

# USI Manufacturing with EPL

- First important note: USI transforms EPL requirement of rocket parts to a dual requirement of Material Kits (MK) and Specialized Parts (SP)
- Second the supply chain to create these parts is highly complex when compared to the basic EPL system of Metal Ore → Metals → Rocket Parts
- Third due to the nature of the change this makes MKS have limited compatibility with other colonization mods (like using more than one life support mod at once)

# New EPL Base Components

- Material Kits and Specialized Parts (MK/SP) are now the core to building using EPL
- Each Ton of dry weight mass takes 800 MK and 50 SP. Each MK = 1 kg and each SP = 4 kg roughly.
- Each MK and SP must be constructed in a manufacturing plant. The Tundra plant is what you'll want to use and it can make up to 3 things at once, which we shall see is a good thing!



# Tundra Assembly Plant

- First Material Kit requirements:
  - Metals
  - Chemicals
  - Polymers
  - Machinery
  - Electrical Current
- All of these will need to be processed in other steps but this is the core of what we need to make Mks.

# Tundra Assembly Plant

- Second Specialized Part requirements:
  - Silicon
  - Refined Exotics
  - Machinery
  - Electrical Current
- Again, all of these will need to be created in preceding processes.



# Tundra Assembly Plant

- Third Machinery requirements:
  - Material Kits
  - Specialized Parts
  - Machinery
  - Electrical Current
- Note the need of Machinery for Machinery. The input is greatly less than the output but it is a requirement of note. If you are out of Machinery you can not make more! So take note!

# Tundra Assembly Plant

- Note that the Tundra Assembly Plant can run three processes at a time. Changing each function slot will cost you MK and SP.
- With 3 functions in one unit you can use a single Assembly Plant for your base with access to power and kerbals to run things.
- The net power cost for all 3 is 55.73 ec/s
- Lastly note that the Assembly Plant can also make colony supplies but that is not covered in this presentation but would exceed the 3 processes each plant can perform.



# Tundra Refining Processes

- Each refinery can process 3 things at a time. If you paid attention to earlier slides you will note you need 6 different materials so we will need at least 2 of these refineries.
- Starting with MK the process looks like this:
  - MetallicOre → Metals
  - Substrate → Polymers
  - Minerals → Chemicals

# Tundra Refining Processes

- For SP you need only 2 things but the chain is a tad trickier
  - Silicates → Silicon
  - Rare Metals }
  - Exotic Minerals } → Refined Exotics
  - Chemicals }
- Take note that you will need chemicals for the refined exotics step and that means processing extra minerals from the previous slide



# Mining Processes

- So now working backwards we know what materials we need to refine things from:
  - Metallic Ore
  - Substrate
  - Minerals
  - Silicates
  - Rare Metals
  - Exotic Minerals

# Mining Part 2

- This list of 6 materials presents a problem. If you got hugely lucky and found a single spot that had all 6 in mine-able quantities congrats!
- Assuming you did get lucky you are going to need at least 2 MEU Plus 500 drills that can each drill 3 materials each.
- If you did not get lucky you have two options
  - Drill dirt and process it into sub types using the industrial sifter at a much lower efficiency
  - Create drill stations across the planet/moon to gather materials making many satellite bases.



# Power!

- This next part assumes you have gotten lucky and can run everything in one location (highly unlikely by the way!)
- You are going to need power! How much? A tad over 450 EC/s. How to get that power?
- Best bet is to use the 2.5m reactor from USI. This beast can put out 1550 EC/s so should fill all your needs.
- If you are outsourcing your functions to other bases such as drilling you can use less power. But don't forget to keep the lights on in the rest of your base!

# Keeping Cool!

- So Drills and Reactors make heat. We like to keep cool!
- To keep cool you will need 2 medium thermal control units and 1 large, or a similar combination of parts. You can use 2 large if you are trying to keep part count down.
- Don't forget other things may effect this such as engineer level and the like.



# Storage

- So you want to do all of this, but you forgot one important part! Storage! Even if you have a planetary storage pool you still need containers to hook into it. How many? Roughly 13.
- Here is the quick break down of what you need:  
MetallicOre, Metals, Substrate, Polymers, Minerals, Chemicals, Silicates, Silicon, RareMetals & ExoticMinerals (They can share a container!), Refined Exotics, Material Kits, Specialized Parts, and finally Machinery.

# Storage Part 2

- Remember each phase needs not only the supplies to make it but a place to store it, so you will need both sides of each equation we've discussed to make it work right.
- Large Storage containers are best in most cases although you may end up having a container farm of sorts which not ideal is at least functional.
- Thanks to logistics systems in USI you don't need to connect many of these parts but will need the kerbals to make that work.



# Total Part Count

- So you got lucky on resources, you minimized your part count to keep yourself happy on your base. What's the damage?
  - 13 storage containers
  - 2 Tundra Refinery Units
  - 1 Tundra Assembly Unit
  - 2 MEU-500 pulse Drills
  - 1 2.5m reactor
  - 2 Large Thermal management systems
  - Net part count: 21
  - This part count ignores all other possible colony required parts.

# Additional Thoughts

- Looking at this system, realizing the odds of getting all of your mine-able materials in one place and the balancing act of managing drill production, refining, assembly and storage, it becomes questionable to even use this system.
- Remember you can ship Material Kits and Specialized Parts to your base. If you can afford this it may be easier in the long run.



# Final Concerns

- This presentation does not cover USI life support or habitation requirements at all and you will need kerbals to run these functions.
- Other mods may have a hook into USI for construction. Be Warned! These hooks can to be partial and often you will find things that still make or require rocket parts. And each change to USI might disrupt the other parts ability to interact with EPL.

# Final Concerns 2

- If you use MKS and other colonization mods that use EPL you may find things make rocket parts but not use them, or need them and can't make them.
- In short using USI and EPL locks you in. So either be prepared for the roughly 16 step process or use a simpler colonization mod that leaves EPL with Rocket Parts and a much simpler chain.



# Last Addendum

- Just my two bits here:

The supply chain requirements to harvest and build items for EPL off world using USI have gotten tougher as time has gone on.

The hook into EPL changing Rocket Parts to Material Kits and Specialized Parts is a bit tough when other mods now find themselves having to build config files to find if MKS is installed and modify their own functions if it is.

We can cover USI – LS next time. Fun with habitation and supplies!