Høyteknologisk fabrikk med skreddersøm – Planlegger den Ideelle Fabrikken”, s48-53
- Fokusartikkel Logistikk og Ledelse nr 10/10 ”Kongsbergindustrien – Økt produksjon med bedre logistikk” av Trond Schieldrop, s. 18-20
- Fokusartikkel i Industrien nr 7/10 ”Avansert fly gir avansert fabrikk” av Ragnar Brekke, s. 20-24

The following channels give further information about the projects and their results:

- Ideell Fabrikk at youtube.com: http://youtu.be/StVZ_OwoSYQ
- Ideell Fabrikk's webpage: www.sintef.no/ideellfabrikk
- SFI Norman's webpage: www.sfinorman.no
- Presentations from Teknologidagene 2010 Ideal Factory track: www.kongsberg-chamber.no/sider/tekst.asp?side=129
- Presentations from Teknologidagene 2011 Ideal Factory track: www.teknologidagene.no/nb-NO/Naeringskonferansen/Ideell%20Fabrikk.aspx