IM469065

Alias and VRED for Heavy Machinery Design

Mike Turner
DG Design

Learning Objective 1

See how Alias can deliver Class-A surfaces from design straight into engineering.

Learning Objective 2

See how VRED visualization can empower decision makers.

Learning Objective 3

Discover how Alias can work with MCAD tools in a seamless way.

Learning Objective 4

Discover how Alias can be used to create fast concept models as well as engineering-ready surfaces.

Description

This class will look at how Alias software and VRED software enable the design and visualisation of heavy machinery and equipment.

Speaker

Creative Industrial Designer Sketch / ALIAS A-Surface CAD / vRED Visualisation

Design Management Experience from ID perspective Concept / Prototype / Production

Global Design Leadership experience daily implementation / long-term strategy

Hungry / Inquisitive / Experienced

LiuGong / DGDESIGN presentation

Key messages

- LiuGong lead their Industrial Design process – with inhouse ID Teams in UK Studio and China.
- DGDESIGN offer design and CAD support – based on a working relationship & simpatico between Gary Major (GM) & Mike Turner (MT) that goes back 18+ years
- Alias used as primary modelling tool for all styling critical parts – full control of A-surface.
- Presentation focusses primarily on RedDot winning TD-16N – but references other LiuGong/Dressta projects completed together using Autodesk tools - to add interest / context
- Over past 3 years VR (both Alias and VRED) increasingly used by LiuGong and DGDESIGN to sanity check concept throughout the digital definition process.
- Off –highway vehicle design very much function-led – working machines, complex package challenges – often tight tooling and R&D budgets.
- Styling has a role to play – but solutions fundamentally driven by practical constraints, end-user requirements and legislation.
- Pace of work and project gestation periods typically much shorter than Automotive projects.

Introduction Mike Turner

- Voluntary placements at JCB as Industrial Designer throughout GCSE & A Level – meets Gary Major
- 92-96 Coventry University – Transportation Design BA (Hons)
- 1997 Adtranz (Bombardier) – Senior Designer, Learns Alias whilst working in Berlin.
- 2001 Renfrew Group - Design Consultancy. (Triumph Daytona & Flymo surfacing)
- 2002 Joins JCB – Introduces 3D Industrial Design workflow (Alias) to organisation. Digital development expands, as does capacity – all product range covered, including JCB Dieselmax land speed car.
- 08-10 MT Freelance – VW, Bloodhound SSC, Nokia, HotWheels, Terex, Triumph, IVT etc
- 2010 MT Rejoins JCB
- 2011 GM leaves JCB to set up LiuGong UK Studio - MT promoted to JCB Global Head of Design.
- 11-16 MT development of JCB Innovation Centre & ID studio: collaborative working, advanced visualisation, digital stakeholder reviews, rapid prototyping, ergonomics & HMI - Full product range & NPI process overhaul – disruptive innovation. (Hydradig)
- 2016 MT joins DGESIGN – Transportation Design consultancy with Rail bias. (DG prior colleague of GM)
- 2017 MT & GM re-establish working partnership - Alias definition and VRED visualisation.
- 2020 Red Dot Design Award - Product Design winner (LiuGong Dressta TD-16N)

Introduction Gary major

- 81-85 Coventry University – Transportation Design BA (Hons)
- 85-87 Industrial Designer, Dutch Rail
- 88-90 Industrial Designer, JCB
- 90-95 Industrial Designer, ABB
- 96-98 Senior Designer, JCB
- 98-2000 Senior Designer Chomiak Design
- 2000-11 Head of Design, JCB
- 11-19 Director of Design, Guangxi LiuGong
- 19 - Executive Director of Design, Guangxi LiuGong
- 2019 Red Dot Design Award - Product Design winner (LiuGong 4180D MotorGrader)
- 2020 Red Dot Design Award - Product Design winner (LiuGong Dressta TD-16N)

DG Design Brief History

- Est. 2000 by David Gordon (Former work Colleague of both Gary and Mike from Rail Industry)
- Transportation design specialists (Passenger Rail Vehicles, Bus and Coach, Off Highway Machinery, Commercial vehicles.)
- Four creatives; 80+ years of combined design experience
- UK based but operating globally
- A proven record of delivering successful, award-winning projects for leading transport businesses around the world.
- Established Autodesk users – Alias, VRED (visualisation, animation and VR) and 3DStudio Max

Background on Liugong

- LiuGong is a part of LiuGong Group with over 60 years designing and manufacturing Off-Highway vehicles in the Construction/Industrial and Agricultural sectors, it has over 9500 employees, 20 manufacturing sites and 5 R&D facilities worldwide.
- Domestic and overseas markets – 2019 saw over 57,000 units sold with a turnover of $27B.
- Extensive product range – Wheeled loaders, full range of excavators, motor graders, dozers, forklifts, skid steers, BHLs, rollers, pavers and harvesters.
- UK Design facility launched in 2011 – to help improve design & perceived quality, particularly focusing on the West – GM brought in from JCB as Director of Industrial Design.

B170D / TD25 - interior concept definition (2017)

- Basic Dozer interior – B170D for China / TD25 for European Market.
- Basic concept volumes had already been established for interior – but lacked finesse, didn’t meet latest package requirements.
- DGDESIGN asked to support – develop the design & manage the project interface with China and Poland Engineering teams.
- Surfaces produced iteratively and shared with project teams.
- Informal daily reviews with LiuGong UK studio introduced via TeamViewer & Skype to ensure alignment.

Mid Cab concept – overview

- Project conceived by Ed Wagner (Exec. Director of Test & New Technology) and Gary Major

- Dozer with radical package rework to ensure peerless all-round visibility

- Benefits:
- Unrivalled site safety
- Operator confidence
- Ease of use

- Command cab – all controls mounted off Operator's seat – minimal interior, maximum space – no waste, no excess.

- Run initially as "skunkworks" programme with skeleton engineering support to devise concept – small teams closely aligned running quickly.

Mid Cab concept - interior definition 2018/07/08

- DGDESIGN invited to LiuGong offices – project introduced under NDA.
- Preliminary engineering cab package data shared during introductory project briefing onsite.
- Alias VR was being demoed to the team anyway, so this raw file was taken into Alias VR - live.
- Session worked surprisingly well – even as an un-shaded, disorganised “engineering heavy” file. (Vive Pro headset, Alienware laptop)
- VR gave Designers opportunity to see constraints first hand – inhouse team immediately realised RH pod was far too big – obstructed visibility out of RH side window considerably – instruction given back to engineers immediately that we’d be reconsidering design.
- Gave a good spatial impression of cab volumes & layout – package concept was felt to be on right track – but obviously needing functional and aesthetic refinement.
- Storage layout & feature ideas were discussed, suggestions made in VR.

Mid Cab concept definition 2018/07/09

- Traditional sightline plane definitions in Alias for 5th and 95th %ile.
- Preliminary Alias block-out work to remap pod functionality / reduce width.
- Live, informal ongoing reviews & update discussions begun using TeamViewer / Skype – DGDESIGN & LiuGong UK.
- Work shared with test and development drivers in China to get feedback and input on control layout.

Mid Cab concept definition 2018/07/10

- Preliminary revised pod volumes shared back to Engineering teams to sanity check revised direction / gain Stakeholder thoughts on revised switch layout.
- Basic block-out work done in Alias to define principles & initial volumes for floormat, front bulkhead, headliner, A-pillar plenums, rear bulkhead mouldings and LH / RH storage volumes.

Mid Cab concept definition 2018/07/11

- Headliner concept volumes updated to take into account ISO clearance requirements – rework to radio & HVAC head unit installation.
- Feedback on pod control layout, and updates in response.

Mid Cab concept definition 2018/07/12

- Main interior surfaces updated In Alias.
- Front bulkhead concept simplified. Storage box removed to allow more foot room for larger Operators.
- Preliminary thoughts on Front duct / vent positions to allow main screen demist.
- Storage requirements blocked out for RH and LH based on initial Operator preferences for layout and features / required volumes for carry on items – drinks bottles, lunchbox, water bottles etc.
- Data shared with Engineering team as CAD files for preliminary checks / feedback.

Mid Cab concept definition 2018/07/18

- Further iteration of interior updates authored based on Stakeholder feedback
- Foot brace pedals and front bulkhead options explored.
- Ongoing Alias VR checks in DGDESIGN studio to review detail changes.
- Ongoing screen share reviews with LiuGong UK team to discuss and confirm tweaks to concept.
- CAD files and images passed back to Engineering team for ongoing assessment / sanity checks.
- **Note: We're only 10 days into project since initial briefing – but making FAST progress - due largely to clear shared vision, clearly aligned (small) teams and good comms.**
- Management confidence in CAD already there – but additional VR experience helps add to sense of digital validation.

Mid Cab concept definition 2018/07/31

- Detail refinement to concept volumes and features.
- Alternate display options included.
- Overall machine appearance images produced – preliminary Alias screengrabs.
- VR concept presented at LiuGong UK offices in Alias – allowing key stakeholders to assess design – Gary and Ed present.
- Polish engineering team members also present.
- Lukasz and Damian spent 1.5 hours going over the design in VR – from an ID standpoint but also general engineering, daily checks, access etc.

Mid Cab concept definition August 2018

- Ongoing & detailed liaison throughout August with engineering teams to refine data – production detailing, underlying packaging for mechanisms, wiring looms etc.
- Ongoing tweaks to RH pod – reduce volumes further and simply design. Cupholder moved rearward to it's not obscuring side window when used.

Mid Cab concept definition September / October 2018

- Further detail development of pods based on developing concept for adjustment linkage.
- Detail development of all interior trim A-surfaces – target to make each component suitable for rapid prototyping / mockups.
- DGDESIGN initial involvement draws to a close - concept freeze on interior.
- Future of project at this stage not certain. "skunkworks" nature of its development needs to be absorbed within Group to become a "regular" project with detailed R&D support to validate.

Ronnie & Reggie development – Jan / Feb 2019

- VRED and Alias used extensively for definition of Ronnie. (Wheeled loading Shovel)
- BEV technology demonstrators – running prototypes
- Ronnie prototype bodywork design defined, refined and frozen in record time: 10 working days – All Alias / VRED.
- *"These Generation-1 machines were designed to be built quickly and easily using zero tooling and some carried over components, and many of the surfaces are planar. The result is a stealthy and brutal aesthetic that is 100% driven by function - very Dieter Rams!" - Gary Major.*
    - 7 Alias iterations actively circulated amongst stakeholders to refine concept and finalise details.
    - Alias VR used to assess initial volumes, sightlines and walkways
    - VRED VR used to prove out sight-lines & blind-spots via shadow plots, and provide higher quality WIP images to summarise design intent.
    - Stakeholder alignment: screen-share reviews of each CAD iteration to ensure Client 100% happy & fully in the loop.
    - VRED assets used to develop launch animation for Ronnie and Reggie (excavator) – used at BICES show – China (September 2019)

Mid Cab development – Jan / Feb 2020

- Development of Launch assets (VRED renders and turntable animation) final production surfaces.
- Images to be used at Conexpo show to support launch / be available in press packs etc.
- Surfaces true to original concept intent – right first time.
- 10 high res images and HD turntable animation produced in VRED.
- 10/03/2020: TD-16N launched at Conexpo Show, Las Vegas
- 30/03/2020: Announced that TD-16N has won RedDot award
- Assets we can use: VRED Renders and turntable 360 animation & photos from show.

reddot design award
winner 2020