Machine control/LandXML
– Anvendelse af 3D design i udførelsesfase (the use of 3D design in the construction phase)

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What is LandXML, and why is it important?

How does LandXML work?

    ☐ How do you import and export LandXML data with InRoads?

Discussion

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What is Machine Control?

The idea is to move from the traditional 2D design environment (paper plans) to the use of the 3D design directly in the construction phase

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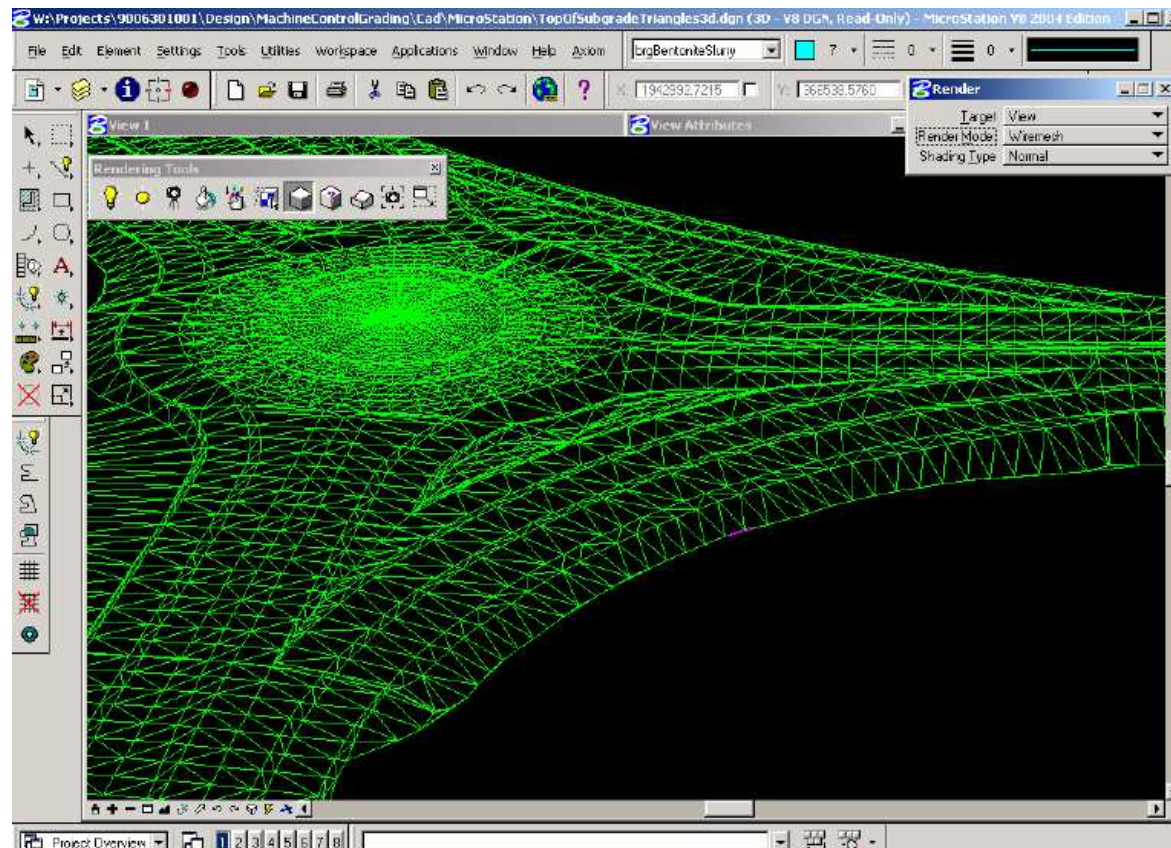
Input for Machine Control

3D Design File: ASCII or LandXML format

Break Line File: DGN/DWF format that contains line work for all
longitudinal elements (centerline, shoulder line etc.)

Survey Control File: This contains x,y,z coordinates for all primary
control points set by the Surveyor (Survey or ASCII format)

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Example of a Surface input for Machine Control

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Why Machine Control

Performing earthworks smarter, faster and more profitably is critical to success in today's highly competitive construction industry. You need to perform all parts of the job faster and more accurately than ever before.

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Faster Job Cycles

Spend more time being productive and less time waiting for surveying and grade checking. With site plan and grade information displayed in the cab, operators can finish jobs faster with minimal supervision—even in dusty, windy or dark conditions.

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Lower Operating Costs

Getting the job done right the first time eliminates rework. With design information at your fingertips, the need for stakes, or stringlines is reduced. Through improved productivity, personnel and machine costs are also reduced. Plus, accurate grading helps you carefully control material usage.

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Machine Control Links

Microfyn

http://www.mikrofyn.dk/

Leica

http://www.leica-geosystems.com/dk/da/lgs_56834.htm

Topgon

www.topcon.eu

Trimble

http://www.trimble.com/gradecontrol.shtml

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High Performance Technology:
Windows® XP Embedded operating system provides higher performance and data stability. Controller Area Network (CAN) system is used for sensor communication.

Mast tilt: Leica Unique Feature
The sensor compensates for mast tilt when computing blade cutting and spreading angles for the operator.

New hardware component:
The new compact sensor module, the central communication point between positioning sensors and the GradeStar interface, is transferable between machines.

Wide compatibility:
Full forward and backward compatibility with GS496, ProControl, SonicMaster and MC1200 Control Systems.

Industry Leading Performance
Allows up to 3rd gear operation (8kph - 5mph).

Grading Accuracy:
3D control permits higher grading accuracy.
- +/- 5mm / 0.02' with TPS
- +/- 10mm / 0.03' horizontal with GPS
- +/- 20mm / 0.06' vertical with GPS

Side Shift: Leica Patented Feature
More accurate grade edges through automation of the lateral movements of the blade.

Hold x-slope:
The operator can maintain a slope across breaklines for flexible grading.

Leica GradeStar

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The largest road project in the world

Construction is beginning on what is touted as
the world's largest public works project – an
Algerian east-west highway linking the
country with Tunisia and Morocco.
Construction is underway and is scheduled
to be completed by 2010

The total highway project will stretch more than
755 miles (1.216 km); the Japanese
consortium bid was for more than $5 billion
(540 billion yen).

More then 100 3D Machine Control systems will
be used on bulldozers, graders, excavators,
trenchers and other machines

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What is LandXML, and why is it important?

LandXML.org **is a non-profit organization**

A common place for civil engineering applications to meet and exchange data

- Without loss of intelligence

Exchange of *design* **information**

- **Not** for exchanging drawing information

XML files allow great flexibility

- Software applications can easily write what they know about a subject, and leave out what they don't know

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What Makes LandXML Different

XML is being used

- Using a flexible file format allows software applications to "do what they can" with the data that they find in a file

Simplicity

- LandXML attempts to store just the fundamental design and survey information. The intention is not to store lots of extra attribute information in the file

The time was right to start the initiative

- Everyone that joined the *LandXML.org*, saw LandXML as a business opportunity

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How does XML work?

A software application reading an XML file looks for headers, or *tags*

- If it recognizes a tag and the application knows how to interpret it, it goes ahead and reads it in
- If it can't interpret the section, it skips over it.

A collection of agreed headers for an XML file is called a *schema*

- The *LandXML.org* group agreed the LandXML schema

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Notes on LandXML

This is not a magic wand

- It is not able to magically convert a complex design to be ready to go in another application.
- Different applications work in completely different ways.
- Although each of these applications exports this data, there are limits as to how well it can be reinterpreted by another application

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What will get converted?

Alignments and triangulations will convert well

  ▫ Other elements may be imported, but might need work to be valuable

There are no issues relating to imperial vs. metric datasets

  ▫ All data is held in world coordinates

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How can I get the most out of LandXML?

Know your data

- What the data roughly looks like
- What are the exported features
  - If possible, get a list of these features so that you can equate (or map) them to features in your application
- Use the data for what it is: design data
  - If you need drawings, reference in original drawings from the originating application

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Importing LandXML data into InRoads

All LandXML data is imported in one process

  - ☐ It is assigned to either Surface or Alignment depending upon the data found

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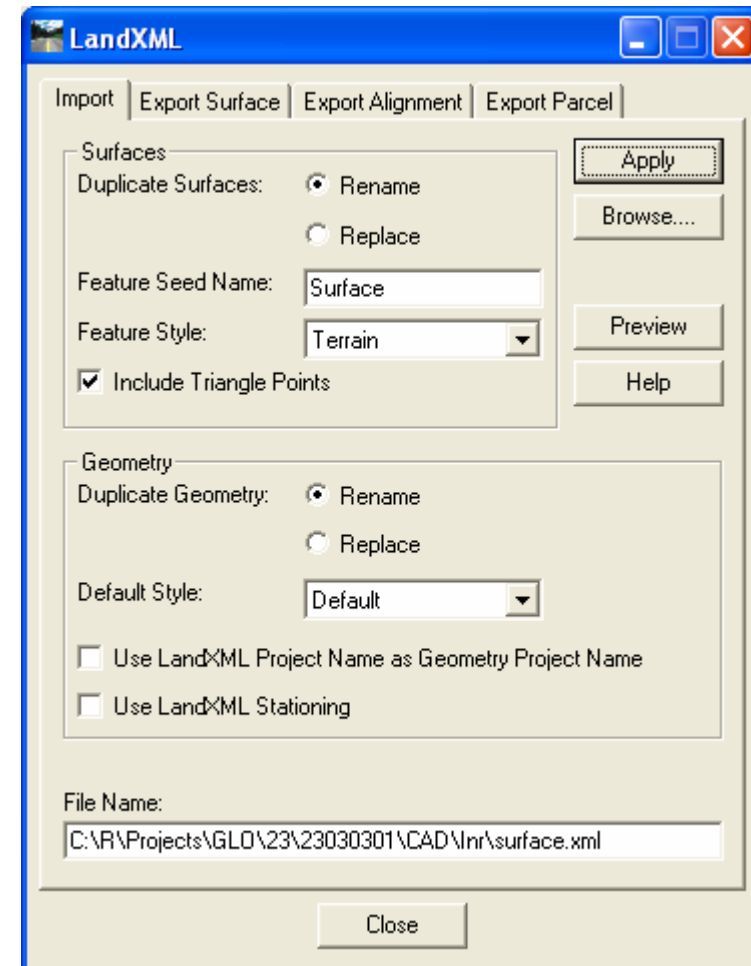
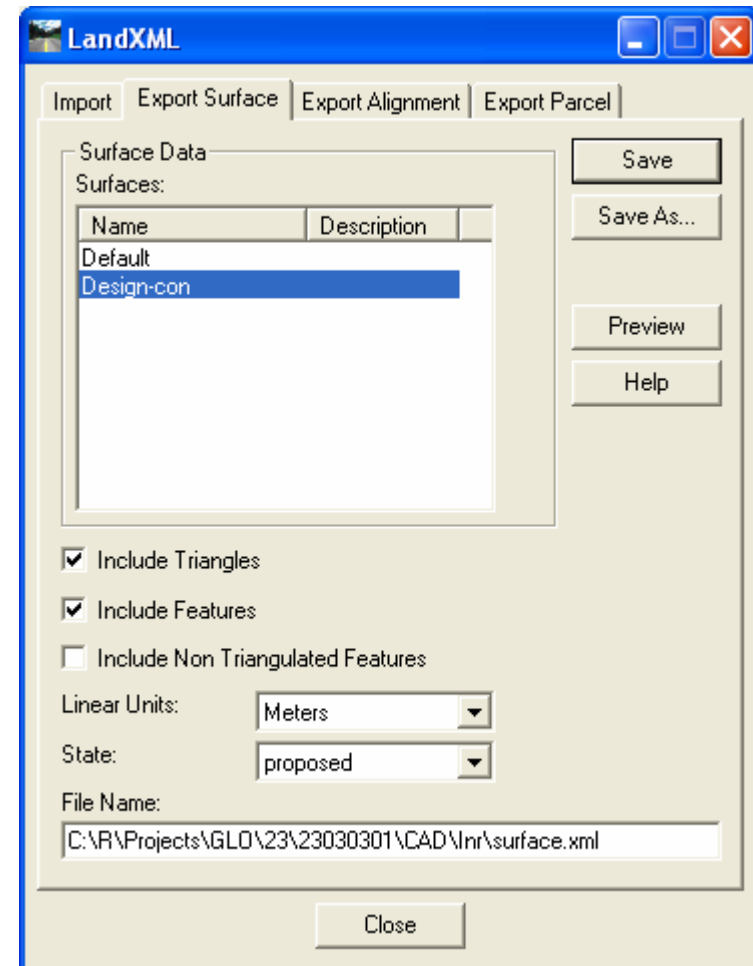# Machine control/LandXML

Notes on Importing into InRoads

Notes:

- With V8.5, make sure that you set the active geometry destination before importing
- The default style specifies the symbology settings stored with the specified geometry data
- The feature style controls where features will be displayed (Plan, Profile & Cross Sections)
- To automatically assign different feature styles to different features, they need to be part of the raw Land XML file

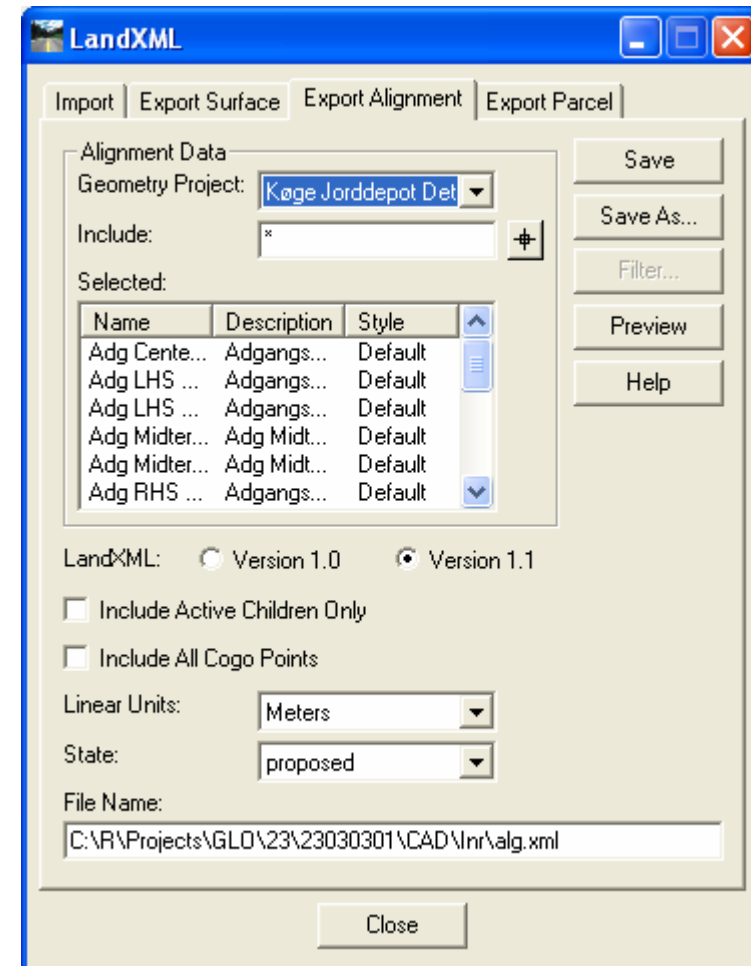bentleyuser.dk

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Export the surface(s)

- Define the *State* of the surface
- Designs can be exported as alignments and as a surface
- Existing terrains are only exported as a surface
    - Usually don't have alignments

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Give a partial name of the alignment(s) to be exported

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Other data to provide

Important for the recipient of LandXML data to know roughly what the data looks like

Suggested additional information:

- Meaningful filenames
  - Don't call your filenames *surface.xml*
- A list of features in the XML file
- Plan drawing(s)
  - This does not have to be to scale
- A simple word document or note outlining what the data is

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Summary

LandXML data exchange can be successfully used to move the design to the construction phase

Data exchange between the applications will improve over time

Spread the word

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