ICEM SURF
PRODUCTIVITY

Accelerating the A-class surfacing process
ICEM SURF PRODUCTIVITY

• Background
• A-class Surfacing Core Principles
• Methodologies
• Standards
• SURF+
BACKGROUND

Steve Cobert

• BSc Aeronautical Engineering, Imperial College, London
• BAe Research Department
• Rover Group
  • Investigation of ComputerVision’s NURBS
  • Developed:
    • AUTOSURF – top down approach

• MNEMONICS – scripting language
  • Honda resurfacing

• Topologies UK – ICEM Surf Training, pre-sales and customer support
• 1999: Formed Geodigm
  • ICEM & Alias Training, Support & Mentoring
  • A-class surfacing – Ford GT Exterior
  • Concept modelling
A-class Surfacing Fundamentals
SURFACING CORE PRINCIPLES

PATCH STRUCTURE
• Min. patches
• Min. control pts.
• Tidy control pts.

ADVANTAGES
• Quicker to build
• Quicker to modify
• Communicates Intent

SIMPLICITY
COMMUNICATE INTENT

Simple Model:
- Order 2 = flat
- Order 6 fillet = curvature matched
- Offset patches

Complex Model:
- Maybe flat?
- Curvature or arc?
- No idea if offset
PATCH STRUCTURE

IDEAL PATCHES
• U & v’s at 90 degrees

ADVANTAGES
• u, v shapes independent
• Easier to match
• Better highlights

P. AXES OF CURVATURE
• Min & max curvature directions
• Align patches with P. Axes

ADVANTAGES
• Minimal patches
• Minimal control pts

COMMENTS
• Essential if tight shape (e.g. fillet)
• Not necessary if very flat
CONTROL POINT PATTERN
CONTROL POINT PATTERN
CONTROL POINT PATTERN
CONTROL POINT PATTERN - “Crisp Packet Surfacing”
**Scenario:**

Cross-car patch
Perfect flow across Y0

**Method:**

Unified Modelling
SYMMETRY
MUTUAL MATCH

Objective:

Perfect transition

Method:

• Match L into R (usually G1)
• Match R into L (usually G1)
• Repeat until converged

Make common area coincide
MUTUAL MATCH
**Objective:**
Create G2 blend

**Method:**
Create-Patch-By Curves
Modify-Patch-Alignment
MANUAL BLEND
MATCH WITH BLEND

**Scenario:**
New feature line
Original surface

**Method:**
Modify-Patch-Match
+ Blend + No constraint
MATCH WITH BLEND
MATCH NURBS WITH BLEND

**Scenario:**
New feature lines
NURBS surface

**Method:**
Similar to previous
But using NURBS
MATCH WITH BLEND
STANDARDS

Improving team efficiency
MODEL STANDARDS

Consistent standards ensure a frictionless transfer of data within a team

Object Naming:
- Lists are temporary
- Object names are permanent
- Move objects non-graphically

Standardise Fillets:
- Arc, order 7 for accuracy
- Curvature matched chordal, order 6, FF 1
- Offset curvature matched, order 6, FF 1

Release Construction Planes:
- Tool directions
- Axes of rotation
- Mirror planes
- Trim extents
A user-customisable productivity tool for ICEM Surf
SURF+

Software

- Runs in parallel with ICEM Surf
- C++ / Qt

Objectives

- Improve work flow efficiency
- Reduce muscle strain (RSI)
- Capture & replay user methods

Benefits

- Potential 10 - 40% productivity benefits
SURF+ SOFTWARE

User Interface:
• User defined hotkeys
• User defined at-cursor menus
• User defined floating menus

Menu Settings:
• Similar to variants – but for all menus

Methods:
• Combine multiple operations
• Use simple scripting language

Examples:
• Wheel from half-spoke
• Vent aperture from 2D curves

UI Optimisation:
• Analysis of user inputs to inform UI
SURF+ CURRENT STATUS

User Interface:
- User defined hotkeys
- User defined “mouse menus”
- User defined floating menus

Menu Settings:
- Similar to variants - for all menus

Methods definition:
- Combine multiple operations
- Simple scripting language

UI Optimisation:
- Analysis of user inputs to inform UI

KEY
- Implemented
- Prototyped
- Under development
SURF+ HOTKEYS

Key Types

- Alphanumerics
- Spacebar
- Alt / Ctrl / Shift
- Function keys
- Special functions
SURF+ HOTKEYS

Aims

- Key combinations accessed by left hand only
- Easy to memorise

Examples

- Surface functions: single key
- Curve functions: Alt + a key
- Move functions: Shift + a key
- Display variants: 1,2,3,4,5
- Select: x
- OK: spacebar (in future)
- Special function: “Close ICEM menus” on Alt + x
**SURF+ COMPARISON**

*Productivity benefit example*

**Scenario:**

Create surface from 2 curves
SURF+ COMPARISON

Productivity benefit example
SURF+ COMPARISON

Productivity benefit example

ICEM Surf

With SURF+ Hotkeys

~30% time saving
THANK YOU FOR WATCHING

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