Need / Motivation

• Design and set-up a new modern and flexible production line.
Current Status / Situation

• Brainstorming sessions of the different company work groups.

• Everyone in the factory design process participates, sharing and building on one another’s insights and ideas.

• Traditional CAD systems facilitate the activities associated with the factory design and evaluation procedure.
Identified Problems

• No chance for real-time collaboration among work groups / employees.

• Decisions are not taken collectively.

• The final decision is often different and unclear, due to the different evaluation criteria and background among work groups / employees.

• If the factory layout design is wrong, it can lead to confused flow patterns, inventories, long process times, inflexible operations and high cost.

• Incorrect factory design affects the factory efficiency, quality and costs.
WITTMANN & PARTNER

iGDSS case study
new factory setup

Brainstorming on factory design

Design alternative factory layouts

Shop floor visualisation

Factory plant simulation

Evaluate alternative factory configurations

Final Decision

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### Brainstorming on factory design

Generate alternative factory configurations, including:

- factory layout
- workflow planning
- material flow simulation

### Design alternative factory layouts

Detail design of 2D/3D factory layouts with respect to:

- machines dimensions
- factory area / land planning
- safety regulations
Shop floor visualisation

• Visualise in 3D/VR/AR the alternatives of arrangement of the facilities / resources of the factory, with respect to:
  • Product configuration
  • Activity layout
  • Human involvement

Factory plant simulation

• Make use of simulation tools to support “virtual experimental” with respect to several factory design parameters (e.g. material flow, resource utilization, etc.)
Evaluate alternative factory configurations

- Criteria-based qualitative and/or quantitative evaluation of alternatives
  - The criteria should be with respect to guidelines and standards related to: production cost, productivity, flow-time, human factors, etc.

Final Decision

- Rank each alternative based on its evaluation score and select the best ranked solution.
General requirements (1/2)

• Quick and easy installation

• Provide an alternative web-based mode

• Need to support cross platform / OS (Windows, Mac, etc.).

• The system must be flexible enough so that team members can be added and/or subtracted as needed.

• Accommodate different levels of IT experts and technical backgrounds.

• User friendly GUI so as to avoid special training for system use.
General requirements (2/2)

• Web 2.0 based and collaborative development and evaluation of process plans and factory layouts.

• The different dispersed key actors should be able to assess online these developments.

• Support group work in order to improve the capability to undertake rapid changes in organizational structure and product requirements.

• Replace physical meetings by on-line collaboration sessions, saving time and money during factory design and evaluation phase.
Technology requirements

• Group decision-making in the phase of process planning and factory layout modeling.

• Material flow simulation.

• Shop-floor visualization (2D, 3D, VR).

• Multi-criteria quantitative evaluation of factory alternative designs.

• Assessment of human safety and ergonomics in alternative plant layouts.
Functional requirements

• Generation of factory design alternatives wrt. existing guidelines and standards.
• Evaluation lists of alternative designs (i.e. layouts, process plans, etc.).
• View / save / print / send factory designs.
• Routings and flow diagrams.
• Web conference / instant messaging / chat history.
• Evaluation results documentation & circulation among work groups.
Solution – iGDSS

Web 2.0 group decision support system:

- to integrate and support group decisions anytime and anywhere;
- to allow group meetings and processes for decision making;
- to increase the productivity and efficiency of the decisional process;
- to increase the decision’s speed and quality.