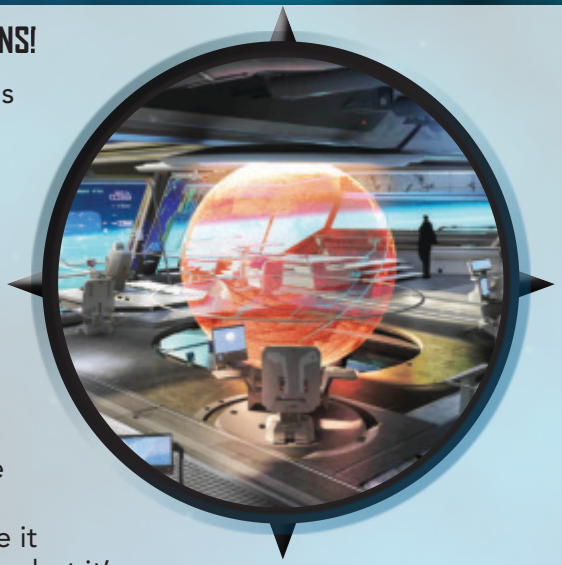
JUMP POINT

A ROBERTS SPACE INDUSTRIES PUBLICATION ISSUE 02.08

IN THIS ISSUE

GREETINGS, CITIZENS!



The good news is that it isn't 3:30 in the morning right now. The bad news is that I'm sitting in another hotel room, finishing another **Jump Point**. Actually, that hops back to the good news side; I think we'll make it out on time again, but it's Friday, and it isn't getting any earlier. We'll see. :)

As promised last month, It's an Atlanta hotel I'm sitting in this time, ready to go out and embrace Dragon Con. It looks like it'll be fun. But first, **JP**.

I know you've seen the Constellation before, but I don't think you've seen it like this. We've got marked-up concept art and the nitty-gritty of conversion into the game engine for all four of the variants. And next month? Either the final article on the Idris, or something completely new. (Well, completely new to **JP**.)

With all the convention-going, Ben got an assist on his two articles, with Will Weissbaum pitching in on the Murray Cup "portfolio" and Todd Bailey and Rob Irving helping finish the Baker System Galactic Guide. Ricky Jutley from Foundry 42 contributes an overview of race development, and we've got Charles Duncan's fourth and final episode of *Lost and Found*. Next month, a new story begins, but we hope to get Charles back for another series.

In the ongoing effort to expand your game-design vocabulary (and mine), there are several terms defined and discussed on page 4. I'll send you there to get them, rather than repeating them all here.

If you're at the show, please track us down and say hi. Ben Lesnick, Dave Haddock and Alex Mayberry are all here, and we've all got various panels and other events.

Hold on, it's gonna be a wild ride!

David

David.Ladyman@cloudimperiumgames.com

P.S. It was great to meet several of you at Comic-Con, but the picture I've chosen to share with you is proof positive that George R.R. Martin and I are two different people. (I'm the one on the left.) We had a scintillating conversation of about 10 seconds, closely observed by the two Men In Black over my shoulder.

EDITOR: DAVID LADYMAN, INCAN MONKEY GOD STUDIOS
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COVER, P3, P64:	CHRIS OLIVIA
PAGE 62:	PAUL JONES
PAGE 71:	DENNIS CHAN
PAGE 73:	SYSTEM CHART, BEHAVIOUR
PAGE 74, 80:	DENNIS CHAN

Constellation Variants

The Constellation was one of the first five ships conceived and designed for Star Citizen. *A brochure for it was put together almost two years ago. Obviously, a lot has changed since that time. When it came time to get the Constellation ready for the hangar ("hangar-ready"), including both the original model and three other variants, CIG turned to David Hobbins and Gurmukh Bhasin for the four concepts.*

Once their work was complete, the task of getting all four ships converted into CryEngine was assigned to the team at CGBot, who included:

Dennia Aguilar (3D Artist)
Chuy Alanis (Lead Artist)
Octavio Andrade (3D Artist)
Carlos Bonilla (3D Artist)
Luis Colunga (3D Artist)
Gaby Escamilla (3D Artist)
Salvador Flores (3D Artist)
Martin Gamez (Lead Artist)
Alfredo Garza (3D Artist)
Hector Gomez (3D Artist)
Jonathan Gonzalez (3D Artist)
Daniel Guevara (3D Artist)
Daniel Hernandez (3D Artist)
Priscila Lopez (Artist)
Ricardo Madariaga (Senior Artist)
Ana Martinez (Senior Artist)
Enrique Martinez (3D Artist)
Fabiola Orozco (3D Artist)
Nohemi Ramos (Senior Artist)
Elena Rodriguez (Senior Artist)
Chuy Salinas (3D Artist)
Lydia Sanchez (Senior Artist)
Diego Zuñiga (3D Artist)

This month, we're looking over the artists' shoulders at their notes, as David and Gurmukh conceive the four Constellation models and then CGBot turns them into playable ships. We've covered the conception process in previous Jump Points, but we haven't spent as much time talking about how they're converted into items that the game engine can manipulate.

The model CGBot inherits starts off with thousands of triangles ("tris"). Every triangle must be tracked and displayed by the game software, so it's no surprise that the fewer the tris, the faster the game can process where the ship is from frame to frame. One of their key tasks is to convert each part of each ship from high tris to low tris ("HT" to "LT," or high poly to low poly).

As they're making this conversion, they're looking out for any poorly fitting joints between adjacent elements on the ship, especially poor fits between exterior and interior surfaces. They're also working on devising the textures that will cover every surface, and they're adding a "collision skin" on every surface; it's this skin that (for example) keeps you from walking right through the walls or floor of your ship into space. And they're on the lookout for "perturb faces," places where ill-matching vertices create a weird shadow artifact on a surface, making it look warped.

And while they're making the best ship possible, they're also tearing it up. When your ship takes damage, or simply incurs wear and tear, it will start to show its age. The CGBot team creates those modifications as well, constructing sequences of damage on every part of the ship, to show what it will look like with 25%, 50% and greater damage. We won't show you that for all four ships (it starts to get repetitious pretty quickly), but we will show you some sample panels that CGBot created for the base Connie.

Along with the damage sequences, there is another sequence that CGBot creates for every ship – the LODs.

"LOD" literally refers to "Level of Detail," and LODs are smaller and smaller versions of the ship, created with fewer and fewer tris. What's this for? When your pride and joy glides past other ships, you want people to see it in all its glory. But the same ship at several hundred meters is going to look much smaller in size. At extreme distances, it's barely going to be a few pixels on the screen. There's no reason for the software to keep track of all those individual tris when the ship is getting farther and farther away. A LODs version of a ship has only a fraction of the tris that are built into the ship you're standing next to.

In this article, we won't try to show you every instance of every improvement that they made, but we will give you examples to help show what went into making the four Constellations that we now have.

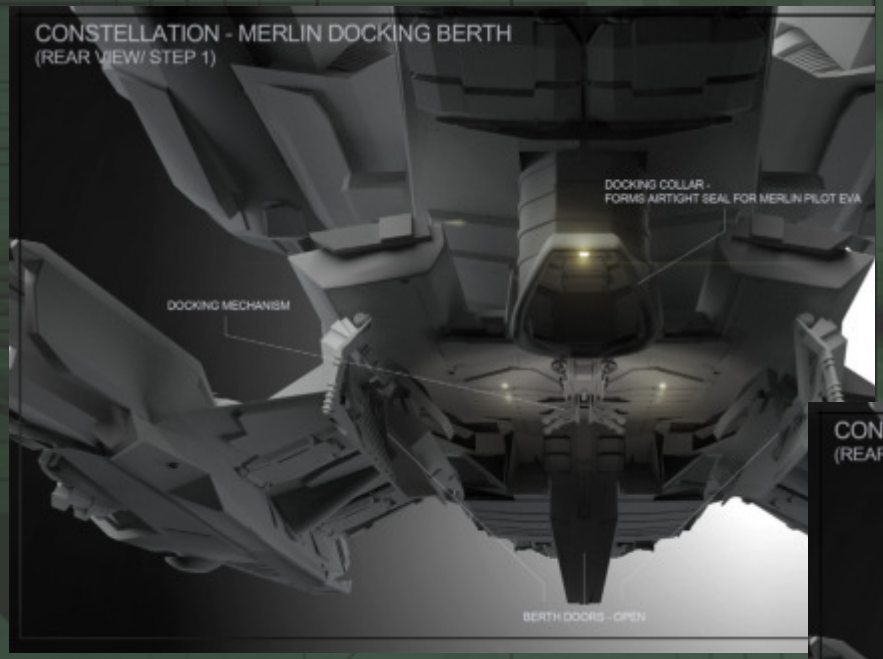
We're going to do that by variant, starting with the base Constellation itself – first the concept sequence (starting when the split into four variants took place), then images that show its conversion into a game entity.

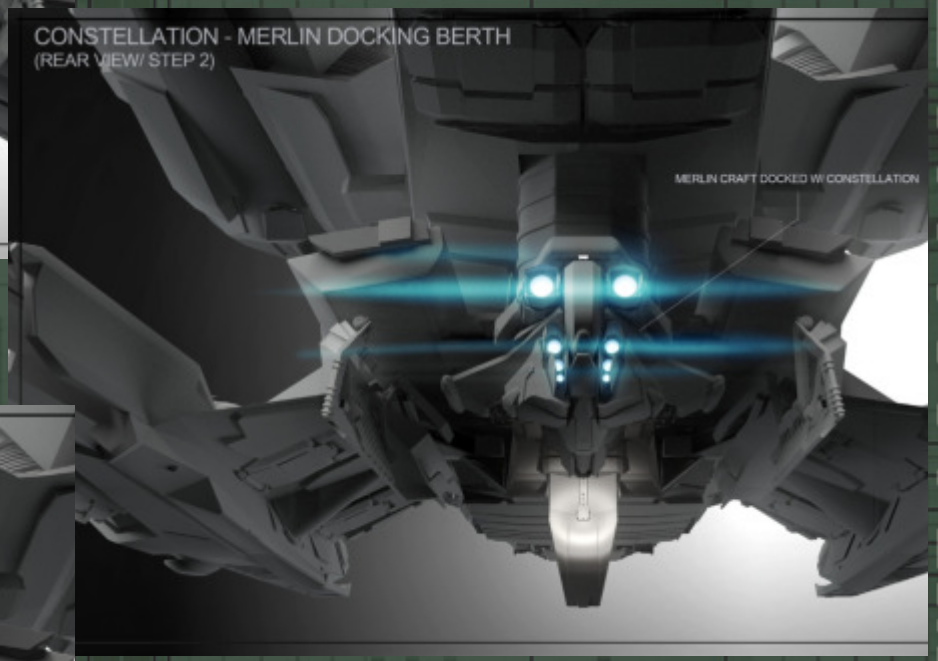
But before we get started, one more bit of bookkeeping: names. The four variants started out with simple designations, then got one set of names (which the artists use throughout this article), and then eventually got another (final) set of names. The most confusing part is that"Taurus" was originally the name of the explorer, and became the name of the discount hauler:

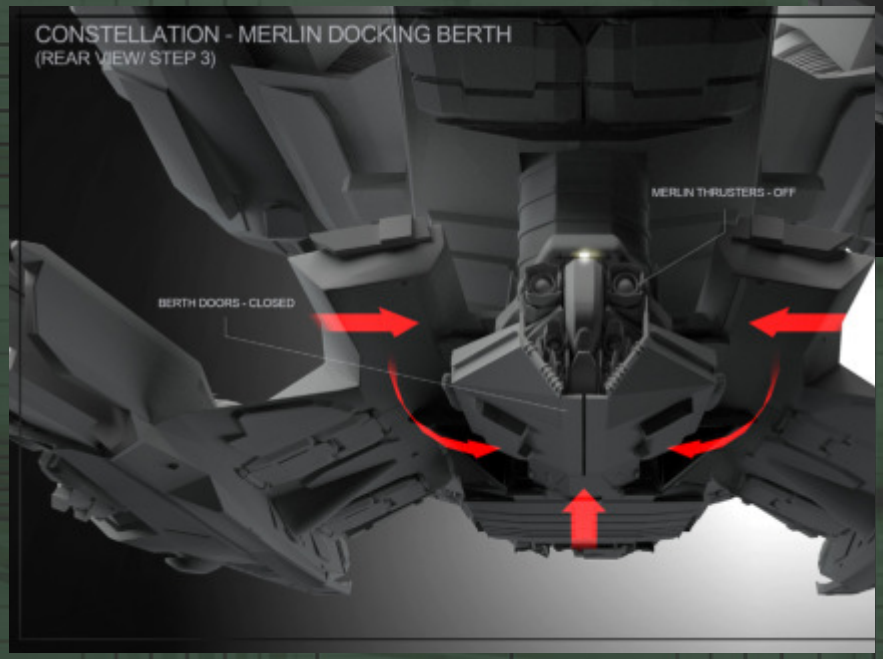
Designation	First Name	Final Name
base	Base	Andromeda (Warrior Maiden)
discount	Aquarius	Taurus (Bull)
explorer	Taurus	Aquila (Eagle)
deluxe	Cygnus	Phoenix

Enough talk; let's see the pictures!

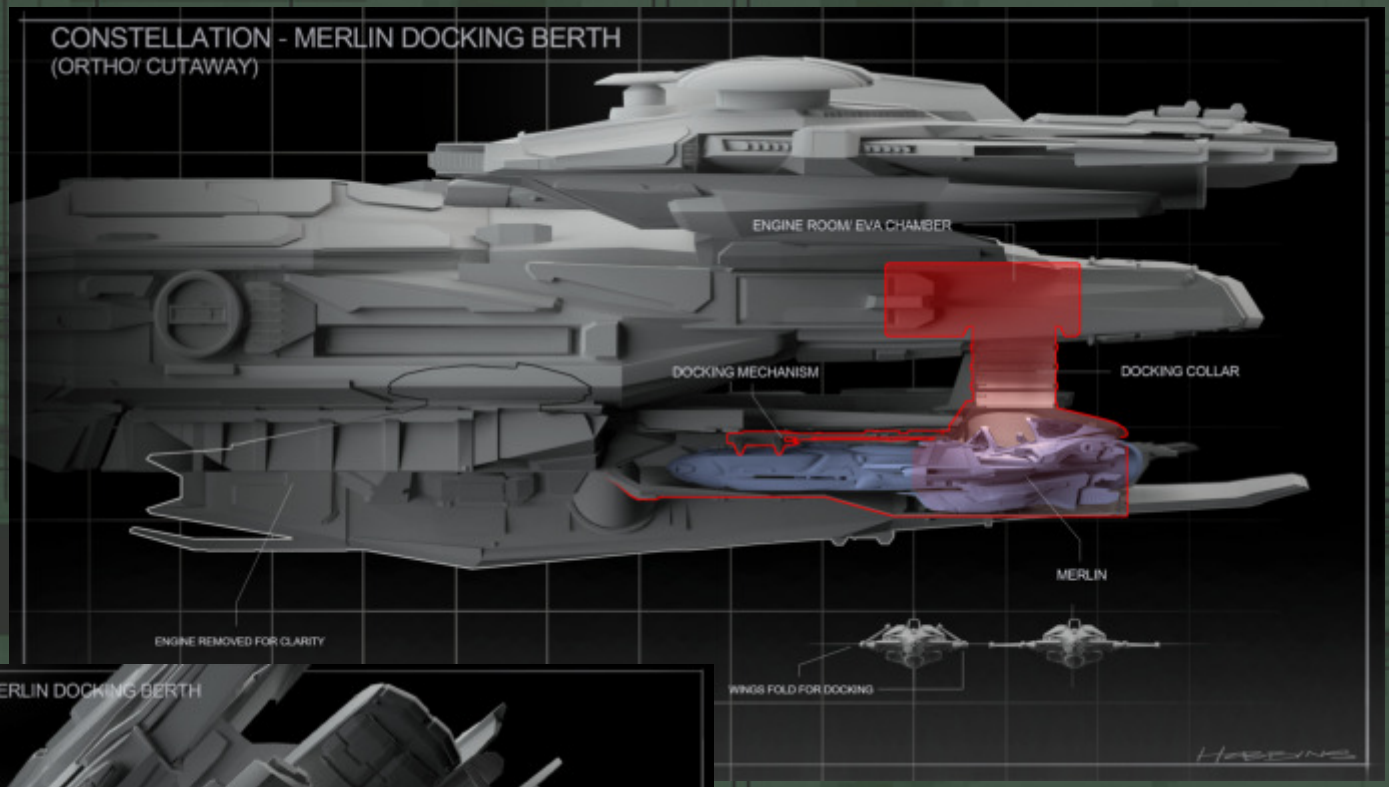
Andromeda (base) concept

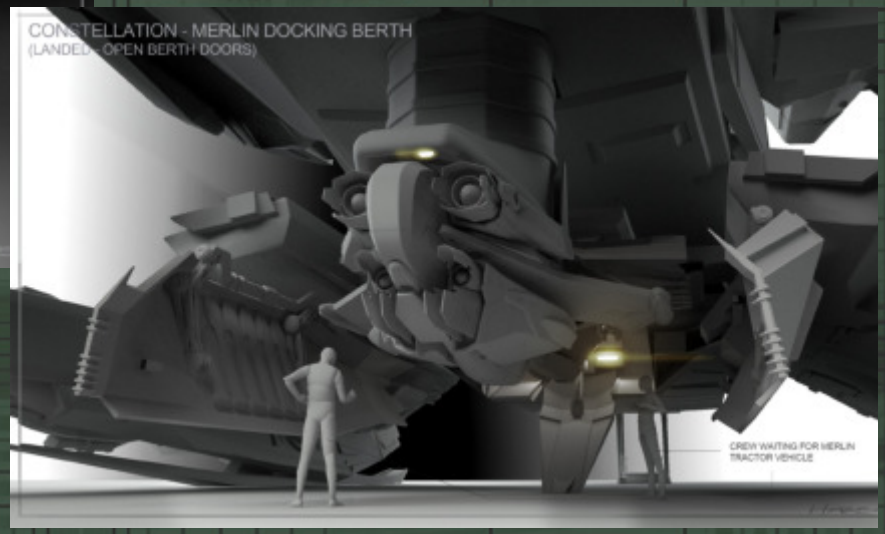




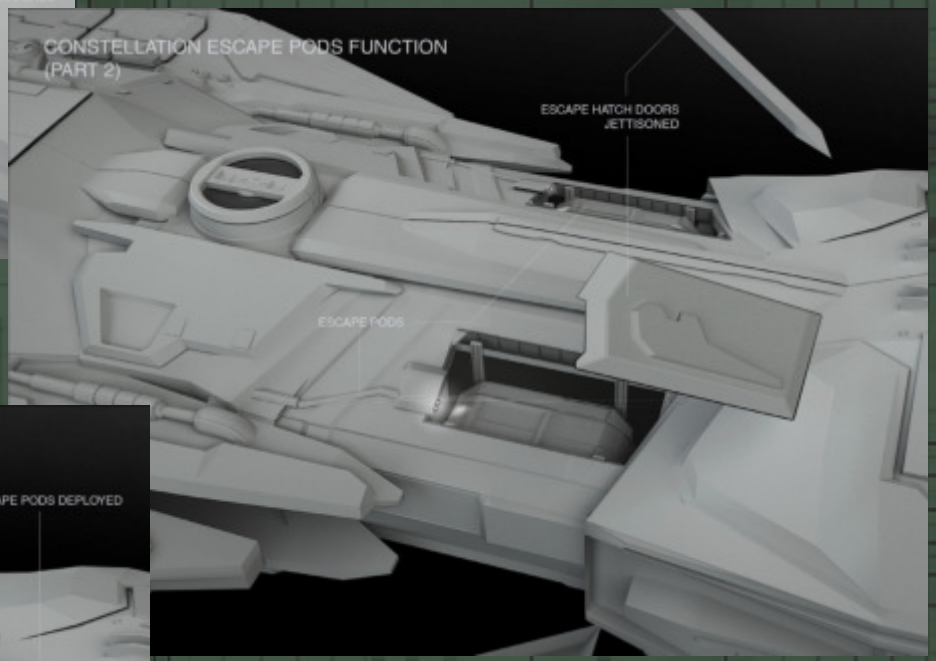


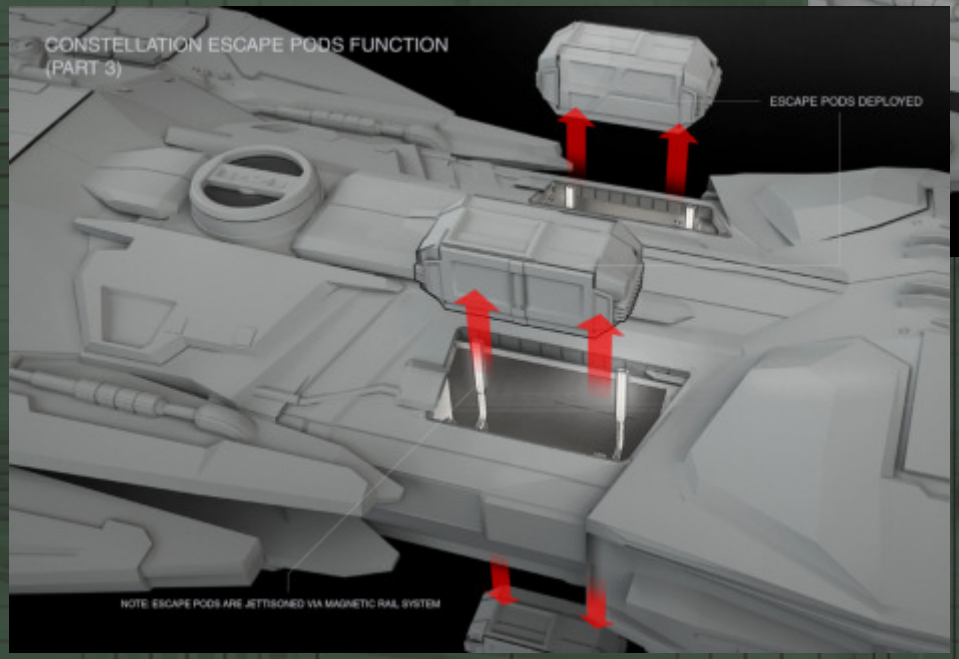
Perhaps the most significant change for the Andromeda in this update is to move the Merlin out of the cargo bay into its own berth.



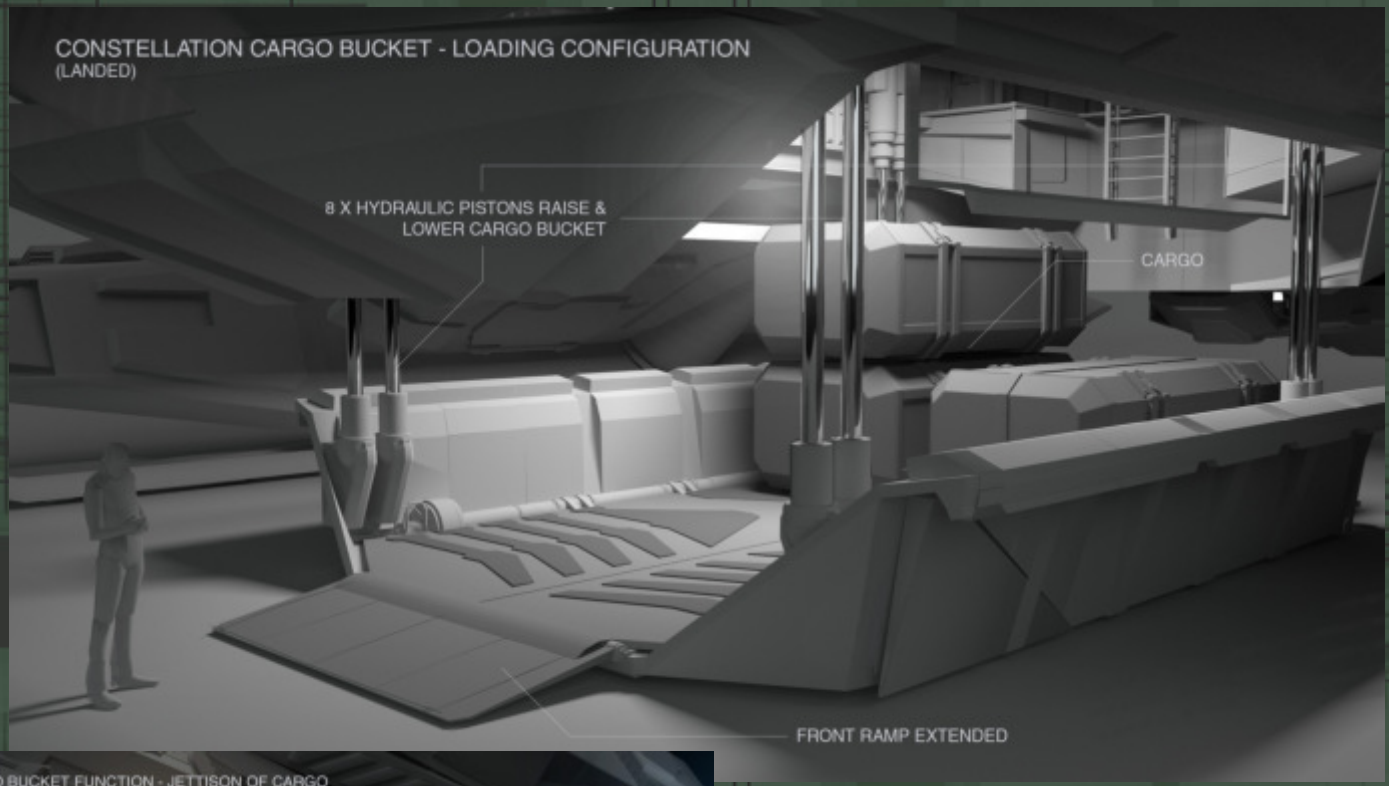


WORK IN PROGRESS



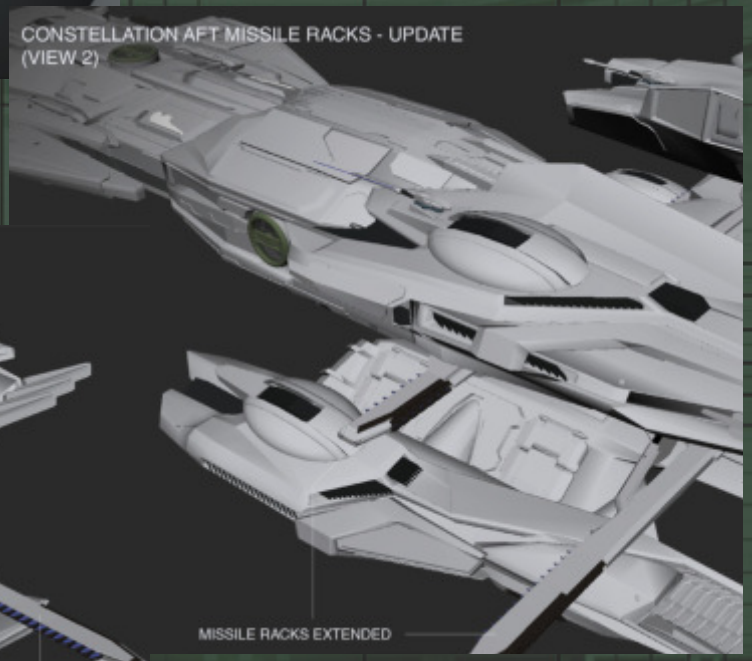


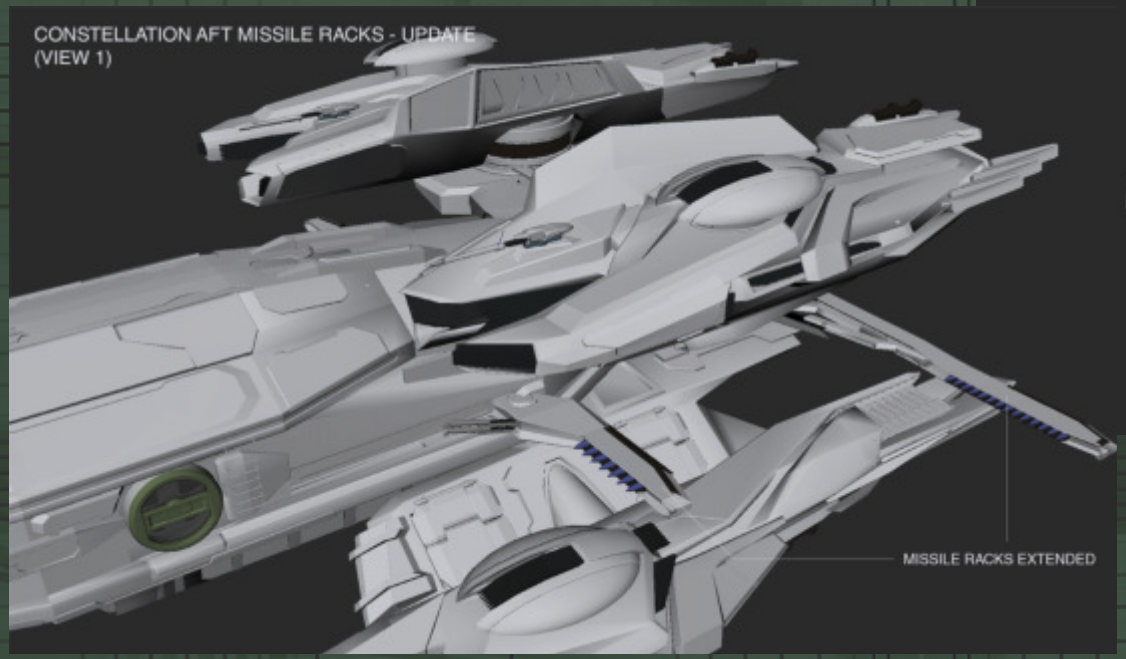
Sleeping berths / escape pods were shifted closer to the cockpit, and how they functioned was worked out.



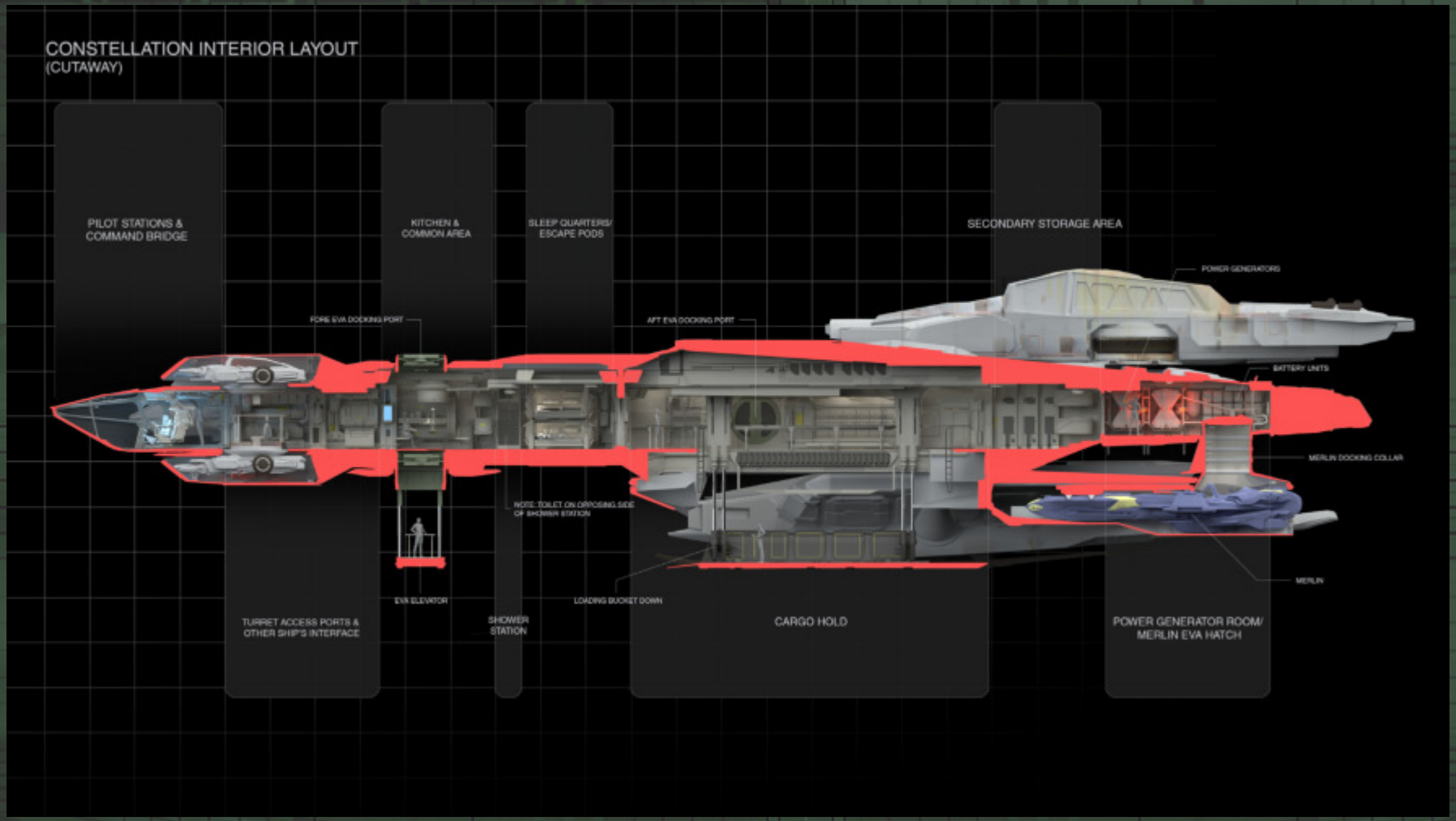
With the Merlin out of the way, the cargo bucket becomes much more accessible and functional.

Weapon mounts were worked out, along with two retractable missile racks on each side (although the number of missiles is still being balanced).

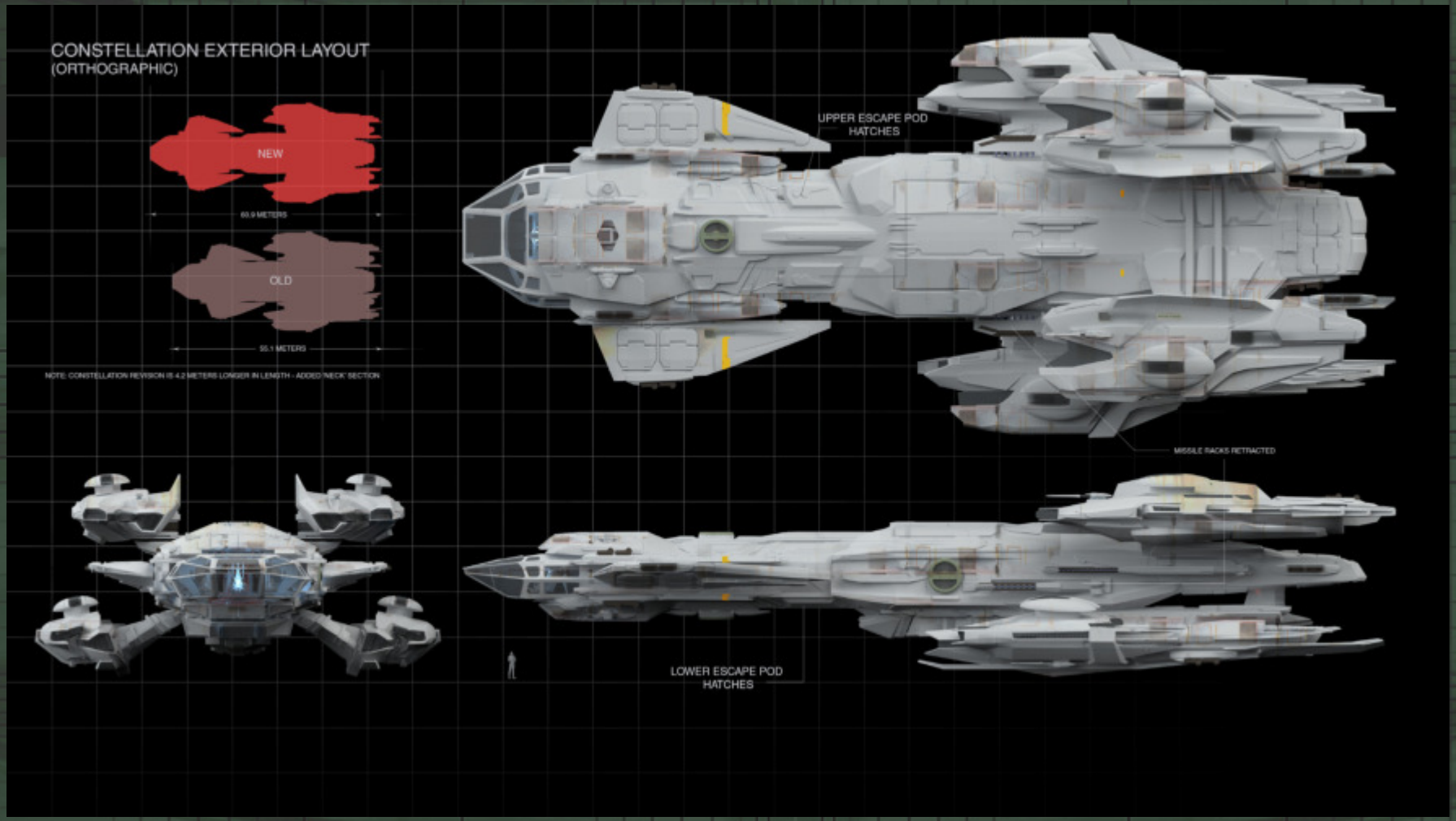




The final concept, interior ...



... and exterior



Andromeda (base) conversion

We worked on the Exterior LODs, using the new LOD script we were given. We checked the differences between the old and new script, and concluded that both were useful.

I worked along with Dennia, splitting the work in two. I worked in the principal parts of the body while she worked in the wings. We were checking to see if the test LODs were useful; however we are still confused about the distances every LOD should be switching.

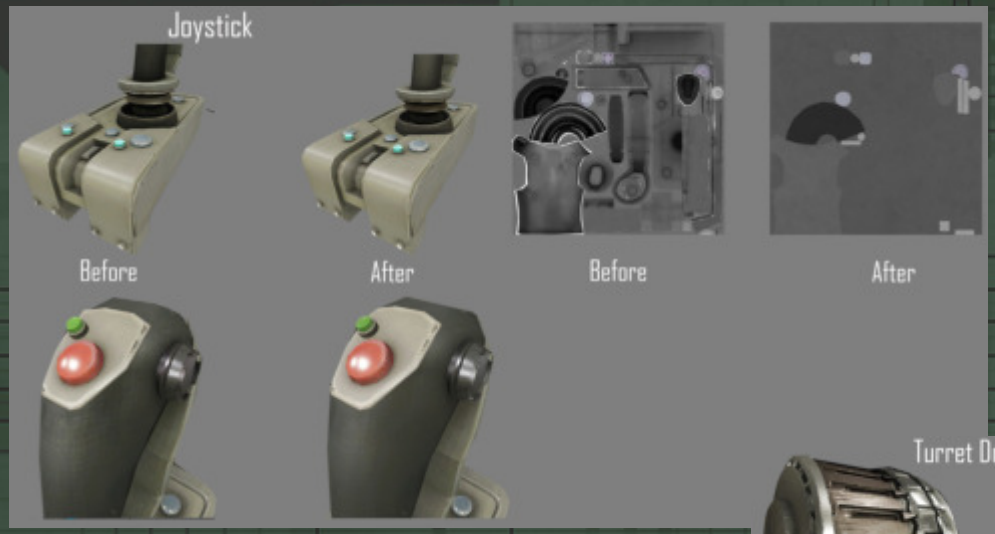
Using the script we tried to discard 70% of the mesh polys. However, there were some cases in which the geometry started to collapse. In those cases we decided to decrease the diminishing threshold between 60% and 50% or even less.

As Carlos said, I worked with the wings (Nacelles Upper L & R, Nacelles Bottom L & R, Wing L & R).

We don't really know the accurate distance at which each LOD in this ship should change, so we used the default distance to test it in engine.

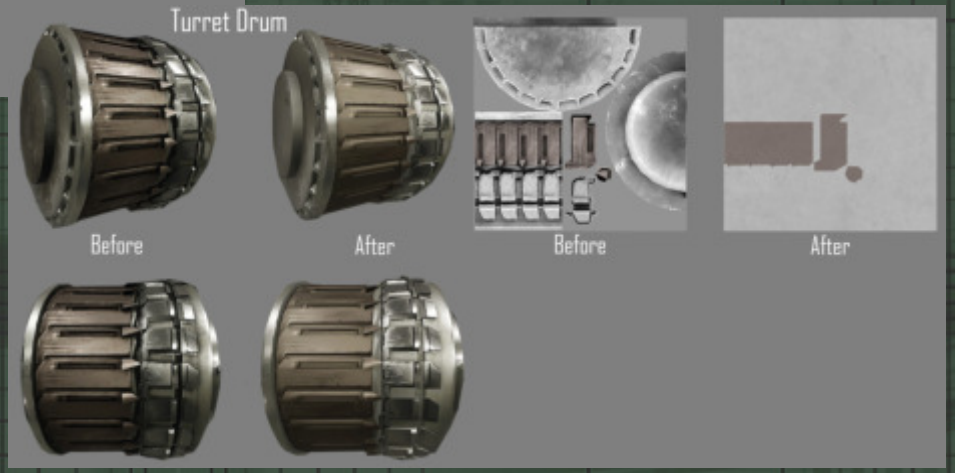
For all of this, we used the script, but for LOD1 we changed some smoothing groups to ensure that the change from original mesh to LOD1 wouldn't be noticed.

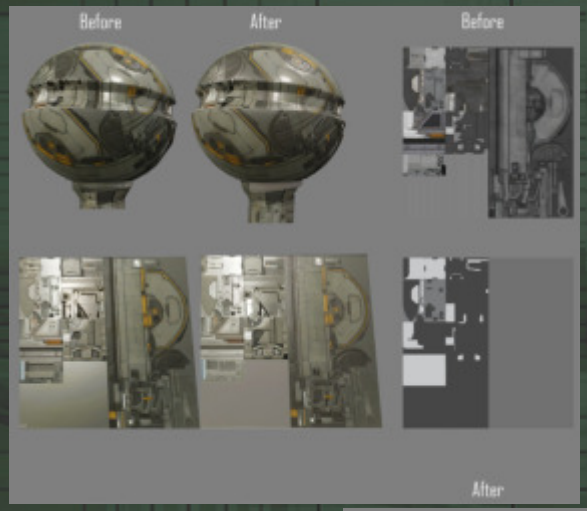
Sean Murphy: Hi, guys, looks good! We like the illustration of the LODs at farther distances.

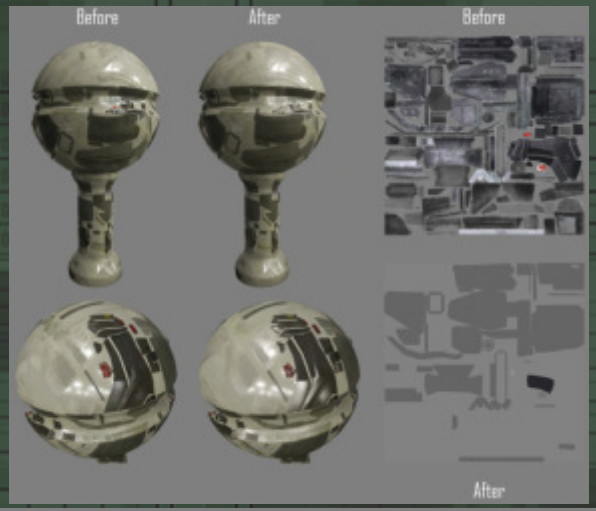


Today I am running some tests on the specs of the Constellation maps.

Also this afternoon, Jay Brushwood shared with us a new animation exporter, and I started doing some tests on this new approach.





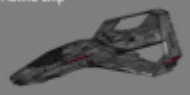


I updated the specs of the Constellation.

I tweaked the blend maps for the Constellation exterior textures.

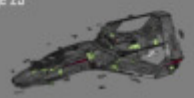
Damage workflow

Pristine ship

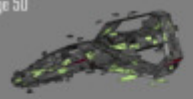


Damage progression

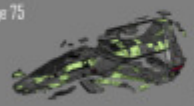
Damage 25



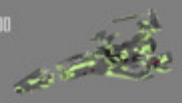
Damage 50



Damage 75



Damage 100



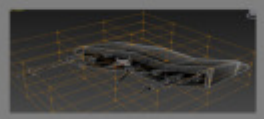
Due to the difference in size between Constellation and the other ships we've work with, we are going to describe the damage process from 75% onwards. This damage process is pretty much the same in every level

1. Crash Lines (Complex shapes 3hrs - Simple shapes 1hr)
Using the mockup as a guide we start drawin lines using the Cut Tool.
In most of the cases we also follow the lines in the textures to define our debris .
For most complex damage or pieces we drew more intrincated "crash lines"
to give it the proper look as if there was some kink of impact.

2. Debris.(Complex shapes 1hr - Simple 0.5 hr per debris)
Once we already defined the pattern in the pristine mesh or pre-damaged phase (if you are in 75% you are using the 50% mesh) we dettach as clone the faces or parts that will work as a debris. In case the debris is just plate we use the shell modifier to give the debris a proper thickness. Afterwards we use a FFD Box to deform the plate to make it look more damaged. We also looked after stretched Uvs to avoid obvius mistakes, we quickly added Vertex Point an finally made a simple collision and we ensure it has its pivot centered.

6. Vertex Paint (0.5 hr)
With most of the damage process already covered we had to add Vertex Paint to the whole Piece so it would look damaged or chared. We also had to correct the VP to make it look like the pre-damaged piece due to the fact that throght the whole damage procces we are continually removing geometry, hence damaging the previous Vertex Paint Phases.

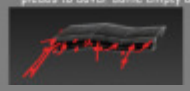
7. Motherpiece Collision (0.5 per piece)
For 25% 50% there was no need to modify the pristine collision beacuse most of the silhouette was intact. However fo levels 75% and 100% it was necesary modify the mother piece collsion due to the loss of big chunks of geometry.



3. Damaging the pristine or pre-damaged piece. (1hr per piece)
Following our guidlenes we decided to give a proper treatment to our mother pieces: If the debris was just a plate we made a bevel in the injury zone. If the damage was not just a plate we had create all the inner structure so it would look credible. If we did not did this there would be a cap that would show all the backface culling of the pieces. At this point we had deform the boundaries of the injury so it could look jagged.

4.Mapping the damaged zones (0.5 hrs per piece)
We had to make UV´s of all the faces that would have damage. to facilitate this we added a temporal extra ID with an obvius color to focalize our faces that would have to had damage mapping. In this way we could select and Unwrap all the faces in one easy step. This mapping would need to have some coherence to where the piece was damaged.

5. Adding bash kit pieces (1hr per piece)
To make the injuries more appealing we added some structurel meshes that where already normalized and ready to use. Some time we had to add more junk to the bigger pieces to cover some empty areas and create silhouette.



8. PFX & Geo Nodes (0.5 per piece)
-PFX: We create a dummy using the Snap Pivot in the debri, we link that very same dummie. Then we clone that dummy and move it to the damage origin aproximatedly, we link that one to the mother damaged piece. For the PFX Nodes with Affect Pivot tool, we modify the Y direction, according to the path we want to give to the effects.
-GEO:We clone again the dummy in the injury zone to have our Geo dummie in the same place as the PFX. We link this dummy to the pristine piece.
We rename according to the naming convention.

9. Integration (2hrs)
We merge all the max files together, and ensure they are properly connected and following the naming convention rules. We check the cga in cyrengine.

PERTURB NORMAL CORRECTION
For each piece that has perturb by face approach, we need to estimate time to make propper corrections, because each edge cut will mess up our normals.
Because of the complexity of the pieces on the Constellation
, we estimate that the time fixing each normal-corrupted would take at most 2 hours

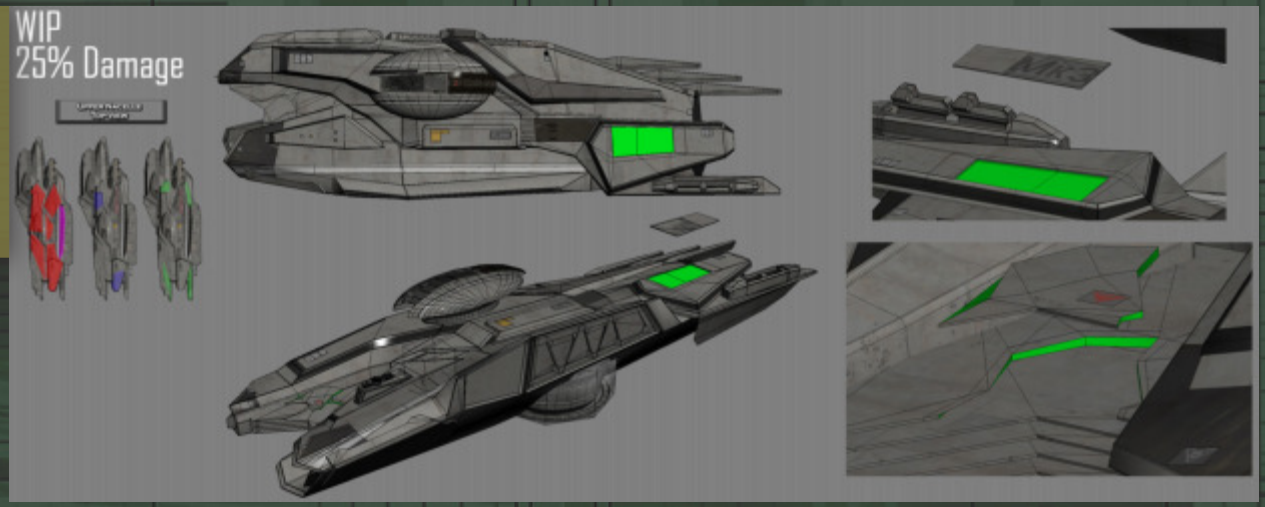
IMPORTANT

None of these ships have the perturb by faces approach. This means that each change in geometry did not affect their normals.
Most of the parts of the Constellation and his Variations have been made with the Perturb approach,
so it means that most of this steps we will have to continiously reworking the normals
Also we´ve been notified that there are Tools to copy normals bewteen objetcs.
However due to the nature of the damage proceses every piece is different in the next stage hence this does not allow us to copy normals.

Today Dennia and I worked on getting the most precise estimates based on the most recent Damage whitebox we received.

We made an image describing our damage workflow and also created a spreadsheet explaining the current Damage plans.

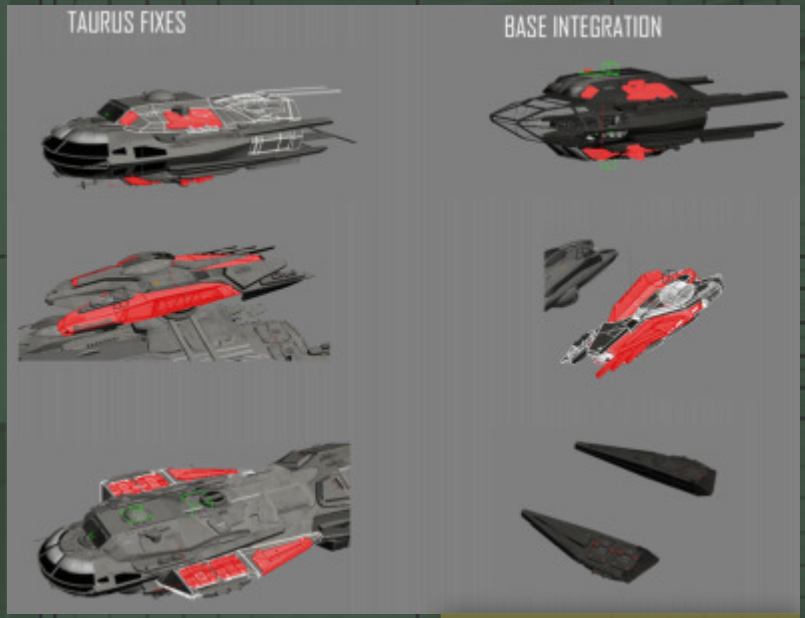
We worked on getting the last Taurus fixes into the Constellation Base. As the pieces started to come out, we started working on them.

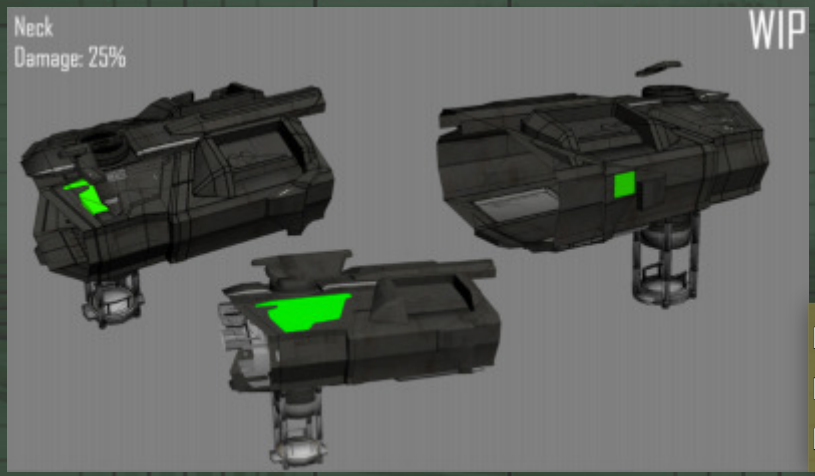


Lower Nacelles Right

Damage: 2 pieces

Percent: 25%





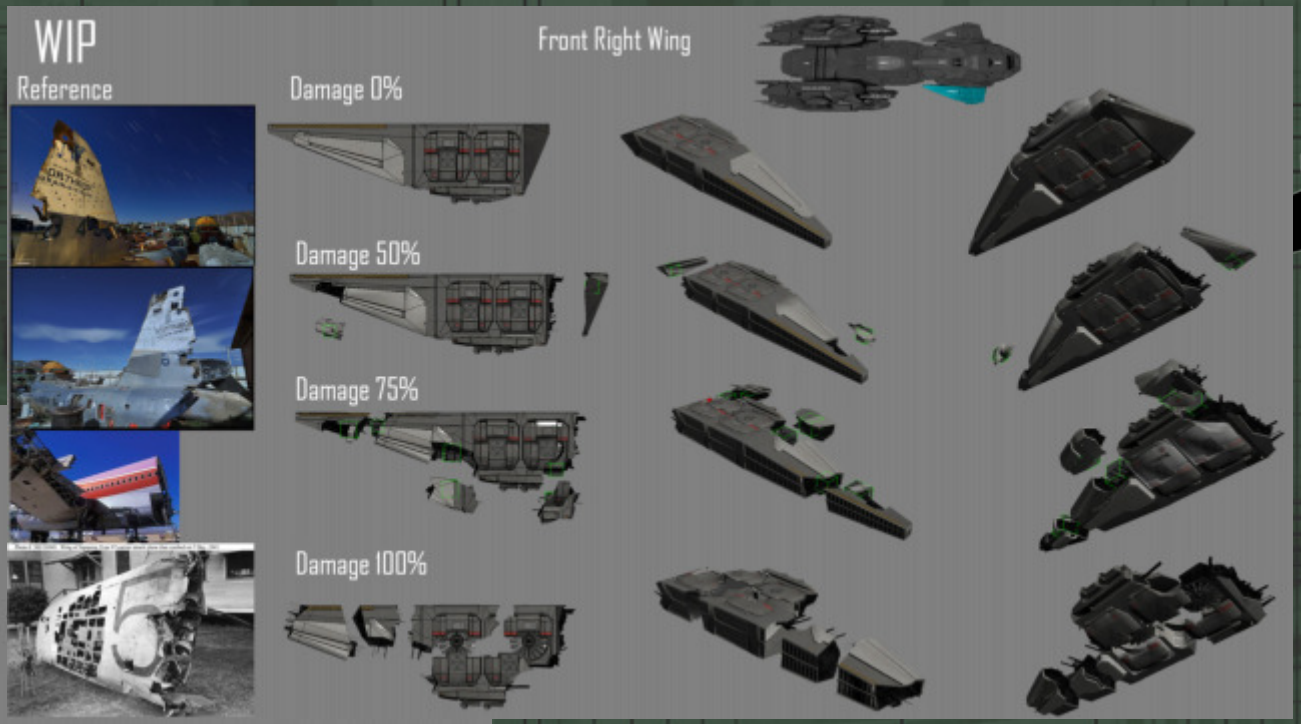
Neck

Damage: 2 pieces

Percent: 25%

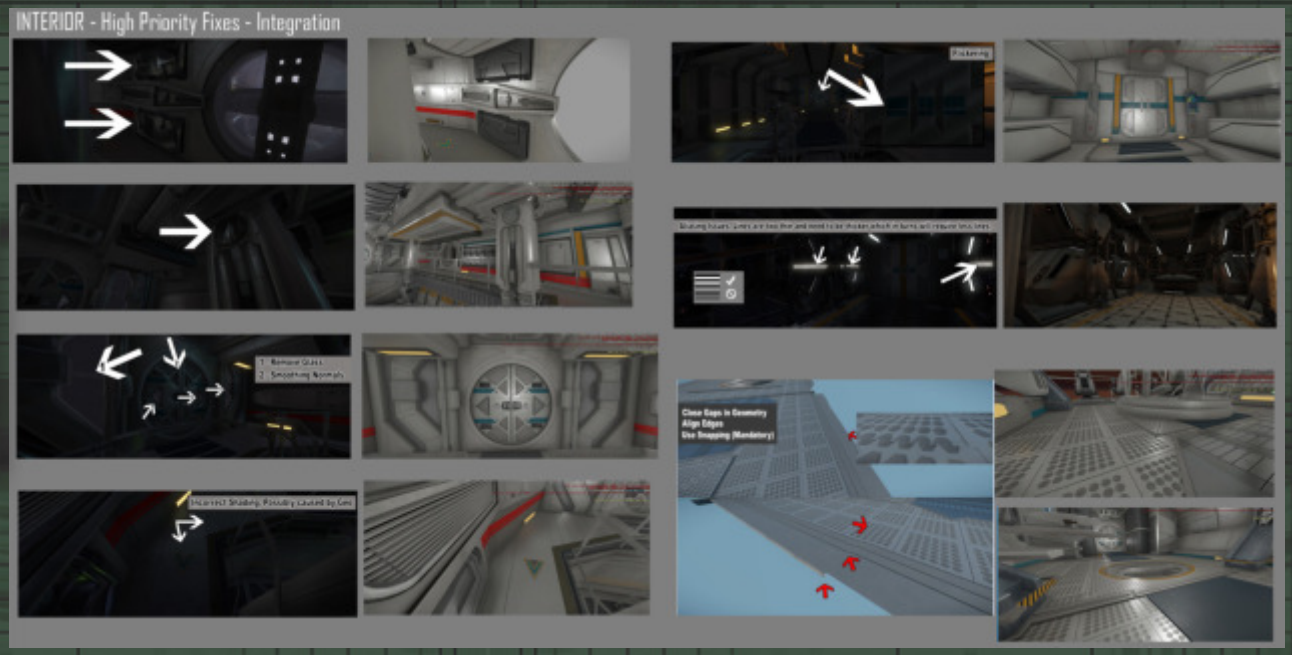
Today I worked on the integration of the Taurus fixes to the Constellation Base, in order to have a better mesh before we start applying Damages.

I worked on building up the 75% Damage on the Upper Nacelle.



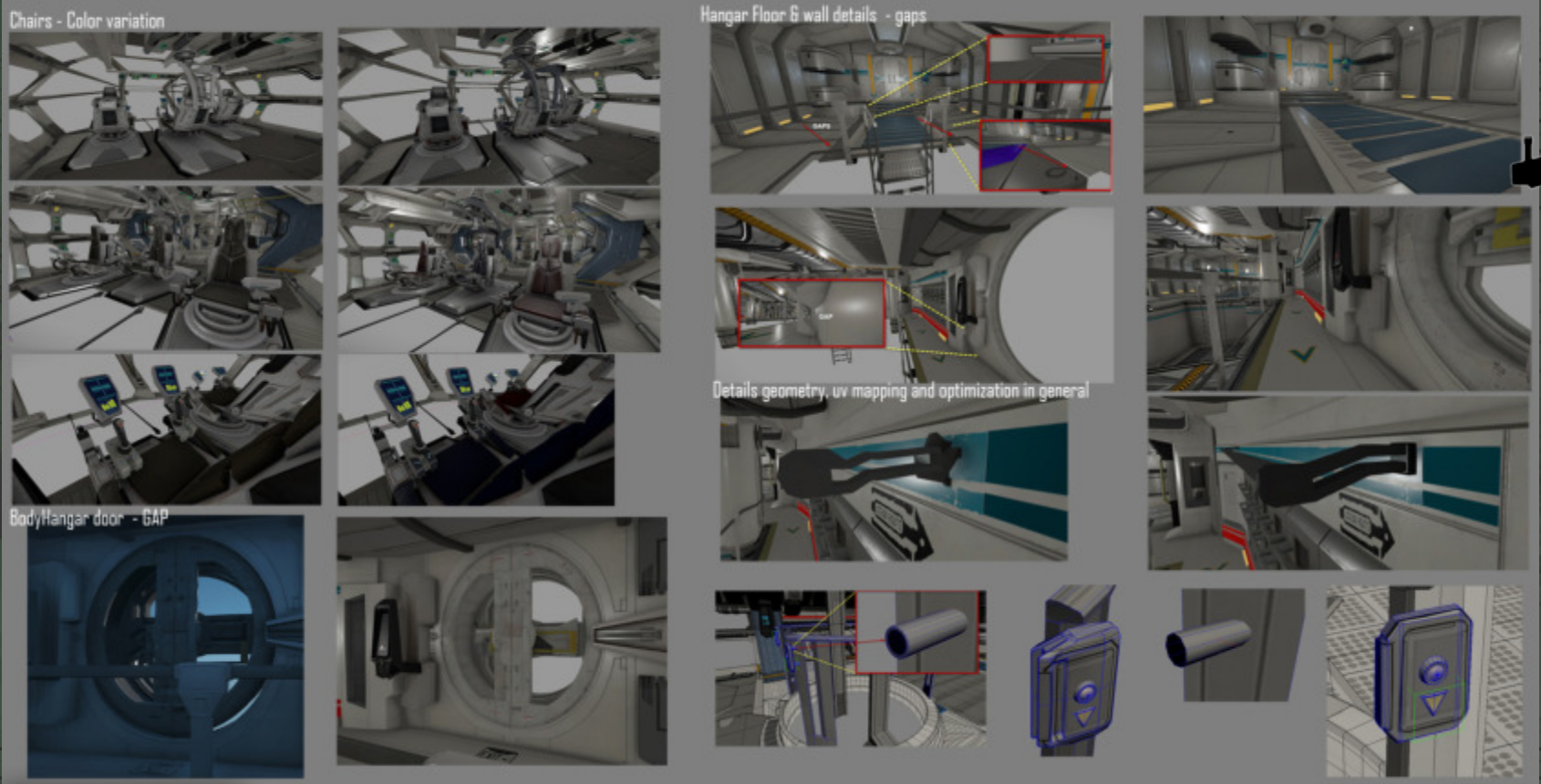
I finished work on 75% Damage on the Nose (Debris and PFX nodes).

Now I'm working on 100% Damage of the Nose. I'm working with the interior too, because the damage at this stage requires modifying the interior with the exterior.



I worked on interior high priority fixes (Hangar walls and Cockpit door), and completed the integration of all the fixes of the interior part that were requested.

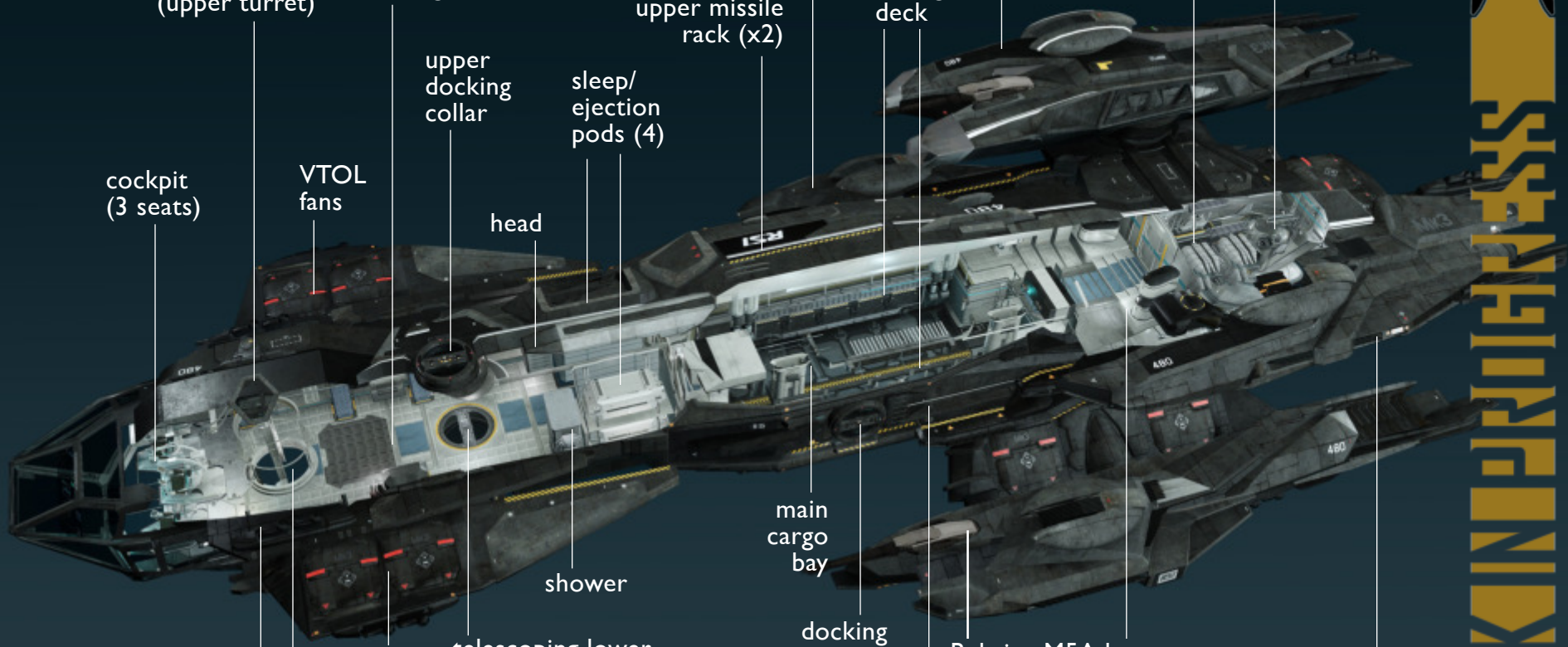
INTERIOR - Fixes - Integration



Continued working on general fixes and improvements in the 3 interior areas (nose-neck, body and PGR). Also integrated all the fixes done in the interior, for the daily review.

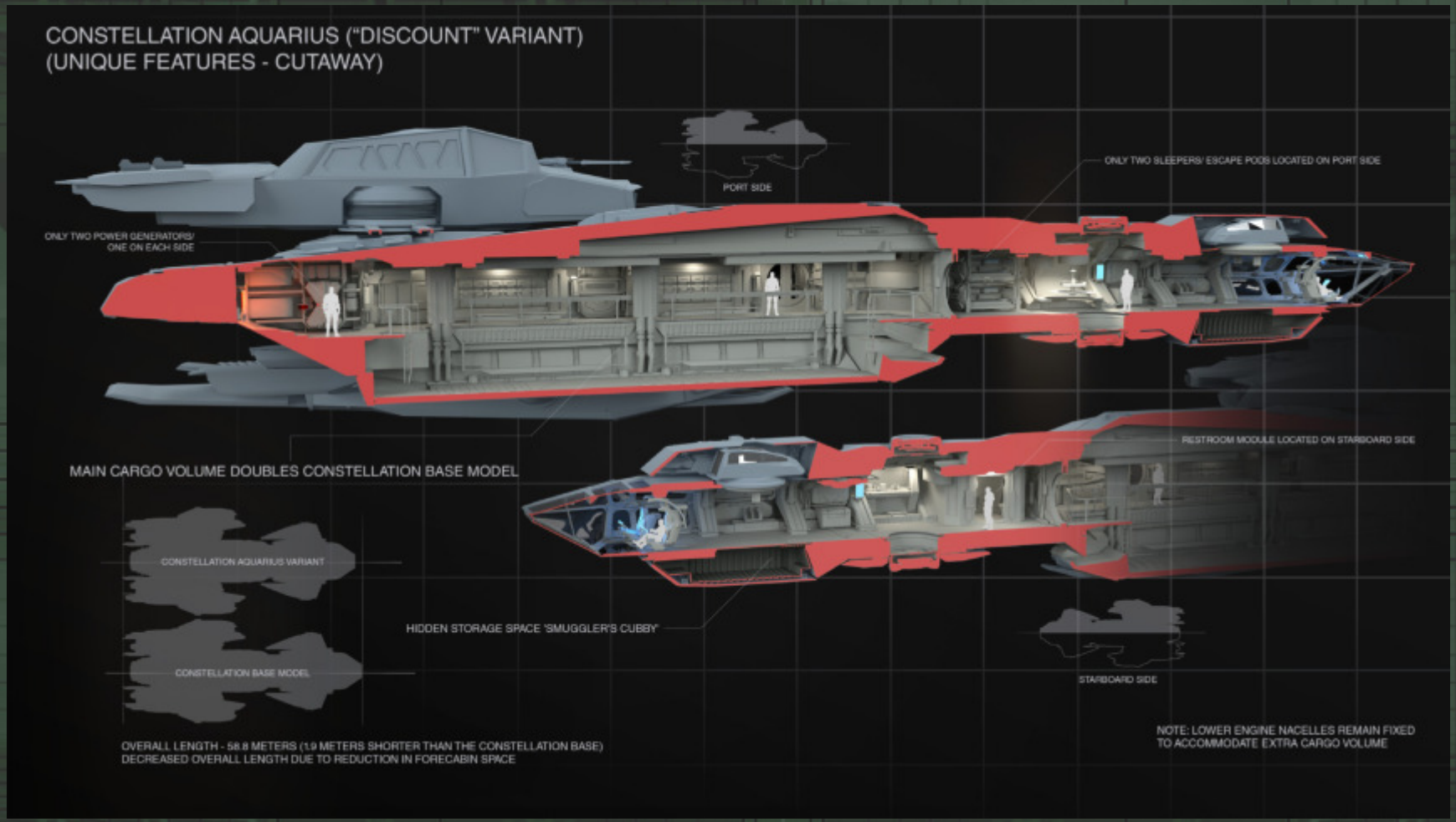
This is what has been addressed, since the last revision:

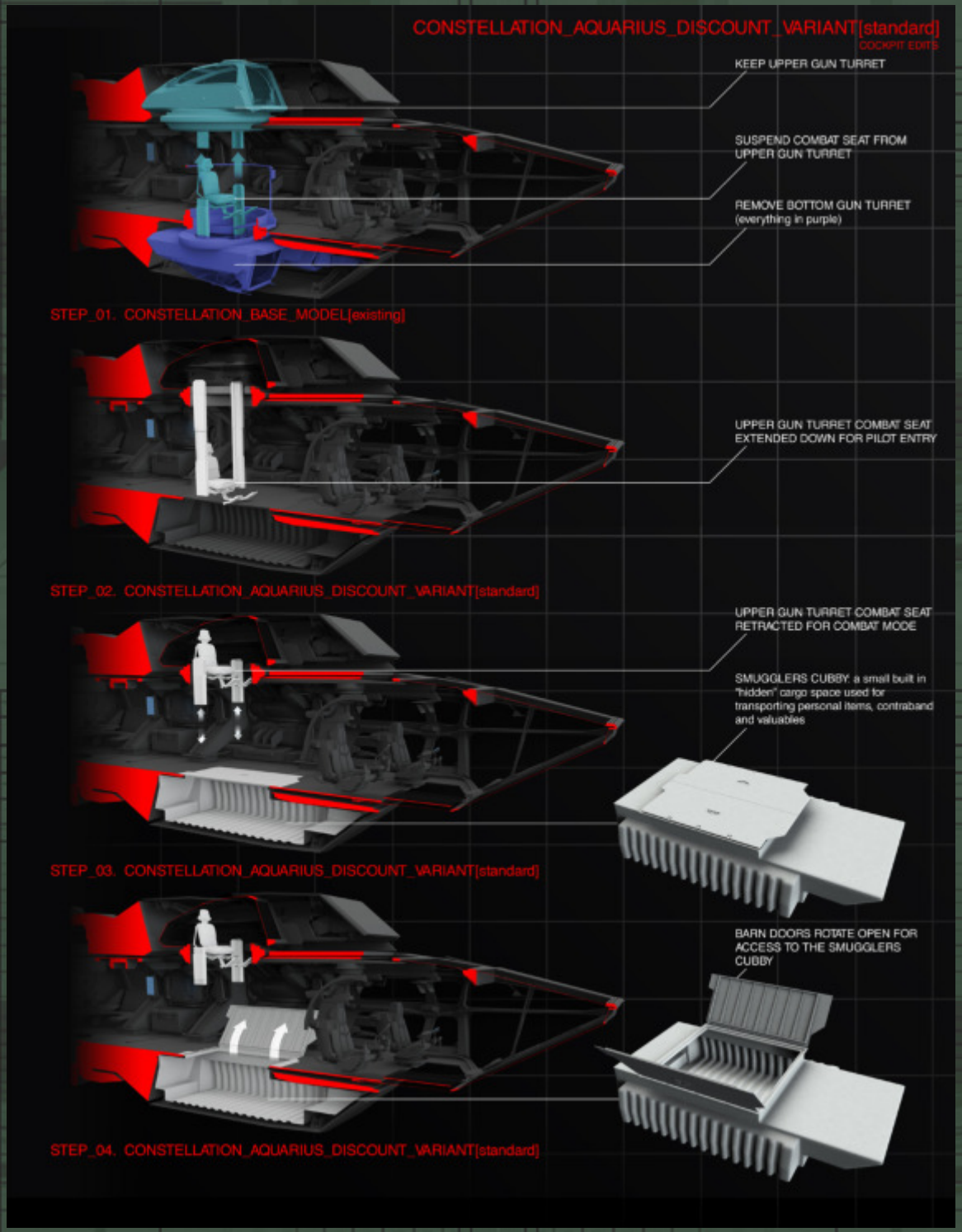
- Gaps between Hangar floor and Cargo Area.
- Gap between interior/exterior facing of the Hangar door.
- Interior geometry crashing out (Interior_ BodySecondaryStorage).
- Custom normals on Secondary Storage pillars.
- Color variations in Cockpit chairs.
- Gaps in Interior Body hangar walls.
- Floating battery cluster geometry in PGR.
- Integration of Back wall detail in PGR.
- Subtle general vertex color variations in the PGR of SecondaryStorage and Hangar Area.
- Decals properly on Interior and Exterior Decals (Mat IDs).
- Custom Normals fixed on bathrooms, bed, table and roof of NoseNeck area.
- Custom normals fixed on PGR floor, battery clusters and Back structure.
- Floating pipes between bathrooms and walls.
- Optimized geometry and uv mapping, and custom normals fixed on hangar tank.
- Reduced Geo inconsistency, fixed crashing pipes and some uv mapping in Hangar roof.



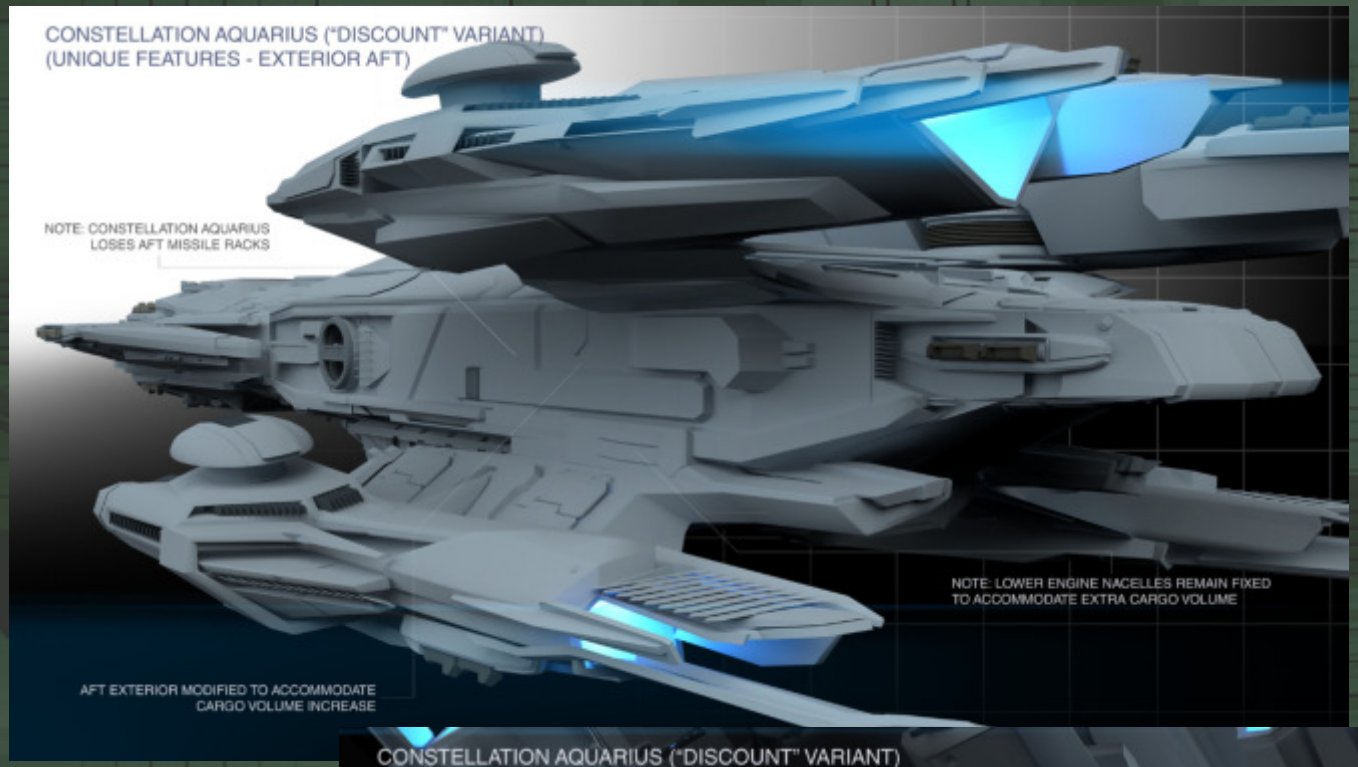
* duplicated on far side

Taurus (discount)
concept

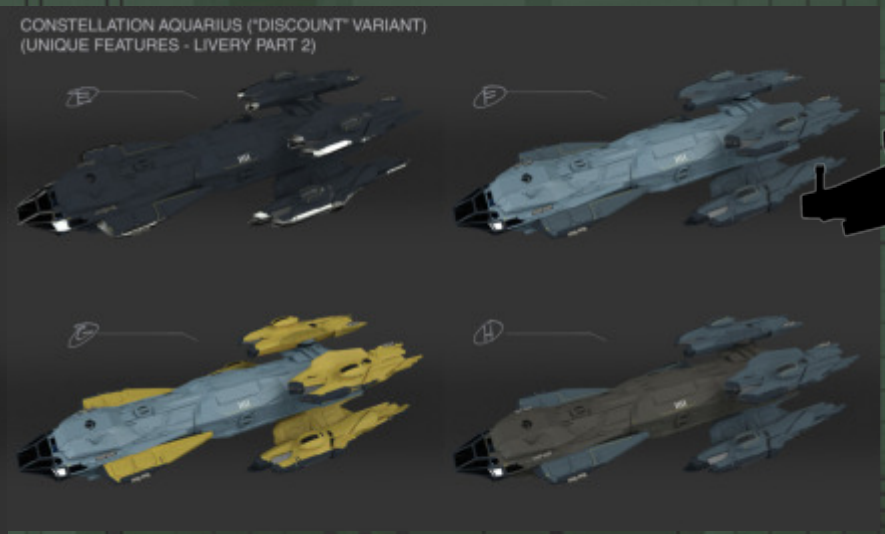




Several changes were made in the cockpit area.



Also several changes in the rear, to accommodate a larger cargo bucket.



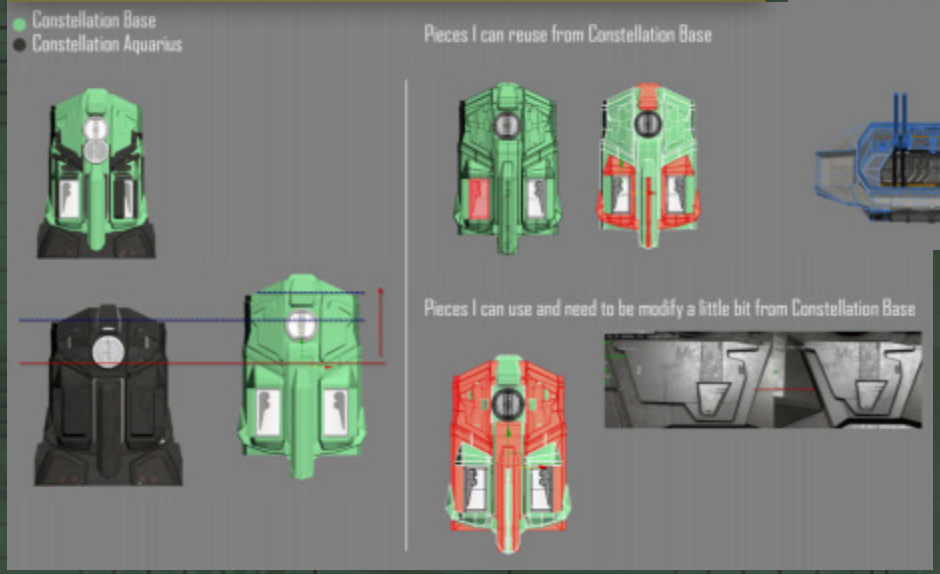
Several choices for primary paint jobs were considered. One was tentatively chosen and then it was handed off to CGBot.

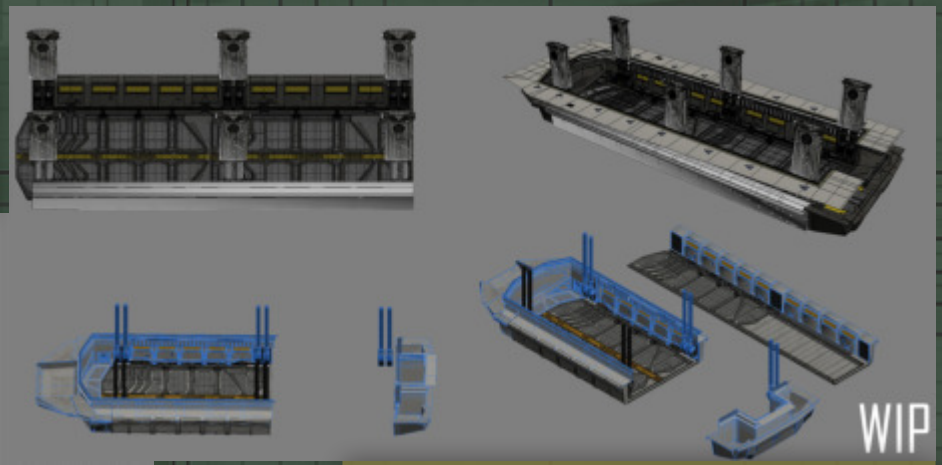
Taurus (discount) conversion

I started checking differences between Aquarius [discount] and Taurus [explorer], comparing them to see how much reusable geometry and mapping there was between them. I also checked differences in geometry groups, hierarchy and part names as compared to the Base's damage state sequences, to see how much can be used for the Aquarius damage states work.

I'm working on fixes to the Constellation Aquarius.

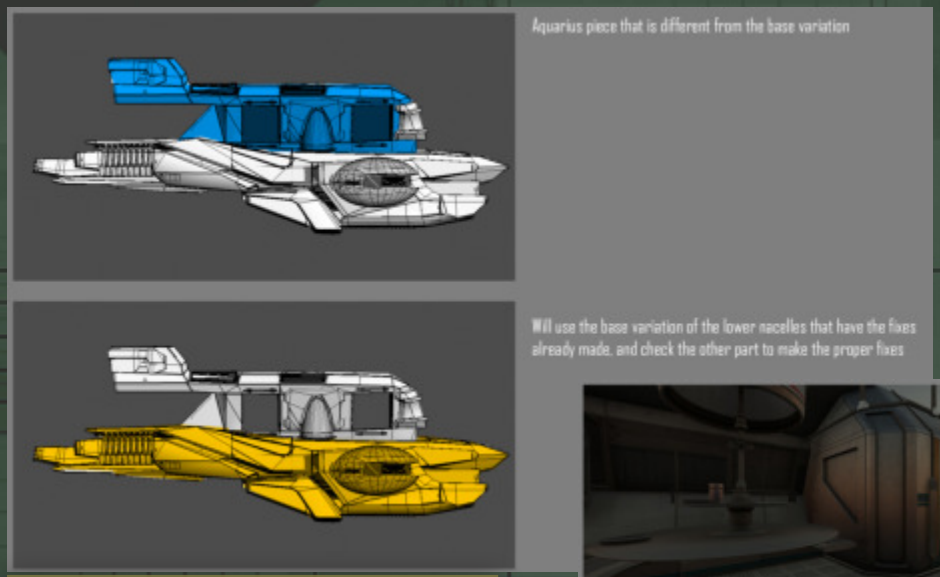
In particular, I'm polishing the Neck exterior zone, using the Base Constellation pieces as much as possible.



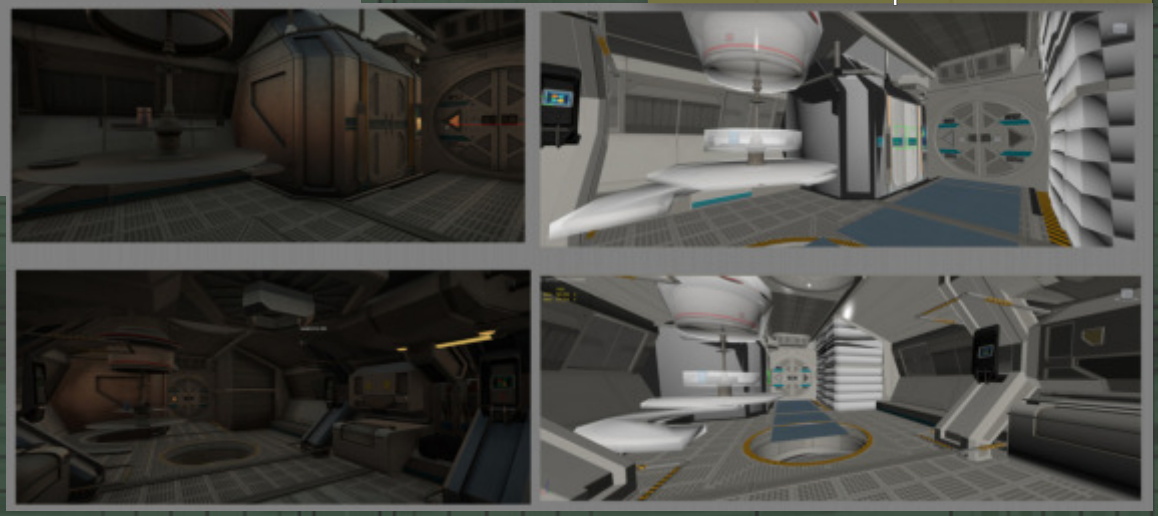


I started adapting the polished cargo from the Base Constellation to the Aquarius.

I worked on uv mapping, normals, collision issues in general, and making an update for those parts that are the same on the Base Constellation.

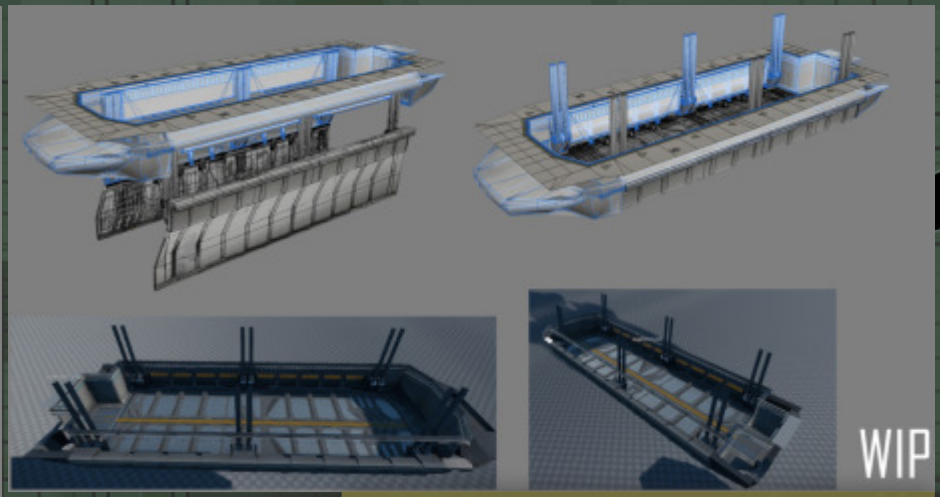


I used the geometry of the Base Constellation to address similar fixes needed on the Aquarius.



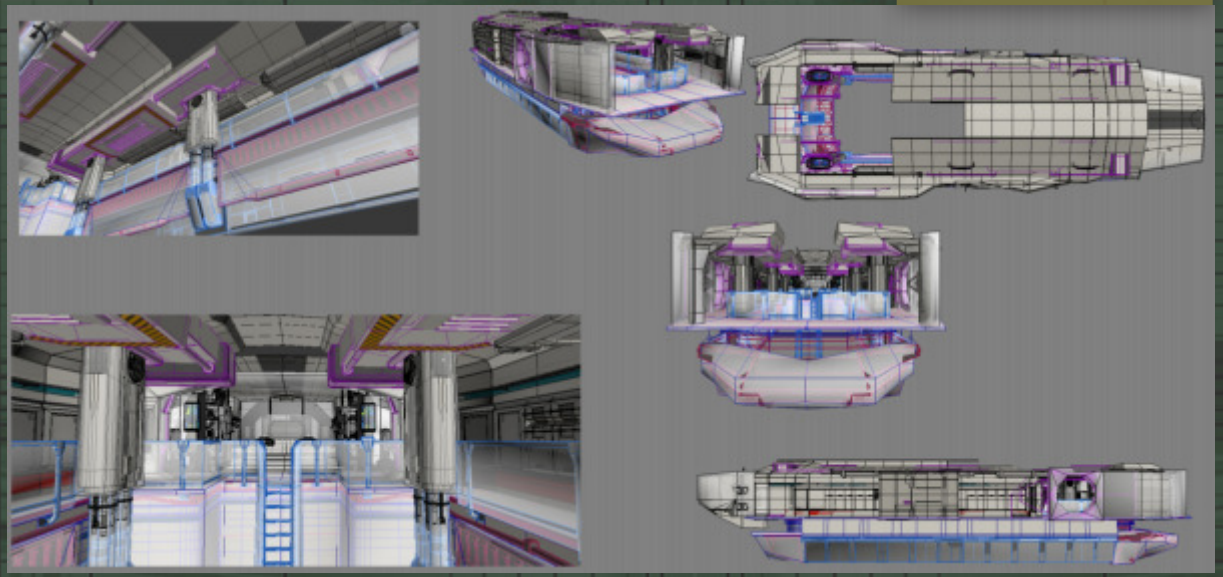
I'm polishing the lower nacelles, making a plan of what things I can recycle from the Base model; I've also begun to integrate the Base lower nacelles to the Aquarius variation.

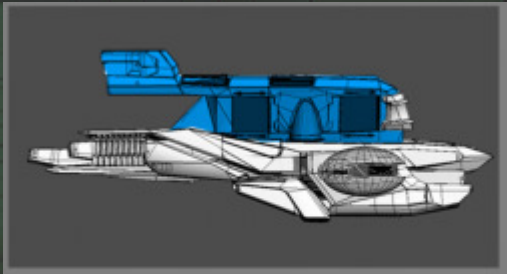
I've been checking the animations of the Constellation Aquarius.



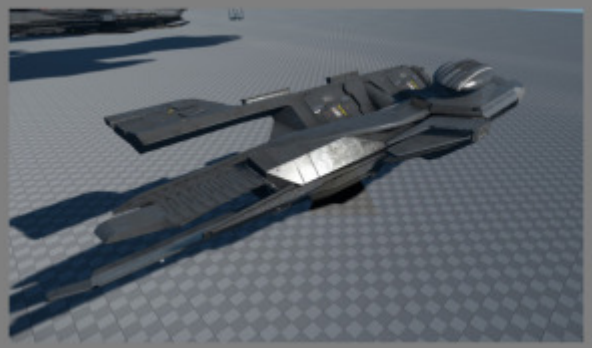
I worked on adapting the polished cargo bucket and the floor from the Base Constellation to the Aquarius.

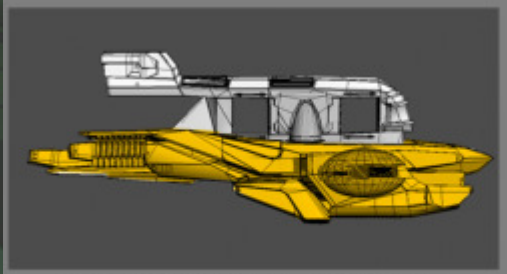
I checked geometry and polish.





Aquarius piece that is different from the base variation



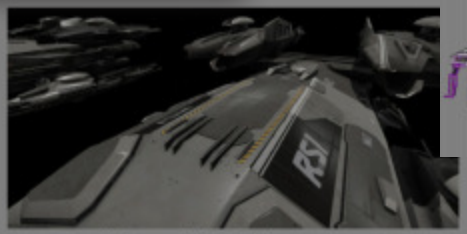


Will use the base variation of the lower nacelles that have the fixes already made, and check the other part to make the proper fixes

I'm currently working on the nacelles. I finished integrating the base recyclable parts of the nacelles; also made the perturb by face and checked for n-gons and degenerated faces.

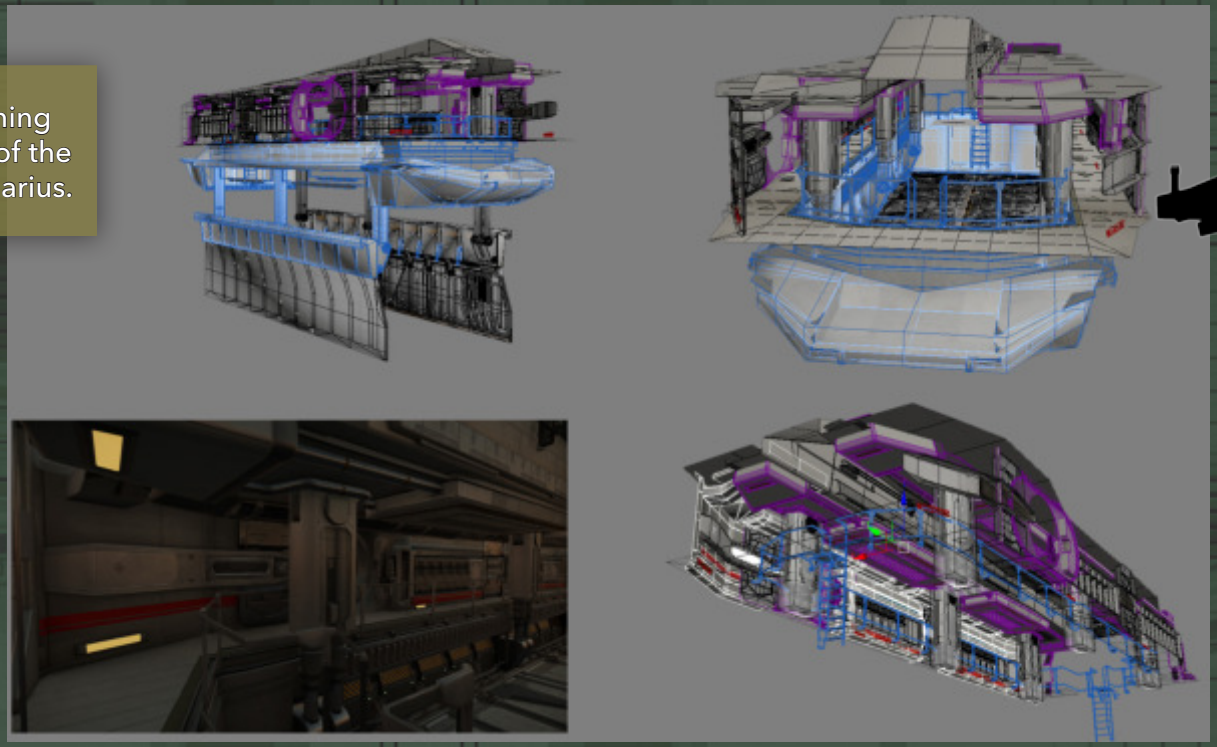
I worked on the Aquarius with the geometry of the Base, adapting detail and polish.

I worked on the Body part, polishing it. I used the stairs from the Constellation Base, checking issues on normals and uv's.

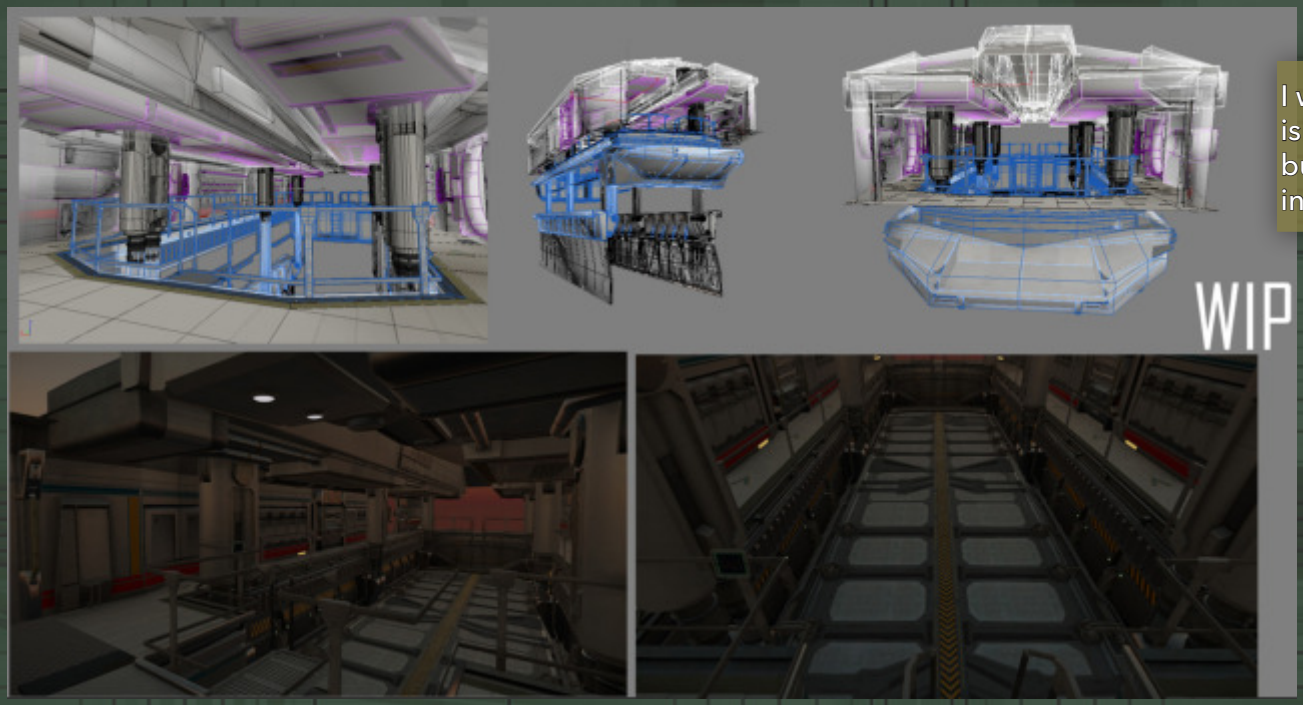


Working on polish of the body part

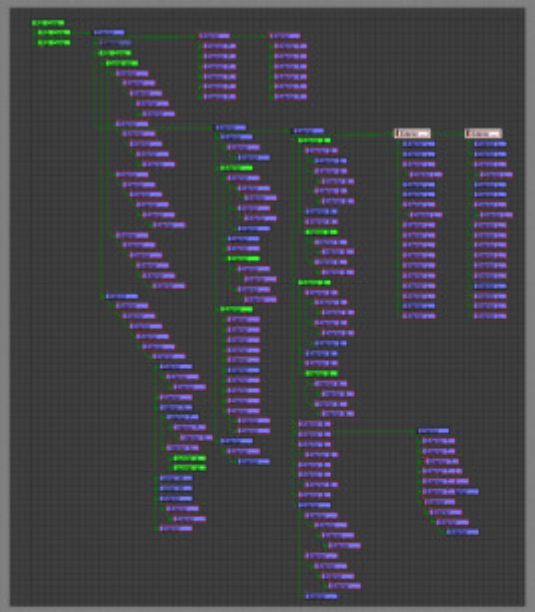
I worked on polishing the interior body of the Constellation Aquarius.

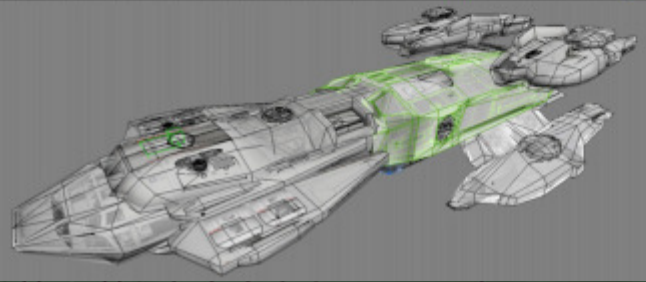


I worked on polishing the cargo bucket and the interior body.

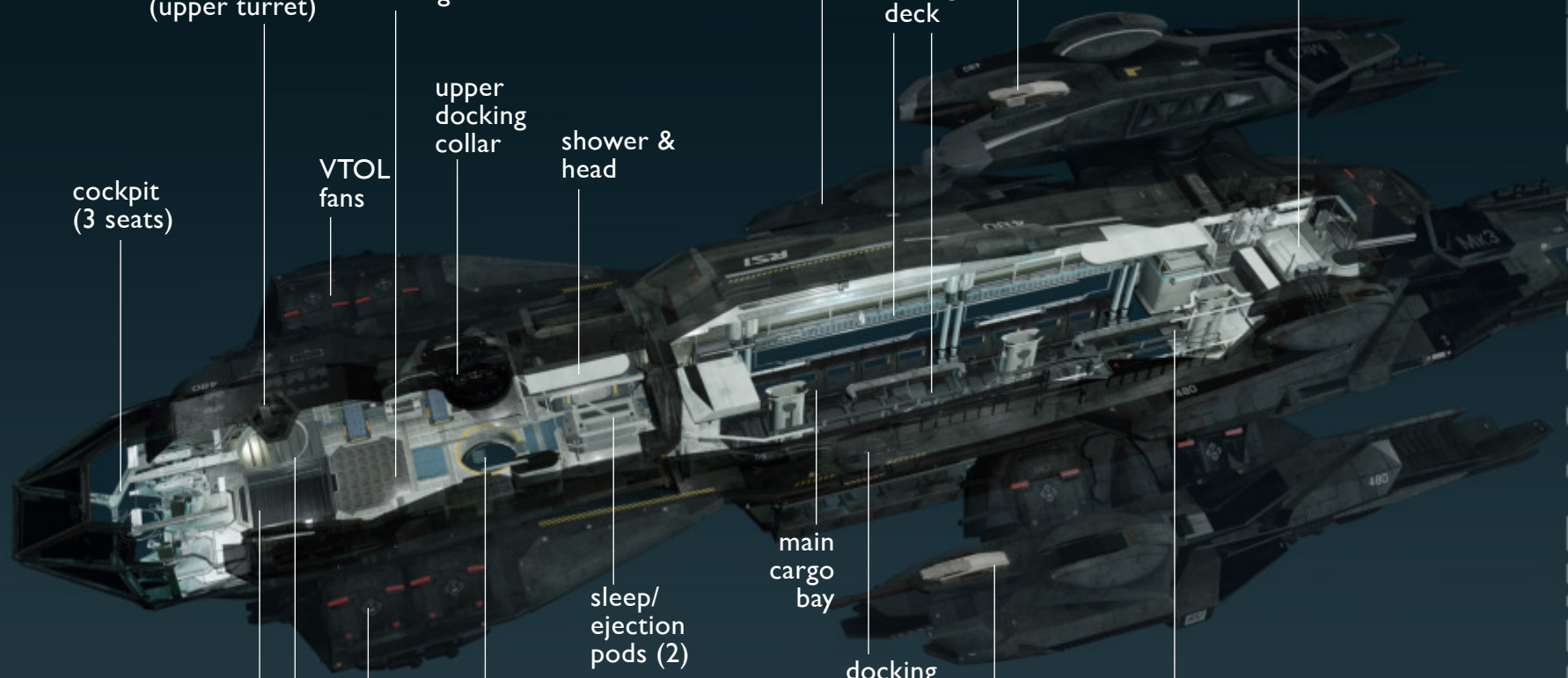


I worked on polishing the external parts of the Aquarius.





I worked on giving the Aquarius almost the same naming convention as the Base, and arranging all related Constellation parts, hierarchy or animation as similar as possible.



* duplicated on far side

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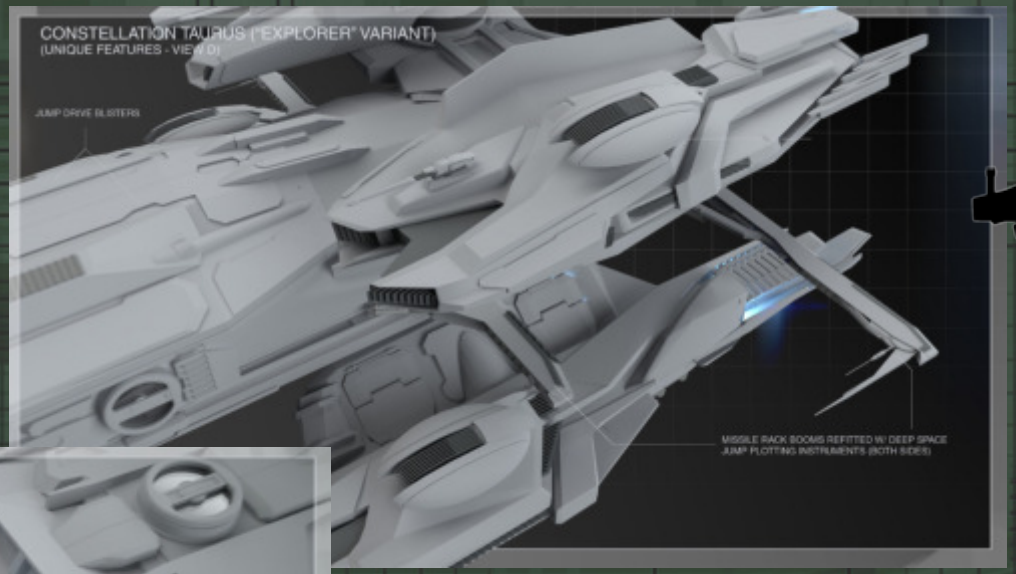
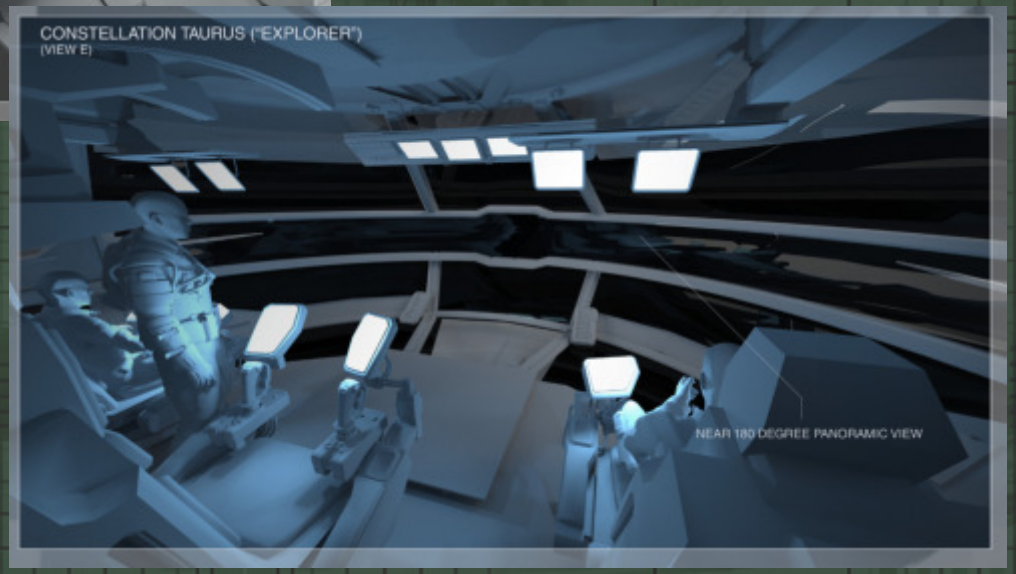
WORK IN PROGRESS

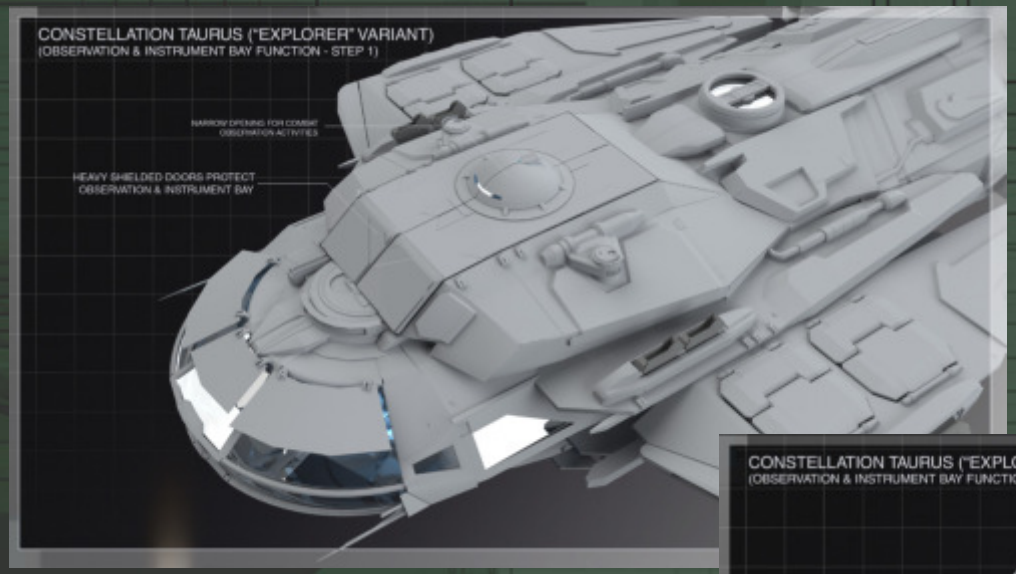
Aquila (explorer) concept

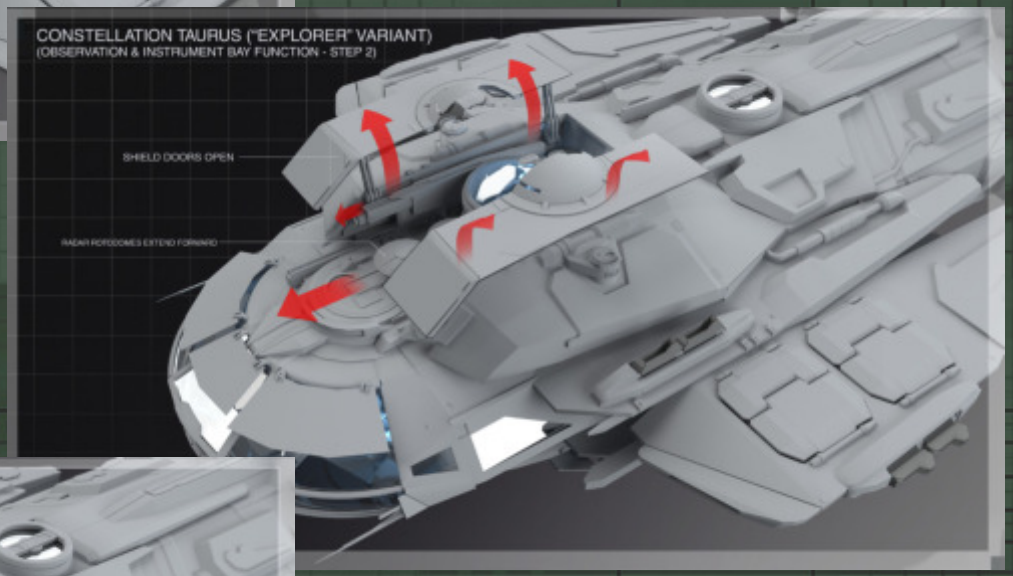
Sensors and probes are key to this variant.

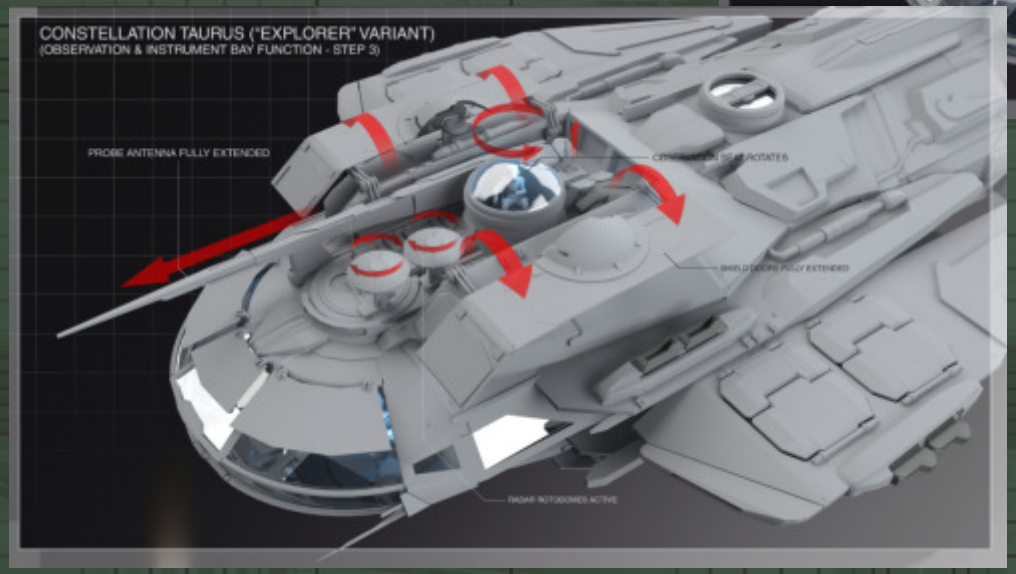

CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(UNIQUE FEATURES - VIEW D)
JUMP DRIVE BLISTERS
MISSILE RACK BOOMS REFITTED W/ DEEP SPACE JUMP PLOTTING INSTRUMENTS (BOTH SIDES)

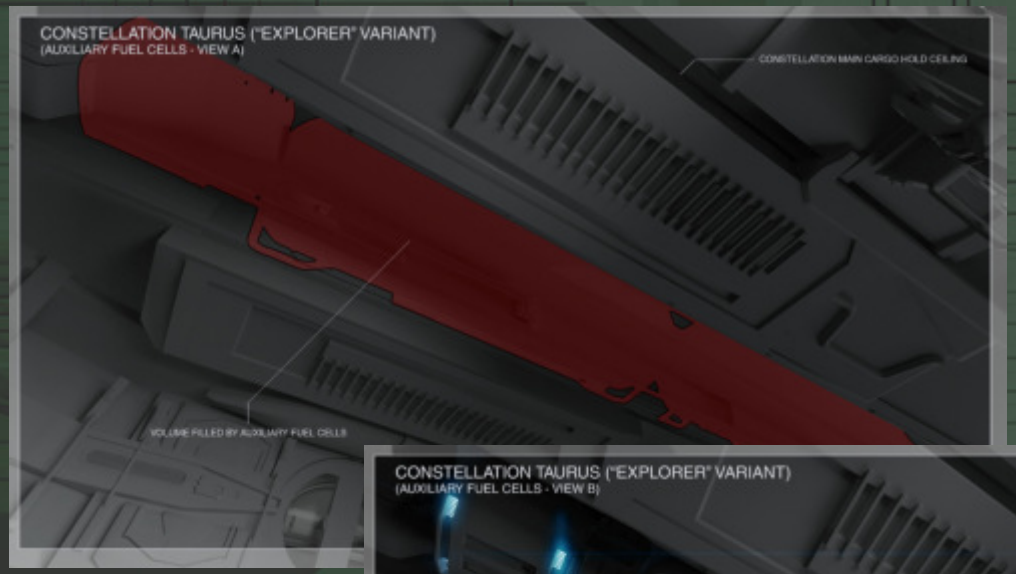

CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(UNIQUE FEATURES - VIEW C)
OBSERVATION STATION (SINGLE SEAT)
MASSIVE PROBE ANTENNA
DUAL "HYPER" RACKS W/ 6 TORPEDOES
EXTERNAL LIGHT VISOR SHIELDS


CONSTELLATION TAURUS ("EXPLORER")
(VIEW E)
NEAR 180 DEGREE PANORAMIC VIEW

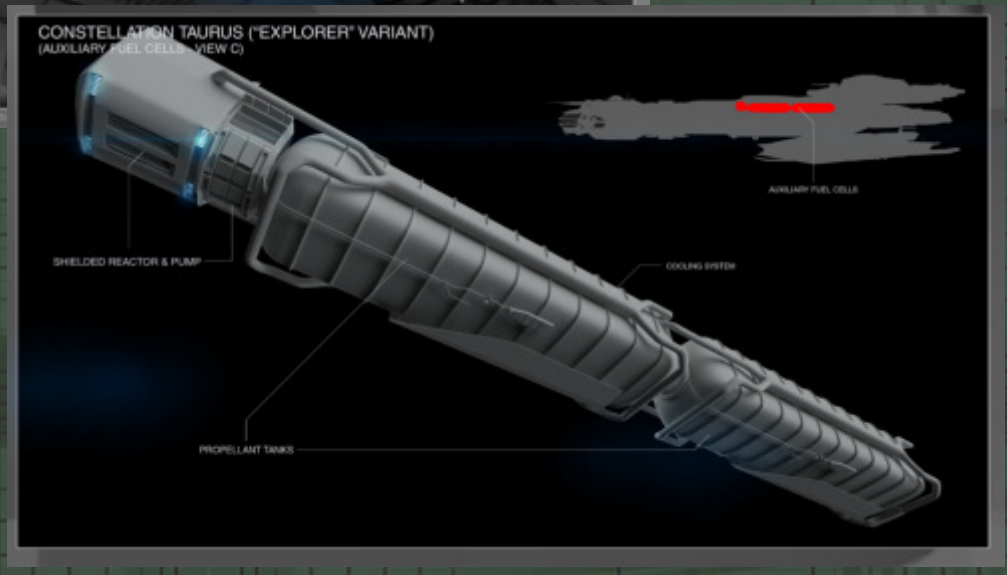

CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(OBSERVATION & INSTRUMENT BAY FUNCTION - STEP 1)
NARROW OPENING FOR COMBAT OBSERVATION ACTIVITIES
HEAVY SHIELDED DOORS PROTECT OBSERVATION & INSTRUMENT BAY


CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(OBSERVATION & INSTRUMENT BAY FUNCTION - STEP 2)
SHIELD DOORS OPEN
RADAR ROTODOMES EXTEND FORWARD


CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(OBSERVATION & INSTRUMENT BAY FUNCTION - STEP 3)
PROBE ANTENNA FULLY EXTENDED
SHIELD DOORS FULLY EXTENDED
RADAR ROTODOMES ACTIVE

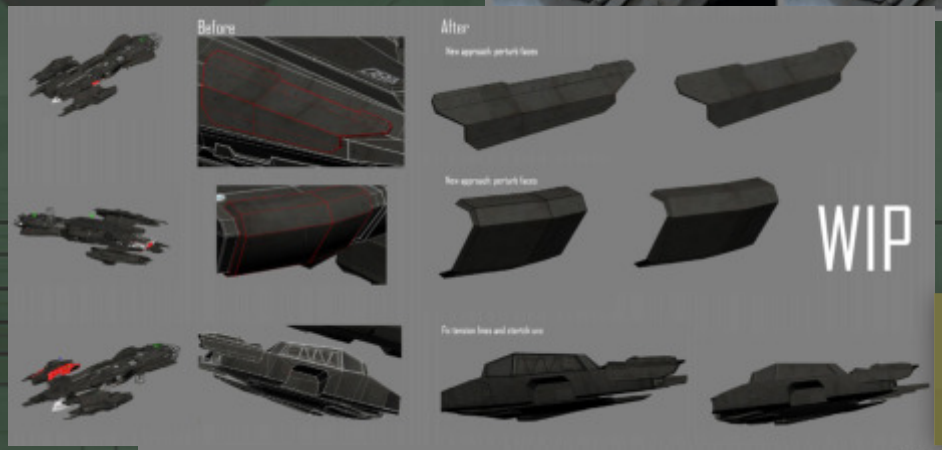

CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(AUXILIARY FUEL CELLS - VIEW A)
CONSTELLATION MAIN CARGO HOLD CEILING
VOLUME FILLED BY AUXILIARY FUEL CELLS


CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(AUXILIARY FUEL CELLS - VIEW B)
CONSTELLATION MAIN CARGO HOLD CEILING
AUXILIARY FUEL CELLS "IN-SITU"

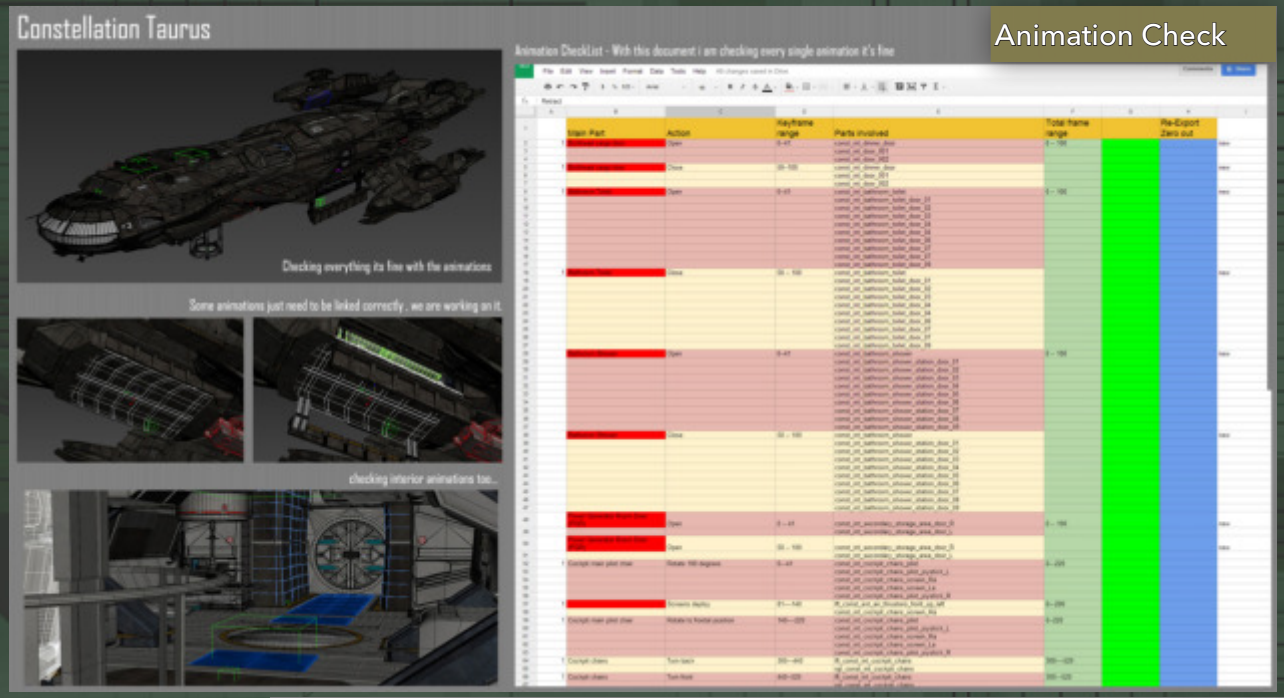

CONSTELLATION TAURUS ("EXPLORER" VARIANT)
(AUXILIARY FUEL CELLS - VIEW C)
AUXILIARY FUEL CELLS
SHIELDED REACTOR & PUMP
COOLING SYSTEM
PROPELLANT TANKS

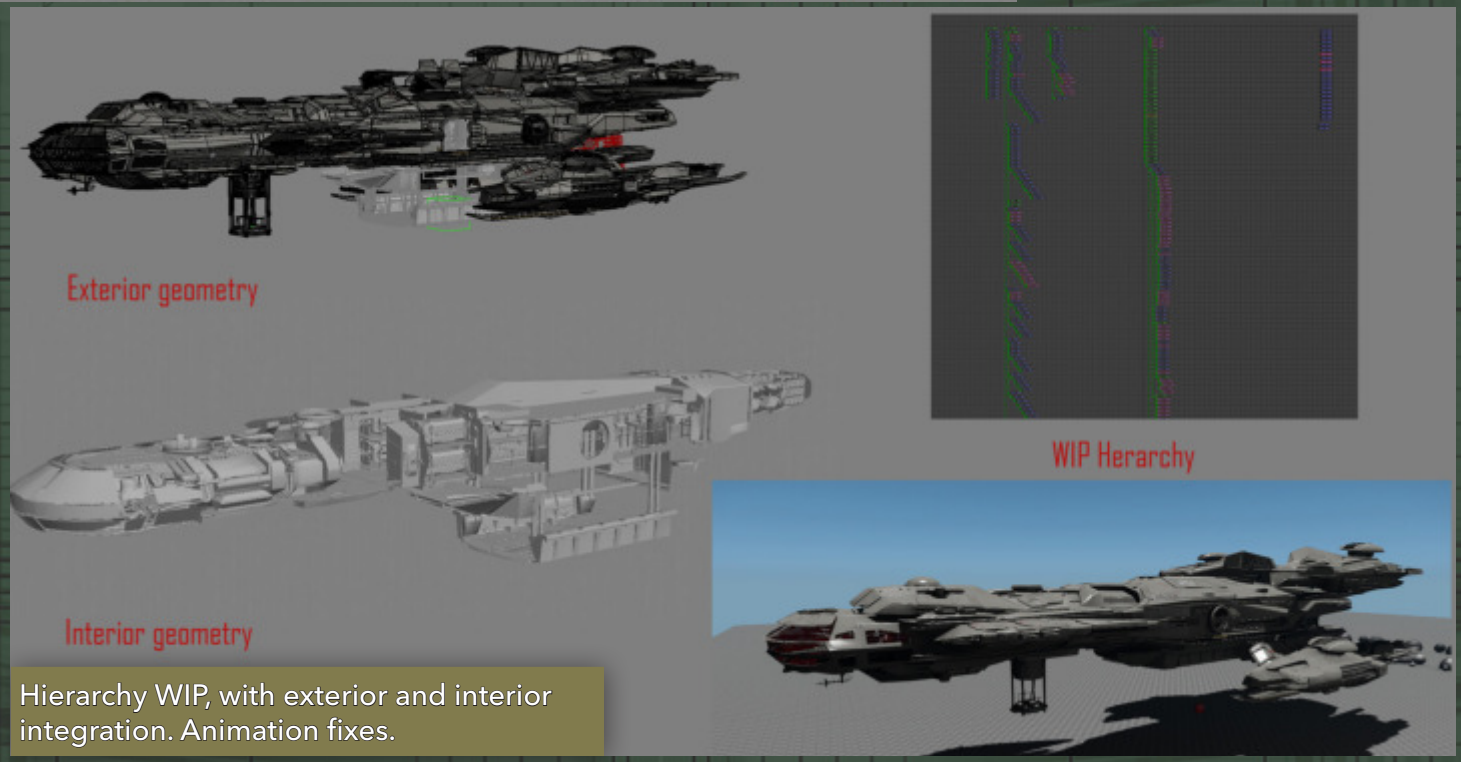
Aquila (explorer) conversion

I worked on checks and fixes.

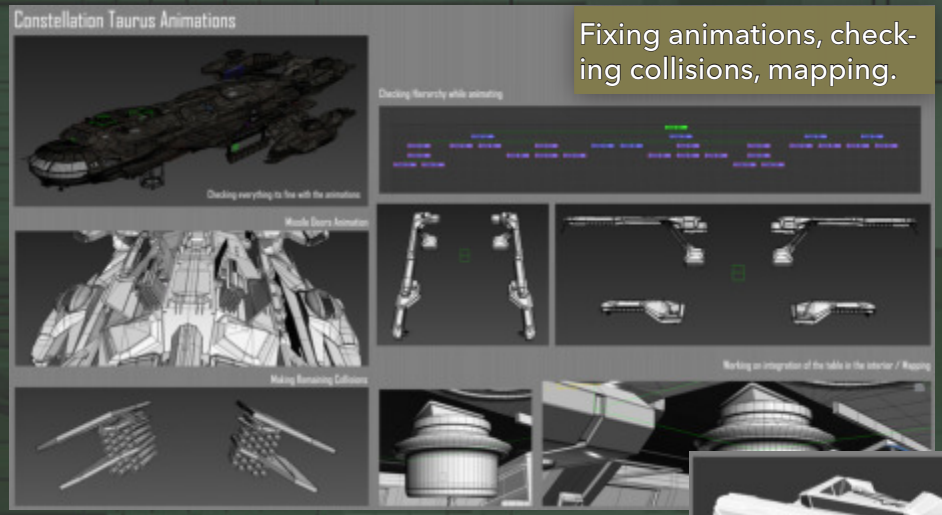


I worked on Taurus exterior fixes. I changed some pieces from the tension-loops approach to the perturb-by-face approach, reducing tris count. These pieces are useful to the Base Constellation exterior mesh also.



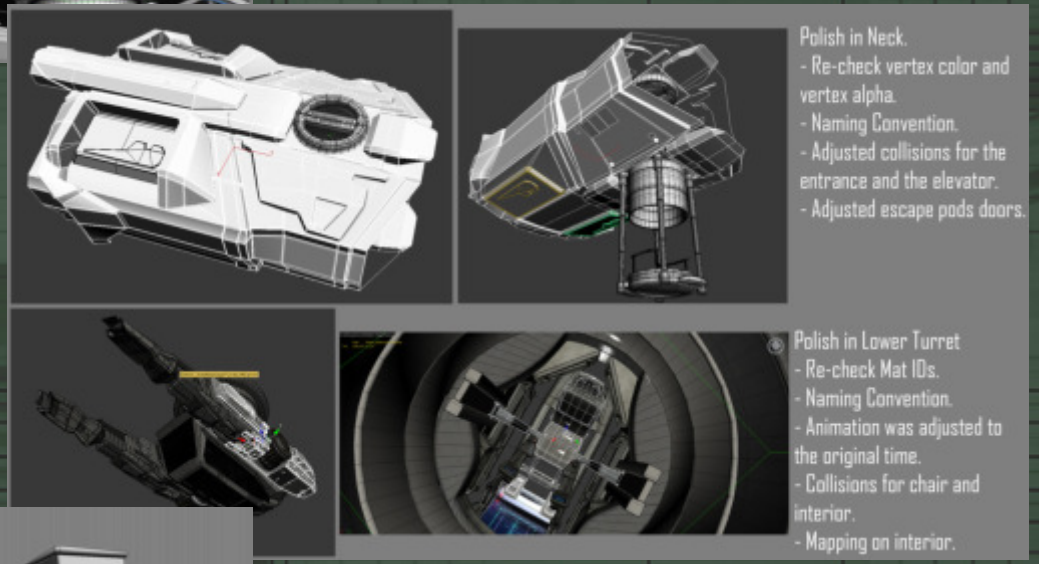


Hierarchy WIP, with exterior and interior integration. Animation fixes.

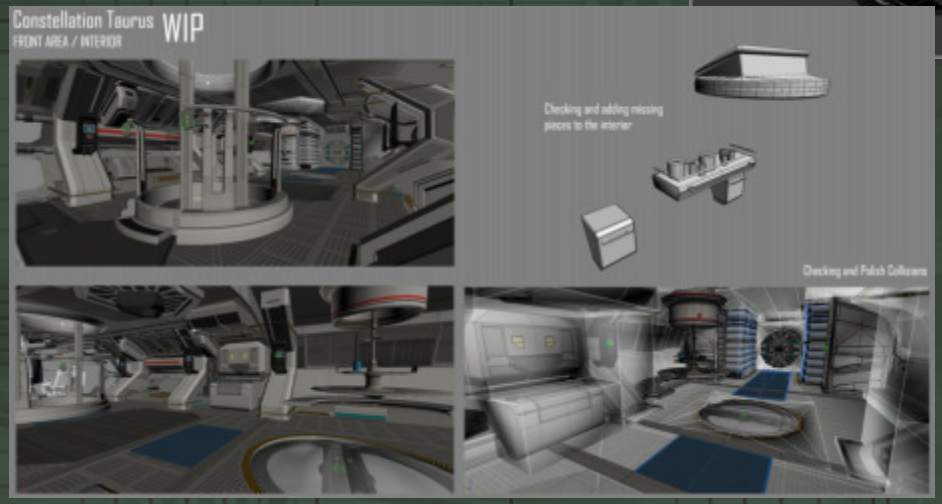


Fixing animations, checking collisions, mapping.

I looked for n-gon faces, polished vertex paint and optimized geometry for the assets: PGR and Cockpit area.

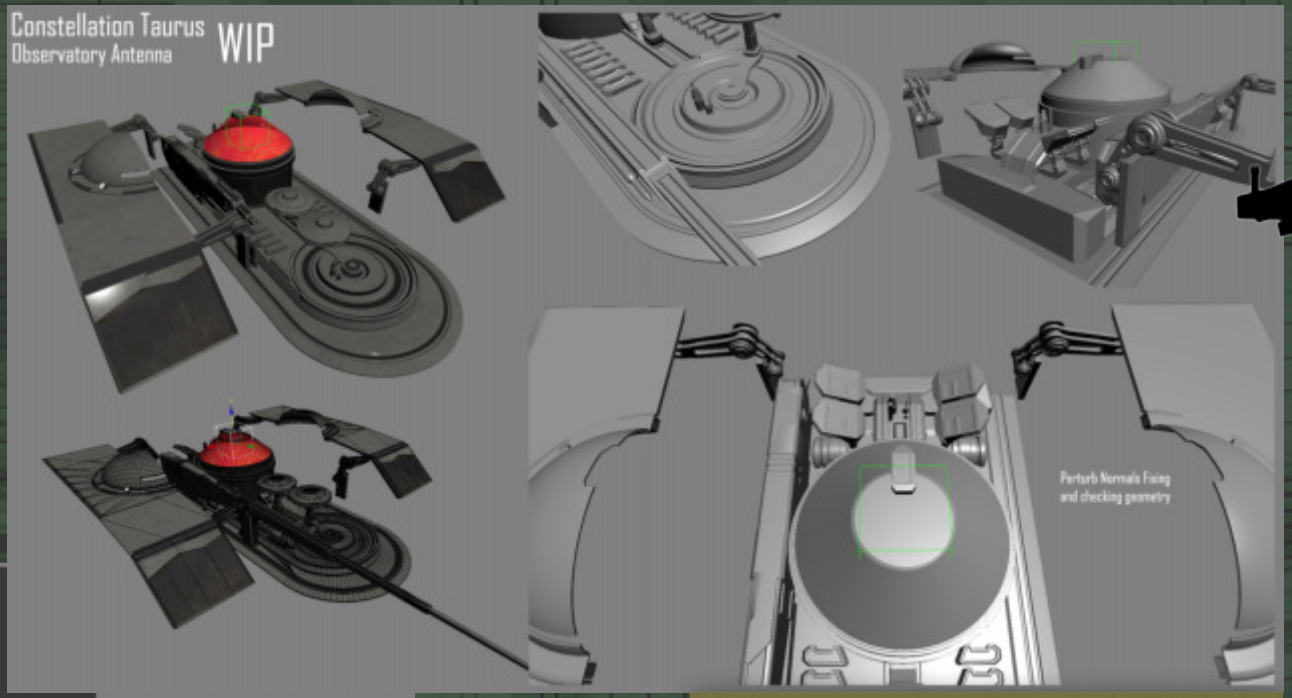


I made a document sorted by area, with a general checklist of errors in certain assets, such as reset custom normals, some n-gons, vertex paint and lack of optimization. I've already made these fixes in the Hangar/ Cargo Area.



I'm just getting started on the Constellation Taurus. I'm checking the nacelles areas and searching for things that need polish or minor fixes, like vertex paint or messed up normals. I have started with the fixes in more visible areas.

Constellation Taurus
Observatory Antenna WIP



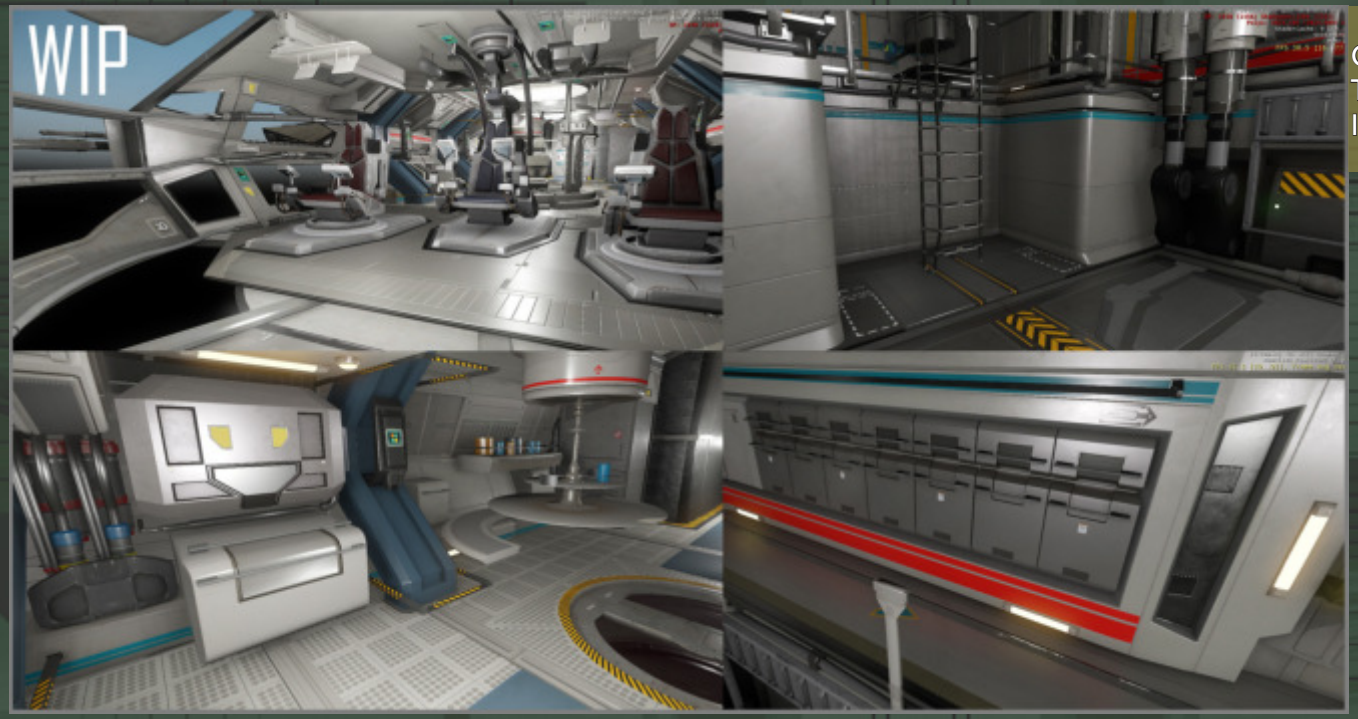
Worked on Perturb normals and checked geometry.

Polish in Tail.
- Naming Convention.
- Mapping.
- Decals.

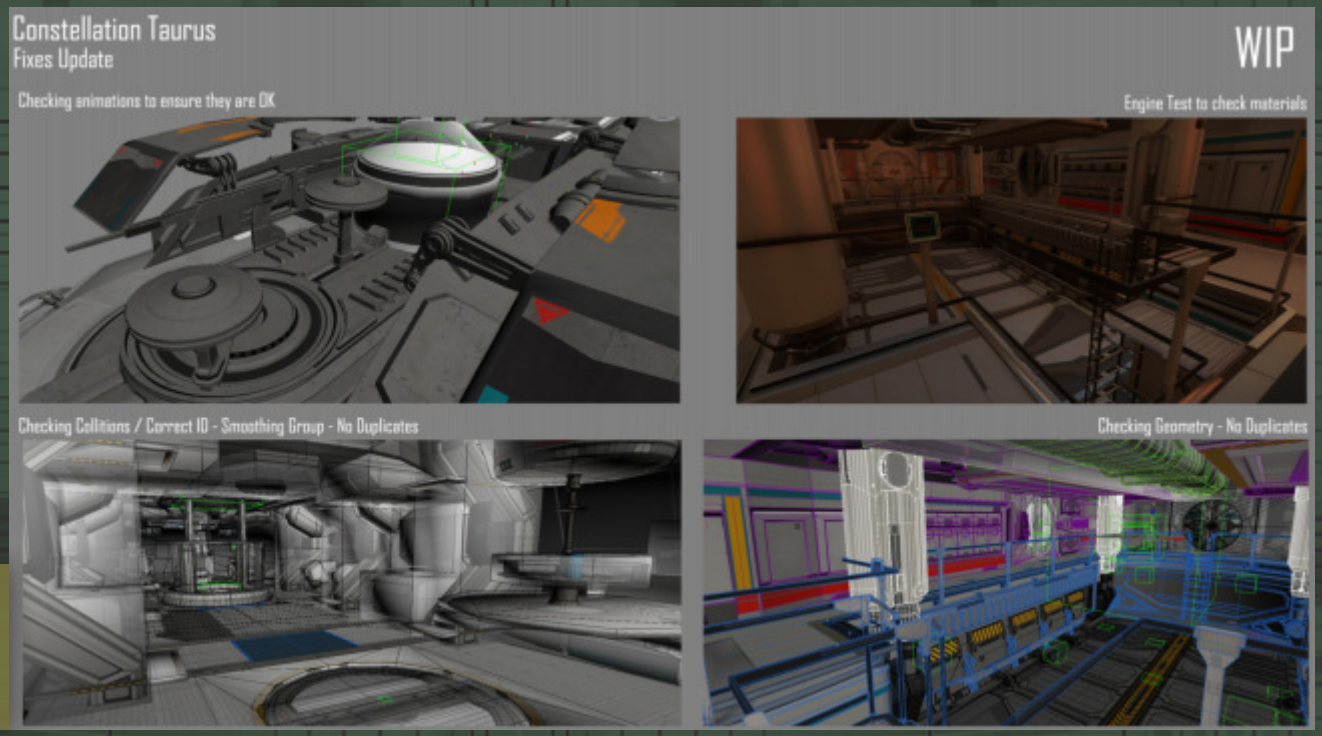
Polish and Integration in Lower Turret
- Naming Convention.
- Collisions for chair and interior.
- Decals on Interior.

Integration of Neck.in Taurus Const.
- Naming Convention.

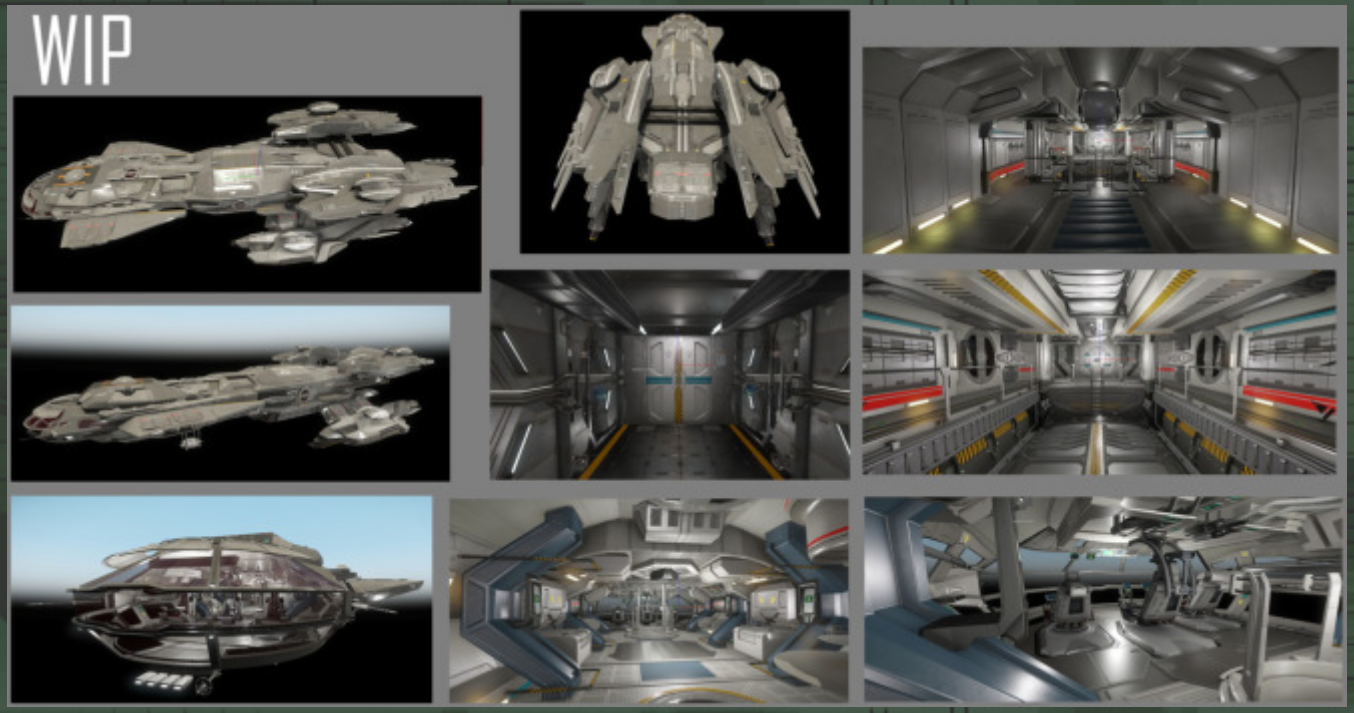
Worked on the Neck, Lower Turret and Tail, in the Constellation Taurus.



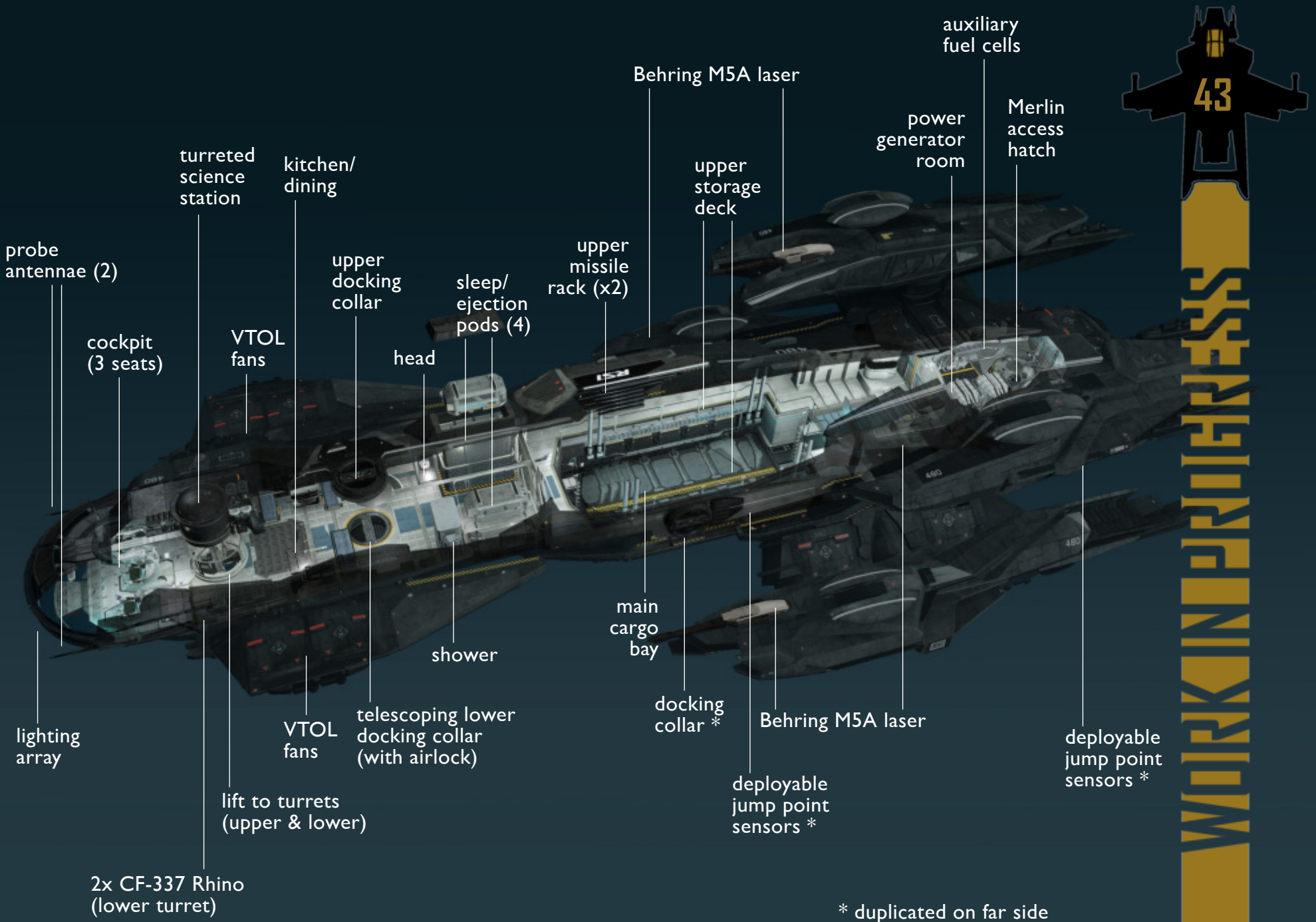
Constellation
Taurus
Integration



Worked on
animations
and fixes.



Constellation Taurus fixes and integration.


probe antennae (2)
cockpit (3 seats)
turreted science station
kitchen/ dining
VTOL fans
upper docking collar
head
sleep/ ejection pods (4)
upper missile rack (x2)
Behring M5A laser
upper storage deck
power generator room
auxiliary fuel cells
Merlin access hatch
lighting array
2x CF-337 Rhino (lower turret)
lift to turrets (upper & lower)
VTOL fans
telescoping lower docking collar (with airlock)
shower
main cargo bay
docking collar *
deployable jump point sensors *
Behring M5A laser
deployable jump point sensors *
* duplicated on far side
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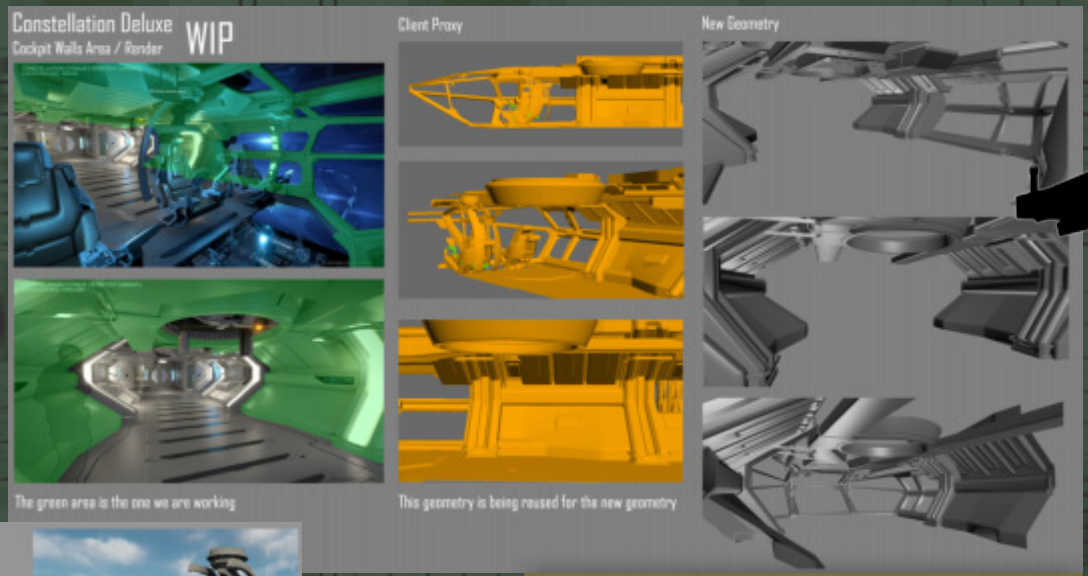
WORK IN PROGRESS

Phoenix (deluxe) concept

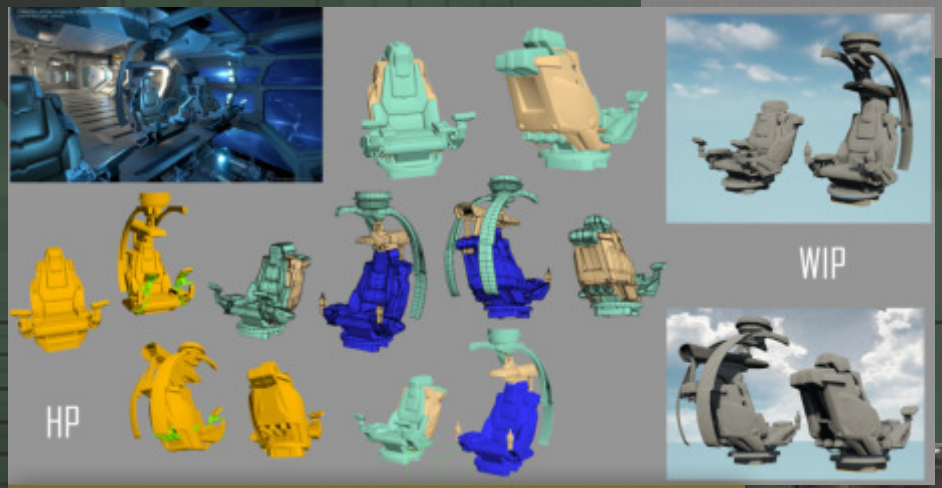
You've already been able to see most of these, so we won't repeat them. (And CGBot's final implementation is so close to the concepts that it's hard to tell them apart.) On this page and next are a few concepts that haven't been as visible.

Pilot's Chair

Phoenix (deluxe) conversion

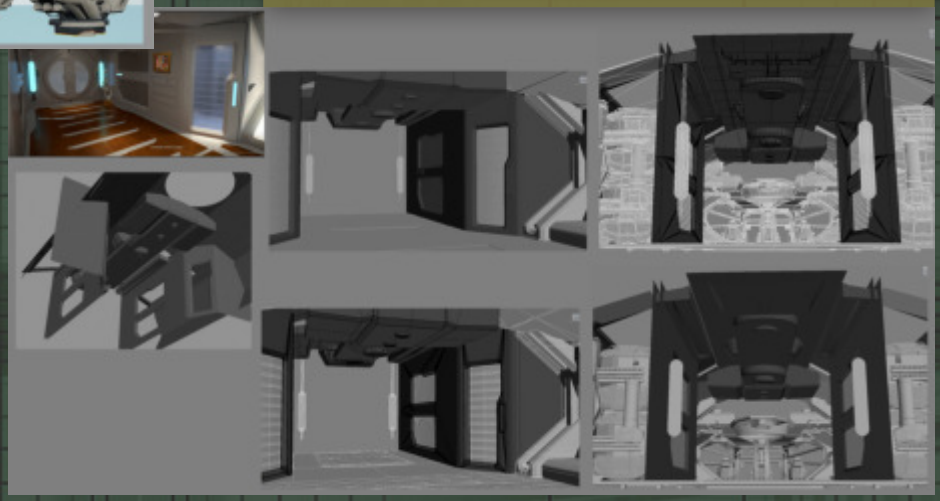


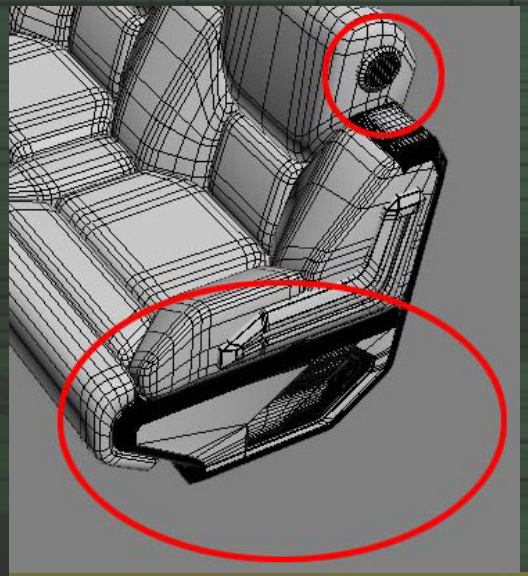
Added small details to the Cockpit area.



Added detail and integration to the Cockpit chairs.

Worked on reducing the bed area to low poly.

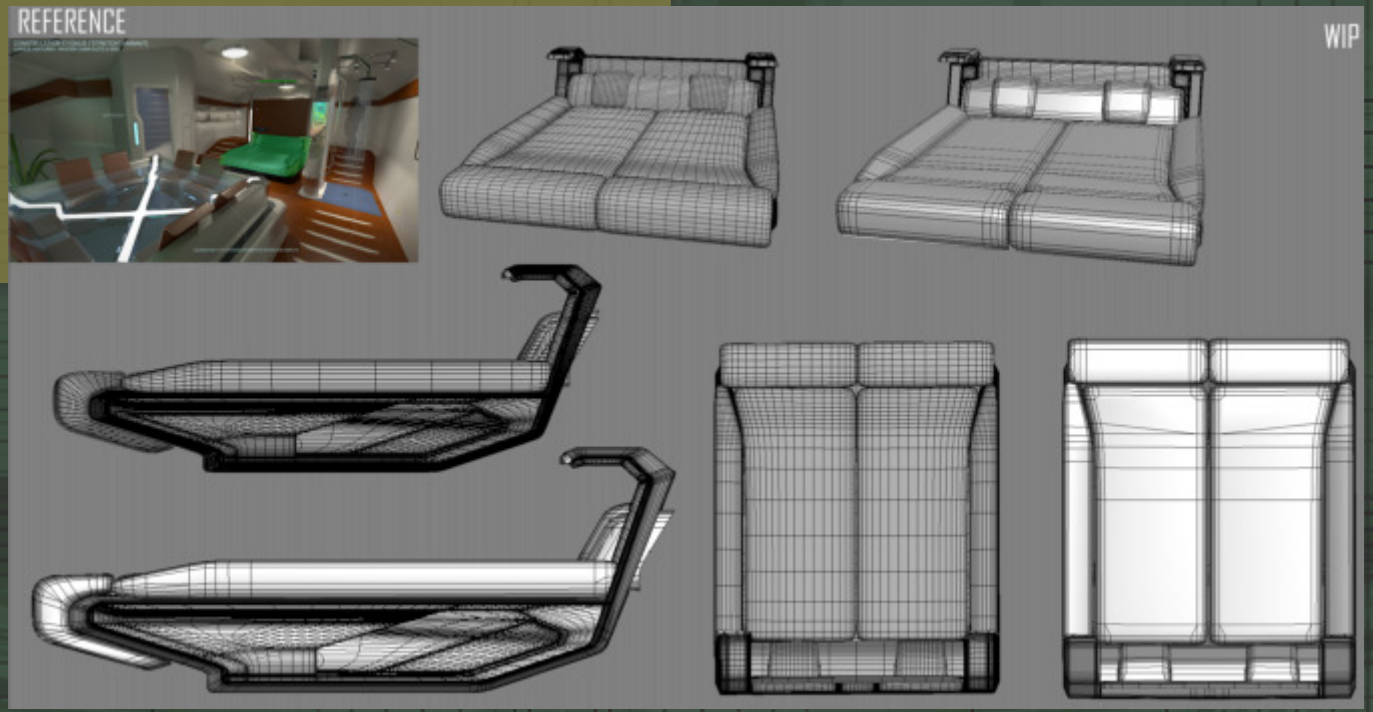




Checked and added collision meshes to smallscreens, Bar / Pillar and Dining Table.

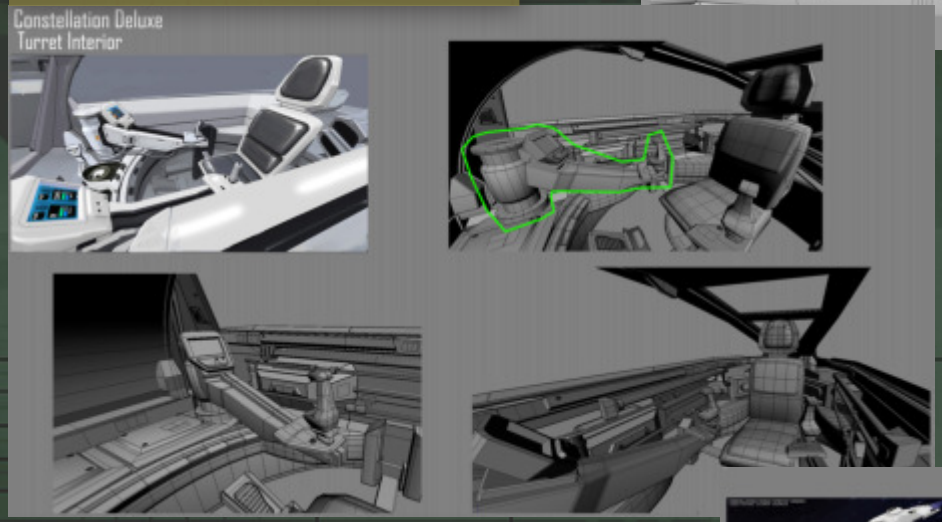
Sean Murphy: Hey all, in general everything is looking good. You may already be addressing this, but the one thing we want to flag is to make sure we're not going too crazy with face count on certain areas. I've highlighted a couple, but we need to look at everything to make sure we're not using too many polys!

CGBot: About the couch, don't worry. We're working on the LP optimization and we are planning on making some pieces with bakes for the geo.

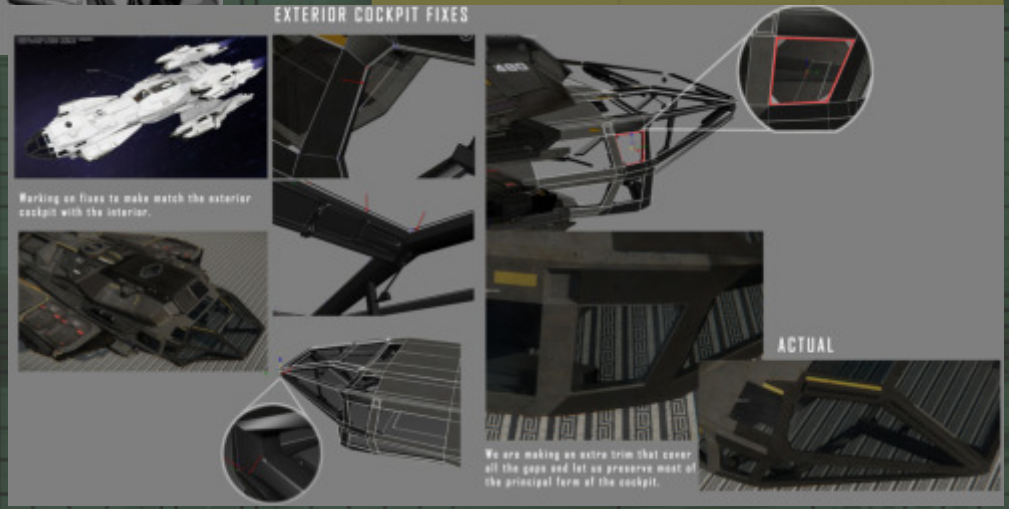


Added handles to the cabinet doors and some pantry separators. Added the wood geometry, optimized and aligned the cabinets, optimized the whole wall a little more, and modified some parts to avoid crashing with other geometries, and to make smoother curves. I started to work on the second wall, which is in front of this one for the bottles.

I'm working on the geometry of the turret interior.



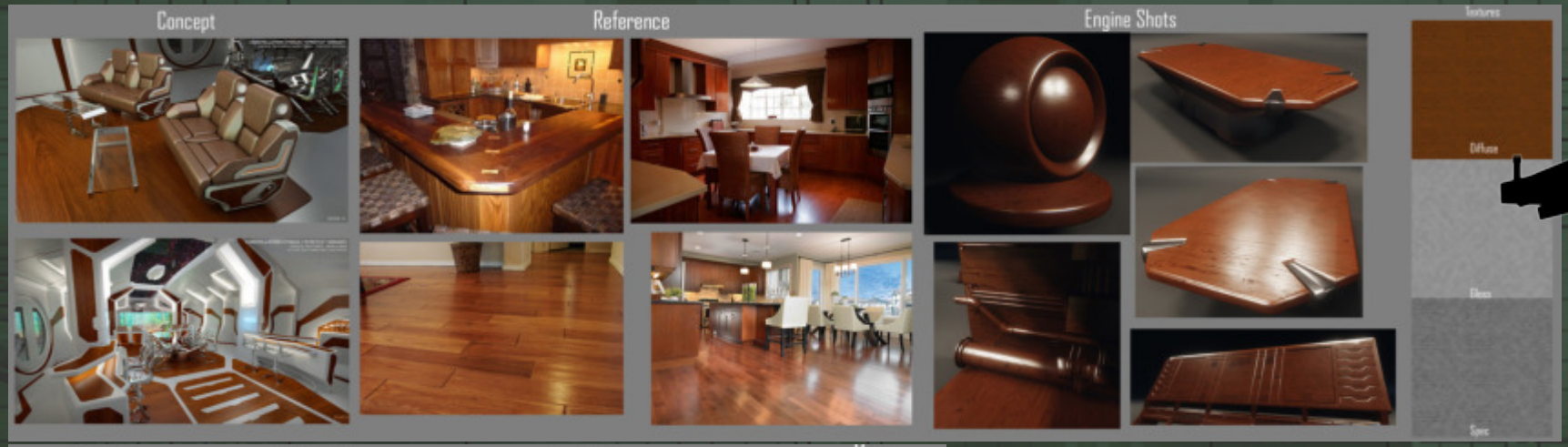
I worked on making the exterior cockpit match the interior. We are making extra trim to cover all the gaps and let us preserve most of the principal form of the cockpit.



Sean Murphy: Everything is looking good! A couple of notes, and you may already be thinking about this:

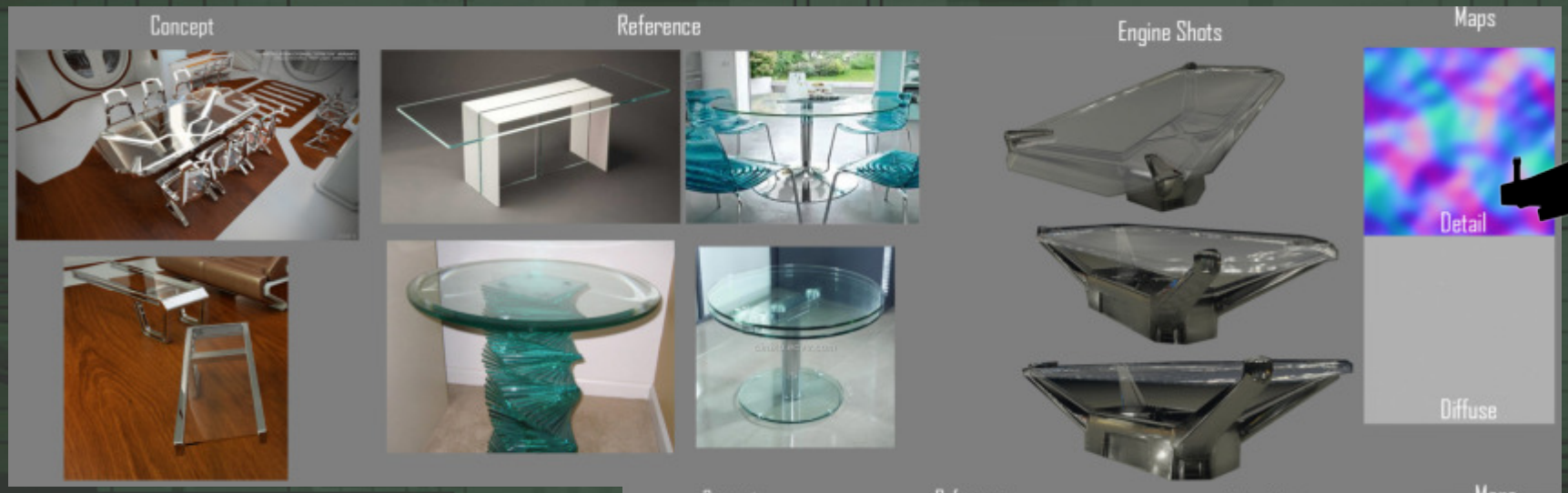
On decals and collision geometry, we need to make sure that the decal or collision is merged with the geometry that it's supposed to be part of. So the decals should not all be one big mesh, but rather decals should be part of whatever they're supposed to be on – so a decal face on an engine should be merged to the engine, not to other decals. The same applies to collision geometry.

I've been working on the textures of the Constellation Cygnus Deluxe. So far I have the chrome, plastic and wood materials, already tested on the ship.



Wood, steel and frosted glass textures.

WORK IN PROGRESS



Glass, leather and armor textures.

Paintover on Side Beds/Escape-Pods, added a retractable ladder mechanism and some extra details, like wooden mouldings and vents.

We finished checking and making fixes on the Cockpit area. We used a double trim in geometry for the structure, to cover all the gaps.

Now we are working on the moon roof, making fixes for the glass and others details.

Sean, we have it planned for the end of the process to attach each collision and decal to its proper surface mesh. By the way, on the liveries one, we've realized that we got it done for the Aquarius with the current "old school approach" of attaching the livery geometry to the mesh it's supposed to be part of. That sometimes doubles the amount of geometry, getting us over the 65k tris limit per entity at exporting. This can be an important impact on the workflow as the ships are currently being entity-optimized and hierarchy-set-up according to the original version of each variant. When liveries need to be done for each variant, having the 65k tris limit per entity will make it impossible to preserve the same amount of entities and the same hierarchy. This may mean a significant amount of re-work or re-organization on LODs, Damage States hierarchy, and naming for each different livery. So this may be an important topic we need to have well-defined for the sake of future work.

I've attached an image [next page] showing some proposals. Constellation Aquarius currently has the same floated livery geometry approach as Freelancer at the moment, which is making it have a different entity setup from Base and Taurus.

Decals (Currently used on Freelancer)

Pros

- Tiled texture already used on the Freelancer.
- White color on diffuse, so it can be painted with vertex coloring.
- Vertex alpha can be used to make some areas more transparent.
- If the ship is already mapped, it's easier to take the geometry from it.

Cons

- It may become too much geometry, as on the smuggler's cubby for the Aquarius. The whole area on the concept has a beige color, so all of that geometry will need to be duplicated.
- It needed this new material ID/1024 texture added on the Freelancer.
- Extra work will be needed on the damage states, as decal geometry will need to match the damaged hull areas. This will require cutting the livery geometry as well, and moving it to match the damaged areas. Or perhaps the livery will need to be redone for damaged areas after the hull geometry is done.

Geometry Cuts, and duplicated base texture

Pros

- Doesn't add lots of geometry compared to the duplicated/pushed approach.
- The Base texture is duplicated and gloss/spec values are slightly different, so (as in the decal approach) this spec change may be more interesting in some light conditions.
- If this is done after the base geometry is already mapped, it will preserve its mapping coherence.

Cons

- It needs all of the base textures/ material IDs where the livery is to be duplicated.
- It needs some perturbed normals rework.
- It needs an n-gons clean-up pass (like for the cut geometry).

Geometry Cuts, and vertex color

Pros

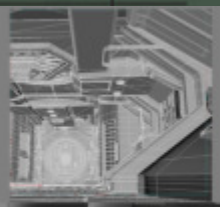
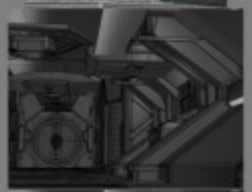
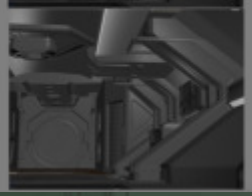
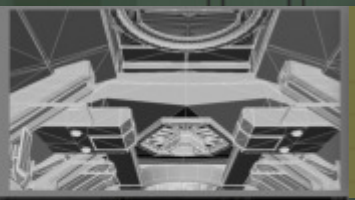
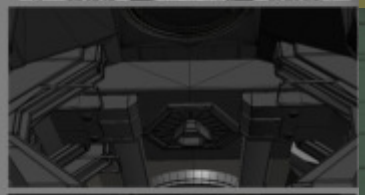
- Doesn't add lots of geometry, compared to the duplicated/pushed approach.
- No re-map work is needed.

Cons

- It needs some perturbed normals rework.
- It needs an n-gons clean-up pass (like for the cut geometry).
- Color range is limited by base texture with the current textures we won't be able to reach the color white, or the beige from the concept.

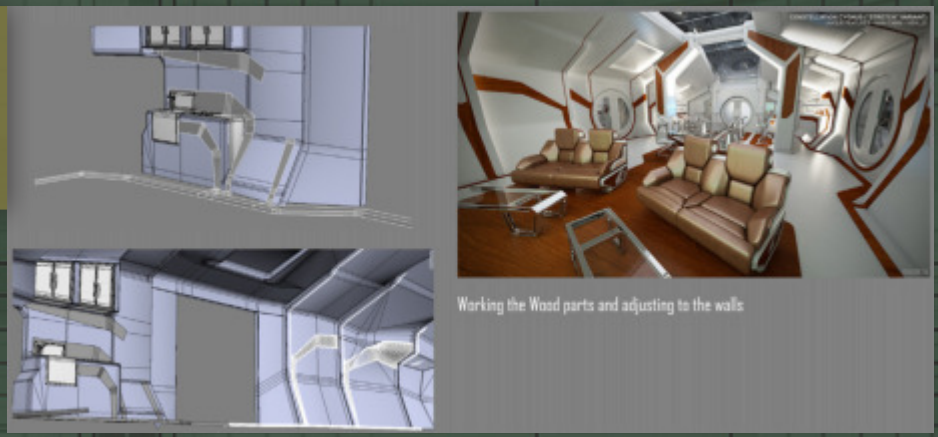


WIP

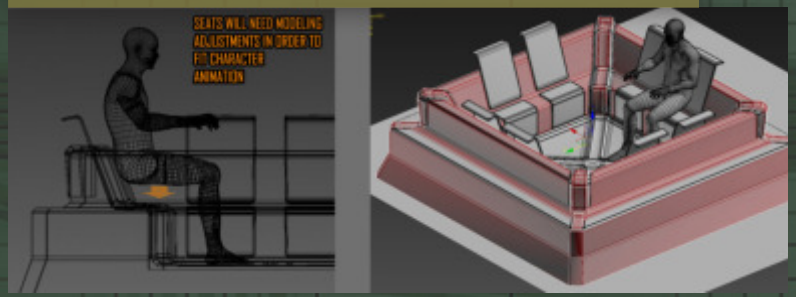

I worked on the roof between the Cockpit and the kitchen walls area, also added transition details to the pillars so they don't look crashed on the wall. I also did a quick, rough animation of the beds going out the escape portals.

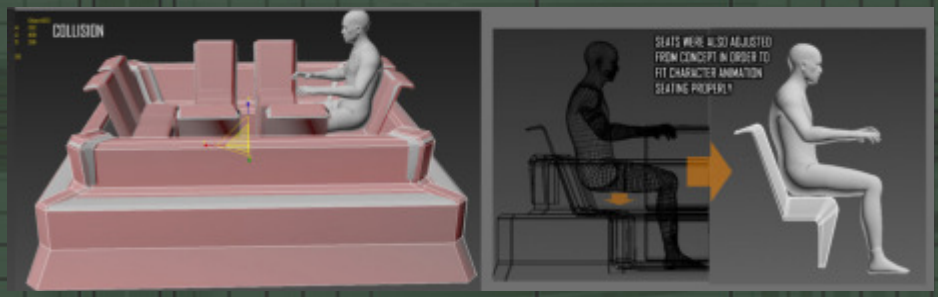
I reviewed the walls/ ceiling scene, and fixed some geometry issues, also worked on the wood parts.

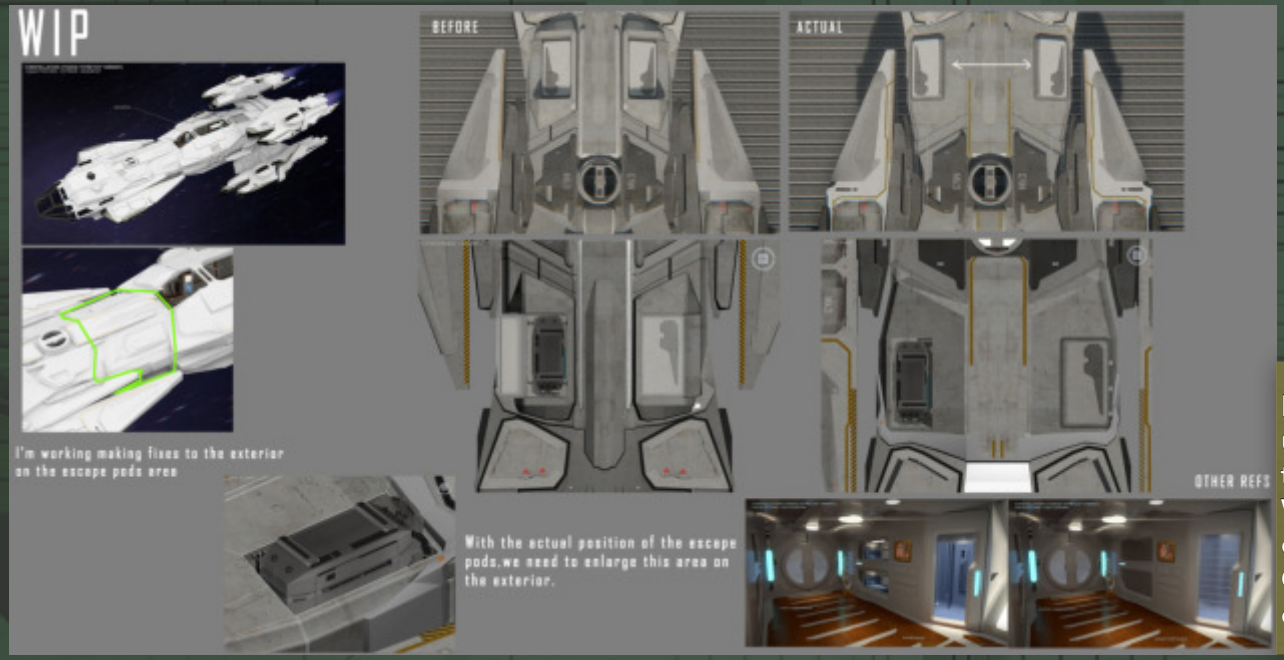


I mapped uv's and collisions. The hot tub's seats will require adjustment in order to fit characters with their seating pose animation.

I've attached another design solution to adjusts seats for proper animation.

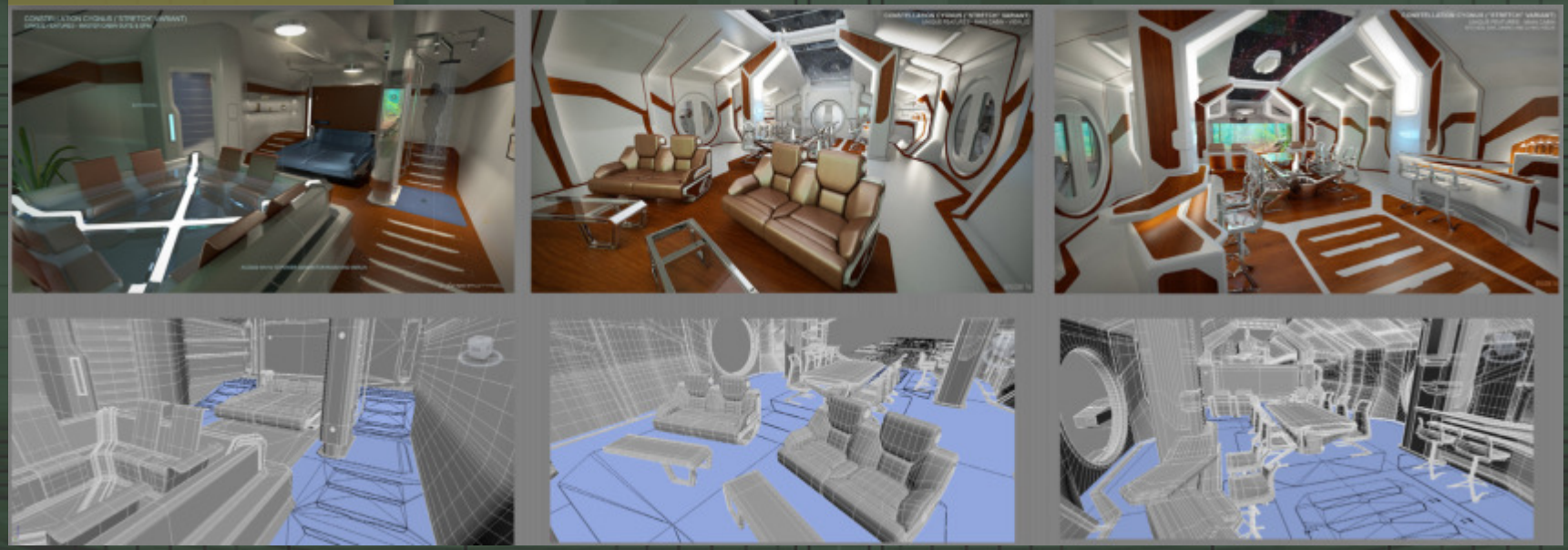




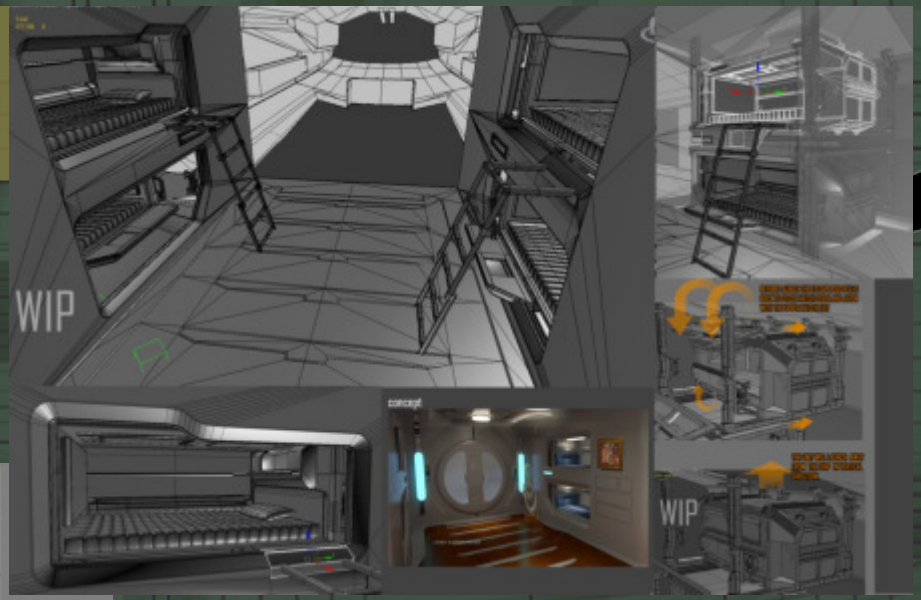


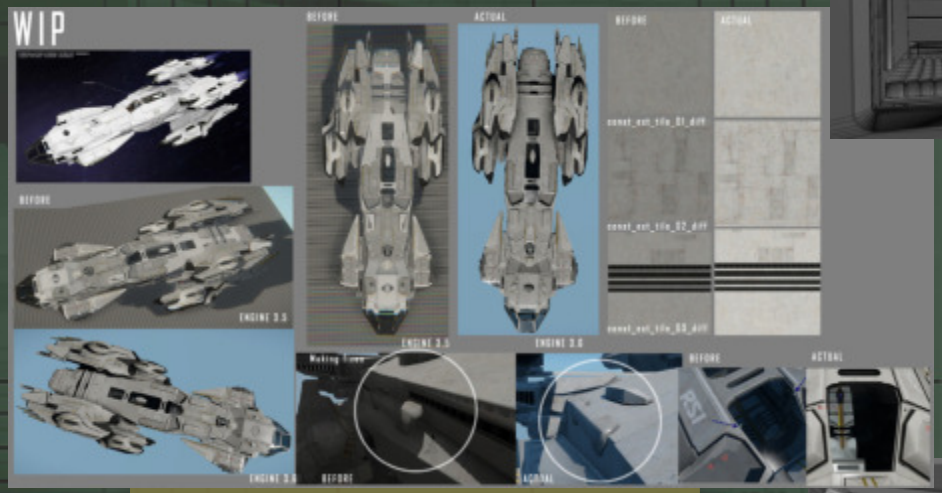
I made fixes in geometry, uv's, and collisions, on the escape pods area. With the actual position of the escape pods in this Constellation, we need to enlarge the exterior.

Here's the LP of the back floor.



I flipped the ladder access on facing escape pod capsules so as to improve the walking space area.



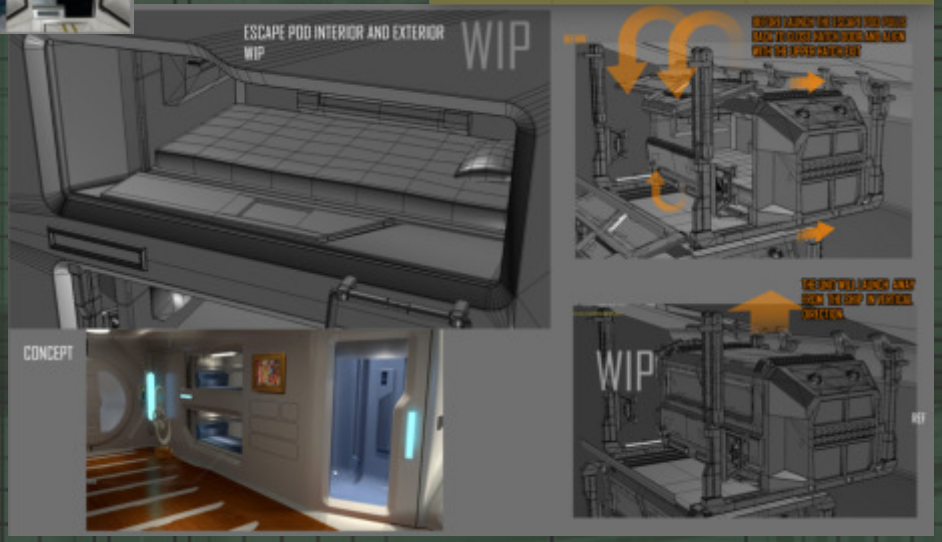


I made fixes on the Constellation Cygnus exterior.

We brightened and diffused it to look more like the concept.

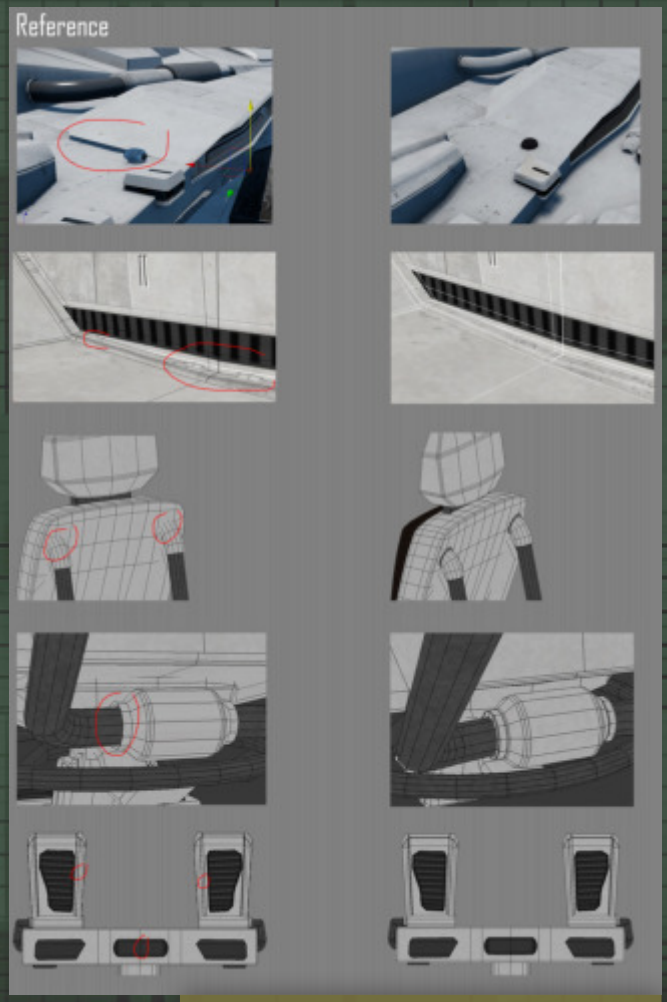
We are checking collisions, vertex color and vertex alpha.

Worked on solving the escape pod's docking and launch system.



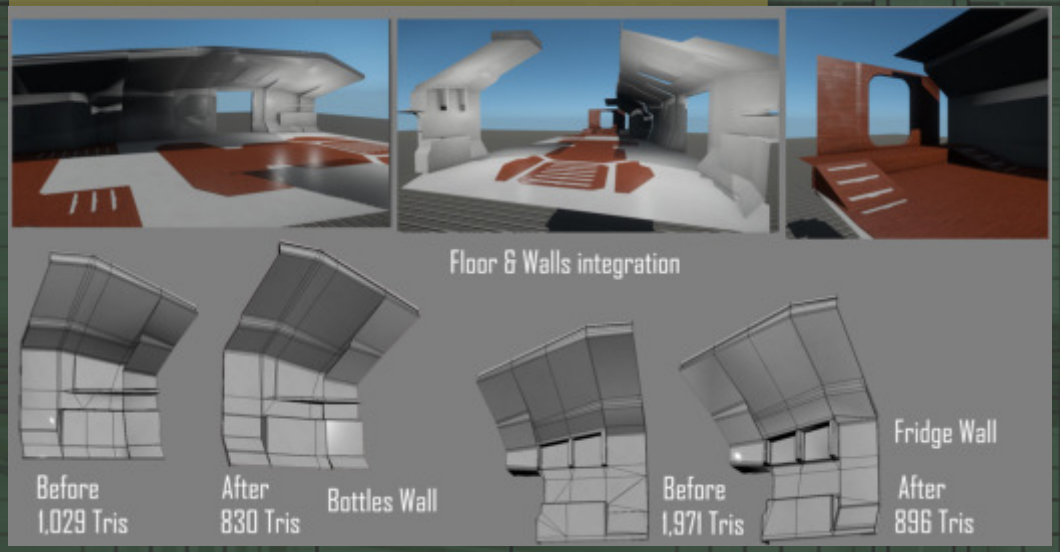
We're polishing, applying vertex paint to give some variation on the ship, checking decals and normal parts that are not working, and we need to use the perturb by face.

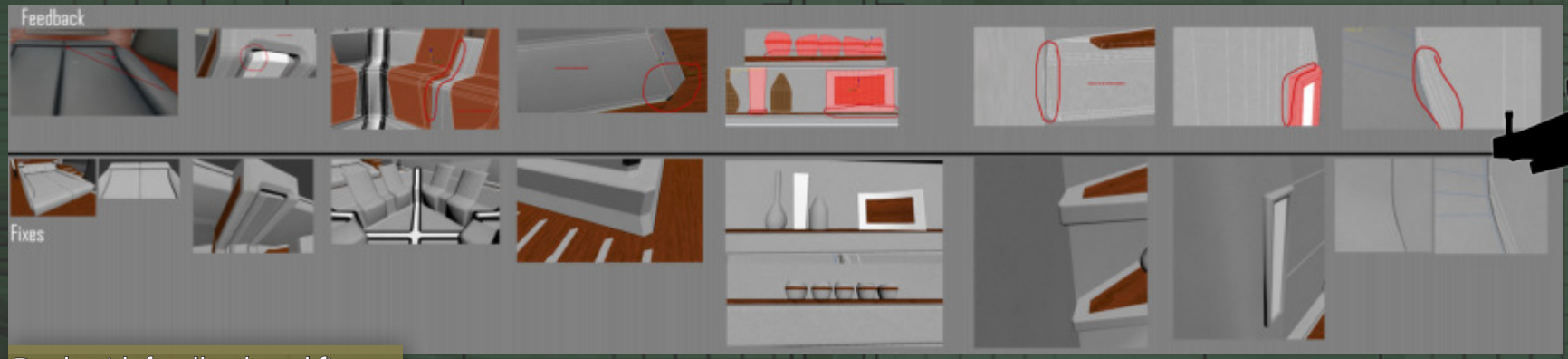
Also we are making an integration with the turret.



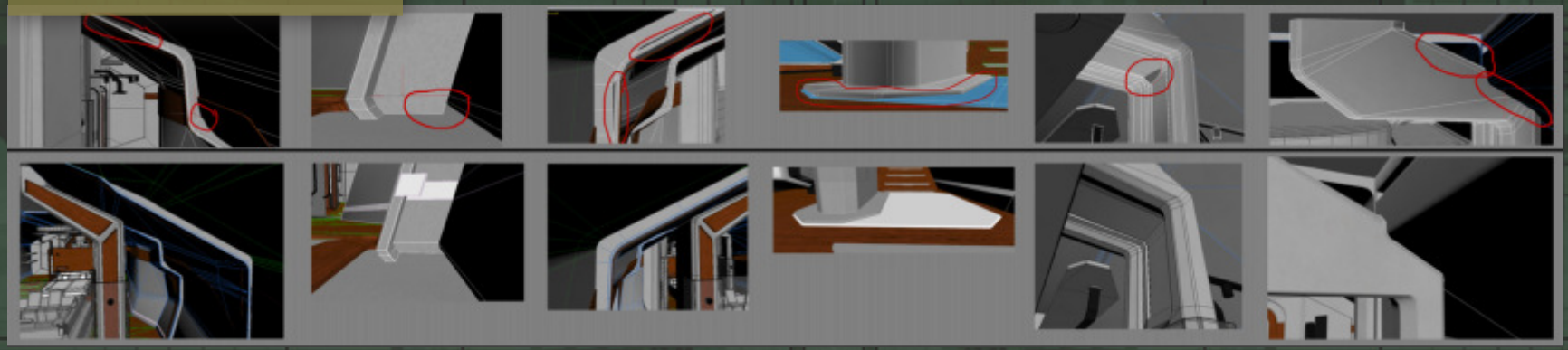
Worked on polish for the exterior and interior.

Walls optimization, floor and door wall integrated, hall walls optimized and integrated, checked it in engine, some perturbs.

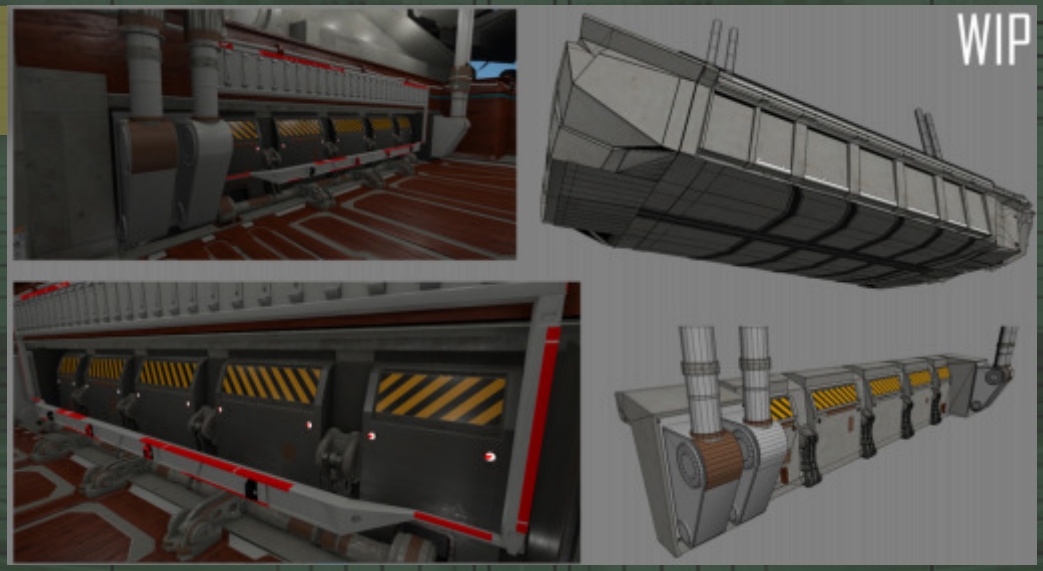




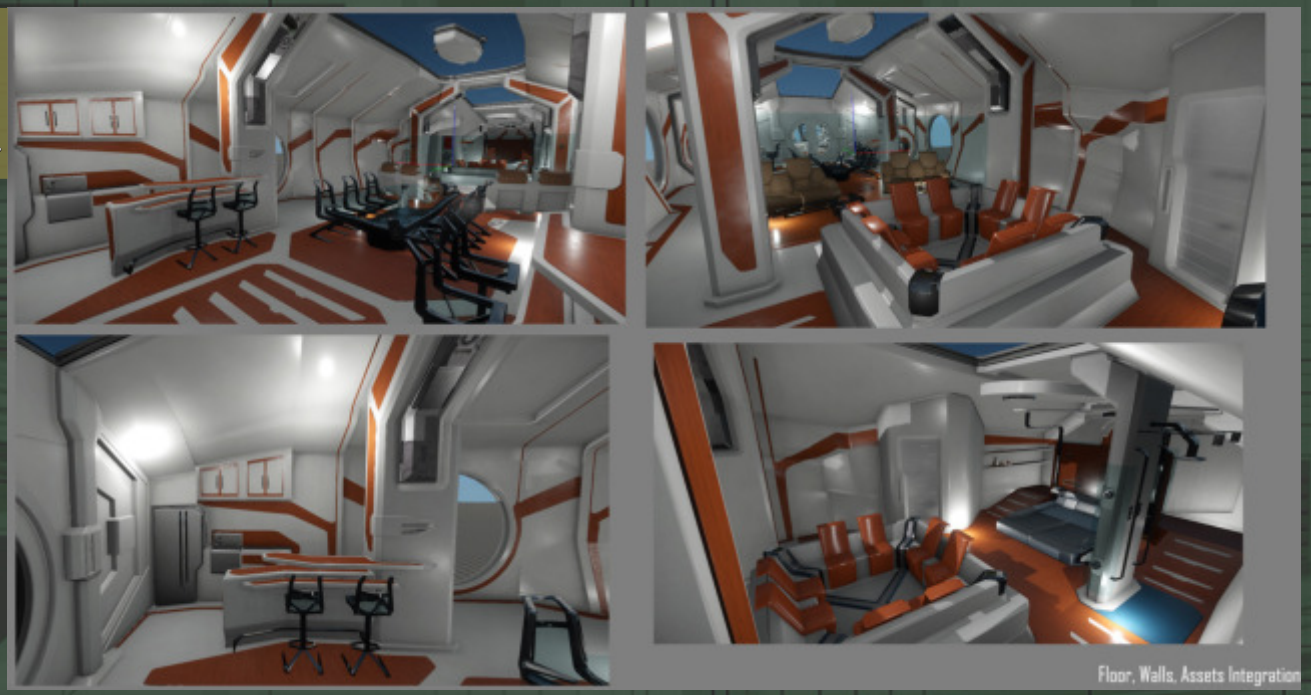
Dealt with feedback and fixes.



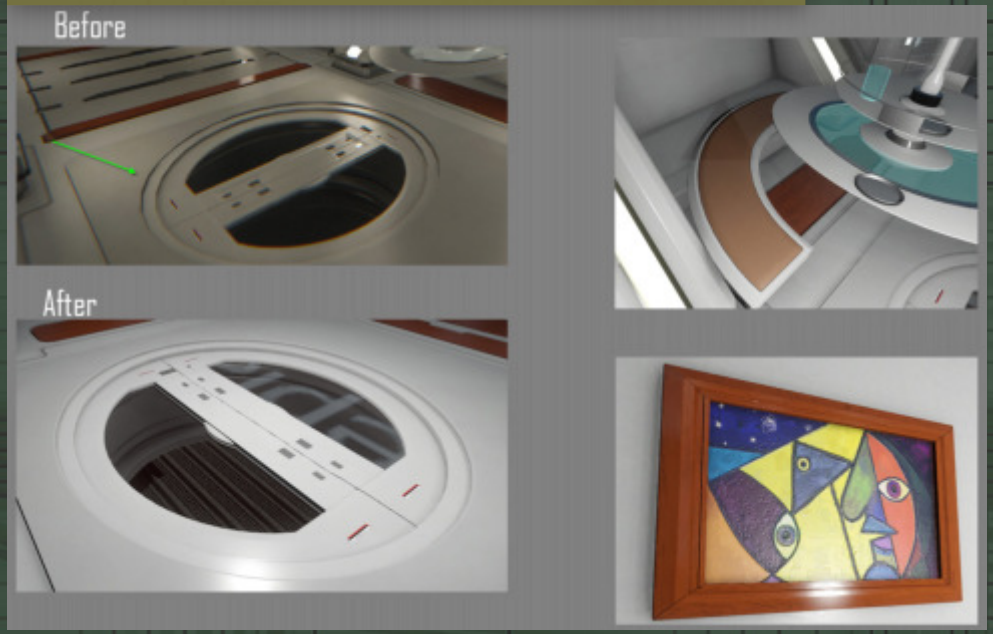
I worked on the uv's and the correct IDs for the geometry of the Cargo area.



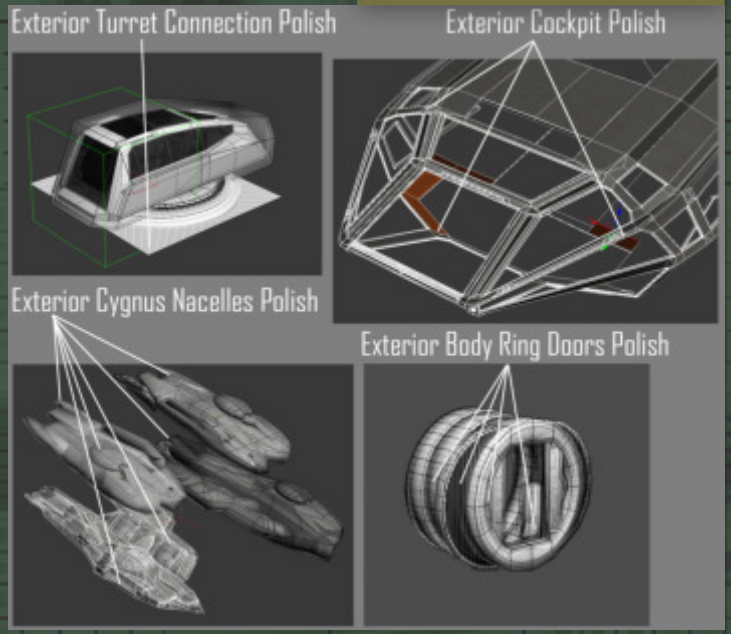
Last fixes, new material check, engine check, decal placement.



I checked the Cockpit for the Constellation Base. This is the polish I did for the Constellation Cygnus, with more details and tweaks for the assets in the image.



Exterior polish on several different assets.



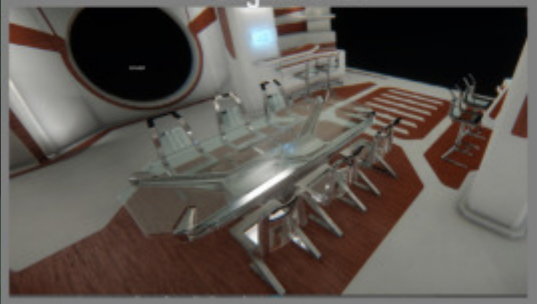
Tweaked the materials. I did a rough illumination of the interior to be able to do so properly.

Concept

Concept

Concept

Engine Shot



Engine Shot

Engine Shot

Concept

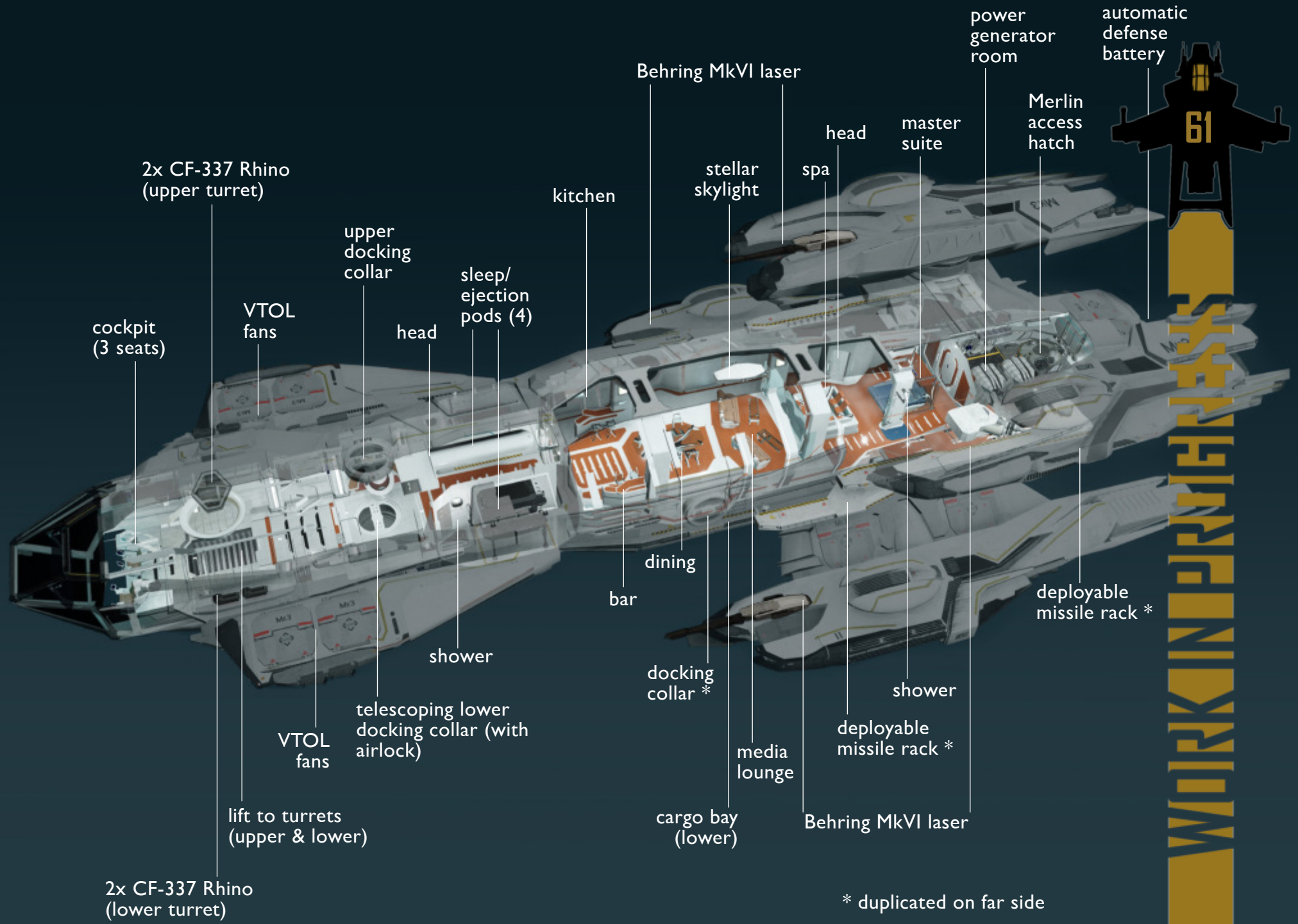
Concept

Concept

Engine Shot

Engine Shot

Engine Shot


cockpit (3 seats)
2x CF-337 Rhino (upper turret)
VTOL fans
upper docking collar
head
sleep/ ejection pods (4)
kitchen
Behring MkVI laser
stellar skylight
spa
head
master suite
power generator room
Merlin access hatch
automatic defense battery
dining
bar
shower
telescoping lower docking collar (with airlock)
VTOL fans
lift to turrets (upper & lower)
2x CF-337 Rhino (lower turret)
docking collar *
media lounge
cargo bay (lower)
deployable missile rack *
Behring MkVI laser
shower
deployable missile rack *
* duplicated on far side
61
WORKINGFRIGHTS

The Murray Cup is the unquestioned jewel in star racing's triple crown. Every year, top racing teams pour blood, sweat and money into attempting to take the top ranking in the challenging system-wide race.

Race History

The Murray Cup tradition dates back to the early settlement of the Ellis System circa 2467. The government's move to terraform four planets at once in the newly discovered system lead to a necessarily massive influx of population and space equipment. With little to do beyond wait for their machines to begin altering planetary core temperatures, terraformers and their families began to pass the time by racing their idle work spacecraft. Soon, makeshift racing challenge tracks were constructed using leftover terraforming equipment, and company craft were modified for speed. It got to be that racing wasn't something to do while not terraforming, but rather that the terraforming was something you did so you could race. The pastime's popularity spread beyond the system, and soon non-terraformers began to arrive to try their hand on the challenging course.

Meanwhile, Amon Murray smelled profit. Murray was a criminal and a gambler who amassed a small fortune by selling bored terraformers drugs and other contraband. He became fascinated with the makeshift races, not as a competitor but as an organizer and bookie; he began taking bets on the amateur system races. After six months, Murray found that he was making more money from booking bets than he was dealing contraband.

Never one to take a small fortune when a large one might be close behind, Murray committed resources to legitimizing the races, offering a small credit purse for the winner of what became known as, at Murray's insistence, the first Murray Cup. This first official race concluded with Ian Rikkord as the 2479 champion. An atmospheric specialist for Gaia Planet Services, Rikkord's claim to fame became the sheer amount of customization he applied to his RSI Nova courier ship, beginning a five-century tradition of cup winners personally modifying stock spacecraft. The reaction to the newly organized racing was electric; new racers from all over the Empire and even beyond were lining up to take part, and with each successive year the Cup prize became larger. By 2488, Murray had "gone legit"; the erstwhile drug runner had repositioned himself as a public figure and the father of modern star racing.

The Race

The Murray Cup is divided into two race types: Classic (once colloquially called Hare) and Blitz (formerly Tortoise, or Div-T). Classic racing is exactly what would be expected: ships trying to out-navigate each other as quickly as possible. Blitz takes into effect ships' weaponry, allowing pilots (with increasing restrictions over the years) to engage in limited combat during the race to disable, but not destroy, competitors. Though most pilots tend to specialize in one racing type or the other, to really become successful in the Murray Cup, it is important to master both skillsets. Racers will train for years to improve their 'off style,' with only a few exemplary pilots every becoming truly 'ambidextrous.'

The Murray Cup's inherent difficulty comes from the course itself, which now spans the entirety of the Ellis system and consists of multiple stages. Each leg is designed to take advantage of natural adverse stellar obstacles present in the system, such as asteroid belts and gravity wells, and, in the last few centuries, man-made obstacles like variable agility rings and targeting gate-locks. Some sections of the track notoriously require such a high level of precision piloting that they have earned themselves infamous nicknames such as the 'Sorrow Sea' or the 'Boneyard.' However, as much as the Murray Cup is about a proud racing tradition, the officials in the League continue to make annual alterations to the track in order to maintain the high degree of difficulty in the face of near constant improvements that manufacturers like RSI and Origin are engineering to make their racing craft ever faster and more maneuverable.

Of course, a ship is nothing without a pilot, and with the Murray Cup broadcast live across the spectrum, Cup winners quickly become legends in their own right. There are few who can think of the sport without mentioning greats like Terra McConoway, who in 2495 became the first person to ever win two Murray Cups, or Issigon Ado, who ushered in an era of interspecies participation as the first Banu to ever win. Then there are those who make history not just by winning, but by how they do it. Take Dax "The Hax" Emmelmann, who in 2731 set a new speed record thanks to his Aurora's heavily modified thrusters. Generations of tinkers since have continued to strive to push that record even farther. Then there is the inspirational tale of Fabis Capaldi, who won in 2798 despite suffering from Rauk's syndrome, a true lesson that anything is possible.

In more recent years, we have seen the rise of greats like the Bakshi racing family, who have almost 40 years of racing and 3 victories under their combined belts and many more to come. Underdog Hypatia Darring still has fans clamoring for her to come out of retirement after her thrilling come-from-behind win in 2934. Yet tragically, the pilot who is still at the forefront of most people's minds is 2942's winner, the late Zack Hugh.

Rules Revision

Fatalities are no stranger to star racing; hundreds of racers and spectators have been killed as a result of accidents in a half-millenia of Murray Cup racing. None, however, have shaken the galaxy and racing culture like the accident that capped the 2942 Murray Cup. After a hard fought race, pilot Zack Hugh began the traditional victory lap, only to be hit headfirst by an amateur pilot, a lap behind, who had lost control of his ship. With that sad ending, racing's greatest prize was awarded to a widow and the Murray Cup Racing League moved behind closed doors to once more adjust the future of the event.

In 2943, Commissioner Marco Verender announced that the race's qualification process was being revisited in the wake of the 2942 tragedy. Starting with this year's race, qualification is now determined by a point system that spans the entirety of the Cup racing season. Pilots who wish to qualify for the grand finalé must earn twenty "points" by placing in other authorized Cup races, with three points awarded for first place, two for second and one for third. The change, as well as updates to the rules for Blitz weaponry states, have been roundly criticized by

race speculators who feel it cheapens the tradition in the name of safety and order. The overall impact to the race will be known soon: this year's season is drawing to a close and a number of standout pilots who have already achieved the necessary twenty points are being followed closely by the media.

2944 MURRAY CUP

Concept Art

Murray Cup Development

This month, we go behind the scenes with Ricky Jutley and the Foundry 42 crew to get a glimpse of how racing was developed for Arena Commander. *Here's what Ricky had to say:*

"Formula 1 in Space"

A race mode is defined in a large way by its handling — flying in *Star Citizen* is very much a simulation, so naturally we found ourselves leaning towards the high-level ambition of "Formula 1 in Space." The ships already enable pilots to adjust flight systems and turn off safeties. Pilots also have full control to tune power output on the fly with the Power Triangle. With those systems in place, there is already a great deal of nuance in something as simple as taking a corner quickly. We hope the race mode will promote the use of those features and really get people fiddling with their setups. The fastest pilots will definitely be the ones that are tuning their ships!

Checkpoint Rings

We quickly decided that we weren't going to impose artificial walls or any kind of out-of-bounds area, apart from the standard *Arena Commander* holo boundary, so we needed checkpoints to guide racers' progress instead. The prototype we put together with scaled down *Capture the Core* rings was pretty successful, so we had a brainstorm meeting and the idea for the expanding/contracting iris was born. The idea behind the iris is that it expands more slowly for race leaders, giving them a more challenging course. There is no rubberbanding or any kind of artificial influence over the ships — every corner counts, so the irises should help keep the race pack a little closer together and races more intense.

WORK IN PROGRESS

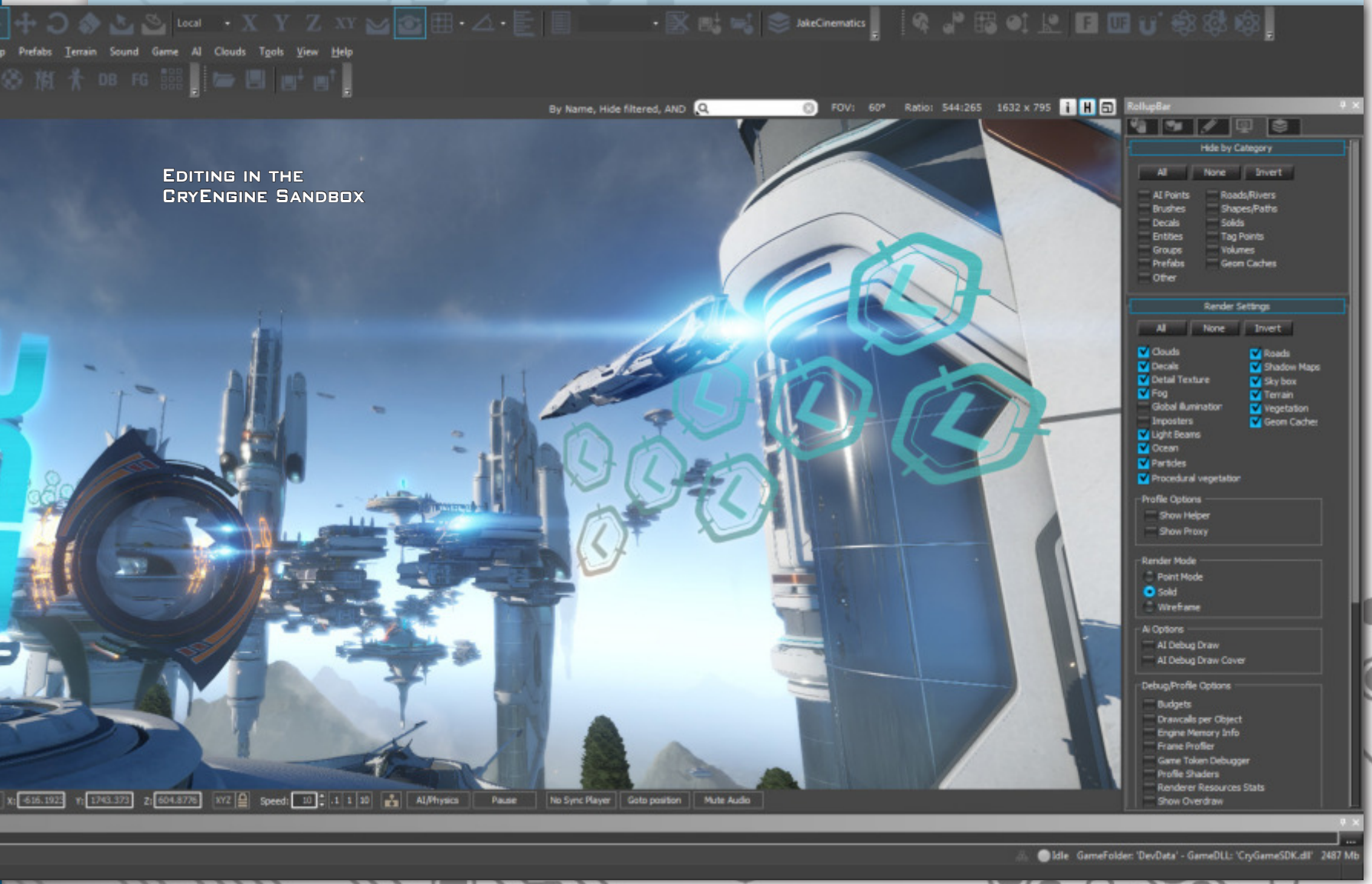
Start Grid

The start grid is one of those great ideas that didn't pan out quite as you hoped! We had an idea that we really wanted to make work for the start grid, but we just had to give up on it. We wanted a launch tube with starting positions on both the floor and the ceiling, with the guys on the ceiling inverted. Early prototypes were awesome — while sitting on the start grid you could look up (or down) and see one of your opponents above (or below) you … but then everyone took off. Your natural impulse when flying down a tunnel is to take the central line, so when everyone boosted their way down the launch tube they headed towards the middle. I'm sure you can guess what happened next. It was messy. As a result we tried expanding the tube, we played around with staggering the starters in different ways, but ultimately we decided that starting everyone the same way up was the best solution to the massive pile-up problem …

WORK IN PROGRESS

Concepting

Once we had a better idea of the kind of structures we wanted in the map, it was sent to our concept artist John McCoy to create the look and feel for the new environment. We wanted a completely new colour palette for the new map — something sleek and modern with clean lines. We also wanted to experiment with an in-atmosphere environment, giving us the opportunity to make a bright environment to contrast with our existing, darker space maps and really give the ships (particularly the sleek new M50) a chance to shine.



Building a New Horizon

We've never been short on ambition here at Foundry 42, and this new level was going to be no exception for our environment team. We were making a new game type, a brand new environment and all on a tight deadline for the Gamescom showcase. The level needed to play well, look amazing and be bug free on a tight schedule.

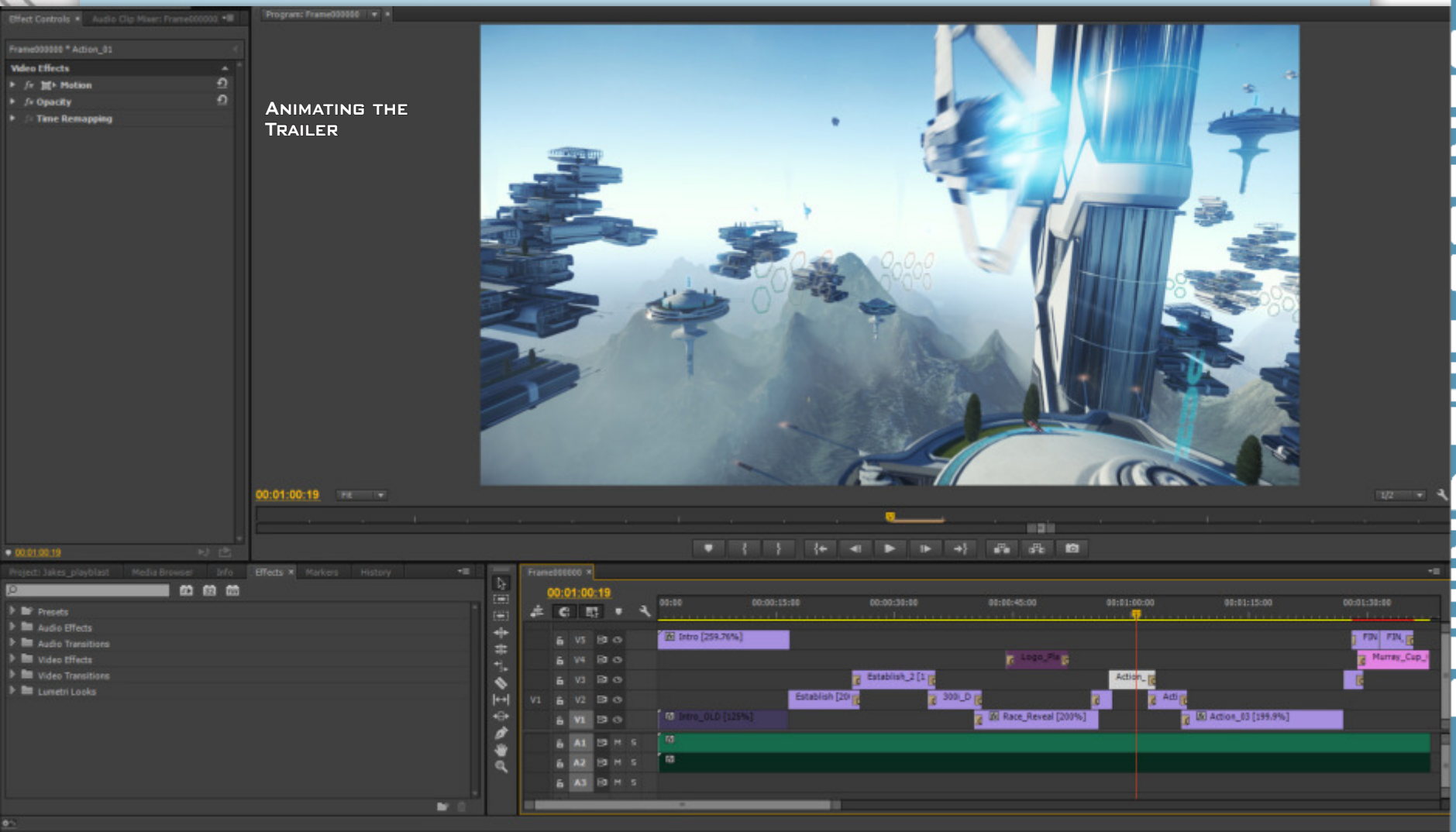
Early on, the team set out to create a world with a strong narrative bond to both the *Star Citizen* universe and to the Murray Cup. It had to be a place people would want to go, like a Monaco Grand Prix in the clouds. Just imagine yourself sitting on the balcony in one of these luxury apartments floating above the surface of this far away world, drinking a cocktail and waiting for the race to begin!

The Final Result

Murray Cup, the Movie

The game mode was being revealed for the first time at Gamescom, so we decided to create a new trailer to maximise the impact to backers both at the event and online. The aim was to showcase the amazing new Racing game mode and New Horizon Speedway map on one of the biggest gaming stages in the world, and we had to do this in just under two weeks! Chris Roberts, after being shown an early version of the trailer said, "it's looking awesome so far — we just need to turn it up to 11!" One week later the final version was cranked up to 11 and ready for Cologne!

How often have you seen an awesome looking CG trailer, only to be left frustrated once you see the actual gameplay? At CIG and Foundry 42 we believe that our trailers should always showcase the action right from within the game itself. That means everything in the Murray Cup trailer was recorded directly from within the same level you get to fly in today… so what you see is what you get!



BAKER SYSTEM

Baker is a binary system consisting of two K-type main sequence stars surrounded by a relatively desolate collection of planets that range from completely uninhabitable to barely habitable. A Covalex shipping hub and a largely automated mining outpost are the sole bastions of civilization in the region. As usual, that's only half of the story — the Baker system is also home to the "Able Baker Challenge," arguably underground racing's most dangerous event.

Baker's claim to fame is twofold: it is one of the only binary star systems in the United Empire of Earth that is (technically) inhabited, and it lies just a single jump from the breadbasket of Terra. The first point has earned the system the attention of a large number of astrophysicists eager to study such a star setup within the confines of safe and patrolled space. The second is the reason for both the system's high point of civilization — the shipping hub — and for its use as an underground racing arena.

Baker and the surrounding cluster were first charted in 2508, by the same expedition that first identified Terra. While Terra was reached and explored soon after the region was charted, Baker remained forgotten due to the fact that binary stars traditionally offer little of value to Humans. Even when a planet within a binary star's green zone can be terraformed, the gravitic stress associated with passing close to (or between) two stars renders attempts at civilization a moot point.

The first successful jump transit to Baker occurred in 2676, well after Terra had become established as a major player in galactic politics. The jump point to Baker was discovered by accident in the outer reaches of the Terra System, and Baker was subsequently explored by a purely scientific expedition. Formal territorial commerce rights were awarded to the Terran government, which has quietly partitioned them out to Terra-based concerns.

Inner Planets: Baker I, II & III

From a settlement-or-resources standpoint, Baker's first three worlds were written off immediately after the system was charted. None can be terraformed in a fashion that will sustain life permanently, and none have resources that make traveling close to the system's stars worthwhile.

Baker I is a small planet with a dense iron core that is in a dangerously close orbit around Baker's two suns. This proximity leads to an unstable orbital trajectory, and scientists posit that its orbit will steadily decay until it is subsumed by the larger star within the next one hundred and fifty million years.

Baker II is a typical smog planet, a sickly yellow-green worldlet with a dense and highly poisonous atmosphere. While not significantly crushed by the stars' gravity during its rotation, Baker II's atmosphere is so unsupportive of Human life that terraforming has never been a serious option here. In fact, the toxic mix is also incredibly corrosive to standard spacecraft hulls; the planet made headlines recently when a Freelancer piloted by suspected gunrunners attempted to hide out at Baker II only to find their ship literally dissolving out from under their feet.

Baker III is an ice giant, a churning mass of white with deep blue veins. The planet's circumference has increased noticeably since its discovery, something astrophysicists are keeping a watchful eye on.

Xenia

Xenia is a Covalex shipping hub constructed to support the burgeoning shipping industry in the Terra System. Xenia has expanded by leaps and bounds with the realization that operating through the station allows merchants to avoid the increasingly high tariffs associated with moving goods through Terra-based facilities.

The station itself has grown into a series of pre-fab habitation facilities joining together cargo bays to form a ring. These bays range from pressurized hangars for smaller ships to massive vacuum 'wet docks' capable of servicing the largest freighter designs. Larger ships flying under Covalex registry and carrying bulk goods typically disperse their cargo at Xenia, where private enterprise crews can pick up contracts for delivery to the surrounding systems.

Xenia is a great place for newly formed Freelancer and Constellation crews to learn the tricks of the trade, with the Xenia-Terra and Xenia-Gem runs being single-jump hops. There's not a great deal of profit in helping Covalex avoid import taxes, but it is ideal for inexperienced crews looking to find their space legs. The station's active job board is also a good place to pick up longer duration missions with higher payouts.

TRAVEL WARNING As Baker has no recognized worlds, it is patrolled ***irregularly*** by the UEEN. You may find yourself in danger when traveling in the system.

Baker IV

The final planet in the Baker system has no atmosphere or magnetic field, but it is home to very dense mineral deposits. Shubin Interstellar has been granted claim rights to the planet and a mining outpost named GIO is now the planet's single feature. Spacecraft can come and go from GIO, although the Shubin-constructed facilities on the planet are spartan at best.

Market Deals — Baker IV

BUY:	IRON	+2
BUY:	COMPOSITES	+1
BUY:	TITANIUM	+1

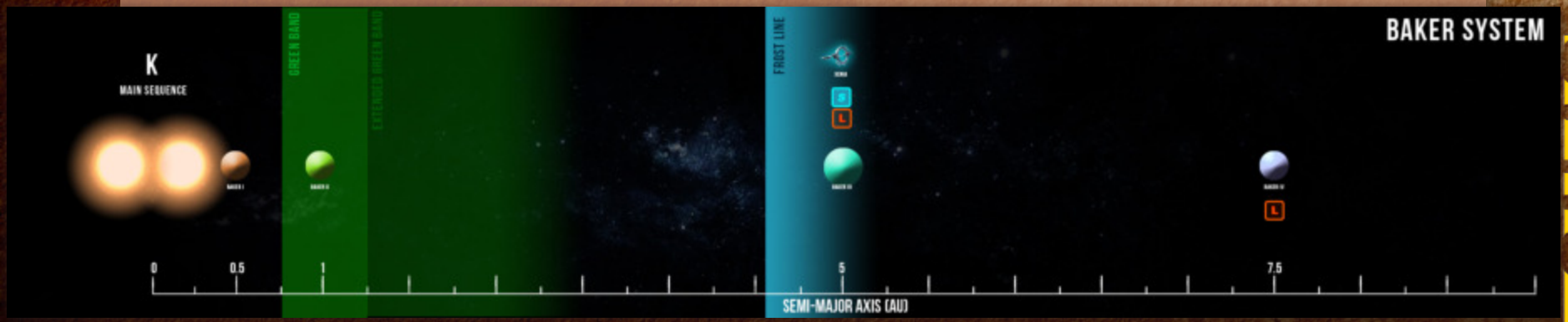
The Race

While Baker's three inner planets may be useless in any formal sense, they have taken on new life as one of the galaxy's most dangerous unofficial racetracks. The Able Baker Challenge, held once every six months on a date announced to the competitors only 24 hours before start time, pits pilots against each other and Baker's innermost planets.

The challenge consists of three legs, connected by quantum travel phases which can only be initiated at specific locations. First, pilots must navigate the space that surrounds Baker III, which is filled with dangerous ice crystals that can impair instrumentation and severely hamper visibility. The second stage is called 'breathing the vapors.' This segment involves ring targets that are placed very close to Baker II's toxic atmosphere. Pilots must navigate the course carefully to avoid hull damage. Finally, pilots must make their way to Baker I, where the final leg is a weapons-free race. Unlike more "civilized" events, racers are not immediately disqualified for the destruction of an opponent's ship (although pilot kills are still forbidden).

This makes for one of the most dangerous competitions in the galaxy. Navigating the course is considered a badge of honor among underground racers, although official racing teams avoid the Able Baker Challenge for the most part. As it is an unofficial race organized by unknown concerns, the challenge has no rules concerning weapons or other safety procedures, other than the final weapons-free stage. Especially competitive racers have been known to gun down opponents even in early race phases in order to gain an edge.

Visitors should also be aware that the underground nature of the challenge has led to a significant number of casualties among amateurs. With Terra only a jump away, there tend to be far more of these amateurs than would typically be expected. Baker's inner band is littered with the destroyed remnants of freshly purchased racing ships.



Lost & Found

by Charles Duncan

Part 4

Oskar Gruber followed the advice of Zara Vencia. Since he was on Borea anyway, contacting Drake Interplanetary would be the next logical step in tracing the history of his ship. Even with the name and the registration number provided by the bounty hunter, it was proving a difficult task. He had started by contacting the corporate offices by voice, then messaging. They had been very polite at first, but flatly refused to release any information regarding the sale of any ship. He began moving up the corporate hierarchy, where the people he spoke with became much less polite and no more helpful. He had finally decided to visit the Drake offices in person. He had been received politely enough, but after less than an hour it was quite clear from the staff that Gruber could either remove himself from the premises willingly, or be forcefully removed.

His tense walk back to the hangar reflected the frustration he felt. He had come so far, he thought, to be stuck here. Somewhere in the Drake computers, there had to be records of the transactions. Something had to show where the ship came from. Even if Drake didn't want to admit it, they had to have some kind of trail showing where the ship had come from. He began to devise schemes: hacking into the Drake computer system, a night-time raid of the corporate offices, infiltrating the staff. Each one was as worthless as the one before it. Even if he did have the skills to pull any of them off, which he didn't, he'd most assuredly wind up in jail, or worse.

The Borea system was home to Drake Interplanetary, and the company's influence overshadowed any scheme he could conceive. He wasn't sure what he could do now; his money for hangar fees couldn't last forever. As he returned to the ship, he was lost in thought, trying to think of some feasible plan. He almost had the cargo ramp closed before he realized he wasn't alone in the hold.

Two men stood flanking a third man seated in the chair at Gruber's workstation. To Gruber's mind, the ones standing looked like nothing so much as hulking brutes; he wondered how they managed to fit up the cargo ramp. The third man was much smaller, almost dapper looking, wearing well-made business attire. "Ah, Mr. Gruber. I was wondering when you would arrive. Please," he said gesturing towards one of the lowered jump seats, "sit down." His voice was pleasant and he smiled as he spoke.

Gruber stood gawking. "Who are you people? And why are you on my ship?"

The smile never left the man's face, but any trace of pleasantry left his voice. "Mr. Gruber. Sit down." One of the two brutes standing beside him visibly stiffened. Gruber saw a large pistol clutched in one paw. The brute stared pointedly at Gruber, but didn't raise the weapon. He didn't need to. Gruber was suddenly reminded of his visit to the prison over Lorona. He sat down.

"Mr. Gruber," the pleasant tone returning to the man's voice, "My name is Mr. Reinhart." He gestured to the men standing beside him. "These are my associates. We are employed by Drake Interplanetary. There are certain matters we feel it is necessary to discuss with you. I trust you have sufficient time available to talk?"

Gruber looked pale, but nodded back.

"Excellent. Now, Mr. Gruber, I represent an interested party who has become aware, quite recently, that you have been making inquiries about a ship. A specific ship. This has caused some level of concern, as my employer is a respected member of the community and has no wish to be involved in the scandals of pirates and bounty hunters. My duties include ensuring that does not happen. Since you have been so diligent in asking questions, I'm certain you won't mind answering a few of my own. Such as, why are you interested in the owner of a ship called the *Pride of Kingsport*?"

Gruber stiffened. "I've just been trying to trace the ownership of a ship. I found some . . . abnormalities about it. I think that might have been the original name of the ship. It's certainly nothing that would justify you barging into my ship and threatening me."

"Oh, Mr. Gruber," Reinhart said, "no one's threatened you. Not yet." He smile grew wider. "Now, if you would be so good as to tell me about the locket?"

"What locket? I don't know anything about a locket."

"Ah, Mr. Gruber, lying is not a forté of yours. Just as you have made your inquiries, I've made mine. Ms. Vencia said you were doing an admirable job trying to trace the owner of it."

"Why," Gruber stammered, "would she tell you anything?"

"Because she is a bounty hunter, Mr. Gruber. And bounty hunters get paid."

Gruber sighed as the fight went out of him. He knew he was outmatched. He had felt himself sinking into the deep end when he went to Lorona. Now he was beginning to feel totally underwater. "It's in the second drawer on your right side."

"Excellent." Reinhart reached down and opened the drawer. He pulled out the box containing the locket and opened it. He did a quick but thorough inspection of it. Then, to Gruber's surprise, Reinhart took the locket and held it in front of the MobiGlas on his wrist. "Yes, this it." He paused for a moment. "I believe it's genuine, yes." Gruber realized that Reinhart was having a conversation with someone

through the Mobi, but he couldn't hear what was being said by the other party. He watched as Reinhart's expression became one of surprise. "Yes, I can take care of that. Are you certain that's what you want done? . . . Very good, then. I'll see what he says." He reached across to Gruber and handed him the box and the locket.

"Mr. Gruber, if you would be willing to spare a few hours of your time, the owner of that locket would very much like to speak with you."

All Gruber could manage was a slack-jawed nod.

* * *

Oskar found himself escorted by Reinhart and company to a very luxurious apartment complex in an exclusive quarter of Borea's capital. Gruber spent most of the short trip in silence. The sharp fear he had felt in the cargo hold of the *Outbound Light* had faded; he hadn't actually been threatened and the men escorting him had been polite, if aloof. As they rode the lift to the top floor, he wasn't sure what to expect. When the doors opened, Gruber walked into a foyer that seemed as large as the *Outbound Light* itself. Reinhart gestured to a large set of doors. "If you'll be good enough to follow me, please." The two brutes stayed outside in the foyer as Gruber and Reinhart walked into a second room as large as the first. The center of the room was dominated by a large bed. Resting in it was a woman. Gruber's first thought was that the woman was old — ancient and frail looking. He wasn't sure if she was awake or asleep. He saw that the bed was surrounded with medical equipment. It was all tastefully arranged, but it was very much present, nonetheless. As he and Reinhart approached the bed, the woman's eyes snapped opened. However frail her body might have looked, the eyes were sharp and cutting. The bounty hunter Vencia would have been envious. Her voice was strong as well, carrying across the room as they approached.

"Well, George, is this the young man you've told me about?"

"Yes ma'am. He passed the scanners, no weapons."

She looked Gruber up and down and then back to Reinhart. "He's not what I expected." She turned her gaze to Gruber again. "I do hope he hasn't scared you too much, young man. George," she shot a glance back towards Reinhart, "can be a bit overprotective at times. He gets so very concerned about my welfare. Your trip was pleasant, I hope?"

"Um, yes, ma'am," Gruber said, "very pleasant."

"I've very glad to hear that." She looked towards Reinhart. "Perhaps you'll be good enough to give us some time to talk privately then, George."

"Ma'am? I'm not certain that's the best idea."

She made a shushing gesture at Reinhart. "Pfft. Off with you. He's unarmed, as you say, and I certainly doubt the young man has come all this way just to assassinate me." She looked intently at Gruber. "And even if he had, it's not like he would be changing much. Now out."

To Gruber's amazement, Reinhart just nodded and left, closing the doors behind him.

"Oh, don't look so surprised. He's good enough at his job and worries even when he shouldn't, but he knows to do as he's bid. I wouldn't be surprised if he came across as a bit aggressive when you first met him, although you shouldn't let that bother you. He's a dear, very concerned for my safety. There were some threats made a few years back, and George has a tendency to not let things like that go. Personally, I think he's overreacting a trifle. You're not here to kill me, are you, Oskar? It is all right if I call you Oskar, isn't it?"

"Um, yes, ma'am. I mean no. I mean, yes, you can call me Oskar. No, I'm not here to . . . kill you."

She looked at him impatiently, "Well then, sit down for heaven's sake. Bad enough to have George and his goons

hovering around all the time. I won't have you doing it too."

Gruber did as he was ordered. He pulled a chair from one of the corners of the room close to the bed. As he sat in it, he marveled at the old woman's presence. He could only imagine what she had been like when she was young.

"Now then," she said, "do you have any idea who I am?"

"Of course. That is to say, you're the owner of the locket, and . . . well, really as far as . . . no; I have no idea who you are."

"My name is Irena Marqet."

Gruber's eyes widened. "Dr. Marqet? I know you. I mean, I know your name. You're one of the founders of Drake Interplanetary."

She cackled and smiled at him. "That's right. I'm also the one who built that ship you've been bothering everyone about."

* * *

The next hour was lost in Dr. Marqet questioning Gruber. He gave up any attempt to ask questions of his own; he told her about the salvage operation and finding the locket. She listened intently as he related his visit to Quister in prison, and he thought he saw a faint tear in her eye when he told her about Zara and Drago.

"That's quite the story, Oskar." She shook her head. "Who would have thought a ship could go through all that?"

"Yes, ma'am. But Dr. Marqet, if you don't mind my asking—"

"You want to know why I put the locket in the ship, don't you?"

Gruber blushed. "Well, yes."

"What do you know about the history of the Drake corporation?"

"Well, I know that it's made its name selling ships like the Cutlass. And it's got a certain . . . reputation for the ships it makes."

"True enough, I suppose. Those horrible advertisements I saw everywhere. Dreadfully tacky if you were to ask me, but apparently they work for the sales, so no doubt we will keep churning them out, just like the ships. Of course, officially, I'm not on the Board of Directors anymore, so they tend not to listen as closely as they once did. And you need not try to be coy around me, young man. I know perfectly well that Drake makes a rather large amount of credits selling ships to people who are on the wrong side of the law. I promise, so long as the UEE doesn't care, no one at Drake Interplanetary is going to care either. But what do you know about how we got started?"

"I know what I've read. It was founded by a group of engineers out of a failed bid for a military contract. It was supposed to be some kind of militia ship. Dr. Dredge was the project lead for it; she started the corporation."

Irena made the same shushing gesture at Oskar that she had at Reinhart. "Jan Dredge? Please. She studied aerospace engineering at the University of Terra. They'll throw a doctorate at you just for landing on the planet. Oh, Jan's smart enough, I suppose, but she was always interested in the bottom line. Cost, cost, cost, always with her. She would have been happier as an accountant. Besides, you're a salvage man, aren't you? How many *project leads* have you ever seen actually work on their project?" Dr. Marqet smiled knowingly. "That's why we lost the contract with the UEE Navy, you know. We were underbid for the contract; oh, how Jan got upset at that. As though we all hadn't worked hard to keep everything as low cost as we could. She was especially upset with me, since I had insisted on certain features that had to remain, no matter what she wanted to override." She laughed quietly. "And we took the project and made billions more than we ever would have working with the UEE. You know, I don't think she's ever forgiven me for that. But she's young yet."

She leaned forward towards Gruber. “I wasn’t even supposed to be part of the project. I had retired a few years earlier. I was certainly the oldest one of us. A colleague of mine, Dr. Allisaid, invited me to join in the team. Initially I was just there in an advisor role. But within a few months I was fully invested in the project. This was in 2920, you know; two years before we officially lost the contract with the Navy. Designing a ship, especially starting from nothing like we were, takes a good bit of time. Frankly, the fact we did it that fast still amazes me.” She pursed her lips. “I suppose Jan deserves some of the credit. She was famous for her lists, her spreadsheets, her timetables. Hmpf. I suppose that’s what they teach at UT.” Her face turned down in a frown. “Silly way the government always had of doing things with that business of contract bidding. If they had any foresight at all they would have known we offered the better ship, as history has clearly shown.” She gave him a questioning look. “When was the last time you even heard someone mention a Wildcat?”

Gruber raised an eyebrow. “A what?”

Dr. Marqet snapped her fingers at him. “Exactly my point!” She frowned again. “That’s the military way though. I should know; I spent twenty years working for them before I had the good sense to retire.”

“Why did you join up with the project then, if you were retired?”

She looked at Gruber sadly. “Because my husband died. We were both engineers. We had done well for ourselves, and we were looking forward to finally getting to do all the things we never seemed to have time for. He was going to take a trip, to give a lecture at a symposium on metallurgy. The ship he was on crashed on take-off. Total engine failure. No one survived. It was one of those accidents that are never supposed to happen, according to statistics.”

She looked at Gruber pointedly. “I had a choice: find something to do, go mad, or die. Yuri Allisaid gave me something to do. So I put everything I had into the project.” She paused, remembering. “It felt good to be working on something. And it gave me a chance to get rid of what I realized was survivor’s guilt. A lot of people thought I wouldn’t want to do it, to have any work related with designing a ship after my husband died in a crash. But it was cathartic. Yes, we were designing a fighter. But it was something that was meant for the outworlds. The local militias that didn’t have the budget of the Fleet. My husband came from a world like that. As I helped work on the design, I thought he would have appreciated building something to help his home, and places like it.” Tears formed in her eyes. “I thought that if I couldn’t do something with him, then I could do something in memory of him. I lost a dream, a dream I had of spending my years with him. And I replaced it with a dream of that ship.”

“No one thought we could actually do it. Even the design team didn’t really think we had a chance of success. But I needed something to believe in. I believed in the ship. The specifications we got for the contract were insane. Honestly, looking back on it, it seems more like the political maneuvering you see to make people think their government is doing something when all they’re really doing is smoke and mirrors. And little by little, we all began to believe in it. We would stay up all kinds of hours, coming up with ideas, rejecting others. Allisaid was a genius for taking a little tidbit detail and then making it actually work into something useful. He came up with the idea for the keel mounted docking collar. Genius idea, really, but none of the rest of us had even thought about it. Oh, we had our problems too. Trying to work out the cockpit seating, for instance. You wouldn’t believe the row we had among some of the team members about the sliding seats. I think Jan actually threw a caffe mug at Zig over it. It was a crazy time. But nothing compared to what came after, of course.

“Once we got past the pure design phase and started working on the prototype hull, we began to see what real

potential the ship had. And of course, we found all the bugs that somehow the computer designs never seem to find. Zig, he was the primary power engineer. He would run around the hangar, wearing this ridiculous blue hat, screaming in a Vega accent, "Power! We must have Power!" every time someone overloaded the coupling circuits. After the fourth time he did that in an hour, Jan walked over, grabbed his hat right off his head, and screamed at him, "Who has Power now?!" Gruber found himself smiling along with the old woman.

"It was crazy, and stressful, and probably the lowest pay-to-work ratio I'd had in forty years. But it was an amazing group of people to work with. I didn't realize how much I needed them, and how much I got from them, until we entered the final testing phases. We were getting ready to do the first test flight, and Yuri looked at me and said he was sorry my husband couldn't be here with us. I said I was too. It hurt thinking about him, but I realized that even though it hurt, it wasn't going to kill me, not having him here anymore." She paused thoughtfully, and Gruber didn't try to speak. "It was a successful test. Better than we had hoped for, in fact. And the next day, I put that locket in the ship."

Gruber looked at her in awe. "I had no idea. No idea at all when I found it."

She nodded. "Why should you? I didn't think anyone would ever find it, hidden away on the prototype Cutlass." She seemed to compose herself and gave Gruber a sly grin. "After hearing all it's been through, we should use it as a marketing campaign. It would make the Board of Directors another billion credits."

"But if it's the first, how did it end up sold to Zara Vencia? I mean, wouldn't you put it on display, or something?"

She laughed. "We had no idea how successful the design would be. And by the time we did, we were too busy trying to crank out new ships to care what had happened to the original. When we officially lost the project, we relocated to the Magnus system. Setting up the initial factories, trying to get subcontracts in place, it was a big endeavor for all us. And remember, this was a company run by engineers. One lost piece of information and it's as though it never existed. Jan was always harping about trying to establish "market share." We were trying to churn out ships as fast as we could. In some cases, we would literally give them away, just to get the word out. Mix-ups occurred. By the time anyone really went looking, that ship was already gone from our books. I suppose I could have had it traced down, gotten it back somehow, but it had served its purpose for me. It got me through a tough time when I needed it."

Gruber reached into his pocket and took out the locket. "Would you like this back?"

She slowly shook her hand. "I'm an old woman, and I'm dying." She noticed the look of concern that crossed over Gruber's face. "Young man, I have been working with machines my entire life. I know when they start to break down. And that's all we are really, specialized machines. Eventually, the parts wear out to the point that you simply can't replace them anymore." She smiled up at him. "Just like the ships we build. But from all you've said, I don't think your ship has reached the same point I have. Why don't you put that back where you found it? And then go see what kind of life that ship has left."

Gruber returned her smile and replaced the locket in his pocket. "Yes, ma'am. I think I can do just that."

"It's been a rare pleasure meeting you, young man. But I think this is about as much excitement as I can tolerate in a day. I'll make sure George gets you back safe and sound to your ship."

"The pleasure has been all mine, Dr. Marqet."

Gruber began walking away from the bed. When he

reached the doors, he turned and looked over his shoulder. Irena Marqet was still awake, looking at him.

"Ma'am, if I could, I'd like to ask you one more question?"

"And what's that?"

"Why did you name the ship the *Pride of Kingsport*?"

He could see her smile from across the room. "Because the town my husband was born in was Kingsport. And I think he would be very proud of that ship."

* * *

Gruber finished replacing the cover of the junction box. The locket was back where he had found it. He smiled to himself, wondering what the next person to find it would think. If there would even be a next person. He had no way of knowing, of course, but after his talk with Dr. Marqet, he thought someone else might find it one day. Even if it was just a daydream, it was a good one. He went outside the ship, doing a pre-flight check. He made sure the cargo ramp was secured, double-checking the blue light indicating proper closure. He ran his hand across the rounded hull as he made a final inspection. He paused for a moment, looking at the new name stenciled in yellow letters along the side. *Golden Opportunity*. He thought it had a nice ring to it. He climbed the port side ladder up to the cockpit and sealed the door behind him. When he had positioned himself in the pilot's chair, he started the sequence to bring the power plant and engines up to full for takeoff. As he did, he looked around the cockpit, almost as if seeing it for the first time.

"You've been a dreamer, a hunter, a pirate, and an explorer," he mused. "I wonder what you'll be with me?"

The End