

HALADA'S
**THE COMPLETE
MINER'S GUIDE**

VERSION 3.0
EXTENDED EDITION

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A word from the author



I wish I could find something smart to write to kick off this guide. Some great simile or metaphor juggling with beautifully crafted sentences that would remind you of Shakespeare and make you think, “this guy got style”. Unfortunately, not for a lack of trying, I couldn’t. Instead I decided to concentrate on the material and worry less about the finesse of the delivery method. Hopefully, it’ll be more useful than some half-assed attempt at writing a Hamlet inspired piece of literature with some technical jargon put into it to make it look like a mining guide!

For those reading this for the first time, you should know it’s been almost three years now since the very first version of this guide was written. It started as a multi-posts forum thread in the Science & Industry forum, then quickly evolved into something more. It was apparent to me the success would ask for more, but due to real life constraints and shift in game interests, I never could push myself to update it.

There hasn’t been an update since October 2007, and thus, something had to be done. Not because the guide was outdated much, but just like the continuously evolving game that EVE is, something as big as the Complete Miner’s Guide deserves at least a yearly update!

Truth be told, Quantum of Rise, called the “Industry” patch by CCP, isn’t so much about like Industry. At least, not in the sense of Red Moon Rising for example, which brought us Exhumers back in December 2005! Quantum of Rise brought us, industrialists, a new toy, and a few welcomed changes.

It would be impossible to make the miner’s guide bigger than it was, or at least, not so much. With 57 pages in its latest 2.2 version, it had pinnacled to the point where it was impossible to add more. It was translated into French, Spanish, Hungarian, Russian as well as German and downloaded over 1,000,000 times!

But I did want more.

So I made the decision to make this new guide. Entirely re-written from scratch (though I will admit, I did allow myself to copy/paste some sentences from the good ol’ guide!) to cover not only mining, but many of the other sectors touching industry, including moon mining, invention, manufacturing, starbases, trading, and so much more.

It is inevitable that this guide will keep growing. It took two and half years to make the Complete Miner’s guide truly complete. It’s time to push the envelope.

I give you, *The Complete Miner’s Guide v3.0 – Extended edition*.

Sincerely,
Halada



1. Introduction

Starting out

If you have just finished creating your character and are a brand new pilot, this guide will serve you just as well as the 4 years Veteran. However, if you have just started, it might be worth checking that you started off the right foot!

Picking the right attributes

If you intend to go toward Industry and Science only, then you should prioritize **Intelligence** and **Memory**. Do not neglect your Perception and Willpower attributes, since these are used for spaceship related training, and as a future miner, trader or producer, you will still need to train a fair share of spaceship skills!

In order of priority, from most important to least important:

1. Intelligence
2. Memory
3. Perception
4. Willpower
5. Charisma

Unless you intend to be a major league trader, feel free to put as little charisma points as possible. For the few trade skills you will need for your career, it is not worth sacrificing points in the other types. The **Caldari Achura** race is particular well known for its ability to have very high intelligence and memory attributes, which will serve you well.

For a good industrial/science character, I like to have my Intelligence and Memory close to 25, with Perception and Willpower close to 20, and Charisma as low as possible. That's with a set of +4 implants and the learning skills trained.

Attributes remap

If you're an old player like me, you might not have known which attributes you would need the most when you created your character a few years ago. Thanks to Apocrypha, you can now remap your attributes **once a year**. I rapidly decreased a few charisma and perception points on Halada in favor of Intelligence and Memory as soon as I could.

Implants



Consider training **Cybernetics** to level 1 as soon as possible. You'll be able to plug attribute modifying implants in your head. Some can add as much as +6 to each attribute. The +3 kind is the most common and very cheap to obtain. Adding +3 across the board early on will help a lot.

Learning Skills



The learning skills allow you to permanently add attribute points to your character. While they are very boring to train, they are worth it on the long run. There are two kinds, the basic and advanced ones. The first are rank 1, the latter rank 3. Prerequisite for advanced learning skills is having the corresponding basic skill to level 4. It will take a starting character weeks to train these fully, so start slow with a few levels on the basic ones, and then over the next months, keep adding a few levels until you are done. If you're creating an alt, getting the learning skills out of the way before moving on to the skills you really want is something I prefer to do. Of course, how you do it is entirely up to you!



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2. Mining

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2. Mining

EVE 101

Before we even start talking about how it all works and what mining is, you need to understand something about how EVE is ran, since it is much different from other MMOs out there, and if you're new to this game, you need to understand this very important fact.

EVE truly sets itself apart from many reasons. For some the singular server where everyone plays all together on one server alone is pretty awesome. For others, it's all about the PvP, and the adrenaline rush it can give you, perhaps because of EVE's painfully severe penalty when you die. For most of us, it's the absence of XP grinding. Finally, and this is the part where you need to pay attention to, the Universe is entirely player controlled.

What does this mean exactly?

It means that every ship you see flying around EVE have all been built by other players. All the equipment fitted on that ship was also built by the players. Short of some items referred to as NPC items (some NPC trade goods, commodities, starbase equipments and certain modules), everything in EVE is player built.

Understanding this is hugely important, since your career as an industrialist, or carebear, will greatly be influenced by what is going on in the EVEverse. You will need to adapt constantly to the varying situations that present themselves. Wars, market crashes, subtle variations to the market that change the entire face of your plan for domination of the Universe... it's impossible to predict, and it's that exact sense of not knowing what is going to happen next that separates EVE from the good MMO league to greatness. Unpredictability.

Now that you know that it is the players that influence everything in EVE, we can get on to business!

1. Mining 101

What is mining exactly in EVE? As your keen sense of deduction might believe, mining in EVE involves the mining of asteroids, or more exactly, the process of extracting ore from the asteroids in order to refine this ore into mineral.

Remember what I saying about everything in EVE being built by players? This is where the minerals come in. There are nine different minerals in EVE. They are called:

Tritanium
Pyerite
Mexallon
Isogen
Nocxium

Zydrine
Megacyte
Morphite

2. Mining

Notice I separated them into two groups. The first group of minerals is called “low-ends” in the EVE jargon, because they can be mined anywhere in Empire space, that is, space with a security status of 1.0 to 0.5. The second group of minerals is called “high-ends”, and can only be obtained by mining asteroids found in low-sec (systems with a security status ranging from 0.4-0.1) or in “nullsec” space, also referred to as 0.0.

You should know that anywhere in Empire space, you are protected from other players by Concord, the EVE Police Force. Whenever someone attacks you there, some NPC ships will quickly spawn in your area and destroy the attacking player. Low-sec becomes highly dangerous since Concord will no longer protect you there, and that space is rampaging with player pirates who will look for you to either destroy your ship, ransom it, or both. Nullsec, or 0.0, is a different story, since that space is usually controlled by an Alliance of player corporations that reign over that territory with a NBSI policy: Not Blue Shoot It. Therefore to be able to mine high-ends, which are up to 3000 times more profitable than low-ends, you either need to take the risk of mining in low-sec space, or join a 0.0 Alliance.

Finally, you can mine Ice, which is refined into varying isotopes. Isotopes are used to fuel starbases as well as ships with a jump drive. Ice belts are found both in Empire all the way to 0.0 space, and are usually quite busy.

The value of each and what is most profitable to mine will be covered later. However, it is important you understand the risk/reward factor that governs the value of the minerals available in EVE. Obviously, you’d want to mine the asteroids that yield you the most zydrene or megacyte after refining, but seeing as how the risks are important, not everyone can do it.

With me so far? Let’s continue...

1.1 Asteroid Belts & Ores

Aside a few exceptions, every system in EVE contains belts, which you can easily warp to via the right-click interface. Upon warping into it, as you’ve covered in the tutorial (which you should do if you haven’t already done so), provided it wasn’t stripped entirely, you will be welcomed by a number of asteroids.

There are 18 types of ore in the game, and each type of ore can be refined to yield 1 to 5 types of mineral at once. Veldspar, the most common type of **ore**, refines into Tritanium, the most basic kind of **mineral** there is. Omber, for example, yields Tritanium, Pyerite and Isogen. The quantity of minerals you will get out of your refine is influenced by the variation

Ore	5%	10%
Veldspar	Concentrated Veldspar	Dense Veldspar
Scordite	Condensed Scordite	Massive Scordite
Pyroxeres	Solid Pyroxeres	Viscous Pyroxeres
Plagioclase	Azure Plagioclase	Rich Plagioclase
Omber	Silvery Omber	Golden Omber
Kernite	Luminous Kernite	Fiery Kernite
Jaspert	Pure Jaspert	Pristine Jaspert
Hemorphite	Vivid Hemorphite	Radiant Hemorphite
Hedbergite	Vitric Hedbergite	Glazed Hedbergite
Gneiss	Iridescent Gneiss	Prismatic Gneiss
Dark Ochre	Onyx Ochre	Obsidian Ochre
Spodumain	Bright Spodumain	Gleaming Spodumain
Crokite	Sharp Crokite	Crystalline Crokite
Bistot	Triclinic Bistot	Monoclinic Bistot
Arkonor	Crimson Arkonor	Prime Arkonor
Mercoxite	Magma Mercoxite	Vitreous Mercoxite

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of the ore, as well as your refining skills. While we will cover refining in details in a later section, we can talk about ore variations right away.

Each ore types has 2 variations, one that will yield an extra 5% mineral, and another that will yield an extra 10% in minerals.

Some asteroids will be bigger and contain more ore than others. You can use a Survey Scanner on your ship to find out how much ore exactly is contained in an asteroid. In most cases, this module is rarely used, as after you've depleted an asteroid, you will simply switch to another one.

What's important to know here is that the security status of the system you are in will affect the quality of the belt. The belts in a 0.5 system will contain bigger asteroids as well as rarer types of ore than say, a 1.0 system. You are encouraged to scout systems that are far away from major trade hubs such as Jita, as any systems near those areas will often be completely stripped of asteroids and contain very little ore for you to mine. Some people often say "there's no ore anywhere!", but that's not true. Get far from the trade hubs, scout systems, and eventually you'll find one that has plenty of ore!

1.2 Minerals

So how do you know exactly which ores the minerals you need come from? You read along and you find out!

Ore	Batch	Tritanium	Pyrite	Mexallon	Isogen	Nocxium	Megacyte	Zydrine	Morphite
Veldspar	333	1000							
Scordite	333	833	416						
Pyroxeres	333	844	59	120		11			
Plagioclase	333	256	512	256					
Omber	500	307	123		307				
Kernite	400	386		773	386				
Jaspert	500	259	259	518		259		8	
Hemorphite	500	212			212	424		28	
Hedbergite	500				708	354		32	
Gneiss	400	171		171	343			171	
Dark Ochre	400	250				500		250	
Spodumain	250	700	140				140		
Crokite	250	331				331		663	
Bistot	200		170				170	341	
Arkonor	250	300					333	166	
Mercoxite	250								530

This table might be confusing at first, so I'll let you in on how to read it! To keep it as simple as possible, we will use Veldspar, the first entry in the table.

The batch is quite simply how many units of Veldspar you need to get a refining batch. In this case, 333. This table reports the refining yield for a batch with a refining yield of 100% (more on that later). Let's word this differently.

For every 333 units of Veldspar you refine, you will get 1000 units of Tritanium (again, with a 100% refining yield. Your yield is influenced by your skills, standings and station equipment. We will cover refining in a section of its own). If you try to refine less than 333



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units, you will not get the option to do so, as the game refines by batches only. If you have more than a batch but not enough for two, you will get the minerals for your batch and some ore in leftovers.

Example: you have 340 units of Veldspar. You refine a batch. You will get 1000 units of Tritanium in your hangar, and 7 units of Veldspar as leftovers.

This is a simple analogy, as you might have to pay taxes (paid in units of mineral during a refine) depending of your standing with the corporation owning the station and your skills. The refining system will be covered later in another section, however this table is very useful to know which asteroid you should mine depending of the minerals you need.

1.2.1 What Should I Mine Then?

This question comes up on the forums every week, and the answer always changes. That's because the mineral market always fluctuates, according to supply and demand. There are several tools to help you figure it out.

The first one is [Eve-central](#). It has an excellent market report on minerals, with statistics up to the last 180 days. Another fantastic tool is the [Trade Hub Mineral Index](#) which reports the average sell and buy prices of minerals across multiple hubs. This is a great tool if you trade mineral for a living (mineral trading gets its own section in this new version of the guide) or need to figure out what your selling prices should be for your production business.

In recent months, Veldspar, which refines into Tritanium, has remained the king in terms of ore to mine in anywhere but nullsec! That's right... Veldspar is worth more than the special ores you can only begin to find in low-sec! Why is that?

Certainly not because of its rarity, but because of its volume. Tritanium is required in everything. Each capital ship requires 100mil units of Trit to begin with, and the capital market has been flourishing at a rapid pace. The demand for it therefore, has only been growing.

This, however, is likely to change. For that reason, you should get familiar with [Cerleste's Ore Table](#) or even better, create your own excel sheet you can keep on your computer and update manually with the mineral prices, either based on the Mineral Index I mentioned above or by looking manually at each mineral in Jita, for example.

If anything, asking someone else "what should I mine" is a lazy question to ask. To be successful in this business you will need to get familiar with the market yourself. You might as well start doing your homework and you can only improve from there!

1.3 The Beginning of a Miner's Career

Ok, so you just started playing EVE, you are very motivated, but completely lost. We just looked at what you can mine, and what it will give you. You are proudly flying around in your rookie ship, eager to get starting on those asteroid rocks, but you just don't how how to. Excited yet? Read on...

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Before you do ANYTHING else, I highly suggest you do the tutorial missions if you haven't already done so, to familiarize yourself with the game mechanics and tools. Another excellent reason is that the tutorial agent will give you ISK and rewards, maybe even an implant, which you can also sell for ISK, which will give you the capital you need to start. Another alternative is to join a corporation and have them help you around. No matter which option you choose, you will need some ISK before you can start.

1.3.1 Your First Ship

The best mining ship for starters is without a doubt the Caldari **Bantam**. Take note that the Bantam is NOT the only capable mining frigate. Each race has its own mining frigate. The Gallente have the **Navitas**, the Minmatar have the **Burst** and the Amarr have the **Tormentor**. It does not matter which race you choose: each race have the same bonuses applied to their respective mining frigate, same for the mining cruiser.

If you train another race, simply train the appropriate racial skill to the ship you want.



Skills you will need...

- ✓ Caldari Frigate 2
- ✓ Mining 1

I suggest you train *Caldari Frigate 2*, then *Mining 1*, then head to *Caldari Frigate 4* and then straight to *Mining 4*. Since the Caldari frigate skill gives 20% to the yield of lasers (only for this ship of course), the 1 day it will take you to get to *Caldari Frigate 4* is absolutely worth it. After that, getting to *Mining 4* will allow you to use T2 Mining lasers, which are a nice improvement over their T1 counterparts.



For the moment, you should fit 2x miners I on your Bantam. The modules you fit in the med slots really are unimportant, as no med slots modules in this game will increase your. Most people use their med slots to fit a tank. You can also train the skill *Mining Upgrades 1* and try fitting one Mining Laser Upgrade (+5% to mining yield per laser) in one of your low slots. Whether it will fit or not will depend of your *Electronics* skill level.

You should mine in your Bantam until you get *Caldari Frigate 4* and *Mining 4*. For the moment keep stockpiling the ore you get, you will get better offers for your ore/minerals in bigger quantities.

1.3.2 The Basic Mining Techniques

The process of locking an asteroid and activating your lazOrz is an easy one. What happens then? Simply, your cargohold will fill up with ore, and once it is full, you will be faced with a choice. This isn't the Matrix so we're not talking a red pill/blue pill dilemma here, but the decision will affect your mining experience for sure.



2. Mining

There have been three popular ways used to mine in EVE since the dawn of time.

Jetcan Mining

This method is the most practical and efficient. It involves the unloading of your cargohold into a jettisoned cargo container floating in space within 1,500m of your ship. A cargo container, also known as a "can", has 27,500m³ of space, which is much more than any mining ship you will ever find.

The process is easy. Right-click anything in your cargo and **jettison** in. A container will appear nearby. Select it in your overview, and keep it open. Then, as your cargohold fills up, transfer the ore to the container. When the can is full, head back to the station, switch to a hauler, haul the can back to the station, rinse and repeat.

Giant Secure Container

A method that is less practical but more secured, you can anchor GSC in space in various spots in the belt. You can assign them a password, which means nobody but someone who knows the password can open it.

The downside is the complexity of setting the belt up. A GSC takes 3000m³ of space, but can hold 3900m³. So for every regular container you would normally fill using the jetcan technique, you'll need 8 GSC to compensate. If you're a solo miner, it might not be a problem, but when you're filling a few dozen cans each hour, either alone or in a group, it can become tedious. Too much so!

Fill & Go

That's probably the simplest method, but also the least efficient. The method: fill your cargo, warp to station, empty cargo, warp back to belt, rinse and repeat.

As you might have guessed, you will be wasting a lot of time warping to and back. So much in fact, that this method is not worth considering until the later stages of your mining career (where many Hulk pilots will rig their Hulk with Cargo Optimization rigs, and fit 2x expanded cargohold II modules in the low slots, bringing up their cargo space close to 18,000 m³) since you'd be filling your cargo too quickly.

1+1 Method

This is in fact, not a method, but rather a 2 account setup. You will quickly discover in EVE that everything is made easier if you work in a team. However, a team might not always be available to help you: in those moment, having your own private team is a valid solution.

A lot of players in EVE multi-client and have more than one account. I personally have eight, and could do without two of these maybe. However, in my early days, I had two accounts for a long time. One mines, the other hauls.

A second account is going to make your mining sessions that much more efficient. If real life money is a problem for you, consider keeping your second account online using Game Time Codes or PLEX cards purchased with ISK.

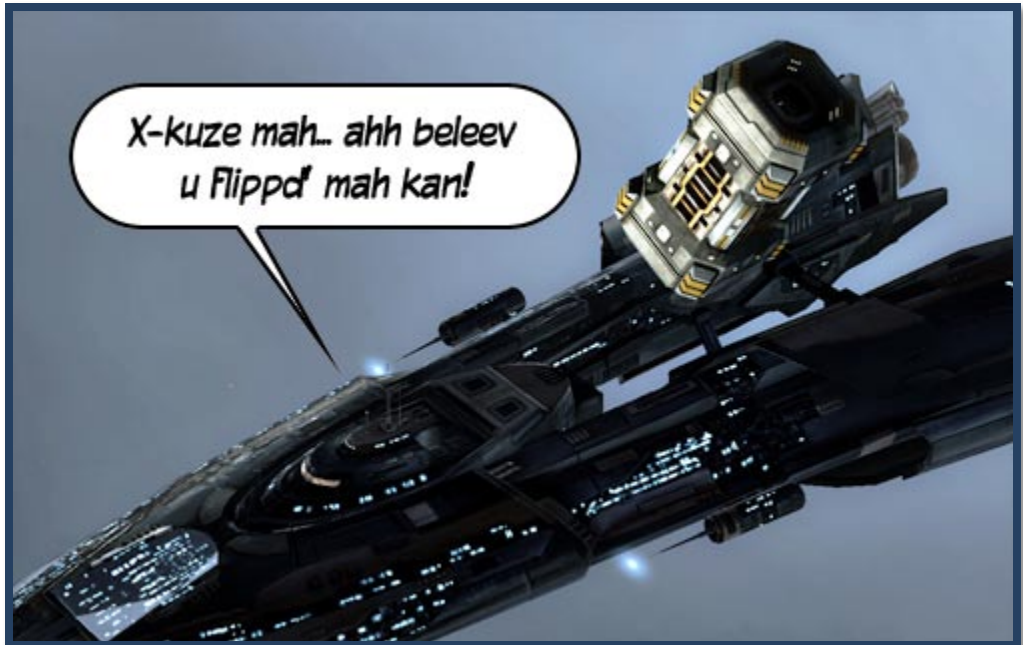
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1.3.2.2 Can flipping

Can flipping is what pirates do to annoy you. While you are jetcan mining, since cargo containers cannot be secured, anyone can approach them and steal their content. When this happens, the player that just stole from you will start to flash red on your overview as well as anyone else in your corp. This means that the player is aggressed, and as long as he continues to flash, you and your corpmates can shoot him without CONCORD interference!

Be warned!

The minute you or a corpmate starts shooting, he can shoot back on the players who are shooting at him!



What do you do in these situations? Follow these tips and you'll get the hang of it really quickly!

✓ **Don't panic!**

Don't start acting crazy! Don't do anything harsh! Take a deep breath, sit back and look around carefully. Is he flashing red on your overview? If not, he hasn't flipped your can yet! The fact he is close to it doesn't mean he is aggressed, yet!

Can flippers usually know what they're doing, and they'll try to trick you in shooting them so they can kill you. If you're in a fragile ship (such as a mining barge), consider switching for a PvP ship quickly and come back to the belt.

✓ **Strategize**

Warn your corp! Anyone in your corp can shoot the flipper now, so consider bringing help on the field to take him down!

It's important to understand that no matter what happens, **the flipper is on his own!** No matter how many people shoot him, regardless if he is in a fleet or not, CONCORD will not interfere and no one else will share his aggression flag, not even his corpmates.

Don't be intimidated if you see some of his friends in the belt with him. If they try to interfere somehow, CONCORD will blow them out of the sky. Remember: the flipper is on his own! Don't accidentally shoot his friends, otherwise they'll be able to shoot you then.



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If the player isn't flashing red = don't touch him.

An evil strategy...

When I first founded Lone Star Joint Venture, my corporation, we very briefly lived in Empire space for about a month. I had been a nullsec player all my life and even I wasn't sure how to deal with can flippers. With the help of the Science & Industry forum readers, we devised a strategy that sometimes work really well at blowing up flippers, and is worth a try.

The technique is the following: mine as you usually would in your favorite mining ship. However, fit a point on it (warp disruptor), and the best tank you can fit on there. You might not have to use it, but it can always be useful.

Rather than filling up a can you jettisoned, ask a friend (not in your corp) or use an alt in a PvP ship (something that locks quickly, like an interceptor, assault frigate, and can do decent DPS) to jettison one for you, and have him remain close to you in the belt, cloaked works even better. Stealth bombers are really fun to use here!

When a flipper arrives in your belt and sees you jetcan mining, he will approach you thinking you are an easy prey and that you are of no threat to him. He won't pay attention to your friend in the belt, since he isn't in the same corp as you. Chances are he won't even notice the can you are mining with is actually not yours, but your friend's that is in the belt (or if your friend is cloaked, he will be even less suspicious).

At this point, he will either steal as much as he can and immediately warp out, or flip it in a fast ship, measure your reaction, and come back in a hauler. The best thing you can do is: nothing! Let him think you are AFK, he will definitely come back in a hauler if he thinks you are.

When he comes back in a hauler, he will usually do so with a friend with some firepower. Uncloak your alt (or have your friend uncloak) and FIRE AWAY! Kill the PvP ship first, if he has one. Then use your mining ship to point down the hauler while your friend finishes the other guy off.

This trick has worked quite a few times for us. In fact, sometimes, they would get confused and shoot the mining ship rather than the friend/alt. Since your mining ship doesn't have any agro, they get CONCORDOKKEN!

A few more general tips...

- √ Avoid leaving too many full cans in the belt, this will attract the flippers
- √ Try switching location if you are harassed too much, flippers are lazy and don't move a lot
- √ Consider using GSC temporarily to dissuade the flipper
- √ Use a hauling alt to empty the can as you fill it. Leave a bookmark in the can so that when you empty it, it doesn't pop!
- √ Use an orca...transfer into the corporate hangar, and the orca pilot can transfer it back in his cargo.

That's about it! Don't hesitate to ask on the forums if you need help about something, but the most important thing is NOT to panic if a flipper targeted you. If you make a mistake you could lose your ship, which is worse than losing some ore!

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1.3.3 Industrial Ships



Each race has its own set of haulers. What is great about EVE is that you are not limited to fly only one race. Unfortunately although the Caldari have the best mining frigate, they do not have the best haulers. Instead, I suggest training for a **Mammoth** (Minmatar).

Skills you will need...

- ✓ Minmatar Frigate 3
- ✓ Minmatar industrial 4



The Mammoth will hold 16,686m³ with 4x Expanded cargohold I modules and 4x **Giant Secure Containers**. Why the GSC ? Simply because they use 3000m³ of cargo space, but can hold 3900m³, which means for every can you can fit in your cargo, you will get an extra 900m³ of cargo. No other T1 haulers will approach that kind of cargo space, except the Gallente Iteron V, which requires Gallente Industrial 5, meaning it is not at a beginner's reach.

However, while you train for the Mammoth, the Caldari Badger will do a fine job. Don't stress yourself at getting a Mammoth too quickly, definitely not before you fly a cruiser. Keep using the Badger until you have a few millions in your wallet.

1.3.4 Joining a Corp

Joining a corp is not mandatory, it is however very, very helpful. There is no valid excuse for not doing so. Many corporations will accept players with casual playing times, or newbies... there are so many corps out there, you are bound to find one that will fit your playing style. Worse comes to worse, just leave and find a new one ! If you don't know where to start, have a look at the recruitment forum, or join the in-game channel eve-university, which is a great place to ask questions and get help !

1.3.5 Selling your Ore

At the very beginning of the game, refining the ore you mine yourself would mean too big of a loss. Your refining skills will be too low at this point (if you have any). You **could** sell the unrefined ore, but I don't suggest doing that. Why?

Most buy orders on the market for ores reflect 90% of the time a much lower value than what your ore is actually worth. Those setting buy orders are well aware that some miners don't understand the system and will just sell at any price. The buyer will then collect the ore and refine it. It's not dishonest: it's a valid trading strategy. This however incapacitates

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your wallet as you are not getting the full value of the work you put in. Joining a corp helps here: there is probably someone in your corp that will be able to get a good (even if not perfect) refine.

If you insist on playing solo, get *Refining 4* and it will already help a whole lot. **The WORST thing you can do is just right click -> sell and accept without even looking at the price you are getting.** This is the most common mistake. Open the market, look at the buy orders, **don't be lazy** ! Each mineral unit has a volume of 0.01 m3 (compared to ore, which take much, much more space) so they really are easy to move around ! Don't be afraid to stockpile and to make your trips more worthwhile ! Knowing the market is the key to make ISK as a miner or a trader, don't go blind-selling the ore you put so much effort to mine !

1.3.6 Your First Cruiser

So, you finally got *Caldari Frigate 4* and *Mining 4*. The next step of the chain is to get a cruiser. Lucky for you, the Caldari also have the best mining cruiser, the **Osprey**.



Skills you will need...

- ✓ **Caldari Cruiser 1**
- ✓ **Spaceship Command 3**

The Osprey is a very nice ship, very affordable and also gets 20% bonus to yield per skill level. I suggest training *Caldari Cruiser 3* immediately. *Caldari Cruiser 4* will not be wasted time, but if you just started, you might want to invest the 4 or 5 days it would take you into other skills, like *Engineering* and *Electronics* for example.

As for fitting the Osprey, it is pretty straightforward. 3x T2 Miners in the high slots, you can fit a tank in the med slots if you want as the Osprey can handle itself in 0.6 systems with a heavy launcher and some drones. As usual in the low slots fit as many mining upgrades as you can. One will fit for sure, two will fit with good skills (*Electronic 5, Mining Ugrades 4*).

Next step is to get *Astrogeology 4*. It will give you another 20% bonus to your yield and is required for the next step of the chain, which is a **Mining Barge** (covered later).

After you reach *Astrogeology 4*, you will be faced with a choice. You can either get *Caldari Cruiser 4* and/or *Mining 5* (both will require about the same time to train). Mining 5 is a good investment for sure. If you plan to go for a Barge right away, than getting *Caldari Cruiser* to 4 is not necessary as you are not very far from your first mining barge at this point (5 or 6 days). If you would like to also train some PvP skills before though, than



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getting *Caldari Cruiser 4* is a good idea as the 20% bonus it will give you is absolutely worth it.

The next step will be either a Battleship or a Mining Barge. The fourth section is dedicated to this important next step and will explain the pros and cons of both to help you in your decision.

1.4 The Different Mining Lasers

There are many types of mining lasers, and it can be quite confusing for the newcomers, so here's a summary of what they are and what they are used for:

Laser name (abbreviation)	Ship	Uses mining crystals
✓ Miner I (or named)	Any ship with a turret slot	No
✓ Miner II	Any ship with a turret slot	No
✓ Strip Miner I	Barges or Exhumers only	Yes
✓ Modulated Strip Miner II	Barges or Exhumers only ✓ Requires mining crystals to be efficient ✓ Cannot mine Mercoxite	Yes
✓ Modulated Deep Core Miner II	Any ship with a turret slot ✓ Requires mining crystals to be efficient ✓ Works with all crystals	Yes
✓ Modulated Deep Core Strip Miner II	Barges or Exhumers only ✓ Works well only for Mercoxite mining	Yes (Mercoxite mining crystals only)

This puts an end to our first section. If you can retain everything you read in this first section, you are already on your way to a brilliant career ! Before heading to the fourth section of this guide, there are skills you should have trained .

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2. Refining

The refining system in EVE is not that complicated, but is not so easy to understand either. Basically, five criteria will affect your refining yield:

- 1- Your *Refining* skill level
- 2- Your *Refinery Efficiency* level (requires *Refining 5*)
- 3- Your standing toward the corporation owning the station where you want to refine at
- 4- The refining equipment of the station

2.1 Calculating your Yield

The formula to calculate your yield is the following:

$[\text{Station Equipment}] + 0.375 \times (1 + [\text{Refining Skill}] \times 0.02) \times (1 + [\text{Refinery Efficiency Skill}] \times 0.04) \times (1 + [\text{Ore Processing Skill}] \times 0.05)$

Thanks to Tinoga Enterprises Services for figuring this one out

To know the station equipment, open the refinery of the station and look on the top right corner, as shown by the following screenshot:

NAME	QTY	GROUP	SIZE	SLOT	MATERIAL	YOU RECEIVE	WE TAKE	UNRECOVERABLE
<input checked="" type="checkbox"/> Triclinic Bistot	9,210	Bistot			Megacyte	13,503	1,500	99
<input checked="" type="checkbox"/> Sharp Crokite	4,196	Crokite			Tritanium	10,661	1,184	77
<input checked="" type="checkbox"/> Crokite	1,540	Crokite			Pyrite	13,503	1,500	99
<input checked="" type="checkbox"/> Bistot	5,127	Bistot			Noxium	10,661	1,184	77
<input checked="" type="checkbox"/> Crystalline Crokite	3,073	Crokite			Zydrine	48,378	5,375	351
<input checked="" type="checkbox"/> Monoclinic Bistot	2,823	Bistot						

REPROCESSING
INPUT LOCATION: My hangar
SHOW ALL
BASE YIELD: 35.0%
NET YIELD: 86.48%
STANDINGS: 10.0
WE TAKE: 10.0%
REPROCESS CANCEL

Base yield: This is the station equipment

Net yield: This **should** be your actual refining yield. However, this is bugged and inaccurately reports the truth.

Standings: This is your standing toward the corporation that owns the station.

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We take: This is the tax the corporation charges you for using its reprocessing plant. In 0.0, this is set by the player corporation in control and is not influenced by your standings. In Empire or NPC controlled stations, your standings is the only important factor in figuring out the tax.

When we talk about the refining yield, we never include the taxes. The yield they give you in the refining window (in this case, 84.5%) is baloney as it doesn't take into account your specialized skills, so ignore it.

You will need a standing of **6.47 or more** with the NPC corporation owning the station you want to refine at **to get a 0% tax rate**. Player controlled stations or Outposts follows another rule, as the corp owning the station can set the tax they want no matter the standing they have toward you.

All NPC/player controlled stations have a station equipment of 50%, while player built Outposts have an equipment ranging from 35% to 50%. Revelations introduced outpost upgrades, which can enhance the various utilities available at them. This however, is a costly business – the advanced refinery upgrade will cost 100bil to install. Thankfully, as we will see, it is possible to get a 100% refining yield with just a 40% equipment, and even with the 35% with the new implant (more later).

If you are too lazy, you can use this [refining yield calculator](#) online. The following tables are also a good reference which you can print and quickly have on hand:

Station Equipment: 35%											
Refining	0	1	2	3	4	5	5	5	5	5	5
Refinery Efficiency	0	0	0	0	0	0	1	2	3	4	5
Net yield	72.5%	73.3%	74.0%	74.8%	75.5%	76.3%	77.9%	79.6%	81.2%	82.9%	84.5%
Ore processing 1							80.0%	81.8%	83.5%	85.2%	87.0%
Ore processing 2							82.2%	84.0%	85.8%	87.6%	89.5%
Ore processing 3							84.3%	86.2%	88.1%	90.0%	91.9%
Ore processing 4							86.5%	88.5%	90.4%	92.4%	94.4%
Ore processing 5							88.6%	90.7%	92.8%	94.8%	96.9%

Station Equipment: 40%											
Refining	0	1	2	3	4	5	5	5	5	5	5
Refinery Efficiency	0	0	0	0	0	0	1	2	3	4	5
Net yield	77.5%	78.3%	79.0%	79.8%	80.5%	81.3%	82.9%	84.6%	86.2%	87.9%	89.5%
Ore processing 1							85.0%	86.8%	88.5%	90.2%	92.0%
Ore processing 2							87.2%	89.0%	90.8%	92.6%	94.5%
Ore processing 3							89.3%	91.2%	93.1%	95.0%	96.9%
Ore processing 4							91.5%	93.5%	95.4%	97.4%	99.4%
Ore processing 5							93.6%	95.7%	97.8%	99.8%	101.9%

2. Mining

Station Equipment: 45%											
Refining	0	1	2	3	4	5	5	5	5	5	5
Refinery Efficiency	0	0	0	0	0	0	1	2	3	4	5
Net yield	82.5%	83.3%	84.0%	84.8%	85.5%	86.3%	87.9%	89.6%	91.2%	92.9%	94.5%
Ore processing 1							90.0%	91.8%	93.5%	95.2%	97.0%
Ore processing 2							92.2%	94.0%	95.8%	97.6%	99.5%
Ore processing 3							94.3%	96.2%	98.1%	100.0%	101.9%
Ore processing 4							96.5%	98.5%	100.4%	102.4%	104.4%
Ore processing 5							98.6%	100.7%	102.8%	104.8%	106.9%

Station Equipment: 50%											
Refining	0	1	2	3	4	5	5	5	5	5	5
Refinery Efficiency	0	0	0	0	0	0	1	2	3	4	5
Net yield	87.5%	88.3%	89.0%	89.8%	90.5%	91.3%	92.9%	94.6%	96.2%	97.9%	99.5%
Ore processing 1							95.0%	96.8%	98.5%	100.2%	102.0%
Ore processing 2							97.2%	99.0%	100.8%	102.6%	104.5%
Ore processing 3							99.3%	101.2%	103.1%	105.0%	106.9%
Ore processing 4							101.5%	103.5%	105.4%	107.4%	109.4%
Ore processing 5							103.6%	105.7%	107.8%	109.8%	111.9%

As you can see, in most NPC stations (Empire/0.0), having **Refining 5**, **Refinery Efficiency 4** and **[Mineral] Ore Processing 1** will fetch you a 100% yield already ! So if you live in Empire, don't go train Refinery Efficiency 5 for nothing and waste 2 weeks of training!

2.2 Refining Implants



Revelations 2.2 introduced a new mining implant, the **Hardwiring – Zainou 'Beancounter' H60** implant, which reduces recycling waste by 4%. It requires Cybernetic 5 and can be found on contracts.

With this implant, you will be able to **almost** get a perfect refining yield at a "virgin" minmatar refinery outpost (35% equipment) with perfect skills: **99.35%**! It's not perfect, but it's pretty damn close!

2.3 From Refining Yield to Reality

Ok so you know your yield, and now you want to calculate how much actual minerals you would get per batch after refining. If you know you will have a 100% refining yield and won't pay any taxes, then simply use the table in section 1.2.1 and you're ready to go! Chances are you won't, so I'll explain how it works. As always, using a concrete example helps, so let's do it again. I'll use Omber as an example.

For every 500 units of Omber, you will get 307 units of Tritanium, 123 units of Pyerite and 307 units of Isogen for a perfect refine. But you determined your yield isn't perfect, and instead it's 88% (hypothetically). To know how much mineral you would get, you simply take 88% of each number. So in our case:

$$0.88 * 307 = 270.16 = 270 \text{ units of Tritanium}$$

$$0.88 * 123 = 108.24 = 108 \text{ units of Pyerite}$$

$$0.88 * 307 = 270.16 = 270 \text{ units of Isogen}$$



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EVE for some reason **truncates** all values dealing with mineral and ore. This means if you would end up with 270.98 units according to your calculations, you would still only get 270 units and not 271 as your mathematical instinct might believe.

If you need to pay any taxes on top of that (shown in the green rectangle from our screenshot above), you need to take it off now. Using our screenshot from above with a tax of 10%, we are left with:

$(100\% - 10\%) * 270 = 243 = 243$ units of Tritanium
 $(100\% - 10\%) * 108 = 97.2 = 97$ units of Pyerite
 $(100\% - 10\%) * 270 = 243 = 243$ units of Isogen

So, we would end up with 243 units of Trit, 97 units of Pyer and 243 units of Isogen from our original batch of 500 in our hangar with a refining yield of 88% and a 10% tax.

If you mine named variations (+5%/+10%) of an ore, you have to factor that at the beginning of your calculations. So in our first calculation, if we are refining Silvery Omber (+5%) instead of regular Omber, we would calculate 88% of $307 * 1.05 = 322.35 = 322$ units of Tritanium and not 88% of 307.

Of course there is an excellent [ore calculator](#) available online for those not so good with Excel or who are simply lazy!

That's all there is to it really. See... I told you it wasn't that bad !

2. Mining

3. The Math System

Previous sections weren't plagued with mathematical equations. This was my attempt to start softly, but now it's time to be serious. The only way to compare ships is to compare their actual yield and what they are capable of, and this can only be done with math, lots of math (although nothing complicated!). If you can understand the system, then you will be able to apply it to every ship in the game, so there won't be any need to eve-mail me and ask me what yield you would get with the skills you now have! If you do I'll spank you, m'okay?

3.1 Skill System

The skill levels in EVE, whatever which skill it is, stack. Concretely, it means the following: using the skill *Mining* as an example, which gives a 5% bonus to the yield of your mining laser per level, if you trained *Mining* to level 4, it means you get :

$5\% * 4 = 20\%$ bonus from the skill *Mining* at level 4.

The effect of the different skills you trained though have to be multiplied together. Say you have *Astrogeology* at level 4 (which also gives a 5% bonus per level to your yield) and *Mining* at level 4, then your net yield would be:

Base laser yield * 1.20 * 1.20 = XXX

Using T2 Miners, which has a 60 m3/cycle base yield, you would get:

$60 * 1.20 * 1.20 = 86.4$ m3/cycle (note that the yield is not truncated nor rounded)

Simple enough? Let's keep going !

3.2 Cycles

Cycles determine how many seconds your laser need to complete a full, well, "mining cycle". The ore you mined will appear in your cargo at the end of that cycle. Named, T1 and T2 mining lasers have a cycle of 60 seconds (1 minute) and strip mining lasers (T1 and T2) as well as the Modulated Deep Core Mining Lasers II (MDCM2) have a cycle of 180 seconds (3 minutes). Ice harvesters will be covered in another section, as the whole ice mining system is quite different from the asteroid mining system.

Before we go any further, you should know that strips can only be fitted on Mining Barges or Exhumers. People are often confused with the cycle time and wonder what is the actual benefit of having a longer cycle. The biggest advantage is actually much more practical than it is beneficial... simply put, most of the time, the cargo of your ship will

be filled after every cycle, which means if you're using the jetcan mining technique (which you should), you'll be emptying your cargo every minute... which means you'll be doing it 60 times per hour instead of 20 if you're using strip miners. It might not look like a lot now, but it DOES make a difference at the end, believe me.

3.2.1 Cycles and yield interaction

Cycles and yield are directly linked. Because of the cycle time difference between strips and mining lasers, it makes it difficult to directly compare the yield of a barge with the yield of a battleship. We could divide the barge's yield by three to bring it to 60 seconds, or bring both of them on a per hour ratio, but this is not precise because of the way EVE truncates the number of units of ore you get per cycle.

2. Mining

The previous versions of the guide used the number of omber units mined per hour to compare the different ships together. However this time I decided to simply compare their yields (in m3/cycle). Keep in mind different lasers have different cycle times (either 60 or 180 seconds) so don't forget to account to this when you read.

If the cycle of your mining laser (again, ice harvesters act differently, this will be covered later) is interrupted for whatever reason (the asteroid pops or you stop the laser prematurely) , you will still get ore for the duration of the cycle you mined. For example, if the cycle stops after 30 seconds, you will get 50% of what you normally get for a full cycle.

Here's a table to summarize the different base yield of each laser and their cycle times

Laser	Base yield (in m3)	Cycle time (in sec)
Miner I	40	60
Miner II	60	60
Strip Miner I	540	180
Strip Miner II	360	180
Deep Core Miner II	120	180
Deep Core Strip Miner II	250	180

For now don't be alarmed about the crystals, they will be covered in another section. It's a nice reference to have for those who are confused about how to calculate your actual ISK/hour rate (more on that in another section).

3.2.2 From Yield to Ore

People are very confused as to the amount of ore they will get when doing a "show info" on their strip or mining laser. It's in fact very simple to find out, you just have to know how. You simply have to divide your yield per cycle by the volume of the ore you're mining, and truncate the result.

Ore	Volume	
Veldspar	0.1	m3
Scordite	0.15	m3
Pyroxeres	0.3	m3
Plagioclase	0.35	m3
Omber	0.6	m3
Kernite	1.2	m3
Jaspet	2	m3
Hemorphite	3	m3
Hedbergite	3	m3
Gneiss	5	m3
Dark Ochre	8	m3
Spodumain	16	m3
Crokite	16	m3
Bistot	16	m3
Arkonor	16	m3
Mercoxite	40	m3



2. Mining

Again, here's an example with Veldspar. Using a hypothetical yield of 1789.67m³/cycle, the amount of Veldspar you would get per cycle is:
 $1789.67/0.1 = 17896.7 \text{ units} \rightarrow 17896 \text{ units/cycle}$

So you would end up with 17896 units of Veldspar in your cargo after every cycle... simple enough, isn't it ? And you thought I'd kill your brains !

This ends our third section. Hopefully I haven't melted too many neurons. If so feel free to get drunk and come back later !



2. Mining

4. Mining Barge or Battleship ?

This is one of the most popular question. Should you head for a battleship or a mining barge? What's the difference ? Which is better? All those questions will be answered in this section.

The first thing you need to ask yourself is the following: do you want to PvP sometimes as well, or are you aiming at a professional mining career and want to concentrate your character only on improving its equipment and yield until you achieve perfection (yes, there is such a thing !)?

If you are unsure for now, then aiming at a battleship isn't a bad idea. A battleship will mine as well as the medium mining barge (**Retriever**) if not outmine it depending of the BS you fly (more on that later), and the training for both at this point is more or less equal... if you know however that you will want to be very serious about it, then heading directly for the Retriever is a better idea. Now is the time to use the math explained in section 3 ... Let's see if you really got it !

4.1 The Battleship Way

The the two most popular battleships for mining are, since Revelation, the **Apocalypse** (Amarr, tier 2) and the **Rokh** (Caldari, tier 3). Although the golden banana has held first place in best mining battleship for a long time, the Rokh is now the master in this class. Both have 8 turret slots, however the Rokh has much more CPU, allowing him to fit one more MLU than the Apoc, and still enough to fit a tank as well.

No battleships in existence have a bonus to your mining yield, so it really comes down to the turret slots and the CPU at this point. Since the Rokh and the Apoc really are preferred, this section will concentrate on those two ships.

I'll assume you have the skills I suggested you train in the first section already trained, which would be *Mining 4*, *Astrogeology 4*. If you have no intention in getting a barge, then you will need *Mining Upgrades 4* to fit as many Mining Laser Upgrades (MLU) as possible on your battleship (it will however not help you on a barge). I will also assume you have *Electronics 5* already. Mining setups are very heavy on CPU, so if you don't already, get it ASAP.

Take note that MLU is the only factor allowing a battleship to compete with the Retriever. Without them, the Retriever will actually be superior in all cases.

4.1.1 The Apocalypse

The Apoc can fit 8x T2 Miners and 3x MLU (you will need 4x Co-Processors II for this to fit though, and you're left with 18 cpu, so no space for a tank at all).

So let's see what kind of yield we will get:
 $60 * 1.2 * 1.2 * 1.05^{3^1} = 100.0188 \text{ m}^3/\text{cycle}$

Since you're fitted with 8 mining lasers, the Apoc gives you a total of 800.15 m³/cycle.

¹ Mining Laser Upgrades give a 5% bonus to your yield per module, but their effect must be exponentially calculated instead of stacked.

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4.1.2 The Rokh

The Rokh got released with Revelations, and it is without doubt a nice battleship. It is even nicer when you know it outmines the Apocalypse since it can fit an extra MLU, for a total of four, while having still a bit of CPU to fit a medium shield booster, or perhaps shield extender. If you wish to keep only 3x MLU, then you have PLENTY of CPU to fit a very good tank. Do not forget the drone bay (you can have 5x T2 medium drones in there) for extra protection. For the purpose of this guide, we will use a full mining Rokh setup, but you should know the Rokh is superior to the Apocalypse in every way as a mining platform.

So let's see what kind of yield we will get:
 $60 * 1.2 * 1.2 * 1.05^4 = 105.01974 \text{ m3/cycle}$

Since you're fitted with 8 mining lasers, you will be getting 840.157 m3/cycle.

4.2 The Barge Way

Before we go any further, you must know that the Procurer sucks. The Osprey will outmine it, so the first barge you will go for will be the **Retriever**.

4.2.1 The Retriever

A big advantage of the retriever is that it uses strip miners, which means a longer cycle (less dragging) and is MUCH cheaper than a battleship.

Skills you will need...



- ✓ Mining Barge 3
- ✓ Industry 5
- ✓ Astrogeology 5

I will assume here you trained *Mining Barge* to level 4 (3% bonus to yield per level) even though you only need level 3 to fly the retriever, as every little bits help. I'll also assume you trained *Astrogeology* to level 5, since it'll be required for the Covetor! While we're at it, since you're serious about mining, you will also have invested the time in training *Mining* to level 5 as well.

Let's see what kind of yield a retriever can fetch with 1x MLU (on a sidenote, no mining barge, not even a covetor, can fit more than 1x MLU, no matter what skills you train. As I mentioned, *Mining Upgrades 1* will suffice for barges):

$540 * 1.25 * 1.25 * 1.12 * 1.05 = 992.25 \text{ m3/cycle}$

As you can see, the Apoc and the Rokh are pretty much on the same level, while the retriever provides a bit less yield. This is nothing to be too alarmed with, as in a month or so you will be flying a Covetor and thanking yourself you trained yourself to fly barges! For the casual miner though, without any real interest in the profession, an Apoc or a Rokh with the proper use of MLU and Co-Processors will offer a nice mining platform without too much training. Not to mention battleships can be easily refitted to serve a range of purposes, from tanking to mission running, plexing and ratting!

At this point if you're considering a more serious mining career you'll need to do a huge step and train toward the very capable **Covetor**.

2. Mining

4.2.2 The Covetor

The Covetor is a very, very nice mining ship. Also much cheaper than a battleship (5 times cheaper than the Apoc actually) and fetches an awesome yield. Although the training might seem extensive, it will absolutely be worth it at the end.

Skills you will need...



- ✓ Mining Barge 5
- ✓ Astrogeology 5

Notably because of its 3rd strip miner, the Covetor is nice, nice – very nice.



So let's see what kind of yield we will get:

$$540 * 1.25 * 1.25 * 1.05 * 1.15 = 1018.83 \text{ m}^3/\text{cycle}$$

This is a 54.08% increase over the retriever already, and a 27.86% increase over the Apoc.

Here is a table to summarize our ships so far...

Ship	MLU	Lasers	m ³ /180sec	Increase in %
Bantam	1	2	544.32	-
Osprey	2	3	1285.97	-
Retriever	1	2	1984.5	0%
Apocalypse	3	8	2400.45	20.51%
Rokh	4	8	2520.47	25.51%
Covetor	1	3	3056.49	54,08%

The table shows the number of MLU required since those figures won't be true anymore when you move to 0.0 and need to tank. Mining in 0.0 space will be covered in its own section, however, you must know that these figures assume someone is tanking for you or that you do not need to tank at all.

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5. Crystals

There are many misconceptions about mining crystals, as to how they work and if they truly are worth it. To make the matter worse, when you do a show info on your laser, the information is not so clearly displayed, and the EVE-O database has false information... We will set the record straight right now!

There are T1 and T2 mining crystals for every ore in the game. However the crystals for mining Mercorit work differently than the rest, and they will be covered in section 10 of this guide where Mercorit mining will be covered in details. You should know there are no crystals for ice mining, so don't try to look for them!

Skills you will need...



- ✓ Metallurgy 3
- ✓ Refining 4

Before Revelations, all crystals had the same pre-requisites, that is, the ones high-end 0.0 ore crystals need. This discouraged many casual miners, as the training for those is as long as for the Covetor... CCP responded by changing those pre-requisite skills depending of the class of ore you mine... whether you want to train for them or not is your decision.

How they work is quite simple: they are inserted in the T2 variants of strip miners, or the MDCM2 which can be fitted on any ship. Simply put, the T1 version of a crystal will increase the base yield of the laser by 62,5%, while the T2 version of the crystal will increase the base yield by 75%. However, the actual increase to your yield isn't 62,5% or 75%, as the T2 variants of mining lasers have a lower base yield than their T1 counterparts. Nevertheless, crystals do bring an advantage, as we will see now.

As we've seen earlier, mining lasers or strip miners which use crystals have a lower base yield than their counterparts. They WILL work without crystals, the yield will however be considerably lower than their T1 counterpart without crystals, so don't be stupid and use the T1 versions until you can use crystals.

To use T1 crystals, you will need the skills mentioned above, and the *[Metal] Ore Processing* to level 3, for example *Omber Processing 3*. To use the T2 crystal, you'd need *Omber Processing 4*.

Here's a table that shows the different base yield of the lasers depending of the crystals you will fit in it.

Laser	Base yield (in m3)	Cycle (in sec)	with T1 Crystal (62.5% bonus)	with T2 Crystal (75% bonus)
Modulated Strip Miner II	360	180	585	630
Deep Core Miner II	120	180	195	210

For the sake of comparison, remember that the T1 strips have a base yield of 540. So T2 strips actually provide a 16,17% bonus to your yield over the T1 strips ! But it's also possible to demonstrate this with an example, so here goes !

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Say we use our previous Covetor with T2 crystals as an example; let's see what kind of yield we will get:

$$360 * 1.25 * 1.25 * 1.05 * 1.15 * 1.75 = 1188.63 \text{ m}^3/\text{cycle}$$

5.1 How do I Read my Yield ?

First you should know the EVE-O database is incorrect, so don't expect to understand how T2 strips work from there. Furthermore, when doing a show info on your T2 strip, here is a lot of information in there and people are very confused.

To know your current actual yield (including all skills and bonuses you are getting), look under "**Specialty Crystal Mining Amount**" (shown in the screenshot by a green rectangle). Just ignore Mining Amount, it will confuse you and there is no need to make it more complicated.

This puts an end to our crystals section. As you can see the increase is absolutely worth it, and it is a good step to take before going on to the Hulk (if you ever do). Plus crystals can also be used with MDCM2, which fit nicely on a battleship, so if you're an Apoc or Rokh miner, you can benefit from this.

In any case, I suggest you train for crystals right after you got your Covetor.

FREQUENCY MINING LASER: INFORMATION
MODULATED STRIP MINER II

DESCRIPTION	ATTRIBUTES	FITTING	PREREQUISITES	VARIATIONS
CAPACITY	50.0 m3			
VOLUME	5.0 m3			
CHARGE SIZE	Small			
ACTIVATION COST	162 Energy			
TECH LEVEL	2			
MINING AMOUNT				
820.156640625 m3				
SPECIALTY CRYSTAL MINING AMOUNT				
1435.27412109 m3				
OPTIMAL RANGE	15 km			
ACTIVATION TIME / DURATION	180.00 Sec.			
META LEVEL				
5				
USED WITH (CHARGE GROUP)	Mining Crystal			

To see your actual yield, look under Specialty Crystal Mining Amount

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6. Achieving perfection

There are many skills and modules that will increase your yield in this game. It is possible for a miner to max those skills and achieve what I like to call, "the Perfect Miner". A perfect miner is someone who has no other possibility to increase his yield. Here's a table with all skills and modules that can influence your yield.

Item	Effect	Note
Skills		
✓ Mining 5	+25% to yield	
✓ Astrogeology 5	+25% to yield	
✓ Mining Barge 5	+15% to yield of barges and exhumers	
✓ Exhumer 5	+15% to yield of exhumers	
✓ Mining Foreman 5	+10% to yield	✓ Must be in fleet to work ✓ Fleet must have fleet commander ✓ Wing must have wing commander
✓ Drone Interfacing 5	+100% to yield of mining drones per lvl	
✓ Mining Drone Operation 5	+25% to yield of mining drones per lvl	
Equipment		
✓ Crystals – T1 and T2	+8,33% (T1) or +16,17% (T2) to yield	fit on T2 lasers & strips only
✓ Mining Laser Upgrades T1, T2 and named	+5% to yield per MLU, +9% for MLU2. Various named variants now available with different CPU penalty.	
Implants		
✓ HX-2 Highwall (slot 10)	+5% to yield (requires Cybernetic 5)	100-250mil on contracts
✓ Michi Excavation (slot 7)	+5% to yield (requires Cybernetic 5)	500-700mil on contracts
✓ Mining Foreman Mindlink (slot 10)	+50% to Foreman skill, +50% to Foreman Link effectiveness (requires Cybernetic 5)	✓ Must be in fleet to work

I deliberately did not list mining foreman links or gang modules, as they CANNOT be fitted on a barge, nor battleship. Those gang modules will be covered in another section, since there are many changes to gang bonuses since Revelations.

Mining Foreman V however is valid, since you can just form a squadron with an alt and you both will receive the bonus, even if you are in a Hulk or a barge.

The mining implants do stack, however as you may have guessed, you cannot plug both the Highwall mining implant and the Foreman mindlink at the same time.

The Michi implant is a COSMOS mission item, which explains why it is a little hard to find and is more expensive. The Highwall implant is easier to come by and is a little more affordable. Whether it's worth it for you to buy these or not, that's yours to decide.

6.1 The Mindlink isn't broken

Since Revelations, the mindlink has been fixed, which is nice of course. It's especially nice used along **Mining Foreman Links** (see section 11), and for squadrons.

It's also a very cool implants, because:

2. Mining

- 1) It enhances the *Mining Foreman* skill effectiveness by 50% (so at level 5, your bonus would end up being $10\% * 1.5 = 15\%$)
- 2) It boost the effect of all Mining Foreman Links (the gang mods) by 50%.

Note: the MiningAmountBonus seen in the attribute window comes from the enhanced Mining Foreman skill effect which is 15% instead of 10%. It is NOT a 15% solo bonus.

The drawback is that you must be in squadron and be the squadron commander for this bonus to affect you. The first bonus will be given to anyone in gang, regardless what ship you are in, while the second one is only useful if you're in a BC/Command Ship with an active Mining Foreman Link gang mod. In terms of bonus, having the Highwall Implant or the Mindlink ends up being the same. The Highwall gives you a direct 5%, while the mindlink boosts mining foreman V by 5% instead. It is however possible to win another 5% like this:

- 5% from the Michi Implant
- 5% from the Highwall Implant
- The extra 5% from the *Mining Foreman* skill boosted by a squadron commander that had the mindlink instead of you.

In a perfect world you would have a maxed out miner, and a friend (or alt) which has the mindlink plugged in acting as a squadron commander. This is how you'd be what I call "The Perfect Miner".

For the sake of example, let's have a look at what a Covetor will yield with all those skills maxed and those nifty implants (drones aside):

$$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05 * 1.75 = 1507.03 \text{ m}^3/\text{cycle}$$

This is a **26,75%** increase over our previous Covetor fitted with T2 strips and T2 crystals. To go back even some more, it's a **89,08%** increase over the Apoc and **127,86%** over our Retriever. Are you starting to think all that investment and training is paying off ?

Oh yes you do... but then, the holy mother of destruction blessed your mining career and and sent you on a path of light to the next step in evolution... the Hulk.

6.2 Upgrades for the bourgeois

Heard of the new mining upgrades CCP first released that were so unbalanced that a Rokh outmined a Hulk? They cost a fortune, people spent millions, and then, silently, were nerfed and did not work. A patch was brought, and their bonuses were changed... those who know what I am talking about might still be crying about it... thank the Gods (hello BSG!) I didn't fall for them. They finally ended up like this...

Name	CPU Penalty	Mining Amount Bonus	Price
Aoede	7.50%	9%	500-600mil
MLU II	12.50%	9%	20-25mil
Carpo	8.00%	8%	200mil
Elara	8.50%	7%	30-75mil
Erin	6.00%	6%	15mil-200mil
MLU I	10.00%	5%	50K

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Just so you know, you can fit two MLU II on a Hulk ... yes, you will need Mining Upgrades IV whereas the other only require Mining Upgrades I, but you will save quite a bit of ISK!

Tip:



Do not forget about the Gypsy' KMB-# implant which add CPU to your ship... you can now fit 2x MLU on a covetor with it!

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7. The Mighty Hulk

It's big, it's sexy, it's powerful... it's the Mighty Hulk™!



Name: Hulk

Class: Exhumer

Cargo: 8,000 m3

Cost: Approx 110mil ISK

Bonuses:

Mining Barge Skill Bonus:

3% better yield for Strip Miners per level.

7.5% bonus to all shield resistances per level

Exhumers Skill Bonus:

3% better yield for Strip Miners per level

3% reduction in Ice Harvester duration per level

Role Bonus:

Able to equip Strip Miner and Ice Harvester turrets.

2. Mining

Since the introduction of Exhumers in RMR, mining became even more profitable. The very nice thing about Exhumers is that once you can fly a Covetor, you're only a few days of training away from flying an Exhumer.

The Skiff, the Mackinaw and the Hulk each have their area of expertise. The Skiff is used to mine mercoxite, the Mackinaw to mine ice, and the Hulk everything else. Since they're all so different, they each will get their section.

The second biggest question after the battleship vs retriever debate is probably, "is it worth it to buy a Hulk?". At the time I wrote the first version of this guide, it didn't take too long before the prices for Hulks sky rocketed. The demand for them only raised, which means right now, the price for a Hulk actually increased, touching the 500mil ISK figure. It is one big investment, so before we go and get one, we need to know if it's actually worth the bang for your buck. Well, it is.

Simply put, the Hulk is a freakin' mining monster. His name was not badly chosen. It gets a combined 20% improvement in yield over the Covetor, and can fit such a nasty tank that it will repel rats (even in 0.0) or small gankers (we have already seen interceptors dying to a Hulk).

Where does the 20% come from ? Simply, from *Exhumer 5* (15%) and the extra MLU the Hulk can fit...

We will do the math again, for the heck of it. I assume you went from a "maxed Covetor" to a Hulk in the following equation:

$$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05^2 * 1.75 = 1819.75 \text{ m}^3/\text{cycle}$$

This is a 20,74% increase over our previous "maxed" Covetor. To go back to our roots, it's a 175.14% increase to our Retriever at the beginning. Can you say, oh my god?

So in essence, the three or four months of training, ISK and effort you put into your character has brought you a 175.14% increase in your yield. Care to ask me if it was worth it again ?

7.1 The Mighty Hulk's Tank

As I suggested when introducing the Hulk, it's not only a good miner, it has a good tank as well. In fact, with the proper fittings, you CAN absolutely solo mine in 0.0 and tank the rats in the belts...

However, I suggest doing this at your own risk. I would NOT AFK solo mine in a Hulk, in case the tank fails somehow or you get ganked, it'll be 400mil ISK and more out the window in a very short time.

This is the setup I used with great success when mining solo in 0.0, until I decided it stressed me too much and I got a domi alt to tank for me !



2. Mining

High-

3x T2 Strips

Med-

1x Gistii-B Small Shield Booster (the A variation, previously suggested in other versions, is now hideously expensive)

1x Eutectic Cap Recharger

2x Gist-B NPC Specific Hardeners

Low-

2x MLU

2xCCC rigs

There's a lot to be said about that setup ! First, this is the **EXACT** setup that works... you can replace the hardeners by the regular t1 named ones (for example, "Anointed I EM Ward Reinforcement"), but the rest must stay as it is. A T2 Cap recharger won't fit on there, the Eutectic is the only thing that will.

Second, you WILL absolutely need *Electronics 5*, and cap skills at level 4. This EXACT setup will leave you with 0 CPU (if it doesn't fit, try training *Mining Upgrades* a few level) so you must absolutely use faction stuff. The Gistii booster is the key to the whole thing!

Third, you need to stagger the strips (try an interval of 20 seconds) in order for the cap to sustain itself. You can eliminate this problem by using CCC rigs, or if someone is using the harvester foreman link on you.

Finally, don't be afraid to lose a MLU and replace it with a PDS2, or better, a faction PDs (True Sansha/Dark Blood) to make it a little tougher. If you cannot afford all those mods, don't bother trying to tank in your Hulk. This sub-section was written to show you the Hulk is capable of tanking (and very well indeed), in fact, I tanked triple BS spawns with its cruisers escort... BUT, it is not invincible, and don't come crying to me if you blow it up !

2. Mining

8. Drones

Drones are not to be ignored, since they can significantly raise your ISK/hour ratio. Of course I'm talking about Mining Drones here if you had not understood yet... it is however not a bad idea to have a few combat drones in your drone bay if you have the room in case some pesky interceptor comes at you ...

Before I go any further, I want you to read this VERY carefully and apply it. In fact, if it helps, you can make multiple Post-it and stick them everywhere in your house...



STAY AWAY FROM HARVESTER MINING DRONES!

Although this statement has been heavily criticized since the birth of this guide, I stand by it. I invite you to read the rest to understand why.

As mentioned earlier, two skills influence the yield of your drones , which are *Mining Drone Operations* and *Drone Interfacing*. Take note that drones cannot mine Ice or Mercoxit. First, let's have a look at the different drones available.

Drone type	Speed (m/s)	Base yield (m3/cycle)	Cycle (in sec)
T1 Mining Drone	400	15	60
T2 Mining Drone	500	25	60
Harvester Mining Drone	250	30	60

Anything strikes you? First thing to look at is the speed, and you can see right away that Harvester Mining Drones have fat asses and are VERY slow ! What is it important ?

The traveling factor !

Unlike mining lasers, drones must travel from and back to your ship before you get any ore in your cargo. They will need 60 seconds to finish their cycle. Any traveling time to and from the asteroid isn't factored in the cycle time. Simply put, Harvester Mining Drones are twice as slow as T2 Mining Drones, and yet, their base yield is only 20% better... and they cost 20 times as much as T2 Mining Drones !

See section 8.2 for further details and explanations.



2. Mining

8.1 What Drones Do For You

Much like the yield of lasers, the yield of each drone is individually calculated and then the number of units of ore is truncated before transport to your cargo. My calculations will factor maxed drone skills, feel free to change the formula to reflect your skill tree.

As we mentioned earlier, *Mining Drone Operations 5* will increase your drones' yield by 25% and *Drone Interfacing 5* by 100%. I also made it clear Harvester Mining Drones suck, so we will use T2 Mining Drones for our example:

$$25 * 1.25 * 2 = 62.5 \text{ m}^3/\text{cycle}$$

Since you can control 5 drones at a time, which means your drones will bring in an extra 520 units of Omber per cycle, or 31 200 per hour. This however does not factor the traveling time we talked about earlier.

An issue with drones is that they suffer a lot from higher volume ore like Bistot (volume of 16m³) since the number of ore units is truncated at the end of every cycle. A good example of this is seeing that training *Drone Interfacing* to level 5 won't bring any benefit when mining most high-ends. How so ?

With a perfect mining drone yield of 62.5 m³/cycle, we get:
 $62.5/16 = 3.90 \rightarrow 3$ units of Bistot/cycle (per drone).

New since Revelations, the **Drone Mining Augmentator** rigs (see section 12) can help a little. Whether choosing this rig over another is worth it will depend of the situation you think you will find yourself in.

8.2 Minimizing the traveling time factor effect

Parking your ship as close to the roid as you can will minimize the traveling time. If you can be under 1KM of the roid you send your drone on, the traveling factor will almost be neglectable. Our 31 200 units of Omber per hour still won't be true, but it should be close. It has been argued and debated that doing so renews the role of Harvester or Elite mining drones, that is, that neglecting their speed makes them superior to T2 mining drones.

Although this is true in theory, it is not in the real world. In my experience, which I like to think is quite extensive, there will never always be a roid within that range for your drones to mine. That is, not a roid worth mining at least. Furthermore, their insane prices means losing them puts an enormous blow on your wallet – and you will lose mining drones. There is no competence argument to be had in this matter. Losing drones, especially in 0.0, is almost a certainty. A simple CTD will result in your drones dying when facings rats. If jumped by pirates, you will always prioritize your ship over your drones, and the chances you can recall them back before you get popped are next to zero.

For those who cannot grasp the huge cost difference, harvesters cost 100 times more than T2 mining drones. It is true that, throughout this guide, I have proposed you buy expansive ships, modules and implants and although it is probably impossible to statistically prove the chances of losing drones versus the chances of losing the said ships, modules and implants are higher, simple logic tells us so. Mining drones are paper thin, one smartbomb will send



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them to hell... and I promise you, they are the favorite targets of pirates when they jump mining operations, and they won't miss them!

For all the aforementioned reasons, I will stand by my original comment, that is, that harvester mining drones are an absolutely waste of your well earned ISK. In 99% of situations, their superior yield will be neglected by their speed. If you are a miner that falls in the remaining 1% of situations and think harvesters still bring you more dough for your efforts, hop in Jita and get a quintuple to serve your needs.

That's it for the drones section. As you can see, they are far from useless. In fact, mining Crokite, it'll bring an extra 7mil ISK per hour (approximately, as always) so they are not to be ignored. However, maxing your drones' yield shouldn't be prioritized over barge or crystals training, for example. It's a nice long-term (if not last) objective for veterans. As always, you can weight the pros and the cons for yourself.

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9. Ice Mining

Ice Mining follows a different patent. Instead of training skills or fitting modules to increase your yield, they will lower your cycle time, which means more cycles per hour, which means more ice units per hour.

The only mining lasers capable of harvesting ice are the T1 Ice Harvester strips, and their T2 counterparts, which means **ice can only be mined by mining barges or exhumers**.

As I said cycle time is what counts when mining ice, and the different between Ice Harvesters I and II is noticeable:



Laser	Cycle (in sec)
Ice Harvester I	600
Ice Harvester II	500

Every time your Ice Harvester completes a cycle, you will get 1 unit of ice. The exception to this rule lies with the **Mackinaw**, which has a built-in bonus of 100% ice mining yield... which means for every cycle, you will get 2 units of ice instead of 1. This table summarizes this well:

Ship	Ice units (per strip/cycle)
Mackinaw	2
Other barges & exhumers	1

There is only one skill that affects ice mining, which is *Ice Harvesting*, which reduces your cycle time by 5% per level. Although *Mining 4* is required to use Ice Harvesters II, it does not change anything in the cycle time or yield of your harvesters. The equivalent of the MLU, called the Ice Harvester Upgrade (IHU) reduces the cycle time by 5% for each of your Ice Harvesters.

Skills you will need...



✓ **Ice Harvesting 5**

The logical choice for mining ice is to get a Mackinaw, as no other ship will outmine it. Plus, they are very affordable.

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9.1 Figuring your Cycle Time

Before we go any further, you must know that unlike "regular" ore mining, unless your full cycle is completed, you will NOT get any ice unit. Again an exception lies with the Mackinaw, which will still give you 1 ice unit if you completed more than 50% of your cycle time.

You will notice the Mackinaw has a 25% penalty to cycle time, but gives a 5% reduction in cycle time per level. So if you have *Exhumer* trained at level 5, and using Ice

Harvesters II, you will get the following cycle time:
 $500 \text{ sec} * 1.25 * 0.75 * 0.75 * 0.95^2 = 317.28 \text{ sec}$

Concretely, it means every 317.28 seconds, you will receive 2 units of ice per ice harvester. Since you can fit two ice harvesters per Mackinaw, it means you will harvest 4 units of ice every 317.28 seconds.

To know how much this translates per hour, you need to figure out how many cycles you will complete per hour. An hour has 3600 seconds, so $3600/317.28 = 11.34$ cycles per hour. Roughly, if you bring it down to 11 cycles per hour, it means you will get 44 units of ice per hour.

9.2 The Hulk or Covetor for Ice Mining ?

Although the Covetor has no bonus to its ice yield, the Hulk was secretly given one along the line. It has a 3% in cycle time reduction per level. Which means, with harvesters II:

$$500 \text{ sec} * 0.75 * 0.85 * 0.95^2 = 287.67 \text{ sec}$$

You'll manage to complete just a little over 12 cycles per hour. Since every cycle you get 1 unit of ice per ice harvester, and a Hulk fits 3, you'll end up having 36 units of ice in just a little over one hour.

The following table compares both ships:

Ship	Ice units/hour	Cycle (in sec)	Cycles/hours
Mackinaw	44	317.28	11.34/11
Hulk	36	287.67	12.51/12

The following table shows what every type of ice refines in:

Ice Name	Heavy Water	Liquid Ozone	Strontium	Oxygen	Nitrogen	Helium	Hydrogen
Blue Ice	50	25	1	300			
Clear Icicle	50	25	1			300	
Dark Glitter	500	1000	50				
Enriched Clear Icicle	75	40	1			350	
Gelidus	250	500	75				
Glacial Mass	50	25	1				300
Glare Crust	1000	500	25				
Krystallos	100	250	100				
Pristine White Glaze	75	40	1		350		
Smooth Glacial Mass	75	40	1				350
Thick Blue Ice	75	40	1	350			
White Glaze	50	25	1		300		

The refining math of section 2 applies to ice as well, so nothing to add here !

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10. Mercoxit Mining

Before Red Moon Rising, the winter 2005 expansion, Mercoxit was considered to be the most valuable ore as it is the only asteroid which refines into Morphite. Not only for that, but also because you **absolutely need mining crystals** to harvest it, only true miners with good skills can mine it. Factor on top of that Mercoxit's important volume, which made the task of getting any high quantities a bitch, all those factors gave it a premium price. The **Skiff** solved that last problem, so well in fact, that the morphite price have sunken to the bottom of the ocean with the Titanic over the last couple of months. Mind you, it is still a lucrative business, but not as much as before, and players who left before RMR and are coming back now will probably ask themselves, "Holy Mother of Destruction, what did you do to my ISK generating machine"?

Nonetheless, we move forward with the new skill you'll need (yes, as in only one):

Skills you will need...



✓ **Deep Core Mining 2**

Training *Deep Core Mining* beyond level 2 is wasted time, since the toxic and dangerous cloud that MIGHT erupt when mining Mercoxit (happened to me once in my life) has a range of 5KM only, and since your lasers have a range of 15km, you mind telling me what the hell you're doing so close ? Thought so...

There really is no point mining Mercoxit in anything else than a Skiff, but this guide wouldn't be truly complete if you did not have all the information. There are two modules that allows you to mine Mercoxit:

Laser	Base yield (in m3)	with T2 Crystal
Modulated Deep Core Miner II	120	140
Modulated Deep Core Strip Miner II	250	437.5

While MDCM2 can be used with any mining crystals, and be fitted on any ship, they are not as powerful as MDCSM2, which is a special kind of strip miner used for Mercoxit mining. The regular Modulated Strip Miner II cannot use Mercoxit crystals. While the MDCSM2 can use any crystals, since its base yield is 110 lower than the MSM2 (250 vs 360), there would be no point.

What is particularly nice about the Skiff, is that it gets a 60% bonus to Mercoxit mining yield – **per level**. What this translates into in a ISK/hour ratio will be covered at the end of this section (and again in section 12), however you may have already guessed that with a 300% bonus at *Exhumer 5*, it'll be a nice one... especially for such a cheap ship.

For the sake of uberness comparison, I'll assume you are a maxed out Hulk pilot already:
 $250 * 1.25 * 1.25 * 1.15 * 1.15 * 4 * 1.05 * 1.375 * 1.05^2 = 3289.17 \text{ m}^3/\text{cycle}$
Mercoxit has a volume of 40m3, so $3289.17/40 = 82.229 \rightarrow 82$ units of Mercoxit per cycle

A Skiff fits one MDCSM2, so you'd mine around 1640 units of Mercoxit per hour. (20 cycles, like the other strip miners)



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10.1 Is Mercoxit mining still hot?

Yes it is, but it only becomes lucrative at *Exhumer 5*. Many pilots stop at *Exhumer 4* since for Hulk pilots, the mere 3% bonus you get for the 20 days (and more) of training it takes might not be worth it for them. However the 60% bonus you're missing if you don't train it plays a BIG role for the Skiff (we might even say the same for the Mackinaw).

Roughly, one unit of Mercoxit will refine into two units of Morphite, and at the time of release of this guide, one unit of Morphite goes for around 8,000 ISK/unit give or take. So we do the math and end up at a ISK/hour ratio of 25,000,000.00 ISK/hour. It's definitely not bad, especially for such a cheap ship (20mil ISK in Jita at the time of release of this guide).

Section 12 has a good comparative chart of the ISK/hour ratios you can get depending of what you mine and what you're flying. Morphite prices have been crashing for the past year. While mercoxit roids aren't the huge money cows they used to be, they still provide some decent money.

This ends our section on Mercoxit. As you noticed I did not talk about mining Mercoxit in a battleship, simply because you cannot do so without mining crystals, and anyone serious enough about mining that trained for crystals will also have done so for mining barges.

2. Mining

11. Mining Foreman Links – Gang Mods

I think I won't be mistaking when I say CCP has revamped the foreman links at least three times since they introduced them in the game, and for at least a year, they didn't even work. They do now, and there are 3 of them. One is very, very useful, the two others are just nice to have if you fly a ship that supports more than one link (carrier, orca, rorqual or command ship).

And there are:

Mod name	Description
Mining Foreman Link – Laser Field Enhancement	Increases the range of the gang's mining lasers, gas harvesters and ice harvesters.
Mining Foreman Link - Laser Optimization	Decreases mining lasers/ gas harvester and ice harvester duration.
Mining Foreman Link – Harvester Capacitor Efficiency	Decreases the capacitor need of mining lasers, gas harvesters and ice harvesters.

The base efficiency of each link is 2% by default, which isn't great. However, some skills and ship bonuses will increase the bonuses of these links to very impressive levels toward the end.

Skills you will need...



- ✓ Leadership 5
- ✓ Mining Foreman 5
- ✓ Mining Director 1

These are the minimum skill requirements, but they do not all influence the effectiveness of the links. In fact, in this list, only *Mining Director* does. Remember the **Mining Foreman Mindlink Implant** I talked about in section 6? It pays off now ! Here's a table with the list of skills you want to max to level 5 to increase the effect of each link to its maximum:

Skill/Mod name	Description
Mining Director	Increases link effectiveness by 100% per level
Warfare Link Specialist	Increases link effectiveness by 10% per level
Mining Foreman Mindlink	Increases link effectiveness by 50%

Note that **Warfare Link Specialist** replaced the skill *Squadron Command* but everything works as before according to my tests.



So at *Mining Director 5*, *Warfare Link Specialist 5* and the **Mining Foreman Mindlink Implant** plugged in, the effect of each link will be:
 $2\% * 5 * 1.5 * 1.5 = 22.5\%$

There were many misunderstandings as to how the *Mining Director* skill worked. Simply put, the base effect of the link is multiplied by the level you trained *Mining Director* at, which explains the "5" multiplier in the equation, instead of putting a "6" to factor a 500% bonus as most people would do.

Now that we know what you can train to max the effect and what each link do, let's look at each in details and see how they truly affect miners.



2. Mining

11.1 Mining Foreman Link – Laser Optimization

As I mentioned at the beginning of the section, the laser optimization link will reduce your cycle time (it doesn't affect ice harvesters by the way) instead of giving a direct bonus to your yield. Which means that a 22.5% reduction in cycle time translates into a yield increase overtime by $1/(1-0.225) = 1.29$ (29%)! Yes, it means a maxed command ship pilot will increase your yield by **29%** ! Yes, you can drool.

We could have treated this link as we did with the Ice Harvesting Link, meaning, calculate how many new cycles we get per hour and then compare the difference. However since we always treated ore mining with yield bonuses, introducing a cycle time bonus could confuse many people, so as I've demonstrated, the 22.5% bonus to cycle time actually is a 29% bonus to your yield. This is how the bonus is factored in the next equation ...

Let's see how our pimped Hulk pilot from section 7 does now:

$$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05^2 * 1.75 * 1.29 = 2347.48 \text{ m}^3/\text{cycle}$$

We already know this is a 29% increase over our pimped Hulk, so no surprises there. How about our retriever from the very beginning? Well, it's a **254,99%** increase! Yes, you read right... amazing how efficient we can become when we know how everything works !

Also take note that with an Orca or a Rorqual, the effectiveness of this link can be further enhanced, to the point where a maxed out Rorqual pilot will boot your yield by **42%**, a 13% increase over a maxed out command ship pilot.

11.2 The other links

I won't bother showcasing the usefulness of the other two links for you, since whenever you can only use one link, you will naturally prioritize the one giving you a yield bonus over one increasing your lasers' range or decreasing the capacitor use (seriously, this is a good one CCP!)

With a maxed out Rorqual pilot your strip lasers' range will approach 22km. It's a lot more practical than useful to be honest, and as for the harvester link... whatever!

2. Mining

11.3 Making them work

The fleet system is one that has been revamped very often. The structure, is very similar to this one:



The bonuses will be shared if you meet **one** of the following condition:

- ✓ You are the fleet commander
- ✓ You are a wing commander
- ✓ You are a squadron commander
- ✓ You were set either as fleet, wing or squadron booster

Note that you will only give bonuses to your family's tree if you are a commander. If fleet commander, the whole fleet will receive them. If wing commander, only the squadrons in your wing, and if squadron commander, only your squadron.

This can be overwritten if the boss sets you as fleet booster. At this point you will be boosting the entire fleet, regardless the position you are in, and whether you are a commander or not.

However, for the bonuses to be applied, the wings and squadrons must have a commander. Every squadron without a commander, or every squadrons under a wing that doesn't have a commander will **NOT** receive any bonuses. Obviously, if there aren't any fleet commanders, nobody will get anything.

2. Mining

12. Rigs

Revelations didn't bring us miners so many treats... in fact, in all the newness, the only true new thing we got is the **Drone Mining Augmentator**, which acts as an implant for your ship (if removed will be destroyed) by increasing your mining drone's yield at the expense of your ship's CPU capacity.

Skills you will need...



- ✓ Drones Rigging 1
- ✓ Jury Rigging 3
- ✓ Mechanic 3

Before you do anything, you should make sure the CPU drawback (-10%, which can be further reduced by 10% for every *Drones Rigging* level you train) won't render your ship useless. For instance, a tanking Hulk won't have the CPU to use that rig. You can always remove it if you found out you made a mistake, however you will lose it (just like normal implants). Since rigs are very new, it's impossible to determine the price those rigs will sell for. Depending of what they'll cost, removing them or not will have to be a decision you make alone. At *Drones Rigging 5* the CPU drawback will only be 5% instead of 10%. It's not a big penalty, but it is something you have to look out for.

Two versions of the rig are available:

Rig version	Description
Drone Mining Augmentator I	Increases mining drone yield by 10%
Drone Mining Augmentator II	Increases mining drone yield by 15%

Funnily enough, they **are** useful. Even the Drone Mining Augmentator I will benefit high-ends (Bistot, Arkonor, Crokite) miners by adding an extra unit to each drone's yield (5 units instead of 4).

However, the drone rigs aren't the most popular ones!

The rigs that are most often used with mining ships, especially the Hulk, are:

- ✓ Cargohold Optimization rigs, to increase the cargo space
- ✓ Capacitor Control Circuit rigs, to increase cap recharge and tank stability
- ✓ Shield or Armor rigs, to enhance the tank

The ship setup section of the guide will give you more information as to which rigs is most useful in what situation.

Between me and you, they might as well have taken the drone mining augmentators out of the game. They are, in my humble opinion, totally useless.

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13. Show me the money

This section will compare the different ships and the ISK/hour ratio they can achieve depending of what they are mining, as well as the values of the different ore types. First we must determine an average price for each mineral before we know the value of 1 unit of each ore.

13.1 Ore Values

Sample table – Data taken from Mineral Trading Index on 11/03/09 20:32 GMT-5								
	Tritanium	Pyerite	Mexallon	Isogen	Nocxium	Megacyte	Zydrine	Morphite
ISK/unit	4.22	4.36	27.00	56.00	84.00	3,080.00	1,750.00	7,900.00

Note that these average prices are just that : averages. The main goal of this section is to compare the general value of ores together. Mineral prices fluctuate on a daily basis, so feel free to come up with your own Excel sheet and change it as often as you need to to reflect the current market situation !

So section 1.2 explained which minerals are refined from each type of ore. Using that and the above selling values of each mineral, we can determine a pretty good approximate value for 1 unit of each type of ore.

Value per ore type based on sample table		
Ore	ISK/unit	ISK/m3
Veldspar	9.01	90.09
Scordite	13.75	91.67
Pyroxeres	25.65	85.51
Plagioclase	30.75	87.86
Omber	59.56	99.27
Kernite	143.85	119.88
Jaspert	148.67	74.33
Hemorphite	348.68	116.23
Hedbergite	423.97	141.32
Gneiss	989.47	197.89
Dark Ochre	1,595.63	199.45
Spodumain	2,016.00	126.00
Crokite	5,871.07	366.94
Bistot	6,627.75	414.23
Arkonor	6,166.56	385.41
Mercoxit	23,320.00	583.00

Don't forget...

Those values are for a refining yield of 100% and a tax rate of 0%. You need to factor those when doing your own calculations.

Ok so now we have an approximate value for 1 unit of each type of ore. First thing that strikes is that high-ends truly are worth more than low-ends, but remember that not all these ore have the same volume, therefore to make a direct comparison, it is more accurate to compare how many ISK you are getting per m3 you mine. In the practical world we don't give a tiny rat's ass, but for statistical purposes, we do.

2. Mining

You will also notice that Mercxit is grayed out, as Mercxit mining uses a different bonus system with its crystals and its equipment, therefore a direct comparison with units or m3 isn't possible.

How can we generally interpret that table ? At the time of the release of this guide,

- Omber is the best ore available in Empire
- Hedbergite is the best ore available in Low-sec
- Bistot and Arkonor are the best ores available in 0.0

Again, I cannot stress this enough: this is generally speaking and in 6 months from now this might not be true anymore. This is why I included the average selling values I used to determine that, so you can check for yourself if this table is still accurate or not. On a bigger scale of things, we can however conclude that Bistot, Arkonor and Crokite will always be the best ores available in 0.0. The price fluctuation of minerals in Empire might have them switch places among the top 3, but certainly not from second best to worse.

13.2 Ice Values

I've been asked this question way too often to ignore it. So we will do just like section 12.1 but this time for ice!

Sample table – Data taken from Jita on 11/03/09 20:32 GMT-5							
	Heavy Water	Liquid Ozone	Strontium	Oxygen	Nitrogen	Helium	Hydrogen
ISK/unit	40	375	2500	350	260	300	330

Again, I repeat before I get yelled at on the forum... these are average values. Since we know the value for each type of fuel, we can determine a price per unit of ice.

Value for ice types according to table	
Ore	ISK/unit
Blue Ice	118,875.00
Clear Icicle	103,875.00
Dark Glitter	520,000.00
Enriched Clear Icicle	125,500.00
Gelidus	385,000.00
Glacial Mass	112,875.00
Glare Crust	290,000.00
Krystallos	347,750.00
Pristine White Glaze	111,500.00
Smooth Glacial Mass	136,000.00
Thick Blue Ice	143,000.00
White Glaze	91,875.00

Don't forget...

Those values are for a refining yield of 100% and a tax rate of 0%. You need to factor those when doing your own calculations.

There is no need to make a ISK/m3 column, as every ice type have the same volume (1000 m3). Marked in bold and in green for you is the best kind of ice available.

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13.3 And the winner is...

This is probably the section most people will jump at before reading anything else. In this guide, we had a look at many different ships, so to make a general comparative chart, we will use the following ships on the evolution chain from noob mining recruit to mining god!

- Our Retriever from section 4
- Our Rokh from section 4
- Our Covetor from section 5 (with crystals)
- Our "Perfect Miner" Hulk from section 7 (refer to section 6)
- Our God Mode Hulk ("Perfect Miner" + pilot boosting him, refer to section 11.3)

Including ALL ore types in this table would be useless, as you can determine this by yourself. The point is to determine with a quick glance the differences between empire, low-sec and 0.0 mining, hence weighting the risks vs. the rewards. Drones aren't factored in this table.

ISK/hour ratio of the different ships covered in this guide					
Ore	Retriever	Rokh	Covetor	Hulk ("perfect miner")	Hulk ("god mode")
Omber	3,938,107.20	4,745,740.80	7,079,301.60	10,835,155.20	13,979,923.20
Hedbergite	5,596,430.40	6,715,716.48	10,073,574.72	15,415,621.92	19,892,766.24
Crokite	14,560,258.56	16,908,687.36	26,067,559.68	39,805,868.16	51,430,590.72
Arkonor	15,293,068.80	17,759,692.80	27,379,526.40	41,809,276.80	54,019,065.60

In bold is the best ratio you can get in the game ... give or take of course. This doesn't include drones naturally... let's not forget our Mackinaw and Skiff...

- Mackinaw "Perfect Miner" (Dark Glitter) : 22,880,000.00 ISK/hour
- Skiff "Perfect Miner" (Mercoxite) : 38,244,000.00 ISK/hour

13.3.1 Drones help

Since drones cannot mine ice nor Mercoxite, which is why we are calculating their ISK/hour ratio separately.

ISK/hour ratio for 5 Mining Drones for key ore types		
Ore	T2 Mining Drones	T2 Mining Drones - God Mode+
Omber	1,858,272.00	2,608,728.00
Hedbergite	2,543,832.00	3,688,556.40
Crokite	5,283,964.80	8,806,608.00
Arkonor	5,549,904.00	9,249,840.00

As you can see drones DO make a difference ... of course those values do not reflect the traveling time factor, refer to section 8 for more information about that.

13.4 The Miner's Uberness

I admit, that's a lot of tables and information one two pages... the golden situation here, according to our tables would be a Hulk in God Mode boosted by a command ship pilot fitted



2. Mining

with both the Laser Optimization and Drone Coordination Link (yes, a command ship can fit two links, as well as capital ships).

The **approximate** best ISK/hour ratio you can currently get at the moment, according to the theory, is around **63,000,000.00 ISK/hour** mining Arknonor (of course with drones). For a refresher, one year ago, this was 112mil/hour. As you can see, mining is no longer the huge ISK generator it used to be. This is due to many factors, notably the new drone regions, the bigger number of Hulk users now, and how easier it is to mine remotely now.

This of course is theory, doesn't take in account hauling time from belt to station, the drone's traveling time, mining lasers stopping prematurely because the asteroid is popped, etc. Nonetheless, suffice to say, mining can be a very lucrative profession when you put the ISK, time and effort in training your character(s) properly.

I can already see players rushing to 0.0 space to try and get access to the good stuff. Unfortunately for you, 0.0 mining has its drawbacks: getting a 100% refining yield is difficult as there aren't that many NPC stations in 0.0. Furthermore, it is dangerous (much more so than Empire), although many consider 0.0 to be less dangerous than low-sec. Even when your ore is refined, you still need to bring it back to Empire to sell it, which poses a logistic problem.

This ends our 13th section. Feel free to come up with your own excel sheets and tables to figure out your own ratios with your current skill tree. You have all the information you will need to do so !

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14. Big Mama ORE



Name: Rorqual
Class: Capital
Cargo: 40,000 m3
Corporate Hangar: 30,000 m3
Ship Maintenance Bay: 1,000,000 m3
Cost: Approx 1,3bil ISK

Bonuses:

- 5% reduction in fuel consumption for industrial cores per level
- 5% bonus to effectiveness of mining foreman gang links per level when in deployed mode
- 50% bonus to the range of Capital Shield Transporters per level.
- 20% bonus to drone damage and hitpoints per level.

- 99% reduction in CPU need for Clone Vat Bay
- 99% reduction in CPU need for Gang Link modules
- 99% reduction in CPU need for Industrial Reconfiguration modules
- 99% reduction in CPU need for Tractor Beams

Can use 3 Gang Link modules simultaneously.

Now let's see what kind this fat mama is made of, shall we?

2. Mining

A recent addition to the family by the Outer Ring Excavation, the Rorqual is a capital class ship meant to support deep space mining ops. Suffice to say, it's an exciting addition for miners. With its whopping skill requirements and costly Capital Industrial skill cost (500mil ISK, ouchie!), is it worth it? Read on.

14.1 The Industrial Core

To distribute bonuses and use the four compression lines the ship has, the Rorqual have its systems' power rerouted using an Industrial Core I module. This module, when activated, will consume heavy water from your cargo hold, and remain online for 10 minutes. During that time, you cannot jump, warp or move. You are effectively stuck in place until the timer expires.

Note that the Industrial Core works within the limits of a POS bubble, therefore you will often see it, if not always, safely parked at a POS while it compresses or boosts a fleet.

The compression rate is of 40 for empire low-end, 20 for other ore and 10 for ice – not neglectable. Just like for a refining batch, you need an exact number of units to make a compression batch, shown in the next table. The compression requires 1 minute per job without skill, or 48 seconds with Industry V, which you should already have by now.

There is a BPO for each type of ore and ice, as well as their named variants. Therefore, 51 BPO in total. They can be purchased in Empire from NPC vendors almost everywhere, and are cheap to buy. If you're going to be compressing a lot (usually Bistot, Arkonor, Mercoxit, Crokite and Ice) then I would recommend you purchase a set of 4 BPO for each of these and their named variants. When you need to compress 50k units of Triclinic Bistot, you will appreciate being able to use all four BPO to use all four compression lines.

Ore type	Ore Volume	Batch for compression	Uncompressed volume	Compressed volume	Compression ratio
Compressed Veldspar	0.10 m3	166,500.00	16,650.00 m3	417.00 m3	39.93
Compressed Scordite	0.15 m3	99,900.00	14,985.00 m3	375.00 m3	39.96
Compressed Pyroxeres	0.30 m3	49,950.00	14,985.00 m3	375.00 m3	39.96
Compressed Plagioclase	0.35 m3	33,300.00	11,655.00 m3	292.00 m3	39.91
Compressed Omber	0.60 m3	25,000.00	15,000.00 m3	750.00 m3	20.00
Compressed Kernite	1.20 m3	12,000.00	14,400.00 m3	720.00 m3	20.00
Compressed Jaspert	2.00 m3	7,500.00	15,000.00 m3	750.00 m3	20.00
Compressed Hemorphite	3.00 m3	5,000.00	15,000.00 m3	750.00 m3	20.00
Compressed Hedbergite	3.00 m3	5,000.00	15,000.00 m3	750.00 m3	20.00
Compressed Gneiss	5.00 m3	4,000.00	20,000.00 m3	1,000.00 m3	20.00
Compressed Dark Ochre	8.00 m3	2,000.00	16,000.00 m3	800.00 m3	20.00
Compressed Spodumain	16.00 m3	1,250.00	20,000.00 m3	1,000.00 m3	20.00
Compressed Crokite	16.00 m3	1,250.00	20,000.00 m3	1,000.00 m3	20.00
Compressed Bistot	16.00 m3	1,000.00	16,000.00 m3	800.00 m3	20.00
Compressed Arkonor	16.00 m3	1,000.00	16,000.00 m3	800.00 m3	20.00
Compressed Mercoxit	40.00 m3	500.00	20,000.00 m3	1,000.00 m3	20.00
Compressed Ice	1,000.00 m3	1.00	1,000.00 m3	100.00 m3	10.00

Assuming you have Capital Industrial Ships IV, you'll need 750 units of Heavy Water (currently priced at around 20 ISK/unit) per activation. The Industrial core activation lasts 300 seconds, so every cycle costs 15,000.00 ISK per activation. In one Industrial Core activation, you have just about enough time to run 6 compression jobs if you're efficient. Each compression job will cost you around 2,500.00 ISK. Not too shabby, huh?

2. Mining

It will cost you approximately 180,000.00 ISK per hour to keep the Rorqual's core running (preferably safe at a POS) with Capital Industrial IV, which is **nothing**.

Foreman link bonus

Along the compression lines, the Rorqual also boosts the effectiveness of the Mining Foreman links, which are the Laser Optimization and Ice Harvesting links if you had already forgotten.

Without the Rorqual, we had determined the link's effectiveness was of 22.5% with maxed skills, which translated in a 29% direct yield bonus. With Capital Industrial IV:

$$2\% * 5 * 1.5 * 1.5 * 1.2 = 27\%.$$

This translates into $1/(1-0.27) = 1.3698$, so approximately 37%.

Worded differently, the Rorqual boosts the fleet some more by 8% compared to a carrier or a command ship. However, we can all agree that this 8% increase when using the Rorqual is an extra special feature on top of the main program, which is compressing.

14.2 Capital Tractor Beam

Although very nice on paper, you will almost never use capital tractor beams, because 99.9% of all Rorquals are left running safely within the security of a POS bubble.

14.3 Clone VAT Bay

By fitting a (or many) Clone VAT Bay in one of the Rorqual's 6 high slots, you can act as a cloning station and receive clones directly within the ship. Although this seems superfluous, it can be a huge strategic advantage if you set up a remote mining camp. Though, to be very honest, I have never used them in over 3 years of playing.

14.4 Fitting the Rorqual

The Rorqual has

- ✓ **6 High slots** (3x foreman links, 1x industrial core, 1 cloak and 1 heavy energy neutralizer)
- ✓ **7 med slots** (usual tank)
- ✓ **3 low slots** (damage control 2, then either expanders or PDS2)
- ✓ **3 rig slots** (suggest using Capacitor Control Circuit or Cargohold Optimization rigs)

It should be apparent that it was meant to be shield tanked, as is the Hulk. Whether the Rorqual is left at the POS or not, it should always have a tank. Therefore, one Capital Shield Booster, as well as the best EM and Thermal Shield Hardeners you can afford should be part of the 7 med slots. Unlike capital armor tanks, capital shield tanks aren't meant to be perma-ran, and you don't dual rep a shield tanking cap either.

As far as lows are concerned, CPR are out of the question since they reduce shield boosting. Therefore, one damage control II to further boost those resists with two faction PDU ought to make a good tank.



2. Mining

Finally, in the high slots, you absolutely need one slot for the Industrial Core and finally one for a foreman link, leaving four free slots to use for either VAT bays, capital tractors or remote hull/shield/armor repairers. Which you fit will depend of your skills and needs.

You must also realize the propositions I gave are standard and very conservative in nature. In my experience though, you will appreciate the quickest cap regen you can get, especially in tight situations when you need to repair or jump away. Since you need 70% capacitor to jump, if you need to travel through many systems, you'll also appreciate the shorter wait.

For a capital ship, I'd fit the best I can afford, Gist-X hardeners and shield boost amplifier even.

14.5 Strategies

There are many school of thoughts on how to use the Rorqual, but most of those can be reunited into two categories:

- 1- Using the Rorqual in belt
- 2- Using the Rorqual at a POS

If using the Rorqual in belt, the biggest advantage you get is the ability to use capital tractor beams and therefore practically eliminating the need for any haulers. For some, this is one hell of an advantage. If you are in a safe environment, I would definitely use it this way. However, in pirated low-sec or hostile 0.0 systems, you must remember that when sieging your Rorqual, you need to wait 5 minutes for the cycle of the Industrial Core to end. Rorquals, like freighters, are very juicy targets, and pirates or hostiles will react to its presence. The Rorqual isn't particularly agile, and it's easy to lock it into place with a fast captor long enough for the bigger guns to take it down.

For that reason alone, I have never seen a Rorqual in a belt, ever. It doesn't mean people don't do it, but I wouldn't. Leaving the Rorqual in the POS bubble, while it gives out the bonuses and compresses (more on that in a minute) is the best way to use that ship, in my opinion of course.

Remember that there is a 10 minutes timer on the Industrial Core. If you activate it and a hostile fleet is reported, you're stuck there until that timer expires, and it won't take 20 ships to bring you down.

A small fleet of recons with a curse or two will dispatch you very quickly.

14.6 Setting up a remote mining camp

I won't even try to delude myself into thinking I was the first to have that idea, but it's a great one, and I'll share it with you.

A long time ago, when capital ships were not yet even on the drawing board, freighters could not load or unload cargo at a POS and hauling was a pain, you were either forced to mine near an Outpost or station, or haul your butt for hours on end.

Today we have an arsenal of logistic tools available for us to use. When I scout for a system to either set up in or to use for a mining op on a larger scale, I've come to grow and love Ombeve's amazing 2D Maps : <http://www.ombeve.co.uk/>



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These maps will allow quickly to see which systems are dead-ends or easier to defend, the number of belts it has, presence of outposts and its security status. Remember, the closest to -1.0 a system is, the better the belts will be. What I do is, find a system far away from any outposts, with a good number of belts and low security status. I then compile a list, hop in a covert up, and go survey those systems. Once I've found the best system to set up in, the fun starts.

To make the most use out of that system, I will set a POS there, to act as a remote camp. If you don't plan to visit the system often, a medium tower will do. **The key:** the X-Large Ship Assembly array. This baby will provide you with over 10mil m3 of storage space, more than enough for a few hours of mining even with an army of hulks!

Leave the Rorqual within the POS bubble, close to the ship assembly array, while you are giving away the bonus and the Industrial Core is active. As the haulers bring back the ore to the array, you can compress it on the fly. When the op is done, you can use the Rorqual to jump it to a close refinery, or if you have a lot, bring a Jump Freighter. Remember, you can load or unload a JF as long as you are close to an **ONLINE** starbase.

The first time you set it up might require a few carrier trips or Rorqual trips, but once it's all set up, it's a bless. Every system without a station should have a POS with an array to act as storage. It's faster and safer.

14.7 Logistics use

Although the Rorqual has a slightly smaller jump range than carriers, it can carry significantly more m3. Unfortunately, you can no longer use the old trick of placing haulers in your ship bay. The Rorqual still offers over 100,000m3 of space if you fit it with cargo rigs and expanders, making it a cheaper alternative than a Jump Freighter, with about 1/3 of the space, but at 1/3 of the price.

Note though, that the cap recharge time will be painfully slow, and you'll need a few minutes between each jump, making pipe traveling dangerous if you don't have deathstars along your way to protect your ass.

Consider using a carrier as a jump buddy to feed you cap, it'll shorten your recharge sessions and prevent you from going insane!

The verdict is...

The Rorqual is a worthy addition to the ORE family. Surely, it isn't the solo pwnmobile some miners were hoping for, and it doesn't replace the need of Hulks, but it surely helps out in many areas and will make those remote systems a lot more attractive now.

The build cost of a Rorqual is around 1.4bil ISK. As any new items, the price they go at fellow supply and demand. Knowing what you know, it is your decision to take whether it's worth the price or not. It's quite apparent though that the Rorqual will not appeal to the solo miner, not without a private toon army at least. Solo, the Rorqual is more than useless, keep this in mind when you train or want to get one.

Worth noting is its drone bay and damage output bonus. A skilled drone user can really do some damage with heavy drones II in this ship with Capital Industrial IV. 80% damage bonus? Great bait ship!

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15. The Orca



Name: Orca
Class: Sub-Capital
Cargo: 30,000m³
Corporate Hangar: 40,000m³
Ship Maintenance Bay: 400,000m³
Cost: Approx 450mil ISK

Bonuses:

250% bonus to tractor beam range
100% bonus to tractor beam velocity
500% bonus to survey scanner range
99% reduction in CPU need for Gang Link modules
Can use 3 gang link modules simultaneously.

Industrial Command Ship Skill Bonus:

5% bonus to cargo capacity per level
3% bonus to effectiveness of mining foreman gang links per level

The Orca is the newest ORE toy. Classed a sub-capital ship, it's a super hauler that also gives out some mining bonuses! Sounds nice? Yes it is!

You will quickly realize the Orca is quite indispensable for a mining op. Unlike the Rorqual, it does not have a jump drive or ore compression lines, but it a very nice cargohold, a ship maintenance bay, a corporate hangar bay and it can fly in Empire!

Do not delude yourself into thinking that the Orca is invincible. Even with its chunk of hitpoints, it is still very susceptible to attack, especially since most will fit it for maximum cargospace, which will make it fat, and slow.



2. Mining

I would fit the orca like this:

Expanded Cargohold II
Damage Control II

Invulnerability Field II
X-Large Shield Booster II
Shield Boost Amplifier II
Cap Recharger II

Mining Foreman Link - Mining Laser Field Enhancement
Mining Foreman Link - Laser Optimization
Mining Foreman Link - Harvester Capacitor Efficiency

3x Cargohold Optimization I

This will give you close to 70,000 m³ of cargo space, plus the corporate hangar (so 110,000m³ in total) with a decent tank. It makes the Orca the absolute best hauler of the game. If you bother with GSC (which is a little crazy, but some people are) it will push the cargo space to 142,000m³.

The Orca, when fully fitted, will still come close to 600mil ISK, which isn't exactly cheap. And unlike the Rorqual, which you usually leave safe and sound within a POS bubble, you'll have to bring the Orca to the belt if you intend to haul with it, making it an expansive target to take down in low-sec or 0.0 space. Even with a tank it will now sustain much damage, and considering it will have such a fat ass, it will be painfully slow to align and warp out.

Keep this in mind when you use it. A better tactic is to have a fast destroyer tractor all the cans in the same spot, have the Orca warp to this spot, quickly empty the cans, then haul it to a POS (which has a X-Large Ship Assembly Array, providing 10,000,000m³ of storage space) then use the Rorqual at the POS to compress that ore and jump it out.

The strength of the Orca is definitely its cargo space. A few of these can support a fleet of two dozens Hulks easily without any trouble at keeping up. It will only pay off if you are organized, and due to its slow align time and speed, I would not recommend to use the Orca to haul across multiple jumps. Use a POS in a system without stations, and avoid using stargates at all, especially in 0.0 space. Use Jump Bridges as much as you can, and don't fly unguarded if you absolutely need to fly across a few systems. Even a small fleet of just two recons can pop your Orca before helps arrive (hello Curse!).

Oh and, fear the curse!

2. Mining

16. Tharkanought™

My position on using carriers or motherships to mine has changed a lot over the years. The real truth is they aren't good at it, and the risk of an exposed carrier or mothership in a belt isn't worth the benefits, in my opinion. Of course, you could mine Veldspar in a Revelation, call it a Veldnought, and feel your e-peen expand rapidly, but it'll be just for show.

Just for argument's sake, I've made a table that shows what a carrier can bring in:

ISK/hour ratio for 13 Mining Drones for key ore types		
Ore	T2 Mining Drones	T2 Mining Drones (God Mode)
Omber	4,831,507.20	6,782,692.80
Hedbergite	6,613,963.20	9,590,246.64
Crokite	13,738,308.48	22,897,180.80
Arkonor	14,429,750.40	24,049,584.00

Racial Carrier IV, with 4x DCU allows for total of 13 drones

Ok, so 24mil ISK/hour for little effort... worth it?

Whereas I wouldn't use a carrier over a Hulk, if you have both, it's worth considering using a carrier, to tank, or to boost. If you pay attention to your intel channels, you should have plenty of time to warp miners to safety, recall your mining drones and assign fighters to your PvPers or jump the carrier out.

As in anything, they will also be useful for logistic purposes, like setting up remote camps or simply supplying them, since they have the biggest jump range of all capital ships in the game, even motherships (which is pretty stupid if you think about it, you'd think a mothership would be the mother of all capital ships, but apparently, it's just the mother of my e-peen boosting!).

With Heavy Interdictors now, which can point motherships and Titans even in low-sec, the risks of using a mothership to mine in low-sec are no longer acceptable.

TI:DR: using any capital ships except the ORE classes to mine is only useful at one thing: giving you the illusion your internet penis is bigger than the average player.

If you feel sad one day, because your girlfriend just dumped you and called you an inadequate lover, feel free to strap some Miners II on your Avatar and go rape some roids. Otherwise, stick to the ORE stuff!



2. Mining

17. Ship Setups

In the old version, this page was meant to give you some cookie-cutter setups, all thought out for you and easy to follow. However, I noticed that this had a negative effect. People started fitting ships in a certain way only because they were told to, and didn't really know why. So rather than giving you setups, I will teach you how to fit them. Give a man a fish, or teach him how to fish!

First, you will want to get a program called Eve Fitting Tool (EFT for short). It's a nifty little application that allows you to import your character's information via API, then fit ships according to your skills. It's a great way to compare stats and figure out the best way to fit your ship before buying all the stuff you wanted and then realize you are 2 CPU short! You can find EFT [here](#), in the Ships & Modules section of the forums.

Second of all, when you're going to be fitting either your mining battleship, cruiser, frigate, barge, exhumer, orca or Rorqual, ask yourself if:

- √ You want to prioritize income (yield) over safety (tank),
- √ Prefer to balance tank and yield or
- √ Go safe all the way and fit a full tank

A general rule of thumb is that you fit as many lasers (strips or regular) as you can in the high. Then, depending of what ship it is, the med and low slots are up to you.

You want to go full yield power and sacrifice tank? Then fit as many Mining Laser Upgrades as you can, using co-processors if you have to. This will leave you with very little CPU to fit a decent tank, but you'll be making more ISK.

You want to play it safe? Then prioritize power diagnostic systems, damage control modules and armor modules in the lows and capacitor and shield modules in the medium slots. Of course, either shield **OR** armor. Not both, for the love of the gods! Not sure if your ship is meant to armor or shield tank?

Fast reference card...

- √ ORE ships, Caldari and Minmatar ships usually **shield tank**
- √ Gallente and Amarr ships usually **armor tank**

If you armor tank, than your medium slots will be free for capacitor modules, surveyors, or electronic warfare stuff (disruptor, web, ECM, etc...). If you shield tank, than you won't have much room for cap rechargers, but you can fit Power Diagnostic Systems in the lows (No CPR, as they decrease shield recharge time), or Expanded Cargoholds II even...

How you fit it depends of what you want to do with it. That being said, here are some popular ways of fitting a Hulk.

√ Full rack of expanded cargohold II in the lows and cargo optimization rigs for veldspar mining in Empire

√ Gistii B tank, with shield or CCC rigs to strengthen the tank. PDS in the lows, or a mix of MLU/PDS.



2. Mining

√ Bait hulk, t2 medium or light combat drones in the bay, one point and one web with a small tank, PDS in the lows, CCC or shield rigs to enhance the tank. Useful to catch can flippers or bait frigate ships in nullsec (ceptors, AF,...)

√ Mix of tank and MLU. Two MLU in the lows, CCC or cargo rigs, and a small tank. Popular way of fitting a Hulk in nullsec.

When it comes to capital ships, you should already know how to fit them. If you don't, you shouldn't be flying them. General tips:

√ Always, always, always fit a **Damage Control II** module. Otherwise all those structure points don't help you at all with the default 0% resists.

√ Always, always fit a tank. Since ORE ships are shield tankers, a Capital Shield Booster I is needed on the Rorqual, and a X-Large Shield Booster on the Orca.

√ Prioritize CCC rigs over cargo rigs for the Rorqual, or a mix of both. Going full cargo fit on the Rorqual will give you a painfully slow cap recharge time, even with a full rack of cap rechargers II in the meds, making the traveling very painful.

√ The Orca benefits from a full cargo fit. Whether you sacrifice the DC2 for a second Expanded Carhold II is your choice. I wouldn't... but you can. Don't forget the Orca isn't invincible.

2. Mining

18. Links

This is an index of all links proposed in the guide and more, in no particular order.

- [2D EVE Maps](#)

An invaluable tool which allows for a quick glance at any system, its security status and number of belts.

- [Joerd's Exploration Guide 2.0](#)

A guide that covers exploration in details

- [ToxicFire's Ore Map](#)

List number of asteroid belts and the ore types in that system for every system

- [Eve-central](#)

Eve-Central is a nice website with reports on the current market situation, and allows to compare prices on all database items universe-wide

- [Refining yield calculator](#)

You can determine your refining yield (taxes excluded) depending of your skills and station equipment with this tool.

- [Ore calculator](#)

Battleclinic has an excellent ore calculator, which will help you know how much mineral you can expect for your refines depending of your skills and station equipment.

- [EVEgeek](#)

Nice website with general information about the game, with an industry section. Ore info, ore calculator and a mineral index are all available for you miners.



2. Mining

Conclusion

What is there to remember to all of this? Certainly not everything!

The guide followed a clear evolution path that you should adhere to if you want to achieve the “Perfect Miner” state. What I referred to as “God Mod” is even possible solo if you trained your alt toward a command ship pilot. When it comes right down to it, as Oma Desala would say, I can only show you the path, you must walk it on your own.

I strongly believe the guide gave you all the information you need to make the best decisions according to your play style. Whether you buy a Hulk or not, to go for a barge or not, what to train first, etc. I did proposed a training path, there is however no shame in stopping your mining training to gain some PvP skill in-between or vice-versa.

Finally, you should all know EVE is a MMORPG, which contains the word “multiplayer” in it. Mining can become addictive and it can burn you out quickly also, even more if you always play solo. Sometimes joining a corporation is what gives you the enjoyment and distraction you need, since mining doesn’t really provide the adrenaline PvP does. Don’t be afraid to watch a movie while you mine, chat with corpmates, or anything else. If you stare at your lasers mining the roid all day, I expect you’ll be needing a shrink shortly.

Use the forums and the websites I suggested, they will help answer your questions and doubts whenever they arise. EVE has a nice and helpful community; you will no doubt find the guidance you need.

I thank you for reading my guide and your support. I hope I could give back a little of what was given to me in the past, by other helpful dedicated players.

Best of luck!

3. Manufacturing

3. Manufacturing

If you've been playing EVE for a little while, you will already know that PvP drives production, and production drives PvP. Supply and demand is the golden rule. Almost everything in EVE is built by players, unlike many other games where you will find many items if not most of them come from NPC vendors.

This means two things:

- 1) The players control the market
- 2) Your competition are people – you can't fool them as easily as computers

This section will concentrate on the art of building and producing everything from modules to ships.

Building 101

Producing stuff in EVE is actually a very simple venture. It is probably the least skill intensive industrial career you can undertake.

Skills you will need...



✓ **Production Efficiency 5** (5% reduction per skill level to the material requirements needed for production)

Skills that will help...



✓ **Industry 1** (4% manufacturing bonus speed per level)
✓ **Mass Production 1** (+1 manufacturing slot per level)

Since production steps and methodology depends on the technology level of the item you want to build (either tech 1, tech 2 or tech 3) we will dedicate a section to each type. But first, let us continue on to the basics.

Blueprint Original and Blueprint Copy

To build anything in EVE, you will need a blueprint to do it. This goes for ships, ammo, drones, modules and anything else you want to fit on your ship. **BluePrint Originals**, herein referred to as **BPO**, come under different technology level. A BPO is a blueprint that has an unlimited amount of runs on it, whereas a **BPC (BluePrint Copy)** is an exact copy based on a BPO that has a limited amount of runs on it.

All T1 BPO are sold from NPC vendors, whereas all BPC are player-made. A BPC is in fact, an exact copy of a BPO made in a lab by a player, with the same Material Level (ME) and Productivity Level (PE) as the BPO. The number of runs available on the BPC depends on the player who made it. The higher the number of runs, the longer it takes to copy a BPO.

Tech 1 BPO can all be purchased anywhere in EVE from NPC vendors. Note that all BPO have a racial attribute to them. For example, a T1 425mm Hybrid Turret is considered to be a Gallente item, therefore the the BPO to build that item will only be available in Gallente space. Tech 1 BPO are available in unlimited quantities on the market.

3. Manufacturing

Tech 2 BPO on the other hand used to be won through a lottery system many years ago, a system that was deemed unfair and a mistake that has thus been ceased quite some time ago. It is now only possible to obtain them by buying them from other players. You can however obtain tech 2 BPC through a process called **Invention**, a very specialized branch of EVE Science which is covered later in the guide in its own section.

Tech 3 production is handled differently and is also covered in its own section.

Understanding ME and PE

When you purchase a brand new BPO from a NPC vendor in a station (tech 1 only, we will cover T2 and T3 BPO later), it will be sold as what you could call a “virgin” BPO, with a Material level, herein referred to as **ME**, of 0 and the same for the Productivity Level (**PE**).

To increase both those values, you will need to research that blueprint in a laboratory, either in a station or in a mobile laboratory anchored at a starbase. We will cover how to research and what skills affect researching a little later. For now we will concentrate on understanding how ME and PE works.

When you try to produce an item, there will be some waste involved. That waste is affected by:

- 1) Your Production Efficiency skill level
- 2) The Material Research level on the BPO.

The higher the ME level on a BPO, the smaller the waste will be. That is all you need to know for now about ME and PE. For a more detailed overview on their effect on production, refer to the Research section of the guide.

To see the amount of materials you need, simply click on the “Bill of Materials” tab in the BPO’s information window.

All the materials listed there are according **to your skills** and the current ME level of the BPO. The “perfect” list of materials is only available if you look in the EVE database.

The screenshot shows the 'PASSIVE TARGETING SYSTEM BLUEPRINT: INFORMATION' window. It features a 'PASSIVE TARGETER I BLUEPRINT' icon and two tabs: 'ATTRIBUTES' and 'BILL OF MATERIALS'. The 'Original Blueprint' is highlighted. Below this, it states 'Produces Passive Targeter I [1]'. The 'GENERAL INFORMATION' section lists: MATERIAL LEVEL 50, WASTAGE FACTOR 0.19%, COPY No, PRODUCTIVITY LEVEL 10, LICENSED PRODUCTION RUNS REMAINING Infinite, and PRODUCTION LIMIT 300. The 'MANUFACTURING' section shows: MANUFACTURING TIME 8 Minutes, 10 Seconds and MANUFACTURING TIME (YOU) 6 Minutes, 32 Seconds. The 'RESEARCHING' section lists: RESEARCH MATERIAL TIME 3 Hours, 20 Minutes; RESEARCH MATERIAL TIME (YOU) 2 Hours, 30 Minutes; RESEARCH COPY TIME 6 Hours, 40 Minutes; RESEARCH COPY TIME (YOU PER SINGLE COPY) 1 Minute, 4 Seconds; RESEARCH PRODUCTIVITY TIME 3 Hours, 20 Minutes; and RESEARCH PRODUCTIVITY TIME (YOU) 2 Hours, 30 Minutes.


3. Manufacturing

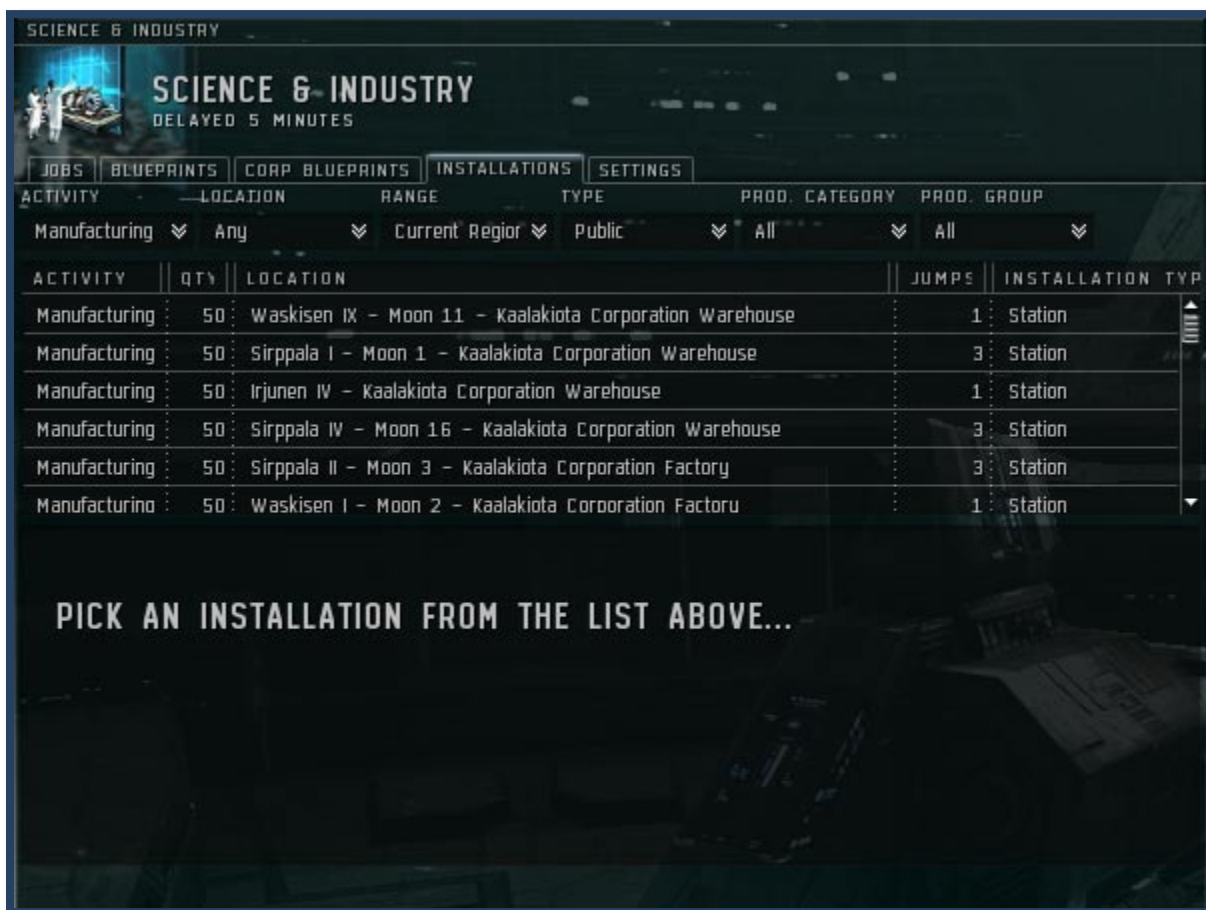
Tech 1 Manufacturing

For all tech 1 modules and ships, all you will need to actually build the items are the minerals and the BPO (**B**lue**P**rint **O**riginal) or a BPC (**B**lue**P**rint **C**opy).

If you have read the mining section of this guide you will already know what minerals I am talking about. As a refresher course, they are Tritanium, Pyerite, Mexallon. Isogen, Nocxium, Megacyte, Zydrine and finally Morphite.

To know the mineral requirements for the item you wish to build, simply do a *show info* on the BPO/BPC, then look under *Material Requirements*. It should look like the image on the left. This list reflects your skills and the current ME level of the BPO/BPC you are looking at.

Once you have the material in the required quantities and the BPO itself, you will need to find a manufacturing installation, more commonly referred to as a slot, somewhere in space. Many of the stations have them, usually 50 slots. To find out if slots are available, you need to open the **Science & Industry** window  anywhere in space. That window is found on the left side menu and accessible via an icon that looks like this.



ACTIVITY	QTY	LOCATION	JUMPS	INSTALLATION TYP
Manufacturing	50	Waskisen IX - Moon 11 - Kaalakiota Corporation Warehouse	1	Station
Manufacturing	50	Sirppala I - Moon 1 - Kaalakiota Corporation Warehouse	3	Station
Manufacturing	50	Irjunen IV - Kaalakiota Corporation Warehouse	1	Station
Manufacturing	50	Sirppala IV - Moon 16 - Kaalakiota Corporation Warehouse	3	Station
Manufacturing	50	Sirppala II - Moon 3 - Kaalakiota Corporation Factory	3	Station
Manufacturing	50	Waskisen I - Moon 2 - Kaalakiota Corporation Factory	1	Station

PICK AN INSTALLATION FROM THE LIST ABOVE...

3. Manufacturing

Once open, proceed to the installation tab. You can filter the results either by system, constellation or region. This is a great way to scan down open and available slots for the entire region you are in now, rather than docking at each and verifying manually. You should note that not all stations offer manufacturing equipment, so don't be surprised if a system does not have any!

Once you found an open slot, pop in your hauler and very carefully bring your BPO and material to that station. Dock up, and unload your cargo in your items hangar. You are almost ready to build your stuff!

The next steps are pretty straight forward...

1) Right-click your BPO or BPC and choose *Manufacturing*



2) A new Window will open. It will have the following fields:

- a. **Installation:** This is where you choose the slot you want to use
- b. **Blueprint:** Reminds you of the BPO you just chose
- Input:** This is the hangar where the material is in. If you produce from a corp hangar, the BPO might not be in the same one as the material, so you need to change this.
- c. **Output:** This is where the product will be put once you deliver it after it is done
- d. **Runs:** Number of runs you want to do

3) Next, you must pick your installation. Click on the *Pick Installation* button, to open the following window:



Caldari Illuminati is proud to support The Complete Miner's Guide



"We are the Alpha and the Omega, the first and the last, the beginning and the end"

CALDARI
ILLUMINATI

As a predominantly industry and trade focused corporation, mining is the lifeblood of our operations. Not only does the guide give you everything you need to maximize your efficiency as a miner, it describes a sound approach to industry in general.

The Complete Miner's Guide is required reading for all members of our corporation.

- Pax Magnus
CEO, Caldari Illuminati

3. Manufacturing

SCIENCE & INDUSTRY - PICK INSTALLATION

ACTIVITY: Manufacturing | LOCATION: Any | RANGE: Current Bluepr | TYPE: Public | PROD. CATEGORY: All | PROD. GROUP: All

ACTIVITY	QTY	LOCATION	JUMP	INSTALLATION TYPE	OWNER
Manufacturing	10	094 Hephaestus	0	Station	Lone Star Joint Venture
Manufacturing	20	094 Hephaestus	0	Station	Lone Star Joint Venture

Filtering options: ALLOW ALLIANCE MEMBER USAGE | ALLOW CORPORATION MEMBER USAGE | ALLOW BY STANDING RANGE | ALLOW BY SECURITY RANGE

#	ACTIVITY	NEXT FREE TIME	INSTALL COST	COST PER HOUR	TIME MULTIPLIER	MATERIAL MULTIPLIER	AVAILABILITY
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted
1	Manufacturing	Now	0.00 ISK	0.00 ISK	1.0	1.0	Restricted

Select Assembly Line above...

TOGGLE FULL LIST

CLOSE

the top section of the window will list all available installations in the range and type you have selected.

- Range:** blueprint location (for POS production), current station, solar system, constellation or region.
- Type:** Public, Corporation or Personal (will show only in a Rorqual). Public slots are the ones available to anyone. Corporation has to be selected if you are looking to produce at a POS facility or if the production slots in a 0.0 outpost have been restricted to your corp only. Personal what you must choose if you are doing a compression job in your Rorqual.

The lower section of the window will list the installations themselves, mentioning their availability, install cost, cost per hour, time multiplier, material multiplier and whether the slots are public or restricted.

Install Cost and Cost per Hour is the same in Empire across all stations. It is however set by the controlling player corporation in 0.0 space. The time multiplier is a standard 1.0 across all stations, except for the Amarr Factory Outpost, which has a default 0.7 multiplier, and is therefore 30% faster than other stations in the game.

3. Manufacturing

The material multiplier is always 1.0 in stations, however it can change in certain POS equipment. For example, the Rapid Equipment Assembly Array has a 1.1 material multiplier. You produce faster but it costs you 10% more to do it.

There are different filtering options you can use to sort through the installations. However they are currently bugged at the time of this writing and you should uncheck them.

Finally, the *Toggle Full List* option allows you to display between a list of all the installations regardless if they are busy or free, or simply list one installation that is free.

- 4) Next, simply choose a free installation and click on *Use Assembly line*. This will bring you back to our original window:



Don't forget to set the correct Input and Output (this should be set to *my hangar* when you produce from your own personal hangar). Finally set the number of runs you want, and press OK.

- 5) A confirmation window will open. It will list the materials you need and confirm what is there in sufficient quantity or what is missing. Note that the window will not tell

NAME	REQUIRED	MISSING	DMG/JOB	WASTE	
Raw Material					
✔ Tritanium	2911405	0	100%	0.9%	i
✔ Pyerite	648218	0	100%	0.9%	i
✔ Mexallon	217425	0	100%	0.9%	i
✔ Nocxium	13606	0	100%	0.9%	i

Production Start Time	Now	Wallet Division	Mining payouts
Production Time	1 Hour 56 Minutes 40 Seconds	Material multiplier (assembly line & item)	1.0
Total cost	117,222.22 ISK	Material multiplier (skill based)	1.0
Install cost	20,000.00 ISK	Time multiplier (assembly line & item)	0.7
Usage cost	97,222.22 ISK	Time multiplier (skill based)	0.8

ACCEPT QUOTE

CLOSE



3. Manufacturing

you *HOW MUCH* is missing. It simply tells you what the total requirement is, and if you meet it or not.

It will report the time it will take and the total cost. **When you press ACCEPT QUOTE, there is no turning back!** The material will disappear from your hangar along with the BPO or BPC. If you cancel the job while in production or in queue, you will lost it all!

About the queue: you can start a job at a busy installation and your job will automatically be queued. It will start when the current job is finished.

That's it! There really nothing more to it. The various POS equipment and facility you can use to build in the will be covered in the starbase section of the guide.

Producing from a distance

The *Supply Chain Management* skill is something you will need to train (level 1 will do) if you want to produce efficiently. When this skill is trained, it allows you to to keep your BPO locked safely in a corporate hangar and issue a production job remotely. Otherwise, you would need to bring the BPO **as well as** the material to the assembly array at the POS, which is risky and unsafe.

Since BPO usually represent a substantial investment, keeping them locked up and safe is the best course of action.

3. Manufacturing

Tech 2 Manufacturing

Tech 2 production is a much more painful and complex process. It involves the mining of moon materials, running those materials together through starbase equipment (reactors) to manufacture new reaction materials, then using those reactions to build special components. Finally, you will get your final product by assembling those components.

The following section has been greatly inspired by the following [guide](#), however I could not reach the original author. Most of the graphs are of his design. Thanks to him!

Skills you will need...



✓ Industry 5

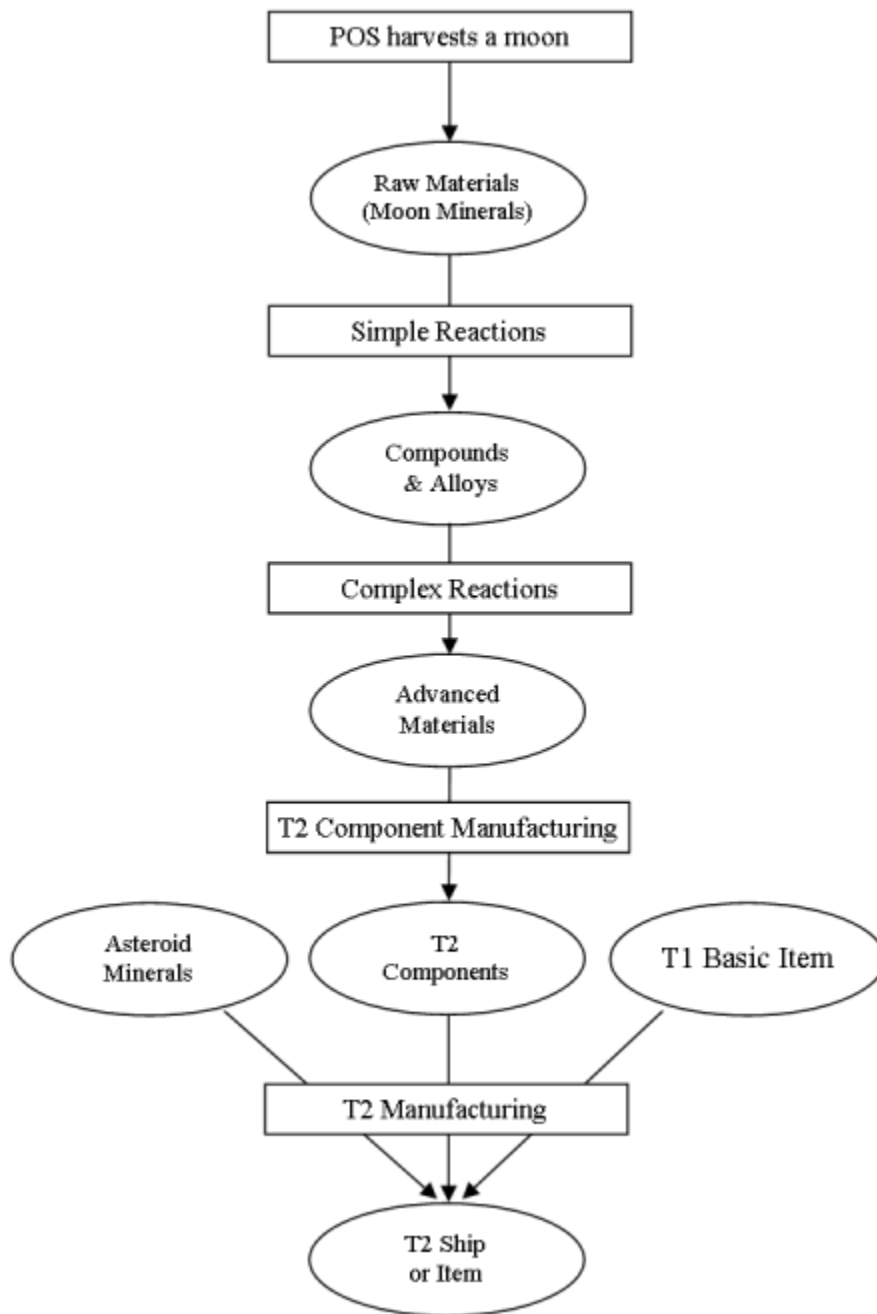
✓ Science 5

✓ A crapload more

(it differs for each BPO and is dependant on race. A show info on the BPO of the item you want to produce will tell you the skills you need quickly).

This section will not explain the process of inventing or moon mining, but rather the process of getting a T2 product from scratch. As it was said, T2 BPO are no longer seeded and must be acquired from another player. You can obtain BPC through invention, which is covered later.

On top of the usual minerals, you will need special material to build special components. The first step of the process is moon mining, that is, deploying a POS at a moon and deploy mining equipment to harvest its resources.



3. Manufacturing

There are many moons in EVE, not all of them have materials that can be mined, and not all materials have the same value. Just like for minerals you mine from asteroids.

There are 5 classes of materials that can be mined from a moon, and they are:

1. **Gasses:** Atmospheric Gases, Evaporate Deposits, Hydrocarbons, Silicates
2. **Rarity 8 metals:** Cobalt, Scandium, Titanium, Tungsten
3. **Rarity 16 metals:** Cadmium, Vanadium, Chromium, Platinum
4. **Rarity 32 metals:** Cesium, Technetium, Hafnium, Mercury
5. **Rarity 64 metals:** Promethium, Dysprosium, Neodymium, Thulium

Gasses are easily found. Rarity 16 metals are twice as rare as rarity 8, rarity 32 metals twice as scarce as rarity 16, and so on. r64 materials are of course much more difficult to find, and are thus worth more than gasses or r8 metals. The relationship between r32 and r64 however often changes, and it is not rare to see r32 metals, even r16, worth more than certain r64 metals. You will understand why shortly.

If you don't have any moons or starbases, it does not mean you cannot build tech 2 stuff! The Jita market is full of those materials! If you're a T2 producer, you'll gain a lot from controlling that step in the chain, but plenty of T2 producers don't mine moons (mostly because, they can't! All r64 moons especially are controlled by powerful alliances, and any moons worth mining are usually taken and protected by a powerful group of players. Moons are infinite in resources, therefore they are the source of many disputes and wars) and make a good profit!

Perhaps now you are starting to understand why tech2 items and ships are more expensive than tech1. The expenses of running a starbase and defending already induce a significant cost.

Simple reactions

A simple reaction is the process of using two batches of two different raw materials and "fusing" them together to create an alloy or a compound. A batch, when it comes to moon materials, is always 100 units, since a moon harvester mines 100 units every hour.

Therefore, you will need 200 units of raw material to obtain 200 units of compound or alloy. The reaction happens once per hour.

On the following page you will find a table that highlights the different alloys and compounds you can make. Note that just like raw materials, compounds also have "rarity groups". The higher the number, the more difficult it is to produce them.

Simple reactions can take place in either a medium or "regular" reactor array. The raw materials for the reaction need to come from a silo, coupling array, or directly from a moon harvesting array. The output of the reaction must be directed to a silo or coupling array.

Example:

Silo 1: 1st material

Silo 2: 2nd material

Reactor: for the reaction blueprint

Silo 3: for the output and final product, the alloy or compound

3. Manufacturing

The exact details on how to setup such a chain can be found in the starbase section.

		Sulfuric Acid	Silicon Diboride	Ceramic Powder	Carbon Polymers	Crystalite Alloy	Ferrite	Titanium Cromide	Rolled Tungsten	Hexite	Caesium Cadmide	Solerium	Pt Technite	Vanadium Hafnide	Prometium	Hyperflurite	Ferrofluid	Dysporite	Neo Mercurite	Fluxed Condensates
I	Atmospheric Gases	100																		
	Evaporate Deposits	100	100	100																
	Hydrocarbons				100															
	Silicates		100	100	100															
II	Cobalt					100														
	Scandium						100													
	Titanium							100												
	Tungsten								100											
III	Cadmium					100					100				100					
	Vanadium						100							100		100				
	Chromium							100		100		100								
	Platinum								100	100			100							
IV	Caesium										100	100								
	Technetium												100							
	Hafnium													100			100			
	Mercury																	100	100	
V	Promethium														100	100				
	Dysprosium																100	100		
	Neodymium																		100	100
	Thulium																			100
		I				II				III	IV				V		VI		VII	
	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

Reaction blueprints can be found from NPC vendors in Empire, and are only good for one reaction. Unlike other BPO, they do not require research!

Complex reactions

We now move on to the 3rd stage of Tech 2 production (remember: 1st one is moon mining, 2nd one is simple reaction).

As you might have guessed it, you will need to use your simple reactions as input material to produce your complex reactions. Unlike simple reactions however, it is not rare to use 3, even 4 simple alloys or compounds for a complex reaction. Complex reactions use, of course, the complex reactor array.

Whereas the input is 100 units for each allow you need, the output varies greatly depending of the complex reaction you are doing. Like simple reactions, complex reactions cycle once per hour. Outputs from compound reactions are called "Advanced Materials."

3. Manufacturing

Here's a table for complex reactions:

		Tungsten Carbide	Titanium Carbide	Ferrite Carbide	Crystalline Carbonide	Sylramic Fibers	Fulleride	Phenotic Compositis	Nanotransistors	Hypersynaptic Fibers	Ferrogel	Fermionic Condensates
A	Sulfuric Acid	100							100			
	Silcon Diborite		100					100				
	Ceramic Powder			100		100						
	Carbon Polymers				100		100					
B	Crystalite Alloy				100							
	Ferrite			100								
	Titanium Cromide		100									
C	Rolled Tungsten	100										
C	Hexite					100					100	
D	Caesarium Cadmide							100				100
	Solerium									100		
	Pt Technite						100		100			
	Vanadium Hafnite							100		100		
E	Prometium										100	100
	Hyperflurite										100	
F	Ferrofluid										100	
	Dysporite									100		100
	Neo Mercurite								100			
G	Fluxed Condensates											100
Output (units)		10,000	10,000	10,000	10,000	6,000	3,000	2,200	1,500	750	400	2

If you look at this chart, you will notice a few things.

Ferrogel and Fermionic Condensates both require a great deal of material to produce. Materials in group A and D are used for 2 complex reactions at least, whereas most of the rest only for one. The reactions on further right require rarer and more difficult simple reactions, and are therefore more costly.

How do you link this all together? You need to study this carefully when choosing WHAT tech 2 product you will want to produce, since it will heavily influence the amount of capital in ISK you will need to invest to make profit.

Once your complex reaction ends, you will end up with an **advanced material**. The next step is the production of tech 2 components.

3. Manufacturing

Tech 2 Components

The production of tech 2 components is done much like you would build a tech 1 ship or item, however instead of minerals, you will need the advanced materials you've just created in your complex reaction.

Each race has 11 different components. Therefore there is a total of 44 components you can build, and you will need a BPO for each of these. Thankfully, tech 2 components BPO are available in unlimited quantities from NPC vendors. They are cheap and easy to find.

Amarr Components

	<i>Tungsten Carbide Armor Plate</i>	<i>Linear Shield Emmitter</i>	<i>Tesseract Capacitor</i>	<i>Laser Focusing Crystals</i>	<i>Nanoelectrical Microprocessor</i>	<i>Emp Pulse Generator</i>	<i>Fusion Thruster</i>	<i>Radar Sensor Cluster</i>	<i>Antimatter Reactor</i>
Tungsten Carbide	40	28	24	39	17	28	17	20	11
Titanium Carbide									
Fernite Carbide									
Crystalline Carbonide									
Sylramic Fibers	30	11							
Fulleride			15	14					
Phenolic Composit					1	8	4		
Nanotransistors			1		7	3		1	
Hypersynaptic Fibers				1				2	
Ferrogel		1					1		1
Fermionic Condensates									1

Gallente Components

	<i>Crystalline Carbonide Armor Plate</i>	<i>Pulse Shield Emmitter</i>	<i>Oscillator Capacitor Unit</i>	<i>Particle Accelerator Unit</i>	<i>Photon Microprocessor</i>	<i>Plasma Pulse Generator</i>	<i>Ion Thruster</i>	<i>Magnetometric Sensor Cluster</i>	<i>Fusion Reactor Unit</i>
Tungsten Carbide									
Titanium Carbide									
Fernite Carbide									
Crystalline Carbonide	46	23	28	32	14	23	14	23	9
Sylramic Fibers	35	9							
Fulleride			17	12					
Phenolic Composit					1	7	3		
Nanotransistors			1		6	2		1	
Hypersynaptic Fibers				1				2	
Ferrogel		1					1		1
Fermionic Condensates									1

3. Manufacturing

Caldari Components

	Titanium Diboride Armor Plate	Sustained Shield Emitter	Scalar Capacitor Unit	Superconductor Rails	Quantum Microprocessor	Graviton Pulse Generator	Magpulse Thruster	Gravimetric Sensor Cluster	Graviton Reactor Unit
Tungsten Carbide									
Titanium Carbide	46	23	28	32	14	23	14	23	9
Fernite Carbide									
Crystalline Carbonide									
Sylramic Fibers	35	9							
Fulleride			17	12					
Phenolic Composites					1	7	3		
Nanotransistors			1		6	2		1	
Hypersynaptic Fibers				1				2	
Ferrogel		1					1		1
Fermionic Condensates									1

Minmatar Components

	Fernite Carbide Composite Armor Plate	Deflection Shield Emitter	Electrolytic Capacitor	Thermonuclear Trigger	Nanomechanical Microprocessor	Nuclear Pulse Generator	Plasma Thruster	Laser Sensor Cluster	Nuclear Reactor
Tungsten Carbide									
Titanium Carbide									
Fernite Carbide	46	23	28	32	14	23	14	23	9
Crystalline Carbonide									
Sylramic Fibers	35	9							
Fulleride			17	12					
Phenolic Composites					1	7	3		
Nanotransistors			1		6	2		1	
Hypersynaptic Fibers				1				2	
Ferrogel		1					1		1
Fermionic Condensates									1

The process of building it is quite simple. Put the BPO and the advanced materials in your corp's or personal hangar, and start the manufacturing job as it was explained in the tech 1 section.

You will notice each race has very similar components in name: armor plates, shield emitter, capacitor, a kind of weapon unit, microprocessor, pulse generator, thruster, sensor cluster and a reactor



3. Manufacturing

These components require similar materials among all the races, and in similar (though not identical) quantities. Therefore you will benefit from your reactions more if you produce more than one kind of tech 2 product.

You will also notice each race has an exclusive advanced material they use. For example, Gallente components all use Crystalline Carbide, but no other race does. Crystalline Carbonide is made from Carbon polymers and Crystalite Alloy. Crystalite Alloy comes from a reaction with Cobalt and Cadmium. Cobalt is an r8 metal and only reacts with Cadmium. So the only technologies that would have any use for Crystalline Carbonide, Crystalite Alloy, or Cobalt are Gallente technologies, but they would certainly have a lot of use for it since all the components require it.

Depending of what the flavor of the month is, it pays off to keep a look on the PvP side of things. If next week Amarr ships would suddenly rise in popularity, then the demand of Tungsten Carbide would rise. The effect of the increase in demand would be felt all along the chain. Since Tungsten Carbide requires Sulfuric Acid and Rolled Tungsten, and that Rolled Tungsten requires Tungsten and Platinum, you could expect the value of Platinum especially to rise quickly.

As you might have understood by now, the T2 market is as big of a market playground than the mineral trading business is. Since the production chain for tech 2 is so long, the end product prices can easily be manipulated or changed by manipulating simply one step along the way.

That's it

Now that you have your components, you are ready to build your ships or modules.

Take note that a lot of the tech 2 builders simply buy either the complex reactions or the advanced materials off the market, invent their own BPC, and build their components that way. Obviously, the more steps you are in control of, the better your profit margin is!

Whether it is worth it for you to buy your components already built, buy raw material then take care of the reaction chain process, or simply buy the advanced materials all ready to go, this is your decision to make. It should definitely be cheaper to buy your raw materials and do your own reactions, however, considering the adding risks (you can't online a reactor in high-sec, only in 0.3 or lower) and added cost, it comes down to risks vs rewards and how well you are organized and how much you are willing to invest.

3. Manufacturing

Capital Ship Production

Capital production in EVE is a very lucrative business, one that is not without risks but with great rewards. The downside is that it will require a very sizeable initial capital investment to make it worthwhile.

Capital production includes the following ships:

Capital Ship	Can be Built in Empire	Number of different components
Orca	Yes	7
Freighter	Yes	4
Rorqual	No	14
Dreadnought	No	12- 13
Carrier	No	12

First, a word about the components. Just like tech 2 production, you must first build your components, then assemble your ship with those components.

There are 19 different capital components in total. These BPO can be purchased in Empire space

from NPC vendors. Alternatively, you can look on contracts for BPC. Those components are much easier to build than tech 2 ones: all you need are the basic minerals, minus morphite, and you're good to go!

What you will notice looking at the table above is the lower number of different components required for the Orca and the Freighter. The cost for each component BPO ranges from 740mil to 1.3bil ISK, approximately, thus making orca and freighter production a good starting business since you will need less ISK in capital to get production going. Factor in the fact you can build them in Empire, it is more than ideal. Unfortunately, it is so ideal that a lot of people build them, making the profit margin smaller than it is for dreadnoughts, carriers and rorquals.

The 19 components are the following, with their respective mineral requirement and cost:

Component Name	Qty	Cost	Volume	Tritanium	Pyperite	Mexallon	Isogen	Nocxium	Zydrine	Megacyte
Capital Armor Plates	1	4,657,037.34	10,000.00	426,662	100,202	39,068	6,411	1,931	308	137
Capital Capacitor Battery	1	3,899,679.21	10,000.00	294,853	97,248	35,662	5,807	1,660	298	126
Capital Cargo Bay	1	4,696,366.49	10,000.00	788,956	65,066	22,197	3,160	900	129	29
Capital Clone Vat Bay	1	6,142,034.62	10,000.00	577,484	125,878	43,710	8,015	2,356	488	200
Capital Computer System	1	4,417,334.21	10,000.00	385,692	100,195	39,777	5,935	1,675	293	133
Capital Construction Parts	1	3,753,393.23	10,000.00	350,072	84,564	34,023	4,603	1,380	242	95
Capital Corporate Hangar Bay	1	5,915,612.74	10,000.00	526,128	131,355	46,258	8,405	2,415	423	196
Capital Doomsday Weapon Mount	1	7,819,313.44	10,000.00	759,175	187,365	55,891	10,039	2,991	500	258
Capital Drone Bay	1	3,315,019.62	10,000.00	313,060	75,070	30,058	4,057	1,134	219	77
Capital Jump Bridge Array	1	10,918,502.94	10,000.00	1,011,472	251,390	67,974	15,933	3,765	671	511
Capital Jump Drive	1	6,425,188.55	10,000.00	676,247	128,691	45,010	7,770	2,028	410	200
Capital Launcher Hardpoint	1	4,921,302.65	10,000.00	425,320	99,528	40,321	6,937	2,127	388	155
Capital Power Generator	1	4,947,434.70	10,000.00	460,034	99,567	41,140	6,755	1,976	329	150
Capital Propulsion Engine	1	4,487,479.37	10,000.00	412,152	99,569	37,869	6,256	1,903	273	136
Capital Sensor Cluster	1	4,386,061.46	10,000.00	400,015	91,101	36,861	6,005	1,627	301	134
Capital Shield Emitter	1	4,778,547.79	10,000.00	449,872	94,646	38,951	6,555	1,834	314	149
Capital Ship Maintenance Bay	1	6,015,325.30	10,000.00	520,101	171,283	48,075	8,125	2,219	412	187
Capital Siege Array	1	5,519,655.30	10,000.00	501,073	112,970	42,607	7,138	2,198	410	193
Capital Turret Hardpoint	1	5,297,842.34	10,000.00	493,186	102,644	40,588	6,998	2,126	395	174

3. Manufacturing



All you need after the components is the ship's BPO itself. They cost approx the following:

Orca: 880mil

Rorqual: 3.1bil

Carrier: 770mil

Dreadnought: 1.3bil

Freighter: 800mil

Again, you can see the initial investment if you want to get all the BPO to sustain your production can be expansive. Just for the Orca alone, if you'd like all the BPO you need, the initial investment would be close to 6bil ISK. It's not the sort of career you will undertake in your first year, unless you sell a whole lot of GTC!

Skills you will need...

✓ **Capital Ship Production 1 (requires Mechanic 5, Industry 5, Production Efficiency 5)**

Capital Ship Production 1 will suffice for carriers, dreadnoughts, orcas and freighters. You will need it at level 4 if you want to build rorquals. Other than meeting a skill requirement, training that skill brings no benefit whatsoever.

As you have noticed by the table above, carriers, dreadnoughts and rorquals can only be built in low-sec, either at a POS, or in a low-sec station. A lot of cap builders build in low-sec stations. There

are MANY of them around with loads of free slots. The only issue with low-sec production is the mineral supply: freighting mins across low-sec can be dangerous and isn't very practical.

If you are organized however, this is easily circumvented. An easy tip: while harder to find, there are plenty of stations that are in low-sec right next to a high-sec system that isn't too busy. With a scout and a double-web, you can easily enter a freighter in low-sec, dual web it to have it enter insta-warp and avoid a gank.

Otherwise, you can use a jump freighter, to jump mineral directly from Empire on top of a station. If you are careful and pop your cyno at the right place, your Jump Freighter will be able to insta dock after jumping thus making the venture risk free. Be careful though: some stations will "spit" you out when you undock, making you out of dock range after undocking.



3. Manufacturing

Avoid using those stations to produce: undocking a freighter that is out of docking range is an easy target for pirates, and a mistake people often make.

A Jump Freighter, using a mineral compression system (which has nothing to do with ore compression, which is exclusive to the rorqual. More on that in the Outpost section, under "Deep Space Production") is the safest and easiest way to keep production going in low-sec.

Producing at a POS

Producing your components in a station and the actual ship at a POS is a technique a lot of cap builders use. The main reason being, the X-Large Ship Assembly Array has a 0.75 time multiplier, in other words, you produce your ships 25% faster.

All you'll need is a large tower with a deathstar setup (refer to our starbase section for setups and tips on how to fit your towers for defense!) and a X-Large Ship Assembly Array. You will need a freighter, too: if you build at a POS, you will need to freight the capital components to the assembly array, since each component are 10,000.00m3 in size, you'll have quite a load to haul to the POS very often, and doing it in a hauler might make you go crazy. Do yourself a favor and get a freighter: you'll just need to do two trips to bring all the components you need for a carrier, rather than 50. Time is money friend!

That's about it

Cap production isn't very complexed or difficult by itself. The difficult park is first getting that ISK to buy all the BPO you need. The biggest headache is figuring out your mineral supply: unless you get organized, you'll get angry very quickly at the gargantuan amount of trit you'll need to buy all the time. THAT, is the most difficult aspect of capital production.

Get organized, and you'll make ISK. The demand for them is practically infinite: there are so many conflicts in New Eden, especially between the big alliances that a carrier and dreadnought business will mean you never have to worry about the market. Follow the political map, get informed on the conflicts, sell your caps in a low-sec region near said conflict, and you'll sell them as fast as a condom dispenser gets emptied during an orgy. Yeah, that's right!

3. Manufacturing

Supercapital Production

Supercap production refers to the manufacturing of motherships and titans. As you might have come to expect, the profit margin in this business is huge, however so is the investment. So why isn't everybody and their cousins saving up to pop a new titan every 6 weeks?

The biggest factor is: space. More importantly: sovereign space. Titans and motherships are built just like any other capital ships: first you build the components, then you assemble those components into a ship. However, unlike every other caps, you **must** build motherships (or moms, for short) and titans at a *Capital Ship Assembly Array*, which can only be anchored in space in which your alliance holds Sovereignty 1 (more about Sovereignty in the starbase section).

This, of course, means 0.0 space. Controlling it, protecting it. This already entails only alliances can build these supercaps. Whoever says 0.0 says:

✓ Logistic issues

Sorting the mineral supply. A Titan for example, needs more than 1 billion units of tritanium alone. For the inexperienced, this is already a barrier.

Also, the Capital Assembly Array only fits in a freighter. You cannot jump it using a Jump Freighter. This means a freighter operation across sometimes as much as 30 to 50 jumps.

Finally, the production of the components themselves. You'll need about 6300 parts for an Avatar. That's 63,000,000.00m3 worth of parts, 12,600 hours of production. That means you need access to a factory outpost, and you'll probably need to build components without rest for almost a month, and that's if you use all the 20 available slots available.

Sounds like a logistic challenge? Yes it is!

✓ Price

A mothership BPO costs about 13bil ISK, while a titan is close to 60bil ISK.

✓ Nice ship, we'll take it!

The risks, of course, are substantial. Whoever sees a cap assembly array will think: monies! It is always a very fat and juicy target that an enemy will try to destroy. For this reason, most alliances build their titans and motherships in a system with capital sovereignty (also called sov 4), which renders all starbases and the outpost unlockable, thus untouchable.

Sov 4 is achieved in a constellation where the majority of systems have sov 3, and where there are at least 3 Outposts. The implications of achieving capital sov are already important, thus not within your average alliance's reach.

For all the reasons above, this is why you don't see 30 new titans being auctioned off every week, and why their profit margin is so huge (currently, the mineral cost of building an Avatar is close to 40bil ISK, whereas they sell for over 100bil in auctions!).

Building supercaps is done by a team, a lot of manpower and a lot of security measures!



3. Manufacturing

Tech 3 Manufacturing

This section of the guide is due for release on April 10th 2009.

4. Research

4. Research

Skills you will need...



- ✓ **Laboratory Operation 1**
- ✓ **Research 1** (5% bonus to blueprint manufacturing time research per skill level)
- ✓ **Science 1** (5% Bonus to blueprint copying speed per level)
- ✓ **Metallurgy 1** (5% Bonus to material efficiency research speed per skill level)

Skills that will help...



- ✓ **Advanced Laboratory Operation** (+1 lab slot per level)
- ✓ **Cybernetics 5** (allows to plug in special implants that speeds up the research process)

Implants that that will help...



- ✓ **The Beancounter series**

Research 101

Research is the process of increasing the ME and PE level of a BPO to reduce their production waste or decrease their production time.

If you remember from our Manufacturing section, wastage is always added to the base mineral amount of what you are producing, and no matter how good your skills are or what equipment you use, you will never reduce the amount below the basic requirements. To figure out what the basic or “perfect” amount is, either look up the BPO on the Eve Database or using an application such as EVE-MEEP (see resources section).



There has been a lot of confusion and many posts on the forums about what incompetence waste really is. In fact, CCP has changed the way ME and PE affects a BPO a few times already, making it really hard to understand the actual system. Production Efficiency skill says you get a 4% reduction per skill level to the material requirements needed for production, however the player guide says 5%.

4. Research

According to the skill's description, which suggests 4%, you should end up with a 5% waste with your skill at level 5 (25% base incompetence waste – (4% x 5) = 5%). However testing in games have proven you get a 0% incompetence waste at level 5, therefore the skill's description is wrong. **Regardless of what it is, you should have Production Efficiency trained to level 5 before you even start producing.**

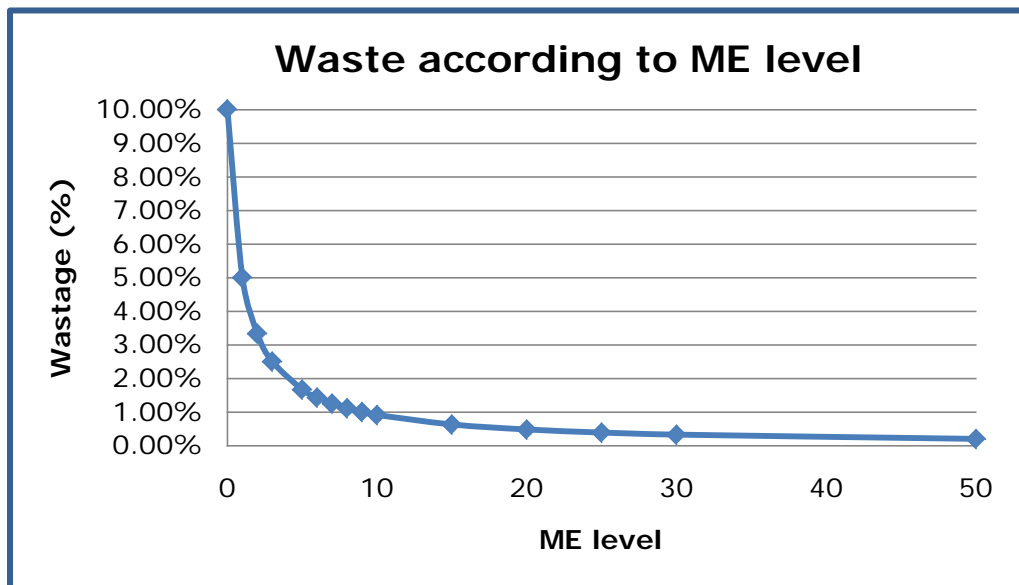
When you reach Production Efficiency level 5, you are no longer incompetent at producing, so you are not personally inducing waste onto your production job. However, as already stated, a brand new BPO has waste embedded in its design and you will need to research it to increase the ME level to reduce that waste. Note that the Production Efficiency skill (PE) has nothing to do with the Productivity Level (PE) attribute you see under a BPO's information window. The PE attribute affects the SPEED of the production whereas the PE skill affects the wastage. Easily confused, easily explained.

You can reduce this waste by researching the Material Level (ME) of the BPO. You can see the design waste on the BPO under Wastage Factor. This is always 10% (0.1) except for some rare items that have a 5% (0.05) Wastage Factor. Drones used to have a 5% wastage factor, but apparently they don't anymore. By researching the BPO we can reduce the design waste using the following formula: $1 + \text{Base Wastage} / (1 + \text{ME level})$.

Using the above formula on a BPO with 10% base wastage, we can calculate our production waste (assuming PE skill at level 5) to be:

- ME0 - 10%
- ME1 - 5%
- ME2 - 3.3%
- ME3 - 2.5%
- ME10 - 0.9%
- ME50 - 0.2%

As you can see, training your ME level from 0 to 10 reduces the waste from 10% to 0.91%, thus reducing the waste by over 9% in simply 10 levels, whereas training a further 40 levels (11-50) only takes off 0.7% (from 0.9% to 0.2%).



The following graph can better illustrate the effect of training ME to higher levels.

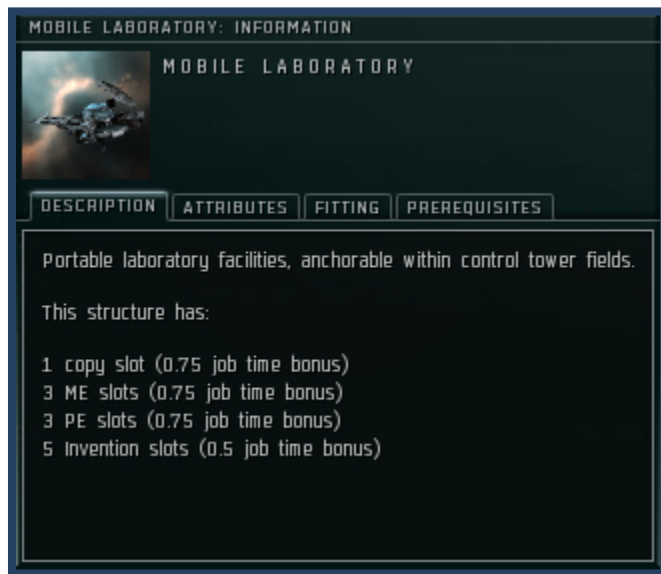
It should be clear that the more you research the less you gain from that research. How does this affect you?

A general rule of thumb used by the producers is that 30 days of research is usually sufficient.

4. Research

How far do you go

When you'll research either the ME or PE level of a BPO, you'll want to do it at a POS. The main reason being the 0.75 time multiplier. Saving 25% off your research time (30% if you were smart enough to train cybernetics 5 and have those nifty Beancounter X60 implants in your head) means a lot. How far you are going to take it depends entirely of what you will do with your BPO.



Manufacturing business

If you're going into production, then you won't be taking your research to crazy ME levels that even Amy Whinehouse would not consider had she enough brain cells left to actually play the game. But let me explain myself further.

I will use the beloved Raven, mother of all ratting ships, as my example.

The build cost of a Raven these days, at:
ME0, is ~85.2mil ISK
ME10, is ~78.1mil ISK
ME20, is ~77.7mil ISK

Remember that graph? The more you research, the less you get out of it. This is where my "30 days worth of ME research is enough" comes from.

For a battleship BPO, with max skills (in this case, Metallurgy 5), it would take close to 27 days to research a Raven BPO from ME0 to ME10, at a POS, of course. So for about 1 month of training for the first then levels, you shave more than 7mil ISK off your production costs.

However, another month worth of research would only shave another 400,000.00 ISK, not even a million! Considering it takes 4 hours to produce a Raven at PE0, you'd need to sell several hundred Raven to make your second month of research worth it!

My personal rule of thumb for ME and PE levels for BPO I use for producing is:

ME100:PE30 for Ammo
ME10:PE5 for Ships
ME50:PE10 for Modules

This of course has been the source of many debates, which, to be honest with you, is not worth arguing for. I usually never go above 30 days except for special circumstances, which are explained later in the guide.



4. Research

BPC business

A BPC business is something a lot of people do, mostly because it is a fantastic way of passively generating income. The premise is actually very simple: you purchase a BPO, research it to crazy Amy Whitehouse levels, then produce copies (BPC) 24/7.

Why is it more important to research your BPO to crazy levels? Because other crazy people did it before you, and since the BPC market is competitive, if someone has a choice between a ME10 BPC or ME50 for the same price, they will pick ME50. And why wouldn't they? They probably don't even fully understand the insignificant savings between the two of them, but it's the same price, and ME50 is bigger than ME10.

This is especially important for:
Capital Components BPC
Ships BPC (all types).

If you intend to go for a BPC business, you'll need to put in 3, 4 and even 5 extra months of research to guaranty a good flow of sales. A good rule of thumb, at least for me, is:

ME150:ME30 for Capital Components
ME50:ME10 for Battleships
ME3:PE0 for Capital Ships
ME500:PE100 for Ammo
ME150:ME75 for Modules

I have had a lot of success with these levels in the past. Of course it is TOTALLY unnecessary but people will buy your BPC. The higher you go from there, the better your sales will be.

Note, however, that you lose a lot of profit if you copy over manufacturing. The difference is significant. A BPC business is a great way to make ISK passively without too much effort: with just one POS, a few labs and perhaps 2 or 3 alts, you can make ISK AFK. All you need to do is log in 30 minutes each week to oversee the copying jobs.

Ready-to-go BPO packages business

This is a favorite of mine. The profit margin is bigger than that of a BPC business, and if you find the right market, you can make a pretty penny. People will pay well to save even just a month of research, much more so for a few months. It became a trend to sell BPO packages that are already pre-researched with at least a month's worth lab time, such as

- √ Drones BPO package
- √ Ammo BPO package
- √ Rigs BPO package
- √ Tech 2 components package

4. Research



A good business, if you got the capital but not the time, is to research capital components BPO, or even Capital Ships BPO. On that market, you can make about 100mil ISK per 30 days of lab time.

Example: A Thanatos BPO at ME1 will easily sell at 100mil ISK above the NPC price, and requires just about one month of research.

You can easily have 10 labs on a large POS, which is a good 30 slots of Material Level research. 30 slots x 100mil of income is 3bil ISK in income per month. One large tower costs about 175mil ISK per month in fuel in Empire space, so 2.8bil ISK in profit each month, passively generated.

Of course this entails a huge ISK investment into those BPO, but if you have it, it's an easy way to make ISK without the effort, is almost risk-free and in less than a year you'll be even and start making money!

The how-to part of this section

The process itself is very easy. And if you do it well, it is totally safe and impervious to corp theft.



Skill that will help...
✓ Scientific Networking 1

The *Scientific Networking* skill is required if you want to research your BPO at a POS without having to physically put the BPO in the lab itself. All you really need is level 1. What this allows you to do is to lock the BPO in a corporate hangar (coming up next) so no one can take it out of there. Therefore, your BPO remains safely locked in a secure place, impossible to steal, while you take full advantage of the POS speed bonus.

To use a POS lab, **the BPO absolutely must be in the corp hangar**. You cannot use a POS lab from your personal hangar, since POS equipment is considered corp asset.

Once the BPO is in place, right-click as you would to produce, but choose either Material Research, or Time Efficiency (*PE*) Research. You'll get a familiar looking window.



4. Research

It is pretty straightforward from hereon out, except perhaps finding the POS lab installation if you have never done this before.

To do so, click on *Pick Installation*, to open yet another familiar window.

SCIENCE & INDUSTRY - PICK INSTALLATION

ACTIVITY: Material Resear ▾ LOCATION: Any ▾ RANGE: Current Region ▾ TYPE: Corporation ▾

ACTIVITY	QTY	LOCATION	JUMP▲	INSTALLATION TYPE	OWNER
Material Research	1	094 Hephaestus	6	Station	Lone Star Joint Venture
Material Research	3	Lab Alpha	6	Mobile Laboratory	Lone Star Joint Venture
Material Research	3	Lab Beta	6	Mobile Laboratory	Lone Star Joint Venture
Material Research	3	Lab Capa	6	Mobile Laboratory	Lone Star Joint Venture
Material Research	3	Lab Delta	6	Mobile Laboratory	Lone Star Joint Venture

Filtering options: ALLOW ALLIANCE MEMBER USAGE ALLOW CORPORATION MEMBER USAGE ALLOW BY STANDING RANGE ALLOW BY SECURITY RANGE

#	ACTIVITY	NEXT FREE TIME	INSTALL COST	COST PER HOUR	TIME MULTIPLIER	MATERIAL MULTIPLIER	AVAILABILITY
1	Material Research	Now	0.00 ISK	0.00 ISK	0.75	1.0	Publicly Available
1	Material Research	Now	0.00 ISK	0.00 ISK	0.75	1.0	Publicly Available
1	Material Research	Now	0.00 ISK	0.00 ISK	0.75	1.0	Publicly Available

Good standing discount %: 0.0 | Max. Character security: 10.0 |

Bad standing surcharge %: 0.0 | Min. Corporation security: -10.0 |

Min. standing: -10.0 | Max. Corporation security: 10.0

Min. Character security: -10.0

The trick here, is to select **Corporation** under type. This will show all installations available to your corporation only. Hopefully you labeled your labs in such a way you can recognize them. Look for **Mobile Laboratory** (or the *Advanced* kind) under the *Installation Type* and you'll have found your labs!

Pick one, choose a free slot, then click on *Use Assemblyline!* Voila! You're done!

Locking down the BPO

Locking down the BPO can only be done by someone who either has:

- ✓ CEO roles
- ✓ Director roles
- ✓ Shares in the corporation

4. Research

Take note that regardless of who initiated the lockdown process, **the CEO will required for the final step.**


The process involved three steps:

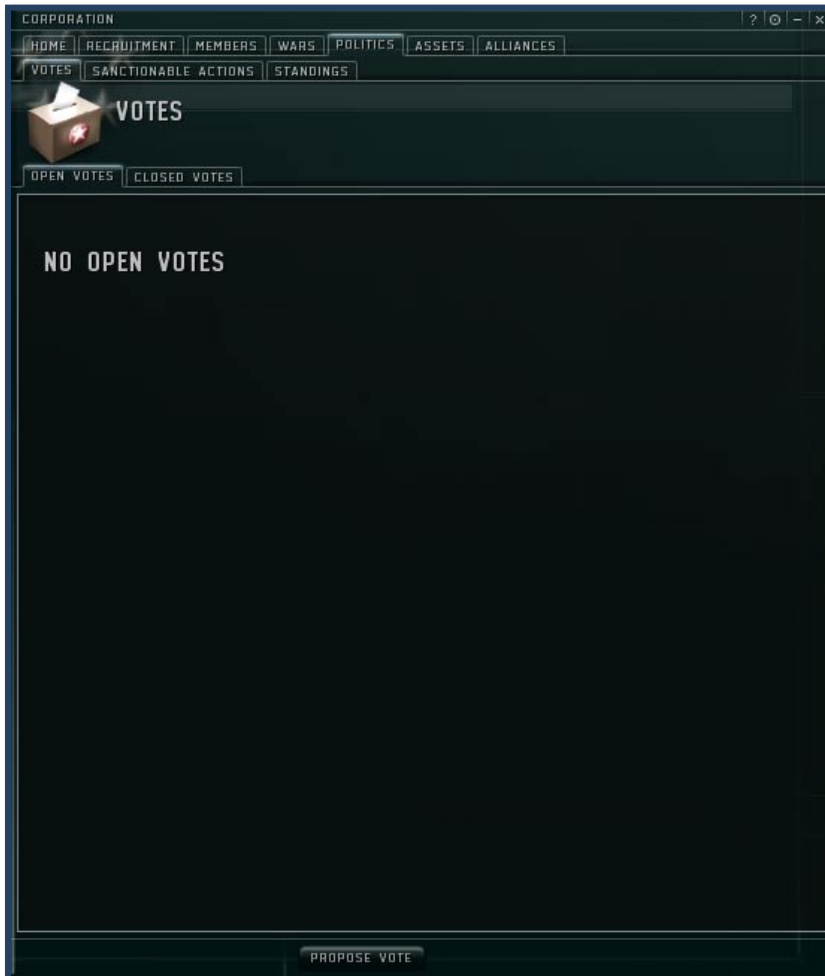
- 1) A Lockdown vote is proposed
- 2) 24h is allowed for shareholders to vote
- 3) The CEO sanctions the action if the vote passes.

Step 1

Right-click on a BPO, and select **Propose Lockdown Vote**. This option will only appear if you satisfy one of the three criteria mentioned earlier (CEO, Director or shareholders).

Step 2

Directors and shareholders will receive an eve-mail notifying them a vote has been initiated. The CEO and directors will need to navigate to the corporation window via 



the corp button. Then find the **Politics** tab, **Votes**, and **Open Votes**.

As you can see here, my corporation currently doesn't have any open votes.

Shareholders will not have access to this window. Instead they must open their wallet, find the **Shares** tab, right-click the name of the corporation in which the voting is ongoing, and click on the **Votes** option.

A similar window will open, where they will be able to vote either **Yes** or **No**.

The CEO should be able to follow the progress of the voting in the politics window, seen on the left.

Step 3

After the 24h voting period has ended, the CEO will need to head to the **Closed Votes** tab, and sanction the vote for it to go into effect.

4. Research

When this is done, the BPO is fully locked down, and can only be unlocked via another vote.

Note: The process of voting has never been very clear to me. As soon as you propose a lockdown vote, the BPO will lock instantaneously even before the voting period ends, and if a majority of people voted yes, it will remain locked without the CEO having to sanction it.

The reverse however, is not true. If you initiate an **Unlock** vote, the vote will need to be favor of yes **and** the CEO will need to sanction the vote for the BPO to become unlocked. I am unaware whether this is a feature or a bug, but regardless of what it is, your BPO are secured and you don't have to worry about a director going rogue and unlocking your BPO while you flew away to Barbados with your girlfriend for a week of hot lovemakin' on the beach.

Copying



Copying is the process of making a BPC out of a BPO. As it was said a little earlier, this is better done in a POS lab, due to its faster speed. If you were ever going to use **Advanced** POS labs, this would be the time, as it has 2 more slots and is even 10% faster than a regular mobile laboratory.

Coupled with the appropriate **Beancounter** implant, you shave a total of 40% off the copying time. If you're running a BPC business, this is quite a significant timesaver.

The process is pretty straightforward. Note that there is a limit on how many runs you can give a BPC, which can be found under **Production Limit** on the

BPO itself. Note that this Limit has nothing to do with how many runs you can make if you are building using the actual BPO.

Some copy job might require materials (such is the case for tech 2 BPO, for example). If this is the case, while the BPO can stay in the corp hangar, you will need to put the material in the POS lab itself.

Invention

The Invention option is the process of trying to convert a T1 BPC into a T2 BPC. The whole process is an important part of EVE and its tech 2 business, and is therefore covered in its very own section.

Reverse Engineering

The reverse engineering option has been made available since Apocrypha and is aimed at tech 3 production. This will be covered in an upcoming update of the guide.