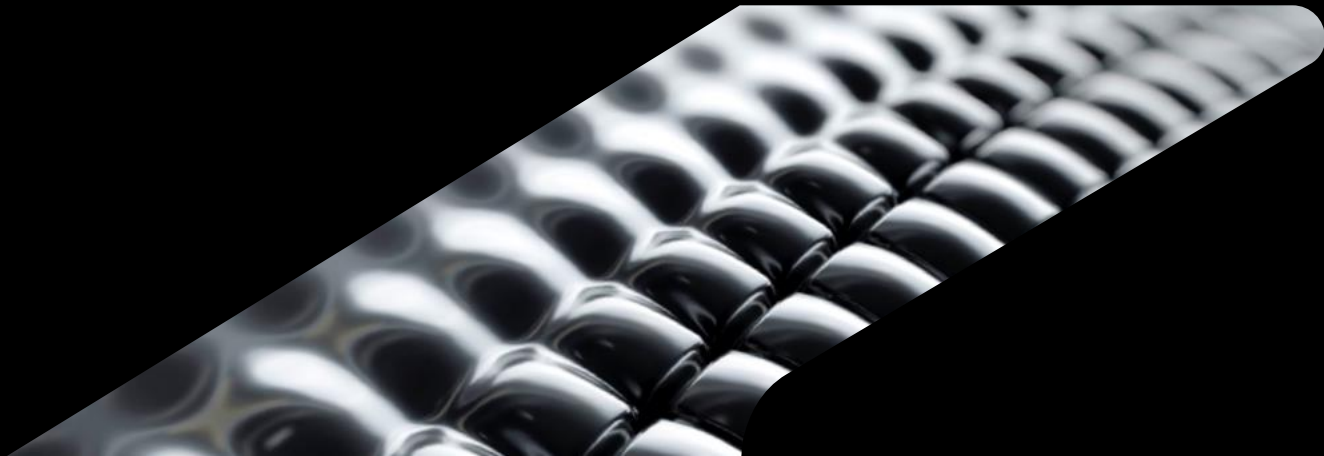




Grading Optimization: Making Choices that Benefit Automatic Grading

CES501760

Russ Nicloy
Civil Solutions Specialist|
macertechnologies.com



Who am I?

- Russ Nicloy
 - Civil Solutions Specialist
 - Almost 30 years between production and a reseller
 - Worked with all aspects of the civil industry



Agenda

- Zones, Lines, and Points
- Visualization Tools to Supervise Progress
- How to “Encourage” drainage
- Balancing Volumes and Other Objectives

A Short Introduction to Grading Optimization

- It is for “Optimizing”
- Users provide the envelope of parameters
- Does the work of a VERY LARGE room of engineers
- The program will find the optimal result

A Short Introduction to Grading Optimization

Some suggestions for use

- Not for the over-constrained project.
- Limit your limits. The more options the more optimal
- Do grading in phases
- Adjust grading limits (extents) per phase
- Set Preferences for speed or quality (mesh, refine, iterations)
- Before accepting results adjust and try again

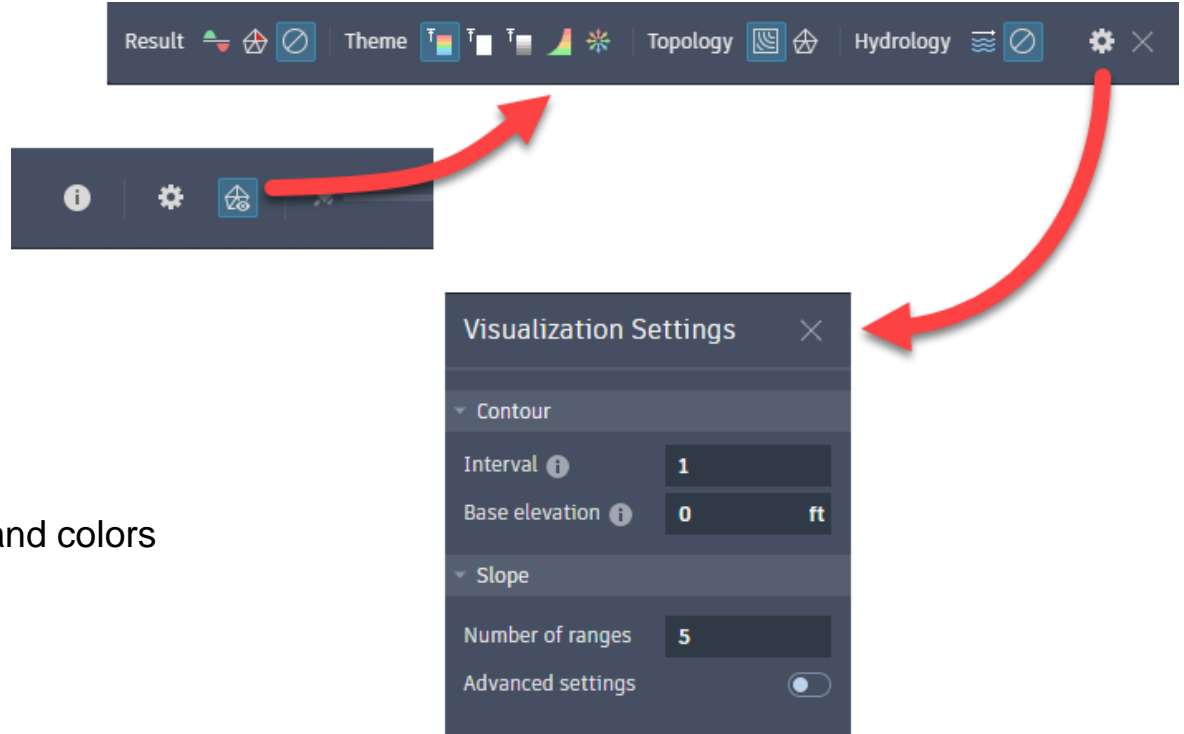
A close-up, black and white photograph of a highly reflective, woven mesh or fabric texture. The mesh is composed of many small, rounded, interconnected elements that create a complex, three-dimensional pattern. The lighting highlights the glossy surface, creating bright reflections and deep shadows that emphasize the texture. The image is partially obscured by a black diagonal shape that serves as a background for the text.

Visualization Tools to Supervise Progress

Visualization Tools

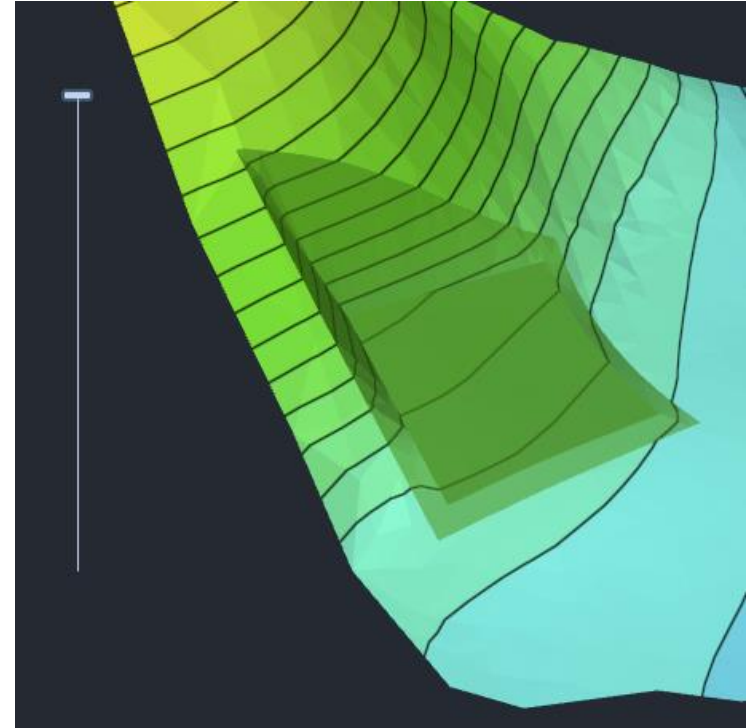
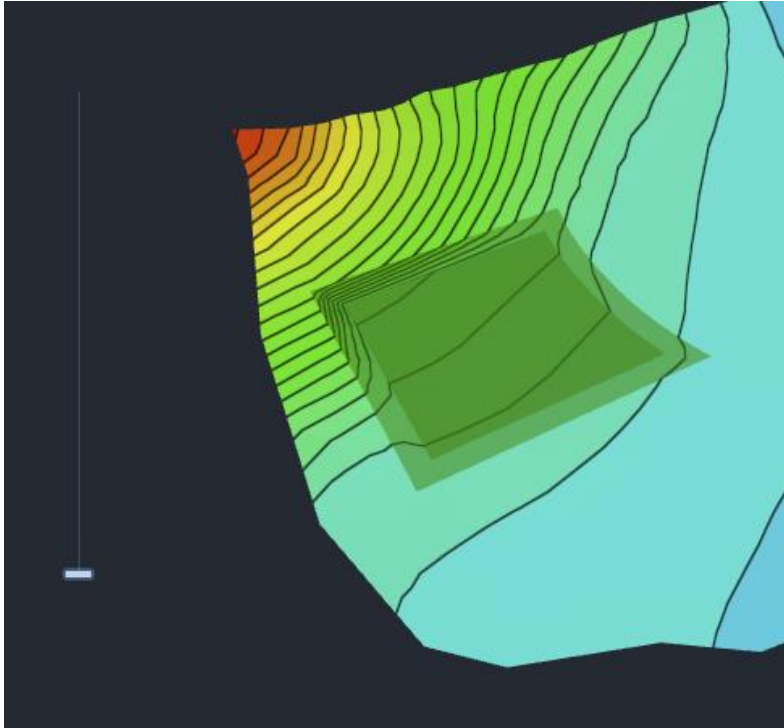
Help for understanding progress

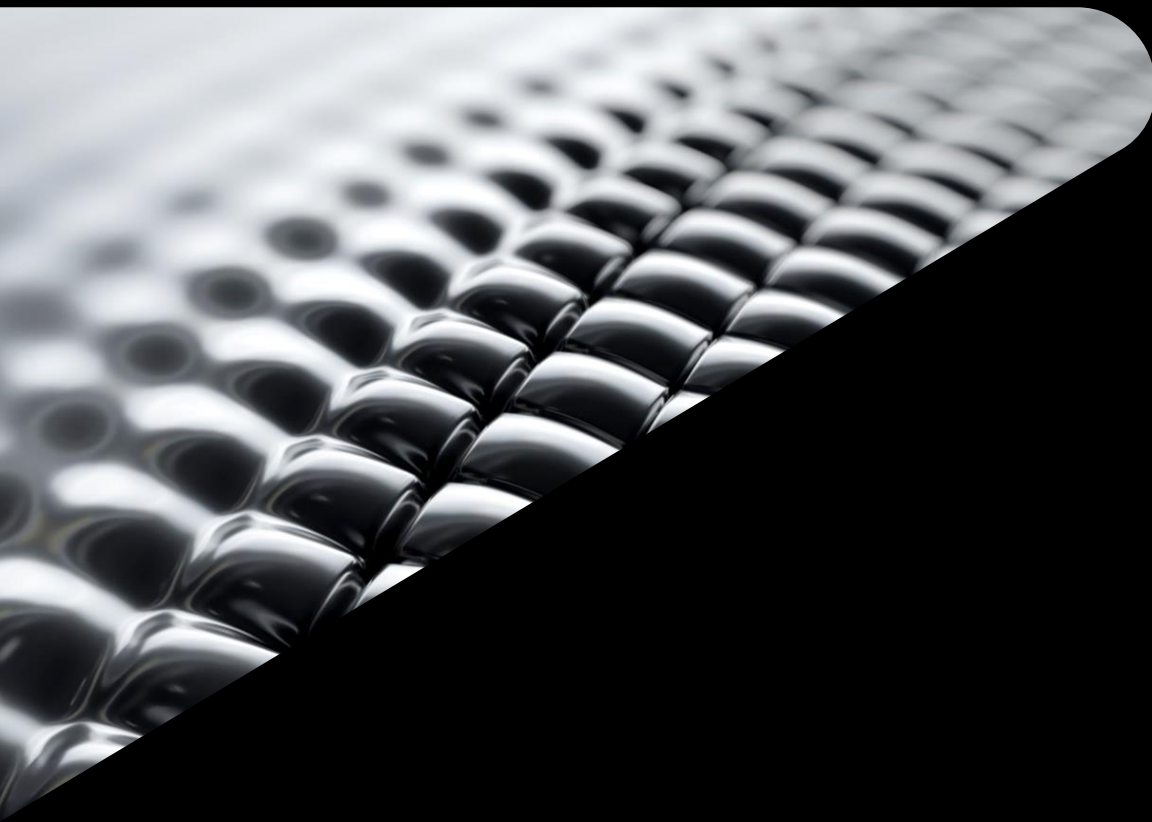
- Visualization Toolbar
 - Violations – colored triangles
 - Theme: Elevation, Slope
 - Contours versus Triangles
 - Hydrology/Slope Arrows
- Visual Settings
 - Contour Interval
 - Advanced Settings for ranges and colors
- Vertical Exaggeration Slider



Visualization Tools

Vertical Exaggeration Slider

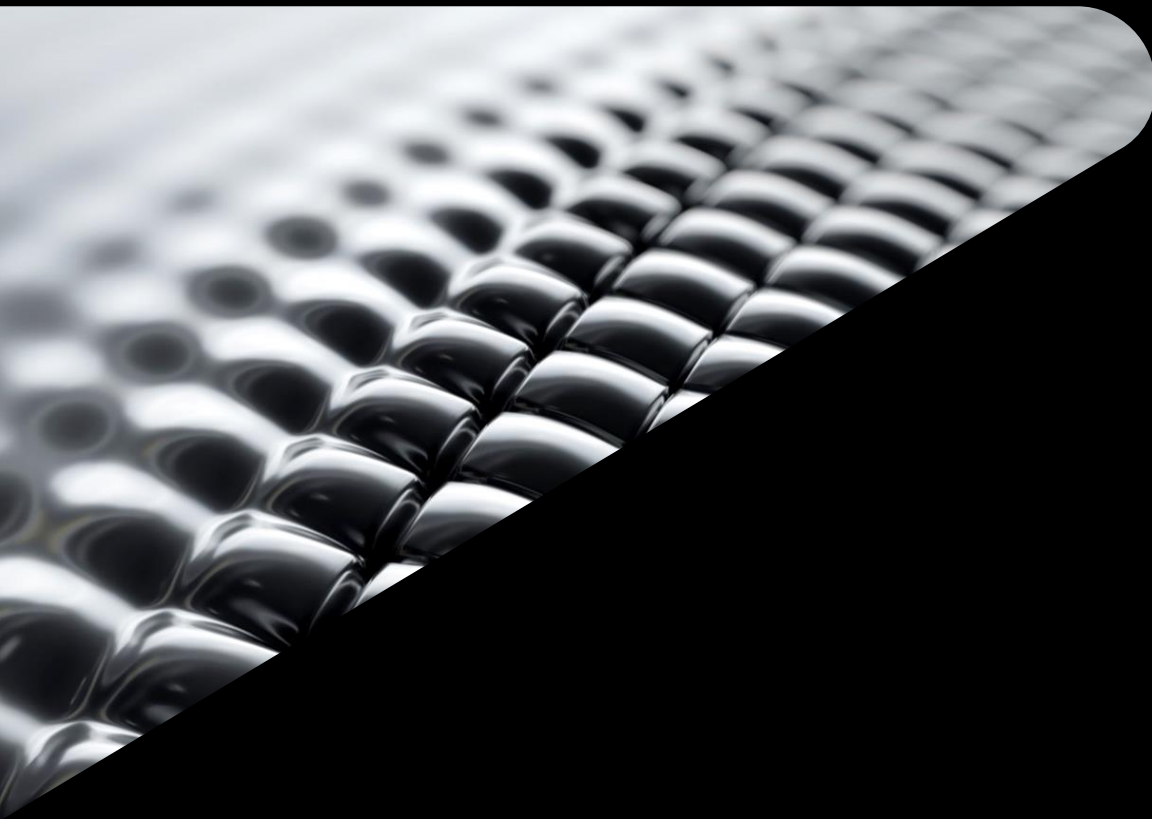




Zones, Lines, and Points

Zones, Lines, and Points

- Zones
 - Areas of grading, closed shapes
- Lines
 - Linear location of grading, usually open shape
 - Feel like breaklines
- Points
 - Location of specific or bounded elevation

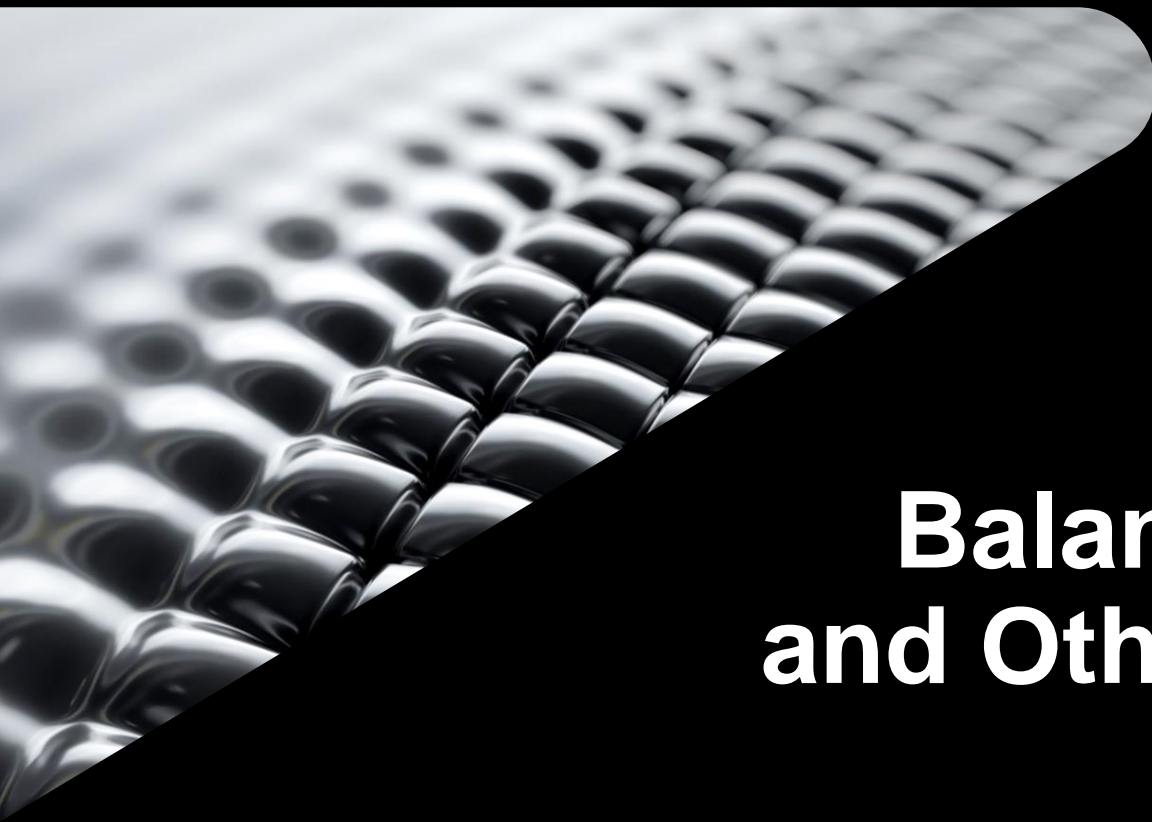


Encouraging Drainage

Encouraging Drainage

Get what you need while optimizing

- Lines that encourage drainage
 - Drain Line
 - Aligned Edge
 - Bend Line
 - Offset Points
- Points that encourage drainage
 - Low Point
 - Bounded Point

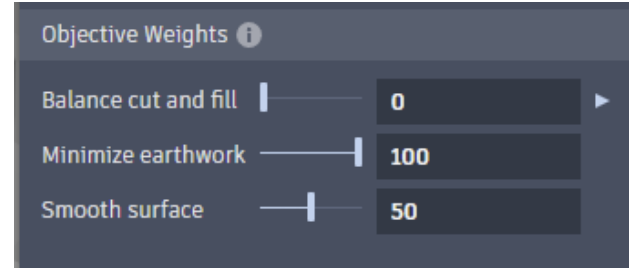
A close-up, black and white photograph of a highly textured, woven mesh or fabric. The texture is composed of many small, rounded, interlocking elements that create a complex, three-dimensional pattern. The lighting highlights the glossy surface of the material, creating bright reflections and deep shadows that emphasize its intricate structure. The image is partially obscured by a diagonal black overlay that contains the title text.

Balanced Volumes and Other Objectives

Grading Objectives

What (and how much) do you really want?

- Objective Weights
 - Balance Cut/Fill
 - Minimize Earthwork
 - Smooth Surface
- A “0” weight removed from consideration.
- May increase time of calculation



Grading Objectives

What (and how much) do you really want?

Objective Weights ?

Balance cut and fill 100

Minimize earthwork 0

Smooth surface 50

Convergence Plots

Feasibility ?

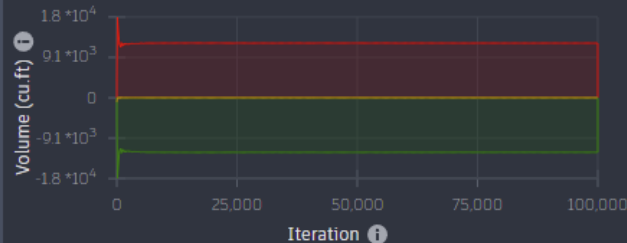
status: Trending towards an optimal solution.

Review needed Iteration required Solution likely



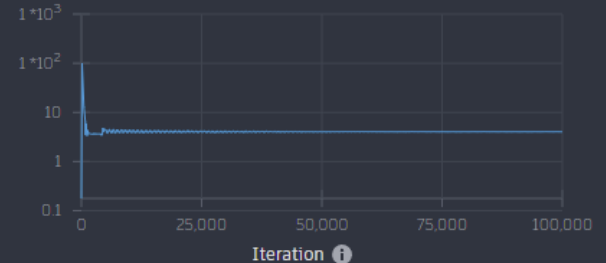
Volumes ?

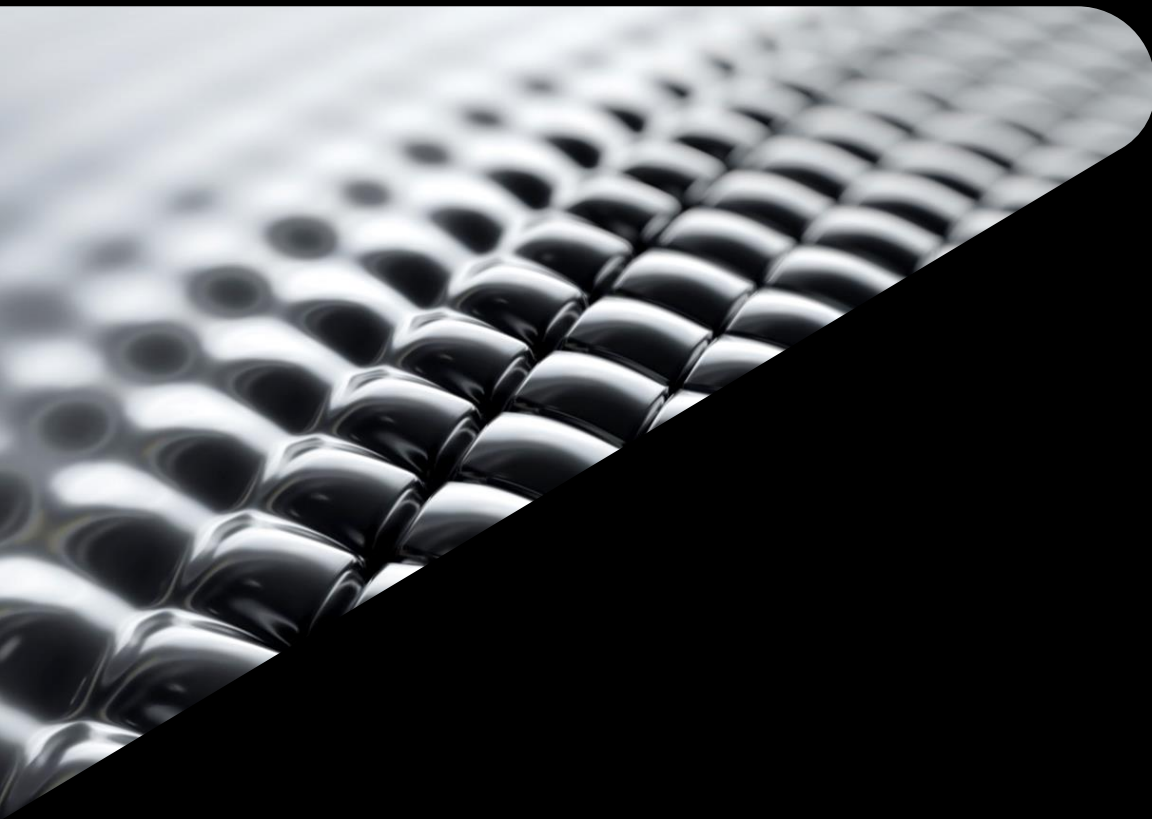
Cut Fill Net



Terrain Smoothness ?

Total Grade Change Measure





Take Aways

Take Aways

- Use the Visualization Tools to supervise progress
- Grading in phases may help some situations
- Drainage changes depending on where you put the “encouragement”
- Remember to set objectives and adjust settings



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