

THE INDUSTRIAL TYCOON'S HANDBOOK

(v1207.14)

"And now onto The Republic of the Sphere: luxury vehicle manufacturer Scion-Nissaki has announced their intention to break ground on a new industrial park, to be built in Volgograd on Terra. The news of the 12.1 billion C-bill facility strengthened already growing signals that the economy of the Inner Sphere is transitioning from a purely wartime footing back into a somewhat more stable peacetime, commercially-based focus. The plant, tentatively dubbed Terra-114, will build 48,000 mid-range all-terrain civilian automobiles -the Gwydion- and employ over 1,200 Terrans. Scion reported ground-breaking is intended to start this spring. In VC news..."

—Phillip Farnsberg, anchor on *The Pink Sheets Tonight*

What does it take to build a 'Mech factory? How long does it take? How much does it cost? How would it run? What would it take to get an abandoned industrial facility restarted? How would a garage shop differ from one of those legendary fully-automated Star League megaplexes? How can I design my own in-universe product? Can my colony build its own weapons of war? These are questions BattleTech fans have been requesting time and again over the nearly three decades of this long-lasting game, using speculation to provide their answers, even as the previous barrier of economics suggested no hard, concrete rules would ever be possible. However, now there is some guidance that will enable the most detail-minded roleplayer the chance to build a star-spanning corporation, from refining the base components of fuel, to building the weapon components on his self-designed mobile behemoth, to assembling it his end-line BattleMech factory, as well as allowing the tabletop gamer to quickly develop a suitable complex for which to mount a defense against those unidentified raiders.

The Industrial Ruleset does all the above and more:

- Establishes the differences in economic scale between a very small cottage-industry or garage shop and the

standard military industries that fuel the Inner Sphere's armies

- Describes the individual processes (Blocks) that make up any production line and who operates them
- Expands upon the Advanced Building Rules, to allow for an additional structure type, Refinery, and fits production lines into the various existing structures
- Describes the process of designing and getting approved a working product, including the pitfalls of sending your mistakes to the production line
- How to modify an existing line, to allow for new products, model variants and even captured equipment
- Introduces the fluid capabilities of a fully-equipped tool-&-die shop
- Discusses how to find someone to build your line, sell you their production equipment and how to purchase or lease your own land
- Explains maintenance, repair, salvage and overtime
- Introduces quality assurance, mothballing and moving your factory away from the front
- Explains line expansions and upgrades
- Includes a facility worksheet

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Dedication: To Helba - for despite her confusion about my interest in a game I never seem to 'play', she still allows me the time to dwell in it; **To Emory** - Thanks for not coloring in my coloring books, even though they are full of neat robots; **To Orion** - for keeping both the feral felines and troublesome trucks away from my office window.

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OVERVIEW

The industrial capacity of the Inner Sphere has been a decisive part of the BattleTech universe since its inception. The Succession Wars were fought outwardly with the intent of claiming the title of Star Lord, but it was the individual battles that made up each of the wars and they were often fought to see which combatant would claim control of any one world's industrial capabilities. The following rules are for the construction of a wide range of industries, be they fuel processing plants, toy factories, BattleMech assembly lines or orbital spaceyards, with economic rules detailing the building and the operation of each individual factory of your future financial empire.

Terminology

The following definitions provide a framework on which these rules build:

Blocks: Products require a fabrication process that includes production machinery custom-made for that specific product. 'Blocks' abstractly represent major portions of that production line and help determine the personnel criteria for the factory.

Fully-Automated: Starting during the Advanced era (Tech Level E), factories could employ fully-automated Blocks handling all aspects of production, with no need of machinery operators nor maintenance by Machinists. Line Engineers are still needed in order to oversee repairs handled by the otherwise autonomous maintenance robots, but as long as materials and other supplies are provided at the delivery docks, the factory can operate on its own.

Laborer: Generally equivalent to military Astechs, the Laborers man the factory lines, pulling levers, pushing buttons, feeding the supply bins, etc. Unlike Astechs, they have no knowledge of Blocks past their assigned work stations and cannot provide maintenance assistance to Machinists nor Engineers.

Line: Casually speaking, a 'line' usually represents one complete production process for a product, of which there may be several 'lines' all producing the same product. For the purpose of the BattleTech Industrial rules however, a line represents all of the production capability for one product at one location and is quantified by the total quantity and retail value (in C-bills) of the products produced in one year.

Line Engineers: Equivalent to the Engineers described elsewhere in the BattleTech Universe, Line Engineers are specialists in the production and quality assurance of the product being produced at their factory. One Engineer is usually assigned per Block to oversee the efficacy and repair of the machinery, though factories have been known to utilize fewer than this when in need.

Machinist: Generally equivalent to a military Tech, the Machinist is responsible for the ongoing maintenance of the Blocks. They know the ins and outs of their assigned machinery and help prevent the line from breaking down. Unlike Techs, they are unable to conduct repairs beyond minor damage incurred through daily operation. However, their thorough knowledge of the production line allows them to perform as assistants to Engineers on an industrial Technical Team.

Production Class: Each product that is made in the Inner Sphere falls into one of sixteen production classes. This classification helps determine the level of sophistication of the personnel and machinery required in the assembly of the product.

Production Cycle: The daily period of activity in which a line is actively producing. The post-cycle time is the opposite, when the Line is generally powered down for maintenance and any necessary repairs.

Semi-Automated: Starting during the Low era (Tech Level B), factories began employing robots to handle many functions usually accomplished by human operators. This freed some industries from employing a large number of otherwise required personnel. Machinists are still needed to conduct the mandated maintenance for the machinery (the assembly lines do not have robotic maintenance technology capable of this level of maintenance) and Line Engineers are required to direct any necessary repairs.

Technical Team: Unlike a military Technical Team, which is comprised of one Tech and six Astechs and performs both maintenance and repairs, an industrial Technical Team is made up of one Engineer and six Machinists and forms up to repair damage that has been visited upon a production line, salvage parts from a Block or put one in mothballs.

Tier: A level of production, of which into any product is classified. A Tier I product is refined (or processed) from raw materials and may be a sub-component of a larger product or even a final product unto itself (ex: processed fuel, laser lens, ream of paper, gunpowder).^{*} A Tier II product is manufactured from Tier I products and is generally considered a 'component' in the BattleTech universe, though it may be sold individually (ex: engine, small laser, K-F hyperdrive, rifle cartridge). Tier III products are assembled from Tier I resources and/or Tier II components and are complete individual units (ex: motorcycle, BattleMech, JumpShip, infantry rifle). GMs are the final judge as to the appropriate Tier level by which a product should be considered.

Unit: One factory generally produces a product of a very specific type. As each individual one is produced, it is referred to as a 'unit.'

^{*}It is understood some items, such as laser lenses, may be far more complex in reality than is suggested here. For simplicity sake, if an item cannot be described as a compilation of multiple parts, then it is considered Tier I. Ultimately, the appropriate level of complexity is left up to the GM and the players.

FACTORY DESIGN

Factory design takes place using the following steps:

1. Determine the Starting Era
2. Determine the Product
3. Determine the Tech Rating of the Blocks
4. Establish the Line Capacity
5. Establish the Facility Dimensions
6. Determine the Facility Construction Costs

To help demonstrate the process of designing and building a production facility, we'll follow a number of characters using these rules to build factories for their assorted products.

- *Edward wants to build a factory that will assemble ejection seats for IndustrialMechs. IndustrialMech ejection seats weigh 0.5 tons and retail for 25,000 C-bills each, with a Tech Rating of B (TechManual, p. 344).*
- *Barclay is a former MechWarrior turned industrialist, who wants to build what he knows. His factory will assemble the WVE-5N Wyvern on Errai, in order to provide the Terran Hegemony with this medium class 'Mech. The 45-ton 'Mech retails for 3,470,865 C-bills and has no components using technology greater than Tech Rating D (Technical Readout 3050 Upgrade, pp. 196-7).*
- *Gale wants to sell standard Gauss rifles as the lowest bidder. Each one retails for 300,000 C-bills and is Tech Rating E (TechManual, pp. 290, 341).*
- *Phil plans to produce and sell pharmaceuticals, specifically the treatment for the dreaded 'Canopian Bug.' He wants to produce 15 million C-bills of pills a year, with each pill weighing 1 gram. His GM decides the pill has a Tech Rating B.*
- *Dieter wants to own a petroleum processing plant for diesel. He intends to have a big corporation behind the endeavor, and wants to produce at least 400 million C-bills of the final product a year. Diesel is Tech Rating A.*
- *Julie wants to own a shipyard that produces JumpShips, specifically of the Star Lord class. Each one sells for 699,239,250 C-bills and she'd like to build at least one a year. The class uses no technology greater than Tech Rating D.*

1. Determine the Starting Era

So, you want to be an industrialist. To begin, a lot of decisions have to be made: what do you want to produce, where do you want to produce it and in what quantity? How much do you want to spend to start the factory and how do you locate your potential customers? To start all this, however, you have to ask yourself: in what era do you want to build your factory?

As shown in Tactical Operations (p. 242), the technological capabilities of the Inner Sphere can be divided and/or described by six eras, each associated with a Tech Rating. See the Technology Ratings Table.

By choosing one of these eras in which to first build your factory, you are making the critical decision as to exactly what technologies are available. This is important, as your production machinery and the product itself is capped at the Tech Rating of the chosen era (unless an upgrade is conducted when higher technology comes available). For those playing in an alternate timeline or era, this easily allows your game to start up in any period you choose. Additionally, knowing the prevalent Tech Rating for your location (faction, planet, etc.) plays a large part in determining what is appropriate for your campaign.

- *Edward is building his factory during the First Succession War, so the prevalent Tech Level is D (High Tech).*
- *Barclay is campaigning during the first Star League, so Advanced Tech (E) is common.*
- *Gale sees the popularity of the Gauss rifle in the years after its recovery in 3040, and decides to open her own factory in 3051, during the opening years of the Advanced Tech (E) era.*
- *Phil's company discovered the cure for the infamous Canopian 'social' virus in 3020, right in the middle of the High Tech (D) era.*
- *Dieter is operating during the early years of hyperspace exploration, during the Common Tech (C) era.*
- *Julie is counting on a greater interest in simple but dependable JumpShip technology during these turbulent Jihad years (Hyper-Advanced (F) Tech).*

TECHNOLOGY RATINGS

Rating	Technology Level
A	Primitive: 19th to early 20th centuries
B	Low Tech: Late 20th century
C	Common Tech: 21st to 22nd centuries
D	High Tech: Age of War & Succession Wars
E	Advanced Tech: Star League/ Post-3050 Inner Sphere
F	Hyper-Advanced Tech: Clan/ Post-3065 Inner Sphere

2. Determine the Product

By this point, most players should know what product they intend to produce. It must have been introduced within the campaign's current year or earlier. (A product can begin to be produced –in a limited, trial production run role– up ten years prior to its official release, but will be considered to operate under restrictions introduced in Mercenary Supplemental II's Alternate BattleTech Era Expansions, with a production value modifier added.)

Each product produced falls into one of sixteen Production Classes, which helps determine costs in the assembly of the product and the construction of the factory, as well as manpower requirements. The product should easily identify with one of the entries on the Production Classes list. Further details on most of the classes can be found in *Total War* (pp. 20-25) and *TechManual* (pp. 9-13).

Production Classes

- BattleMech (ex: *Battle Cobra*, JR-7D *Jenner*, MAD-4H *Marauder II*)
- IndustrialMech (ex: Hyena, Dig Lord, Powerman)
- ProtoMech (ex: *Harpy*, *Minotaur*, *Roc*)
- Combat Vehicle (tracked, wheeled, hover, VTOL, surf, naval, hydrofoil, sub, WiGE)
- Support Vehicle (tracked, wheeled, hover, rail, VTOL, airship, fixed wing, all naval)
- Battle Armor (ex: Asura, Infiltrator, Void)
- Conventional Fighter (ex: Boomerang, Guardian, MechBuster)
- Aerospace Fighter (ex: CHP-W5 *Chippewa*, F-100 *Riever*, *Turk*)
- Small Craft (aerodyne, spheroid) (ex: KR-61, ST-46)
- DropShip (aerodyne, spheroid) (ex: *Leopard CV*, *Noruff*, *Overlord*)
- Satellite (ex: PowerSat, Figyel II, D40)
- Space Station (ex: *Bastion*, *Olympus*, *Capital*)
- JumpShip (ex: *Star Lord*, *Tramp*, *Merchant*)
- WarShip (ex: *Kirishima*, *Fredasa*, *York*)
- Components (including installed weapons, sensors, myomer, etc.)
- Other Items (including ammunition, fuel, food, clothing, rifles, etc.)

All but the last two production classes should be self-explanatory. Components can be regarded as equipment that -in order to be used- must be permanently installed during the assembly process for a final product, such as a BattleMech or a support vehicle. Other Items is the catchall

category, as it describes everything not previously categorized. It includes a wide range of objects that are rarely related, including infantry weapons, ammunition, medication, toys, food, medpouches, golf clubs, etc. The category represents everything that is not either a member of one of the first fourteen production classes or is not something that needs to be installed on a larger product. All consumables (ex: fuel, food, munitions) are represented by the Other Items category.

Almost anything conceivable for use within the BattleTech universe can be manufactured through these rules. However, due to the sources of information available between the primary 'characters' of the game (i.e., the war machines) and those that can be assumed to exist (ex: everyday items like tires, microwave meals, valve stems, etc.), plus the nature of manufacturing and assembly, every conceivable product falls into one of three levels of production, referred to as Tiers:

- **Tier I:** Composed primarily of the processing/refinement (oil-to-fuel, raw materials into chemicals, medicinal development, food processing, etc.) and minor item assembly (textiles, crockery, bricks, steel i-beams, etc.) stages. The processing/refinement stage is where raw materials are processed into finished goods, usually as sub-components for Tier II products. These are the most basic items. For example, petroleum, when processed at a Tier I facility, can be sold as diesel fuel, gasoline and kerosene. Sand can be processed by one Tier I facility into glass, whereby another Tier I facility would use the glass to produce lenses for laser weaponry (a Tier II product). The core concept of a Tier I product is something that either is made from a raw (or semi-processed) material (petroleum, raw minerals, ore, crops) that must be refined or processed (into fuels, plastics, food, etc.) or a sub-component (cables, fuses, pipes, rungs for a hamster wheel) that can only be utilized within a larger (oftentimes more complicated) product. Products that fall under the Other Items production class may fall under Tier I.
- **Tier II:** Primarily the manufacturing stage, but with some complex assembly. This is where various sub-components are pieced together to form a component, usually for a Tier III product (but can also include other larger Tier II products). An example of this might be where lenses, capacitors and metal tubes (all Tier I), along with other sub-components, are assembled to form a small laser (Tier II). K-F hyperdrives are assembled from the coil, initiator, controller, tank, sail and charging system sub-components (all of which are also Tier II products). The Tier I sub-components of bullet, case, gunpowder and primer are assembled into the Tier II product of a rifle round. Usually, Tier II products are sold as individual units, but are often incorporated into the assembly of larger systems (such as combat vehicles, JumpShips and artillery pieces). Some examples of Tier II products are LRM 5 launchers, LRM 5 missiles, tires, fire control systems, pistol ammunition and hamster wheels.

From the Production Class list above, Components and some Other Items are Tier II.

- **Tier III:** The end-product assembly stage. Made up of possibly numerous Tier I and Tier II elements, the Tier III product can be a simple item or a complex machine, sold as a complete package, usually as a model or brand name. BattleMechs, motorcycles, WarShips, aerospace fighters, blankets, stimpaches, pistols, processed food, space stations and hamster habitats are all examples of Tier III items, in that each can be utilized without needing to be installed onto a larger system. From the Production Class list, the first 14 classes (through WarShip) and some Other Items are all Tier III.

Properly identifying the Tier category of a chosen product is important, as the costs associated with the acquisition of supplies and materials for the manufacturing of that product will come into play during the operation of the factory. The final decision of Tier categorization lies with the GM.

Following the determination of the Production Class and Tier category, the individual retail cost of the item must be identified and recorded. For many canon items, the associated C-bill cost can be identified in the proper FASA, FanPro or CGL title, but if an item has not been listed, the GM can set a price in C-bills. If you have a general idea how much the item would cost in modern US dollars, you can multiply it by the following scale (all amounts in 2010 US dollar value):

- **3025:** 1 SL dollar/C-bill = \$9.95
- **3052:** 1 C-bill = \$8.00
- **3062:** 1 C-bill = \$6.54

So, as an example, a 21st century high-end civilian laptop may retail for US\$1,700 today. In 3025, the equivalent model would sell for about 171 C-bills ($1,700/9.95 = 170.85$, rounded); in 3052 it would sell for around 213 C-bills ($1,700/8 = 212.5$, rounded). In 3062, it would take 260 C-bills ($1,700/6.54 = 259.94$, rounded) to walk away with the laptop.

Record the product, its Tech Rating (equal to the highest Tech Rating of all components, if any), the Production Class, Tier category and the individual retail cost of the product.

- *Edward's ejection seats have a Tech Rating of B and fit into the Components production class. Because the seat is built from smaller sub-components, it is not a Tier I product. Because it is installed into an IndustrialMech, it is not a Tier III product, so it falls into Tier II. The retail cost of an ejection seat is 25,000 C-bills.*
- *Barclay's Wyverns have a Tech Rating of D (as they have no components with an E rating or higher), are of the BattleMech production class and are Tier III, as they are assembled from components (such as armor, myomers, sensors, cockpits and weapon systems) and into end-line products. The WVE-5N model lists for 3,470,865 C-bills.*

- *Gauss rifles have a Tech Rating of E, are considered Components (for the production class) and are Tier II products (since they are utilized as a component on a larger unit). They retail for 300,000 C-bills.*
- *Phil's GM decided that the Tech Rating for the pills is B. They are also Other Items on the production class list and are Tier I, since they are refined from baser chemicals. After discussing the in-universe place for the drug, it is decided each dose (1 pill) retails for 2 C-bills.*
- *Dieter's diesel has a Tech Rating of A (it was invented in the late 19th century), is considered to be in the Other Items production class and is a Tier I product, since it is the result of a refinement process. It retails for 1,000 C-bills per ton (see Strategic Operations, p. 179).*
- *Julie's Star Lord JumpShip has a Tech Rating of D (as it has no components with an E rating or higher), is part of the JumpShip production class and is a Tier III product. A Star Lord class JumpShip sells for 699,239,250 C-bills (Combat Operations, p. 179).*

3. Determine the Tech Rating of the Production Blocks

Each refinery, manufacturing or assembly line is made up of custom-made machinery that performs certain functions directly related to the production of the chosen merchandise. Because these lines are the vital feature of the factory, especially in the BattleTech universe, they are as important in the construction of a factory as the fusion engine is to a BattleMech. As the number of types of products capable of being produced in the BattleTech universe approaches infinity, a system of simplifying the representation of the various machines making up the assembly line is required. This is done by breaking up the line into Blocks.

Blocks represent very rigid capabilities of the line, usually quantified by the Tech Rating and the output of the Block (both in the number of units assembled each year and the retail value of all those units). The value of the product is important to the output of the Block, for it helps represent the relative complexity of higher-value items. From the point the Block is itself manufactured and delivered, it is tied in to the specific product for which it is to assemble. (Modifications can be made and these will be discussed later, in the Line Changes section.)

Blocks are also 'children' of the time period in which they are developed. A Block of a specific Tech Rating can only assemble products of that Tech Level or lower. Lower tech Blocks can be built for a cheaper amount than the current era's maximum Tech Level allowed, but the size and the required personnel to operate will be defined by the Block.

Along with Tech Ratings, Blocks come in two categories of sizes: standard and limited. Standard Blocks are required

for all lines where the total yearly product run has a retail value of 40 million C-bills or more. The limited Block is simply an abbreviated standard Block for capping off a production line that produces something other than a multiple of 40 million C-bills. For example, a production line making 200 million C-bills of products would need 5 standard Blocks; a line producing 225 million C-bills of product would need 5 standard Blocks and 1 limited Block with 25 million C-bills of capacity.

Limited Blocks may also be used for micro-industries. When used individually, they are geared for the smaller operations that produce 40 million C-bills or less worth of product every year. These operations tend to be smaller local or planetary factories, often restricted in their customer base to those on-planet. Their Blocks cost a percentage of a standard Block, relative to its production capability. Personnel requirements for limited Blocks are equivalent to the percentage of 40 million C-bills capacity of the Block, rounded up.

Standard Blocks: 40 million C-bill increments

Limited Blocks: less than 40 million C-bills, rated as a percentage of 40 million

Choosing a Tech Rating for your Block that is higher than that of the product's Tech Rating allows the character's factory to produce the item more cheaply, represented by a greater overall yearly output. While the initial factory construction will be more costly, the cheaper production will result in an earlier realization of profit. The Production Capacities Table has production capacities for standard Blocks based upon Tech Ratings. (Production capacities for limited Blocks are established by the player in 1 million C-bill increments, not to exceed 39 million.)

Starting in the Low Tech Era (Tech Rating B), new levels of automation for industry became available. Blocks

equipped with semi-automation (equivalent to the 20th century automobile industry's industrial robots) removed the need for as many Laborers, for computers became more apt at controlling their own functions. By the Common Tech era (Tech Rating C), this semi-automation became more reliable and the Laborers were no longer required. This made long term employment costs drop for owners of these semi-autonomous factories, though Machinists were still required to conduct regular, daily maintenance on the systems and Line Engineers continued to oversee the efficient operation of the overall line. With the advent of the Advanced Tech Era (Tech Rating E), computer control systems had become so exceptional, they could now control robots capable of performing the required maintenance on the Blocks within fully-automated factories. No longer were the Machinists needed, though factory owners did their best to retain the expert minds of the Line Engineers, in order to direct and code repairs of any systems that did find ways to fail.

The Block Tonnage and Personnel Table indicates the tonnage of each Block and the number of Laborers required to operate a Block by Tech Rating. The data for limited Blocks is equivalent to the percentage of 40 million C-bills capacity, with tonnage and Laborers rounded up.

Record the chosen Block Tech Rating, Production Capacity Per standard Block (in millions of C-bills), Block tonnage and required Laborers. If you know you will use a

PRODUCTION CAPACITIES						
(In millions of c-bills/year per Block)						
Block Tech Level	Product Tech Level					
	A	B	C	D	E	F
A	40	-	-	-	-	-
B	48	40	-	-	-	-
C	58	48	40	-	-	-
D	70	58	48	40	-	-
E	84	70	58	48	40	-
F	102	84	70	58	48	40

BLOCK TONNAGE AND PERSONNEL		
Block Tech Rating	Tonnage	Laborers
A	1,600	440
B	475	140
B/SA	665	75
C	225	60
C/SA	300	0
D	144	40
D/SA	190	0
E	120	32
E/SA	160	0
E/FA	200	0
F	110	28
F/SA	145	0
F/FA	185	0

limited Block (or use both standard and limited Blocks), record the percentage of capacity it will be using compared to a standard Block of the same Tech Rating. If you do not yet know the capacity of the entire line, record the relevant data for just the standard Block. Round up for capacity, tonnage and Laborers.

- Since Edward is building his factory during the Succession Wars (Tech Rating D), he has the option of purchasing Blocks with the Tech Ratings of B, C or D. (Tech Rating A is not available, for those Blocks cannot produce Tech Rating B ejection seats.) He also has the option of semi-automating Blocks from each of those eras. Ordering Blocks with a Tech Rating of B would be the cheapest initial choice (see the Block Era modifiers on the Factory Costs Table), but the Blocks are more massive and require more personnel (Laborers and Machinists) to maintain and operate (per the above table). While Tech Rating D Blocks are more expensive, they only require 40 Laborers to operate and they can produce 58 million C-bills worth of ejection seats a year, 18 million more than a Block with Tech Rating B. Edward decides to go with Tech Rating D, no automation and records the following on his worksheet:

Tech Rating: D
Capacity (standard): 58,000,000
Tons (standard): 144
Laborers (standard): 40

- Barclay is assembling a BattleMech with a lower Tech Rating than some of the others appearing in this Golden Age, so he wants to be able to turn a profit sooner than later and is willing to invest the necessary funds now to do so. He decides to go with the most advanced Blocks available to him, those with a Tech Rating E, with full automation. He records the following:

Tech Rating: E/FA
Capacity (standard): 48,000,000
Tons (standard): 200
Laborers (standard): 0

- Gale has little choice in her options for Blocks, as Gauss rifles have a Tech Rating of E and she is campaigning in 3051, the Advanced Tech era. She does have the option to choose between the three levels of automation. She is wary of not having the assistance of Machinists on hand and chooses to go with semi-automation. She records the following:

Tech Rating: E/SA
Capacity (standard): 40,000,000
Tons (standard): 160
Laborers (standard): 0

- Phil decides that he doesn't want to invest too much money into a high-tech factory during the uncertain times of the Succession War era, especially since a pharmaceutical production line making a Tech Rating B medication doesn't require it. Besides, he decides it would be good to have the extra pairs of eyes on the production process. He is also certain he won't be producing 40 million C-bills worth of his pills, but for now he records the relevant data for a Block with a Tech Rating of B:

Tech Rating: B
Capacity (standard): 40,000,000
Tons (standard): 475
Laborers (standard): 140

- Dieter has the option of B, B/SA, C or C/SA Blocks. He can choose to go low-tech, like Phil did with his pills, but Dieter comes from the frame of mind that while working with a dangerous substance like petroleum and diesel, its best to work with the safest equipment available. He chooses to go with a Tech Rating of C for his Block and also chooses to semi-automate it, in order to reduce the risk of human error. He records the following:

Tech Rating: C/SA
Capacity (standard): 58,000,000
Tons (standard): 300
Laborers (standard): 0

- Julie knows that there is a lot of interest in the various classes of JumpShips that have emerged since the discovery of the Helm Memory Core. She will need to keep her expenses low, so that she can offer her Star Lords at a rate that would be attractive to the trading companies that may be interested. While she has the option of choosing from Tech Ratings E and F for her Blocks, Tech Rating D with no automation is the best choice for her. She records the following:

Tech Rating: D
Capacity (standard): 40,000,000
Tons (standard): 144
Laborers (standard): 40

4. Establish the Line Capacity

The player must next decide how large the production line shall be. The answer is dependent upon how many units are expected to be built per year. You have the additional option of either maximizing your production capability right away or reserving additional capacity for later expansion of output. When establishing the size of your industrial operation, how much you want to produce in a given year must be determined.

There are two ways to make this decision. The first is by the quantity of units you want to produce. If you run a BattleMech production firm assembling Grand Crusaders, how many do you intend to produce a year? Once the number, your Production Capacity Quantity (PCQ), is known, multiply it by the total retail cost of an individual unit and that's your Production Capacity Value (PCV).

Ex: One Grand Crusader GRN-D-01 costs 15,550,200 C-bills. Producing seven every year would mean your factory intends to produce at least 108,851,400 C-bills of value every year.

The second method is to work from the other end: decide how much value you want to produce yearly (i.e., PCV) through the line and divide that number by the total individual retail cost per unit, which provides you with the PCQ produced yearly, rounding up to the first decimal.

Ex: The factory intends to assemble 110,000,000 C-bills of Grand Crusaders. Dividing that by the retail value of 15,550,200 = 7.073864, rounded up to 7.1.

In either case, you now have both the PCQ and PCV. Divide the PCV by the standard capacity (from the worksheet) to reveal how many standard Blocks are required. Round the number up to the 2nd decimal. The remainder indicates the required capacity of the one limited Block that caps off the line. If the sum is equal to a full number, then only standard Blocks are required. If you have not already, fill in the line for limited Blocks on your worksheet, without rounding up capacity.

Ex: For the 'Mech factory above, divide the PCV (108,851,400) by the standard Block capacity (in this case 48,000,000) to get 2.2677375. Rounding up to 2.27, this factory would need 2 standard Blocks and 1 limited Block with a capacity of 27%.

Note: Building more capacity than you initially intend to use is a perfectly viable business decision. You are not required to actually produce the full PCQ/PCV on a yearly basis. By not operating the extra Blocks, you save on labor and supply costs. When mothballing these Blocks, maintenance is not required. If you do not mothball (due to a temporary decrease in production or the need for short-term layoffs, etc.), required maintenance drops to 25% for each unused Block. Standard Blocks must be mothballed or shutdown as complete units, while solitary limited Blocks (i.e., lines using only a single limited Block) can have up to 75% of their capacity mothballed or shutdown.

When using only a limited Block, you can order it to be capable of a production capacity higher than initially intended, but not in excess of 39 million C-bills, which is the maximum PCV available. If you want to reserve the capacity for higher production greater than 39 million C-bills, standard Blocks will be required.

PCV = Quantity of product × Individual Retail Cost

PCQ = Annual retail cost output / Individual Retail Cost

Record the line's PCQ, PCV and number of Blocks required.

- Edward has decided he wants to make 250 ejection seats a year (PCQ), as he'll be the official supplier for an IndustrialMech manufacturer who anticipates producing almost that many I-Mechs. He multiplies the PCQ by the retail value (25,000) to get his PCV (6,250,000). In order to find out how many Blocks he'll need, he divides the PCV by the standard Block capacity (58,000,000) and gets 0.11 (6,250,000 / 58,000,000 = 0.10775862, rounded to 0.11). Since that is not a round number, he only needs one limited Block and no standard ones. As he elects not to build a line larger than this, he records the following:
 % Standard: 11%
 Capacity (limited): 6,380,000 (58,000,000 × 0.11 = 6,380,000)
 Tons (limited): 16 (144 × 0.11 = 15.84, rounded up)
 Laborers (limited): 5 (40 × 0.11 = 4.4, rounded up)
 PCQ: 250

PCV: 6,250,000

Blocks - Limited: 1

- Barclay wants to produce at least 10 Wyverns a year (PCQ), giving him a PCV of 34,708,650 (3,470,865 × 10). As the PCV is less than the 48,000,000 capacity of his chosen Block type, he only needs one standard Block. Unlike Edward, though, he sees value in having the option to increase his productivity without having to build again first, so he chooses to buy a full standard Block. Since his PCV is now 48 million, he divides that by the retail value of a Wyvern (3,470,865) to find out his new PCQ, 13.9 (48,000,000 / 3,470,865 = 13.829405, rounded to 13.9). He records the following:
 PCQ: 13.9
 PCV: 48,000,000
 # Blocks - Standard: 1
- Gale intends to produce as many Gauss rifles as she can possibly churn out. She already knows she wants to purchase 3 standard E/SA Blocks, each with 40 million capacity, so she'll have a PCV of 120,000,000 (40,000,000 × 3). Dividing this number by the retail value of 300,000 gives her a PCQ of 400. She records the following:
 PCQ: 400
 PCV: 120,000,000
 # Blocks - Standard: 3
- Phil had previously decided to limit his production to about 15 million C-bills. Now he has to determine the attributes of the limited Block that is being produced for his line, to see how close it actually gets. He calculates the percentage-to-standard of his limited Block to be 37.5% (15,000,000 / 40,000,000 = 0.375, not rounded). That equates to a capacity of 15,000,000 (40,000,000 × 0.375), 179 tons (475 × 0.375 = 178.125, rounded up), 53 Laborers (140 × 0.375 = 52.5, rounded up). Since he had previously decided the retail value of the pill was just 2 C-bills, that gives him a PCQ of 7,500,000 (15,000,000 / 2). Good thing the Canopian pleasure business is thriving. He records the following:
 % Standard: 37.5%
 Capacity (limited): 15,000,000
 Tons (limited): 179
 Laborers (limited): 53
 PCQ: 7,500,000
 PCV: 15,000,000
 # Blocks - Limited: 1
- Dieter is ready to start working on the financial design of his refinery. As he had previously decided it should produce 400 million C-bills (equivalent) of product, he has a working PCV already. To determine his PCQ, he divides the PCV by 1,000 (per ton, the larger, standard measure of fuel units) to get 400,000. He then divides the PCV by 58 million to determine that he needs 6.9 Blocks (400,000,000 / 58,000,000 = 6.89655, rounded up to 6.90), or 6 standard blocks and a 90% limited Block. He could decide to go with the full 7 standard Blocks, but his company's board of governors restricts him to the original PCV. Dieter determines that a 90% limited Block will have a 52,200,000

capacity (58,000,000 x 0.9) and will weigh 270 tons (300 x 0.9). He records the following:

% Standard: 90%
Capacity (limited): 52,200,000
Tons (limited): 270
Laborers (limited): 0
PCQ: 400,000 (tons)
PCV: 400,000,000
Blocks - Standard: 6, Limited: 1

- Julie intends to produce as close as she can to one Star Lord per year. Since that is her intended PCQ, all she has to do to determine her PCV is record the retail value (699,239,250). She calculates her Block requirement to be 17.49 (699,239,250 / 40,000,000 = 17.48098, rounded up to 17.49), or 17 standard Blocks and one 49% limited Block. She thinks about the advantages of rounding it up to a full 18 standard Blocks and decides to go that route. That means her new PCV will be 720,000,000 (40,000,000 x 18) and the new PCQ will be 1.1 (720,000,000 / 699,239,250 = 1.02969, rounded up). She records the following:
PCQ: 1.1
PCV: 720,000,000
Blocks - Standard: 18

5. Establish the Facility Dimensions

A factory is more than just its production equipment inside. It is a complex with a design both unique to the product being developed and the designer's style. As a part of the process, some of the capabilities of the factory are determined by some of the attributes of the external facility itself.

As noted, factories in the Inner Sphere have been participants in the many wars that raged around them. Depending upon the location, the products, the era and even the level of the controlling character's paranoia, a factory may be a simple brick and mortar building in the midst of an urban landscape to a sprawling smoke-belching complex located on a large, flat and otherwise empty plain. It could even be in a deeply-hidden and well-protected mountain fortress. How much is invested to protect or supply your factory is up to you.

The physical size, in the BattleTech map scale of 30-meter hexes and 6-meter levels, is determined primarily by the number of Blocks that make up the line. Horizontally, each Block (whether standard or limited) requires one hex. They can be comprised of a single line of hexes or any other configuration, as long as each one adjoins another, with the production line unbroken. Vertically, the requirements are dependent upon the production class of the product, as the assembly/processing needs of the Block may dictate height requirements. Products in the Other Items production class require a minimum of only 1 level

(refineries have a minimum of 3, 4 or 5 levels, depending on the amount of the CF). Aerospace and conventional fighters, small craft, combat vehicles, ProtoMechs, satellites, Battle Armor, support vehicles and components require a minimum of 2 levels. BattleMechs, IndustrialMechs and aerodyne type DropShips require 3. Spheroid type DropShips require 7. DropShips capable of less than 3/5 thrust and all WarShips, JumpShips and space stations require orbital construction. The minimum number of levels associated with each class are just that: minimums. If a player determines that a product needs more than 3 levels to be accommodated within the production facility, then a higher level may be established for that facility. The standard applied for minimum levels is determined by dividing the height of the product (in meters) by 6 and adding 1. See the Structure Components Table for details.

Minimum Levels = (Product height / 6 + 1)

The rest of the building must be accounted for as well. Support infrastructure for the production line is made up of the various utilities, storerooms, maintenance services, administration offices, personnel resources (lounges, washrooms, infirmaries, etc.), coolant and supply feeds, testing/calibration labs and other numerous functions associated with the product. (This infrastructure does not include options such as tunnels, armor, weapons, power, environmental sealing or subsurface structures, as they will be covered later.) To determine the amount of hexes the support infrastructure requires, multiply the number of Block hexes by 0.5, rounded up to a full hex. If a sole limited Block is being utilized and the combined space of the Block and the support infrastructure equals less than 1 hex, then only 1 hex is necessary for the whole facility. Level requirements are left up to the player. They can be located next to the Block hexes, but don't necessarily need to be the same level. The CFs of the structures housing these support services do not need to match the the production line's CF, if they are recognized as different buildings located next to the production line. (If they are considered adjoining and a part of the same multi-hex structure, they will need to be constructed to the same CF requirements. The use of tunnels to connect two different structures does not define them as one structure.)

If hangers are to be used as a hex type, keep in mind the combined weight of the Block, the items being assembled (divided by number of Block hexes) and any other support equipment may not total more than 600 tons per hex.

Orbital factories can be designed similarly, though tonnage plays a more important role than physical size. Space stations are constructed per the rules in *Strategic Operations* (pp. 144-160), with enough cargo space (p. 155) set aside in the design process for the Blocks and their support infrastructure. To determine the total amount of cargo space necessary to hold the complete industrial capacity of the facility, multiply the Block tonnage by the number of Blocks, then multiply the sum by 1.75. Any additional need for warehousing supplies and storing

completed production units must be accounted for separately.

Orbital Cargo Space minimum tonnage = total Block weight \times 1.75

One note on orbital factories with ground-based facilities: some financial savings can be realized by conducting the assembly of multiple components into modules on the ground and then shipping those up, via DropShip, to the orbiting facility for final assembly. If the player decides to follow this strategy, up to 50% of the Blocks involved in the assembly process may be installed in the ground facility, with the remainder orbital. There must be an even number of Blocks, however, in the total design of the overall orbital-ground factory complex. Limited Blocks can not be used anywhere in such a split facility. The assembled modules must also fit within the allotted cargo space of the servicing DropShips. For products requiring orbital assembly, but having pre-assembly ground facilities, the buildings on the ground are required to be a minimum of 5 levels high.

Players utilizing ground facilities should refer to the Structure Components Tables to select their structure type and preferred CF for each building.

Note: for those players with fully automated factories, the installation of the Blocks in a complex with multiple production lines assumes that the various lines are connected via some network. It can be via directly adjoining hexes or the advanced nature of the complex allows for fully automated delivery vehicles or even some under- or above-ground conveyor system. This is included in the initial Block costs and only needs to be fleshed out by the player, if so desired.

- *Edward's factory concept has been sent to the architects for drafting. Because he only has one limited Block, the production machinery only requires 11% of one BattleTech-scale hex. Ejection seats are considered Components, so the facility will need to have 2 levels. The support infrastructure requires less than one hex (0.11 Block hex \times 0.5 = 0.055), so the complete facility can fit within 1 full hex. Because Edward has such a small facility, he elects to build one 2-level, 1-hex building, rather than having a separate 1-level building for the support services. He also chooses a standard Light Building as his structure type, with 10 CF. He checks the Adjoined box.*
- *Barclay is building a BattleMech factory, but like Edward, he only needs one Block and, therefore, only one Block hex. Due to its production requirements, this Block requires a facility 3 levels tall, which he will put in a Heavy Building, with 65 CF. He elects to have the support infrastructure be a part of the overall building, so the support hex (1 Block hex \times 0.5 = 0.5, rounded to 1) increases the overall size of the facility to one 3-level, 2-hex building. He checks the Adjoined box.*
- *Gale is building a weapons complex, and needs 3 hexes to place her 3 Blocks. Because weapons are considered Components, the facility will need to be 2 levels high at a*

minimum. For this part, she chooses a Light Hanger with 8 CF. Her support infrastructure requires 2 (3 \times 0.5 = 1.5, rounded to 2) additional hexes, which she chooses to build in an co-located 1-level Light Building, with 5 CF. Over all, her Gauss factory is comprised of one 2-level, 3-hex building and one 1-level, 2-hex building.

- *Phil has chosen to utilize a smaller, limited Block, which amounts to only 37.5% (15 / 40 = 0.375) the size of a standard Block. As the support infrastructure would increase that only by 0.1875 hex (0.375 \times 0.5 = 0.1875), the total facility will fit within one hex. His pills are considered to be Other Items as a production class, and only require 1 level, which Phil decides to go with. His complete facility takes up one 1-level, 1-hex Medium Building, with 20 CF.*
- *Dieter is building a 7-Block facility, so he'll need the seven hexes those require, as well as an additional 4 (7 \times 0.5 = 3.5, rounded to 4) hexes for support infrastructure. Because fuel is considered to be an Other Item, it appears he could consider a 1-level complex, but since he will be using the Medium Refinery structure type (with 15 CF), a minimum of 4 levels is required. As the support services will be interspersed throughout the refinery (as four separate light buildings), only adjoined buildings will be used. Dieter's fuel refinery takes up to eleven 4-level hexes.*
- *Julie is the only character to be building an orbital facility. She decides to explore the options of having both a dedicated orbital facility and one split between orbit and the ground. For the fully orbital shipyard, after she has designed the space station itself, she sets aside a certain amount of cargo space in the station for her factory. To determine what that amount will be, she multiplies the tonnage of her Tech Rating D Block by the number of Blocks, to get 2,592 tons (144 \times 18). She then multiplies that amount by 1.75, to determine the complete tonnage for Blocks and support infrastructure, calculating that 4,536 (2,592 \times 1.75) tons of cargo space will need to be dedicated to the Star Lord assembly line.*

For the split orbital-ground option, Julie determines that she will need 9 Blocks on the station, meaning that a total of 2,268 (144 \times 9 \times 1.75) tons of cargo space will be required. For the ground facility, 9 Medium Fortress hexes (CF 30) will be used for the Blocks and an additional 5 (9 \times 0.5 = 4.5, rounded to 5) Heavy Building hexes (25 CF) for support. As these modules are intended for orbital construction-only assembly, the ground production facility is required to be at least 5 levels high. She elects to break off the support hexes into a separate 1-level co-located building. The ground based facility is comprised of one 5-level, 9-hex production building and one 1-level, 5-hex support building. Originally, it appeared she would have to assemble modules of about 2,300 tons in mass, in order to fit them on the company's Buccaneer class DropShip, but she contracted with a transport firm utilizing Mules and now the modules can be up to 2,715 tons in mass.

6. Determine the Facility Construction Costs

When it comes to determining the cost of the overall facility, the process is broken into two sections: production line and structure building. The first deals primarily with the costs of Blocks and the degree of specialization those machines bring to production, while the second is a modified and abridged analysis of costs for erecting structures, as introduced in 'Housing and Base-Building' from Mercenaries Supplemental Update (pp. 133-136).

Factories are notoriously expensive in the BattleTech universe, especially those built to support the war efforts of the various factions. Players will quickly come to realize that most of these facilities are vastly beyond the financial means of average mercenary groups and will probably depend upon the massive subsidization of the facility by the host faction. It is the intention of these rules to allow for a small, non-military facility to pay itself off within 20-50 years of profitable business, while a production line geared towards supporting the various war efforts will require the considerable support of a nation that expects to quickly receive a significant return upon what very well could be a multi-century investment.

Production Line

The primary cost towards any production, military or civilian in nature, is that of the Blocks that make up the heart of every factory. The base cost of each standard Block is a solid 250,000,000 C-bills (with a comparative amount for limited Blocks). This base cost is applied to a series of multipliers, based on what era the industrial campaign starts in, what tech rating the Blocks have, the production class and tier of the product, the degree of automation employed and the location of the intended facility. For Location multipliers, each modifier can only be applied once, but all applicable modifiers should be used. Once the cost of the individual Block is modified by these multipliers, the sum is further multiplied by the number of standard Blocks purchased. The limited Block is modified by its Percentage Standard amount and then added to the sum of all the standard Blocks. This is the final cost of the production line itself. See the Factory Costs Tables for these modifiers.

- *Edward is buying a Tech Level D series of Blocks for his factories. As his current era is also of Tech Level D, his Block Era multiplier is 1. The Production Class multiplier for ejection seats, which are classified as Components, is 0.5 and the Tier II multiplier is 1.25. Since he is not automating his factory, the Automation Multiplier is 1. As the factory is building on the Lyran world of Rajkot, it is located within two jumps of Circinus Federation space, which means the IS Periphery border Location multiplier of 1.05 applies. The sum for a standard Block is 164,062,500 (250,000,000 x 1 x 0.5 x 1.25 x 1 x 1.05) C-bills. As he is only buying one limited*

Block, he applies the modifier of 0.11 (the % Standard figure for his Block) for 18,046,875. That is his final Production Line cost.

- *Barclay, on the Terran Hegemony border world of Errai, is building his factory in 2761, during the Golden Age of the Star League, when the prevalent Tech Level was E. He chose the E/FA (Tech level E, Fully Automated) series for his Block, so the Block Era multiplier of 1 applies. Since the Wyvern falls under the BattleMech production class, that multiplier is 5, with a tier multiplier of 1.75. Being fully automated means his Automation multiplier is 2.25. Its location on a border world brings a 1.1 multiplier, while the major industrial background of Errai provides another multiplier of 0.9. The sum for each Block is 4,872,656,200 (250,000,000 x 1 x 5 x 1.75 x 2.25 x 1.1 x 0.9) C-bills. Like Edward, he only has one Block, but the difference in cost for a BattleMech factory is obvious.*
- *Gale is building her factory on the Lyran world of Alkaid, when the current Tech Level is E. She chose to buy the E Tech Rating of Blocks, so the Block Era multiplier is 1. Building Gauss rifles, categorized as a Component, means that the Production Class multiplier is 0.5 and the tier multiplier is 1.25. Since she chose to semi-automate, the Automation multiplier will be 1.5. As Alkaid is located within two jumps of both the Draconis Combine and the Free Worlds League, she receives the Location multiplier of 1.1. The sum for each Block is 257,812,500 (250,000,000 x 1 x 0.5 x 1.25 x 1.5 x 1.1) C-bills. Multiplied by 3 (for the 3 Blocks she ordered), the total cost of the production line is 773,437,500 C-bills. She better hope she finds a steady customer.*
- *Phil is opening his chemical factory on the capital world of Canopus IV, where the current Tech Level is D. He chose to buy a limited Block with a Tech Level of B, in order to save some money. Since his Block's Tech level is so much lower than the current era's, his Block Era multiplier is 0.7. Pills count as Other Items as a production class, so that multiplier is 0.25 and the tier multiplier is 1.0. The block is not automated, so the Automation multiplier is 1. Since the factory is located in the Periphery and on a capital, two Location multipliers, 1.15 and 0.9, apply. If this had been a standard Block, the sum would be 45,281,250 (250,000,000 x 0.7 x 0.25 x 1 x 1 x 1.15 x 0.9) C-bills. However, since Phil chose a limited Block, he applies the 37.5% standard to that amount, thereby pricing his sole limited Block at 16,980,469 (45,281,250 x 0.375 = 16,980,468.75, rounded up) C-bills.*
- *Dieter, located on the Terran Alliance planet of Alula Australis in the 22nd century, has decided to utilize the latest technology in processing his oil; his C series Blocks give him the Block Era multiplier of 1. Since diesel is categorized as an Other Item, his Production Class multiplier is 0.25 and the tier is 1.0. He's chosen to remove as much as he can of the human factor by semi-automating, so the Automation multiplier is 1.5. Because this campaign is so early in the BattleTech timeline, his GM decides that there is no Periphery or factional 'threat' and*

the planet can be considered to be an Inner Sphere internal world, with a Location multiplier of 1. The sum is 93,750,000 (250,000,000 x 1 x 0.25 x 1 x 1.5 x 1) C-bills. This is multiplied for six blocks, and the % Standard modifier is applied to the one limited Block, for 84,375,000 (93,750,000 x 0.9) C-bills. The two amounts are added to get ((93,750,000 x 6) + 84,375,000) for a final cost of 646,875,000 C-bills (or the equivalent).

- Julie has decided to go with the fully orbital facility for her JumpShip production line. She is building it in orbit of the major industrial world of Belladonna, an internal Davion planet. Since she is using a Block with a lower Tech Level than the prevalent Jihad era of F, her Block Era multiplier is 0.7. The Production Class multiplier for JumpShip is 8 and the tier multiplier is 1.75. She is not utilizing automation, so her Automation multiplier is 1. She enjoys a double modifier for her Location multiplier: Inner Sphere internal world (1.0) and Major world (0.9). The sum equals 2,205,000,000 (250,000,000 x 0.7 x 8 x 1.75 x 1 x 1 x 0.9) C-bills. Since she has 18 blocks, the total sum is 39,690,000,000 C-bills.

Factory Costs Tables

Flat Costs:

Block.....250,000,000

Production Line (in C-bills): ((Block Flat Cost x # of Standard Blocks) + cost of optional Limited Block) x Block Era Multiplier x Automation Multiplier x Tier Multiplier x Production Class Multiplier x Location Multiplier(s)

BLOCK ERA MULTIPLIERS

Current Era Level	Block Tech Level					
	A	B	C	D	E	F
A	1.0	-	-	-	-	-
B	0.8	1.0	-	-	-	-
C	0.7	0.8	1.0	-	-	-
D	0.6	0.7	0.8	1.0	-	-
E	0.5	0.6	0.7	0.8	1.0	-
F	0.4	0.5	0.6	0.7	0.8	1.0

AUTOMATION MULTIPLIERS

Automation Level	Multiplier
Fully Automated (FA)	x2.25
Semi-Automated (SA)	x1.5
No Automation	x1.0

TIER MULTIPLIERS

Tier	Multiplier
Tier I	x1.0
Tier II	x1.25
Tier III	x1.75

PRODUCTION CLASS MULTIPLIERS

Production Class	Multiplier
WarShip	x15
JumpShip, Space Station	x8
ASF, Small Craft, DropShip	x6
Battlemech	x5
ProtoMech, Conventional Fighter, Satellite	x3
Battle Armor, Combat Vehicle, IndustrialMech	x2
Support Vehicle	x1.0
Component	x0.5
Other Item	x0.25

LOCATION MULTIPLIERS

Location	Multiplier
Inner Sphere internal world	x1
Inner Sphere Clan border world	x1.15
Inner Sphere faction border world	x1.1
Inner Sphere Periphery border world	x1.05
Periphery world	x1.15
Deep Periphery world	x1.4
Clan world	x0.8
Major world	x0.9

Factory Structure

borrowed heavily from Mercenaries Supplemental Update

Under these rules, the construction of a building for a production line is not a hit-or-miss affair but a simple matter of investing the C-bills and man-hours to construct the facilities the company needs. The Structure Components Table provides the basic cost and man-hour formulas for each standard structure that may be constructed for a factory but is far from exhaustive. The rules use Construction Factors (CF) that denote the relative strength and damage capacity of structures, under the standard rules for buildings in Tactical Operations (pp. 128-133). The man-hours involved in their construction are reflected as well.

All structures used at factory complexes have a maximum size in terms of number of hexes occupied and levels of height (excluding basements). This reflects the maximum overall size a single structure may occupy, though how these structures are laid out are open to the base designer's preference. Note also that any multi-hex structure receives the same CF per hex (though this CF applies to the full height within said hex), so a 3-hex structure reduced to a CF of 0 at the center hex will only collapse at its center. A single structure may not be constructed with a CF that varies between its hexes (though a similar effect may be obtained by simply placing structures of differing CFs in adjacent hexes). Non-Hangar structures may have basements of any depth, allowing sizes beyond the normal height maximum but must still pay the man-hours to construct these extra levels.

Further note that the use of appropriate engineering equipment (such as backhoes, bulldozers, drills, dumpers, hoists, piledrivers, saws, rock cutters, and wrecking balls) can reduce the manpower needed to clear land, build structures, and such. To reflect this, multiply the total man-hours required for base construction by 0.9 for every appropriate support vehicle used in the process. Multiply again by 0.85 for every appropriate IndustrialMech also employed. Round this final result up. When in doubt, allow a gamemaster or other neutral party to determine whether a support vehicle or IndustrialMech qualifies as an appropriate engineering unit. For example, a factory construction project that requires 30,000 man-hours to complete, but has the aid of two engineering vehicles and an IndustrialMech, can help reduce these man-hour needs to 20,665 hours [$30,000 \times 0.9 \times 0.9 \times 0.85 = 20,655$]. One departure from the original 'Housing and Base-Building' rules from Mercenaries Supplemental Update is each additional unit of engineering equipment must also be accompanied by a minimum of 5 laborers. This team makes up not only the crew of the engineering unit, but also make use of its efforts (guiding hoisted slabs, laying liquid ferrocrete, assembling delivered building materials, etc.).

Buildings: Everyday structures such as offices, light industry, medical clinics, and similar edifices typically are in the standard Buildings category. These structures fall into

the Light, Medium, and Heavy CF categories as outlined in Tactical Operations and follow all standard rules. Buildings may not be armored, nor may they mount heavy weapons (weapons larger than RPG support weapons), but they may house non-weapon equipment useful for their function (at additional costs). Examples of this equipment may be infirmaries, computer and communication resources, administration offices, maintenance services, coolant and supply feeds, as well as testing and calibration labs. The tonnage of such equipment a structure may contain per hex is equal to the structure's CF times its number of levels.

Hangars: Hangars are specialized structures intended to house vehicles, freight, supplies, completed production units and the like. Hangar structures come in Light, Medium, Heavy, or Hardened CFs and may not be armored. Their open internal construction means they always have half the CF value of their equivalent building type and may not be constructed with basements. Hangars must stand at least as tall as the units they house (e.g. 2 levels for 'Mech units, 1 for most others) and should have a Large Door on at least one facing (considered free for purposes of equipment tonnage). Hangars may mount equipment like buildings, but as all units (and internal equipment) within a hangar may only stand on the floor or the rooftop, the tonnage of any gear tops out at 600, reflecting the maximum number of bays a Hangar may possess per hex (so a one-hex 'Mech Hangar has room for a lance-worth of BattleMech cubicles, regardless of its CF, while the same size vehicle Hangar may have bays for up to 6 heavy vehicles or 12 light vehicles). Note that stacking rules only apply inside a hangar when units are active and engaged in combat.

Refinery: The additional structure type of refinery has been added here. These processing plants do not fit the descriptions of the type of production facilities found in buildings, hangers or fortresses, so a new type is available for construction. They take longer than a building to construct, due to their extensive networks of distilling, coking, cracking and reforming equipment (including the related piping) and cost more due to the expense of the specific labor employed to erect the refinery. They can be built with Light, Medium or Heavy CFs, may not be armored, nor may they mount heavy weapons. When ever a refinery takes damage, the Block, without the protection of walls, is generally the one receiving the damage and an explosion may occur when ever a 9 or higher is rolled with 2d6 (check with each hit).

Fortresses: Fortress structures are available in Medium, Heavy or Hardened CFs and may be armored and mount heavy weapons. The mass of armor and weapons a Fortress may mount per hex are limited by the structure's CF, but are considered additional to any non-combat gear which may be placed within such structures, as noted above under the Buildings entry. Note that an armored Fortress must allocate its armor to each facing (including the roof) that is open to attack, and that this armor must be destroyed before structure's CF can take any damage or hostile units can enter.

Tunnels: Usually used for subsurface structures, but also applicable above-ground between sealed structures, tunnels are essentially specialized variations on the hangar, comprised of two opposing walls and ending on each side in doors. Construction of tunnels follows the same basic rules as hangars, and require the added cost of doors at each end. Treat any junctions where two or more tunnels cross as a non-tunnel structure, complete with doors opening into each tunnel passage.

Walls/Fences: Walls and fences follow a hexside rather than occupying a full hex and may be of any length desired. Depending on construction, they impose an additional Movement Point cost to units that pass through them using ground movement (though in the case of Armored, Hardened Walls, the armor must first be destroyed).

Armor and Weapons: Fortresses and Walls may add armor as indicated on the Structure Component table. As noted above, all armor on a given hexside must be destroyed before hostile units may enter or cross through an armored Fortress/Wall structure or before the CF within can be damaged (note that attacks against other sections or facings of the same Wall or Fortress structure must still contend with any remaining armor).

Only Fortress structures may mount heavy weapons. The maximum tonnage of such weapons—discounting ammunition, turret mechanisms, and heat sinks or power amplifiers—that may be mounted per hex of Fortress is equal to the Fortress' CF divided by 10. Lighter structures, such as Buildings, Hangars, Refineries and Walls, may mount Medium and Small weapons (RPG support weapons or small arms, respectively), at a limit of six such weapons per level of structure height. Note that these weapons are not counted toward the structure's standard weight limits for other equipment.

Power: For most structures and facilities, it is generally presumed that any power needs are met by the capacity of a local power grid. But where desired, players may opt to create an independent generator for their facility. In such a case, determine the base generator weight by adding up the total number of hexes of structures the generator will supply with power, not counting its own structure. (Note: for this computation, multiply any multi-level structures by their height, so a 2-hex building that is 3 levels tall is worth 6 hexes [2 x 3 = 6]). Then add to this figure one tenth of the total weight of all heavy energy-based weapons (used only by fortresses) and all Blocks in the power grid (rounding up to the nearest whole number).

Multiply this figure by 3 for Steam or Solar-based power supplies, 1.5 for Fission or Internal Combustion-based power, 1.0 for Fusion-based power, and 0.5 for External power supply (provided by the local grid, which makes the generator in this case more of a capacitor back-up). Round this final result up to the nearest whole number to find the tonnage of the power generation equipment needed for the complex. This equipment may be housed within a Hangar or any other dedicated structure to protect it against the elements and hostile fire.

Generators powered by Steam, Internal Combustion, and Fuel Cells require a storage place for their fuels as well. To abstract the fuel needs of such facilities, consider that a typical factory complex consumes 2 tons of fuel per day for every 5 hexes of structure that use power, plus 1 ton for fuel per hour for every heavy weapon battery that sees use in combat. Fuel is typically purchased on a monthly basis, so a complex's minimum fuel storage should be sufficient to see to a month's worth of continuous power for all essential structures.

Environmental Sealing: Buildings, Hangars, Refineries and Fortresses in vacuum, toxic atmospheres or underwater must be environmentally sealed (all other structure types can make do with adequate built-in ventilation that does not add significantly to their cost under these rules). For such structures, a 2D6 roll must be made, modified as noted on the Sealed Structure Breach Table below, whenever the structure's CF suffers damage in excess of 10 points (per hit). If the final, modified result is 10 or more, the structure is considered to be breached. A breached structure will not necessarily collapse, but all unprotected personnel and equipment within the entire structure is considered destroyed. Adjacent structures -such as tunnels- are not considered to be breached unless the doors between them are open.

Units attempting to move through the walls or closed doors of a sealed structure must make the breach check first in order to pass. Remember that an armored structure may not sustain CF damage until its armor is destroyed. See the Sealed Structure Breach Table.

SEALED STRUCTURE BREACH	
Target Number (TN) for Breach is (2d6): 10	
Structure	Roll Modifier
Light	+2
Medium	0
Heavy	-2
Hardened	-4
Subsurface	Depth / 2 (round up)

Subsurface Structures: As a more complex option, Building, Hangar, Refinery and Fortress structures may be constructed below ground (or underwater), rather than above. Doing so, however, poses certain risks, such as the threat of collapse from combat, both inside the structures, and above ground (if the complex is close enough to the surface, or simply located underwater). The costs and construction times of such constructs also increases dramatically, while the sizes of the same are vastly reduced.

To abstract all of this, players interested in constructing subsurface facilities may use the existing rules for surface structures, with the following exceptions:

For a structure to be considered subsurface, the highest elevation of the structure must be more than one level below the surface of the ground (or body of water) itself. Underwater subsurface structures require Environmental Sealing as well, and may be constructed at a depth no deeper than their CF (so an underwater light hangar, CF of 8, may not be constructed at or below a depth of 9). No such sealing is necessary for underground structures unless the native atmosphere is unbreathable.

Only Buildings, Hangars, Refineries, Fortresses and Tunnels may be built as subsurface structures.

The maximum structure sizes (both in terms of height and number of hexes) for all subterranean structures are reduced to one-half of their surface versions, rounded up (so a subterranean hardened fortress hex can be a maximum of 15 levels "high" and occupy no more than 10 hexes as $30 \div 2 = 15$ and $20 \div 2 = 10$).

The cost and man-hour requirements to construct subsurface facilities multiplies the standard structure costs by five. If the subsurface feature is both underground and underwater (such as beneath an ocean floor), double these costs again (and note that environmental sealing is required).

Any subsurface structure may be damaged normally by units standing within the structures, while tunnel openings and underwater subsurface structures not also built below the floor of the water feature may be attacked by units outside. As with sealed structures, each hex of subsurface structure that sustains damage in an attack must check for breaches, though a breach result for an underground subsurface structure translates into a collapse for that hex only. (As with surface structures, a multi-hex subsurface structure will collapse completely if more than half [rounded up] of all its hexes collapse.)

All equipment and unprotected personnel within a flooded or collapsed subsurface structure are considered to be destroyed in the event of a collapse. Vehicles and 'Mechs within a collapsed subsurface hex suffer damage as though they stood within a collapsing structure equal to the height of the subsurface structure, plus the height of all ground/water above it.

Units attempting to move through the walls of subsurface structures may not do so under any circumstances if the area beyond the wall is solid rock, but may inflict damage on the walls to encourage a collapse. Units in submerged subsurface structures may attempt to penetrate the walls using the same rules noted for environmentally sealed structures above. See the Structure Components Table.

- *Edward's ejection seat factory is to be built on one hex, with two levels, as a light building. Because he chose 10 CF, his construction costs for the facility itself will be 200,000*

(10,000 x 10 x 2) C-bills and require a minimum of 200 (100 x 2 x 1) man-hours.

- *Barclay's 'Mech factory is to be built on 2 hexes, with 3 levels, as a heavy building. Because he chose 65 CF, construction costs for the facility itself will be 3,900,000 (10,000 x 65 x 3 x 2) C-bills and require a minimum of 3,000 (500 x 3 x 2) man-hours.*
- *Gale's Gauss factory is to be built as two buildings, a 3-hex, 2-level light hanger and a 2-hex, 1-level light building. The hanger has 8 CF, so its construction costs will be 384,000 (8,000 x 8 x 3 x 2) C-bills and require a minimum of 180 (30 x 3 x 2) man-hours. The building has 5 CF, so its construction costs will be 100,000 (10,000 x 5 x 2 x 1) C-bills and require a minimum of 200 (100 x 2 x 1) man-hours. Total facility: 484,000 C-bills and 380 man-hours.*
- *Phil's pill lab is to be built as a single hex, single level medium building. Because he chose 20 CF, construction costs for the facility itself will be 200,000 (10,000 x 20 x 1 x 1) C-bills and require a minimum of 300 (300 x 1 x 1) man-hours.*
- *Dieter's diesel processing refinery is to be built as five buildings, a 7-hex, 4-level medium refinery and four 1-hex, 4-level light buildings. The refinery has 15 CF, so its construction costs will be 6,300,000 (15,000 x 15 x 7 x 4) C-bills and require a minimum of 28,000 (1,000 x 7 x 4) man-hours. The light buildings have 15 CF, so their construction costs will be 2,400,000 (10,000 x 15 x 4 x 1 x 4) C-bills and require a minimum of 1,600 (100 x 4 x 1 x 4) man-hours. Total facility: 8,700,000 C-bills and 29,600 man-hours.*
- *If Julie's JumpShip yard had been split between the orbital facility and the ground facility, she might have gone with two buildings, a 9-hex, 5-level medium fortress and a 5-hex, 1-level heavy building. The fortress has 30 CF, so its construction costs will be 27,000,000 (20,000 x 30 x 9 x 5) C-bills and require a minimum of 27,000 (600 x 9 x 5) man-hours. The building has 25 CF, so its construction costs will be 1,250,000 (10,000 x 25 x 5 x 1) C-bills and require a minimum of 2,500 (500 x 5 x 1) man-hours. Total facility: 28,250,000 C-bills and 67,500 man-hours. But, as she elected to go with a fully orbital facility, the installation of the blocks and support infrastructure are the only things she has to contend with (which will be discussed in the Operations rules).*

7. Quick Generation

The above Factory Design rules are intended for the players that want the same level of detail as they would get out of designing their own custom BattleMechs, Combat Vehicles or from any of the myriad other construction rules that can be found in TechManual and elsewhere. For those players that are looking for quick stats on what a facility can do, with some leeway as to those capabilities, the following checklist might be helpful:

1. Establish the local community's Tech Rating. (Tech Ratings Table, p. 3).
2. Establish the Product Class (and the product). (Production Class list, p. 40)
3. Establish the Factory's Block Rating and Production Capacity per Block. (Production Capacities Table, p. 6)
4. Establish number of Blocks in the factory.
5. Determine how many individual units will be produced annually. (Production Capacity x Block Quantity ÷ Unit Cost, rounded)
6. Determine Factory size. (Multiply Block quantity by 1.5, rounding up.)

Additional details desired (such as factory heights, emplaced weapons, etc, can be added by utilizing the relevant rules, modifying as appropriate for your campaign.

For example, using Barclay's example of a BattleMech assembly facility, modified for Quick Generation:

1. Tech Rating: E
2. Product Class (Product): BattleMech (WVE-5N Wyvern)
3. Block Rating: E/FA (i.e., Fully Automated), 40m C-bills each, annually
4. Number of Blocks: 2
5. Annual Production: $23 (40,000,000 * 2 \div 3,470,865 = 23.05, \text{ rounded down})$
6. Factory Size: $3 (2 \times 1.5 = 3)$

OPERATIONS

Industry Personnel

In the Industry rules, factories employ three different categories of personnel: Primary, Administration and Optional.

Unless determined otherwise, personnel have a Regular Experience Rating. If they wish, players can use the Random Experience Rating Table (see p. 273, TW) to determine the Experience Rating of each individual Machinist, Engineer or industry Technical Team.

Rules for locating and hiring these personnel are left up to the gamemaster. In general, Laborers and administrative personnel should be fairly easy to locate and hire, as a new factory often draws the necessary personnel directly from the local economy. Machinists and manufacturing engineers can be considerably harder to locate, as their skills are often in great demand, especially during the later Succession Wars. Players may choose to generalize this process, just putting out employment offers and assuming they are filled or they may make a campaign of itself to locate these "warriors of industry".

Personnel Types

Primary Personnel

Line personnel are comprised of the three critical jobs seen on the factory floor: Laborer, Machinist and Line Engineer. Each one has a role that cannot be filled by the other and employing as many as possible helps assure a productive and profitable production line.

As previously defined, a Laborer is roughly the equivalent to that of a military Astech, though they only get paid 5 C-bills per hour. Laborers perform rote roles in the operation of stations on each Block for which they receive the basic training. It may comprise of pulling levers, pushing buttons, adding in a resource on one end or pulling out a finished product at the other end. Unlike the other primary personnel, Laborers cannot work past 8 hours in each production cycle, thereby requiring a factory owner to employ additional shifts for additional hours of production. When a factory suffers a lack of an appropriate quantity of Laborers, the production line is reduced in the quantity of products produced.

A Machinist is often compared to his military counterpart, the Technician. Their pay scales are similar, as the Machinist is valued for his knowledge in keeping a working Block producing or assembling the products, especially in the turbulent post-Star League eras. Where the Machinist differs is in his inability to effect repairs upon a damaged Block without the guidance of an Engineer, due to the intricacies of the production equipment. As an Astech often benefits from his experience and may develop the skills to become a Tech, so does a Machinist have the opportunity to become an Engineer, though the process is much longer to complete. Machinists may work for up to 16 hours per production cycle, though maintenance and repair efforts will take twice as long when conducted past the 8-hour point. A shortage of Machinists will eventually result in needed maintenance going undone and damage to a Block. The general knowledge to perform as a Machinist comes from the Career sub-skill Machinist.

Line Engineers (sometimes referred to as Manufacturing Engineers) perform double duty on a production line. While they may occupy most of the production cycle monitoring the various Block processes from a central monitoring center, it is their skills at quality control and repairs on the actual Blocks that make them so valuable to factory owners. Line Engineers are critical in the design phase of a production line, as the individual Blocks are conceived, drafted and produced at a die & tool center and the knowledge Engineers bring with them allows only their career field to perform the necessary repairs to a damaged Block (with the assistance of six Machinists on a Technical Team). When Blocks are performing as expected, the Line Engineer monitors all of the various functions, processes and procedures of the machinery and employees, insuring that a quality product comes out at the end of the line. A shortage of Line Engineers will be first

felt in the subsequent quality of those products and eventually in the length of time for recovery from damage (if recovery is even still available). The general knowledge to perform as a Line Engineer comes from Mechanical Engineering, a sub-skill of Career.

Administration Personnel

More than likely, a good number of the Admin personnel will be comprised of the player's characters. This category of personnel include the executives, managers, secretaries, salespeople, accountants and office assistants that round out the population of any business and who handle the daily office routine. These administrative personnel may be the ones who negotiate construction contracts or sales agreements. They manage the strategic focus of the business, arrange for the transportation needs of the company, insure logistics are met and that employment requirements are maintained. Each factory has a required minimum number of administrative personnel, equal to the number of line personnel divided by 30, rounded up. For example, if a production line requires 745 people (Laborers, Machinists and Engineers) for all of its Blocks, then the administrative burden would be an additional 25 ($745 / 30 = 24.83$, rounded up). If optional personnel are directly employed by the company (rather than contracted out), then their numbers should be added to that of the line personnel, before determining the administrative requirement.

Optional Personnel

Optional personnel for a factory are numerous. Many will likely be security or utilities (for the production line or the facility itself), but other optional employees may fill roles in transportation and medical. Summed up, any other roles that a player feels needs to be filled or would enhance the campaign would most likely fall under the optional category.

Experience

Over time, individual Machinists and Engineers and complete Technical teams can improve their Experience Ratings. Players should keep track of the number of experience points accrued by each team. Consult the Personnel Experience Table to find the number of points required to move up to the next Experience Rating. Points are accrued for each consecutive three months completed or from the awarding by extremely successful maintenance efforts (see the Maintenance Merit of Success table). Veterans may not achieve the Elite rating by the accrual of points from time in service, but only through merit-based awards.

A team is made up of seven personnel: one Engineer and six Machinists. A team that suffers casualties can be brought back up to strength via new members, but the experience count will drop to 0 for that rating if suffering three or less casualties and 0 of the next lower rating if suffering four to six casualties.

PERSONNEL EXPERIENCE

Old Rating	New Rating	XP Required
Green	Regular	5
Regular	Veteran	10
Veteran	Elite	10

Salary

BASE SALARY

Position	Monthly	Annual
Primary		
Line Engineer	1,500	18,000
Machinist	640	7,680
Laborer	320	3,840
Administration		
Executive	variable	variable
Department Head	1,500	18,000
Administrator	640	7,680
Secretarial Staff	320	3,840
Optional		
Security	700	8,400
Utility Emp.	500	6,000
Transportation Emp.	500	6,000
Medic	640	7,680
Doctor	1,500	18,000

Product and Production Line Design

A large part of the allure of BattleTech is the opportunity the player has to develop his own designs for use on the battlefield. Almost every title ever produced for the table top game has provided additional rules or items to enhance these characters made of metal and exotic compounds. The end result of number crunching (whether with a pencil and paper or with the Heavy Metal suite of programs) is a machine invested with malicious intent for

our battlefield foes and crafted to bear as much personality and weaponry as we could muster from ourselves.

The sheer scope of the background canvas that the developers of the last 25 years have painted constantly show the capital, personal and political value that the people of the Inner Sphere (and its environs) have placed on their war machines. Where the player may have spent hours developing his initial design, prototyping it out on its first tabletop battlefield and then perfecting it again on the design table, his fictional counterparts have tirelessly slaved away at fine-tuning this same beast over months and years, manipulating computer wireframes, building and climbing over prototypes, piloting the first production units out onto the testing ground and then the battle ground. This is the aspect of the BattleTech universe that this portion of the industry rules will address.

Product Design

The player has already designed the industrial facility his characters need to produce the products they want to take to market. Some characters may be intending to build a product that is not new to the Inner Sphere, in which case they (the characters, not the players) will move to start designing the types of Blocks necessary to fill that production line. Other characters, however, may be needing to design their product itself.

New Design

A team of design engineers, all having the technical skill necessary for that product class, must be brought together in order to design it. See the Design Team Table for team sizes. Unless determined otherwise, team personnel have a Regular Experience Rating. If they wish, players can use the Random Experience Rating Table (Total Warfare, p273) to determine the Experience Rating of each member of the team or the team as a whole. It is important that the team's average Experience Rating be established.

The team will be need to be funded C-bills equal to the retail value of the final product multiplied by 1,000, with a minimum amount of 50,000. See the Product Design Time Table for the length of the initial design process. Teams with an average skill of Elite will roll two less d6, Veteran will roll one less d6 and Green teams will need to roll an additional d6. At the end of this time, the design is submitted to either a company or governmental panel for review and a Review Check is rolled, with a TN of 7, modified by the production class modifier. Success means the design has met with the panel's approval and it has been released for production. A submission that fails is sent back to the team for modification, which will take an additional amount of time, as indicated in the Extension column. The extension time is again modified by the team's average skill the design is either accepted or the characters wish to withdraw it from consideration. Each month of the extension will require additional funding equal to the original monthly funding

[i.e., total initial funding divided by number of initial months] multiplied by 2.

- *The Halswell Electronics company is planning to release a new small laser design, to be retailed in the amount of 11,250 C-bills. As the design is less than 30 tons, 3 engineers (all with the Regular Career/Laser Engineering skill) are brought together to form a design team and are funded with 11,250,000 (11,250 x 1,000) C-bills. After rolling 2d6 + 4 for Component, an 11 is the result, indicating the design is ready for submission 11 months later. The Review Check must roll a 6 or better, but instead*

DESIGN TEAM	
Product Size	Team Size
less than 30 tons	3
less than 200 tons	1 per 10 tons
200-1,000 tons	1 per 50 tons
1.001-10,000 tons	50
greater than 10,000 tons	50 per 10,000 tons

PRODUCT DESIGN TIME			
Production Class	Design Length (months)	Review Modifier	Extension (months)
BattleMech	6d6 + 24	+2	3d6
IndustrialMech	4d6 + 18	+1	2d6
ProtoMech	6d6 + 24	+2	3d6
Combat Vehicle	3d6 + 18	+1	1d6 + 3
Support Vehicle	3d6 + 6	0	1d6 + 3
Battle Armor	3d6 + 18	+1	1d6 + 3
Conventional Fighter	3d6 + 18	+1	2d6
Aerospace Fighter	6d6 + 24	+2	3d6
Small Craft	6d6 + 24	+2	3d6
DropShip	6d6 + 24	+2	3d6
Satellite	3d6 + 18	+1	1d6 + 3
Space Station	10d6 + 60	+3	5d6
JumpShip	6d6 + 36	+3	3d6
WarShip	10d6 + 60	+3	5d6
Component	2d6 + 4	-1	1d6 + 2
Other Item	2d6 + 2	-2	1d6 + 1

a 5 is rolled and the design is sent back for changes. A 1d6 + 2 is rolled for 5, meaning that 5 more months are needed before the design is re-submitted, and the team requires another 10,227,273 (11,250,000 / 11 * 2 * 5 = 10227272.73, rounded up) C-bills for the process.

New Variant

A new variant of an established model (including Omni alternate configurations) is much easier to design than a model from scratch, as long as the company doing the design has access to the blueprints of the original model. A similarly styled team must be brought onto the project, but instead of using the complete design length, the process only needs as much as indicated in that production class' Extension column. Funding is determined by taking the difference in retail costs between the original model and the variant and multiplying that by 1,000 C-bills (minimum result of 25,000). Omni alternate configurations only require the difference in value of the new configuration multiplied by 1,000 (i.e., no minimum). Upon completion of the draft design, the Review Check is held and, if it fails, sent back for modification, just as with the new model.

- *HildCo Interplanetary has been ordered to design a Royal version of their VTR-9A Victor for release to Star League member states. As the new variant will mass 80 tons, an 8-member design team (all with the Career/BattleMech Engineering skill) has been brought together and funded with 13,500,000 (8,027,221 - 8,013,721 x 1,000) C-bills. They roll 3d6 from the Extension column and get 12, delivering the new VTR-9B for review one year later.*

Captured Equipment and/or Partial Plans

Sometimes an enemy item of interest is captured on the battlefield or stolen through an act of espionage. Or maybe only partial plans are made available. An attempt can be made to reverse engineer and then copy it. This task is put before the appropriately assigned design team, from a faction with the same or higher Tech Level (ex: Inner Sphere teams still have a great deal of trouble reverse engineering Clan tech from anything other than an institute of higher learning). They follow the exact same path that a new design team would take, with the only difference being a process that takes half as long. Roll for the design time length as indicated for the production class on the Product Design Time Table, and divide the result by 2 (rounding up). If this is a variant of a known device (such as a new Gauss rifle type) and blueprints are available for an original model style, the captured item can be compared to the plans. The Review Check enjoys a -1 modifier in this case. If one or two additional copies of the item are made available to the design team, then the engineers can learn more by safely taking some of them apart. One additional example of the captured item provides another -1 modifier, two additional examples provide a -2 modifier (the maximum allowed). Funding remains the same as for a new design.

Production Line Design

Once the product plans have been approved by the review panel, the Blocks needed for the production line must also be designed. This step can be skipped if the characters have the blueprints for an equally sized production line that makes the exact same product, as they'd be commissioning a new set of Blocks identical to the original set. If no such plans are available, then the blueprints for the product are turned over to a line designer, usually the company's senior line engineer. This engineer spends 2d6 + 2 months (-1 month for a Veteran experience rating, -2 for Elite, +2 for Green) developing the plans for the line. The character may spend an optional amount of time equal to half that needed to develop the line plans to review them for possible errors; a review check with a TN of 7 is rolled, modified per the review modifier on the Product Design Time Table. If the roll fails, an error is discovered and an additional 1d6 months (no modifiers) are needed to correct the plans, after which they are provided to the machinist's shop, error-free. If the optional review period & check are not done, then a review check is automatically rolled upon the line's installation at the industrial site (months later). Success at this point results in a working and error-free set of Block blueprints for the product line. Failure results in a production run-long error introduced into each product. (See the Quality Assurance section.)

Tool & Die Shop

The tool & die shop is the answer to the question, "Who makes the machines?" It is a specialized machinist's shop used to cut, shape and form a wide variety of products and components and can make dies, molds, jigs, fixtures, machine tools, gauges, cutting and other tools, and all other objects which are used in the production line Blocks of the BattleTech universe. Tool & die shops come in all manner of sizes; some fill up the cargo bays of specialty DropShips hired by colonies or remote planets to assist in the production of the tools with which they need to grow or survive. Other corporations specialize in the production of custom machinery, such as Blocks.

For the player valuing the benefits of owning such a shop, the tool & die machinery are treated as variations on the production line Blocks. Shops have a Tech Rating, and may produce any machinery equal to that rating or earlier (there are no modifiers -cost or time- for lesser rated products). They may also be used to build and assemble complete runs of standard commercial & military products. Some 'garage' factories use a tool & die shop, rather than a limited Block, for just this purpose (ex: some Solaris VII shops or S.L. Lewis Incorporated's Savannah Master line). The size of the shop is completely up to the player, though the output is much slower than an equivalently sized Block. Because the shop must be re-set for each new product type and because it is not set up to provide the level of efficiency of a production line, a tool & die shop produces

items over a comparatively longer time, with a monthly output 3 times slower than an equivalent Block (round up, when necessary).

To design a tool & die shop, first design an equivalent Block (semi- and fully-automated shops do not exist), using Components as the production class. It has the same weight and the same hex and level requirements. The cost of the shop is three times that of the Block itself. Shops do require Machinists and Laborers in equal numbers, but not Line Engineers. A tool & die shop may be installed onboard a DropShip, support vehicle or any other vehicle with the space to carry it.

Buying the Block

The characters now have in their hands three things: product blueprints, production line blueprints and a briefcase full of cash. As it is a long process to build Blocks, the next thing they need to do is to find a source to build the Blocks they need to put in their facility. That task is usually left up to the company's senior line engineer, but the player may apply the Negotiation skill of any character.

One Availability Check (TN 7+) may be made each month, applying the Block's Availability Rating and all applicable modifiers (see the Block Availability and Manufacturing Equipment Availability Modifier Tables). If, due to the number of Blocks being ordered, the modifiers prevent any successful rolls from being possible, the characters must split the order and find two corporations (not necessarily the same month) to build the Blocks. A failure indicates that no capable machinery

BLOCK AVAILABILITY	
Production Class	Availability Code
BattleMech	C-E-C
IndustrialMech	C-E-C
ProtoMech	X-X-E
Combat Vehicle	C-D-C
Support Vehicle	B-C-B
Battle Armor	E-X-D
Conventional Fighter	C-D-C
Aerospace Fighter	C-E-C
Small Craft	B-D-C
DropShip	C-E-D
Satellite	C-E-D
Space Station	D-X-E
JumpShip	C-F-D
WarShip	D-X-E
Component	B-D-C
Other Item	B-D-C

company is available to start on the project at that time. Success indicates the opposite: each point of MoS adds an additional company ready and willing to negotiate for the contract.

The characters' assigned negotiator then steps forward to mediate the various contracts. The first step is to receive the company's offer, which will include both price per Block and time until delivery. To determine the starting cost, make a Negotiation Check with a TN of 10, modified by the Equipment Rating of the item in question, as well as -1 if the character is a Veteran Line Designer, or -2 if an Elite. For each successful Negotiation Check die roll, the original Block cost is reduced by 10 percent (round down in all instances).

A player can make a total of three Negotiation Check dice rolls in an attempt to affect the price, but each subsequent roll applies a +1 cumulative modifier. A failed roll automatically applies a positive percent equal to the last negotiated Block cost (or adds 10% if the first roll is failed). For example, a player has rolled successfully twice and has reduced the purchase price of the contract by 20 percent. He's feeling lucky and is pushing for a 30 percent price reduction. He applies the +3 modifier and rolls again, but fails. A 30 percent increase is automatically applied to the current negotiated price, meaning the player will pay a 10 percent increase from the original base price and cannot roll again.

The player then rolls 1d6 + 4 to determine delivery length (in months) for each Block, added together for the total time of the delivery contract.

MANUFACTURING EQUIPMENT AVAILABILITY MODIFIER					
Availability Rating	Modifier	Quantity Blocks	Modifier	Location of Factory	Modifier
A	-4	1 limited	-1	Inner Sphere internal world	0
B	-3	1 - 3	0	Inner Sphere Clan border world	+3
C	-2	4 - 6	+1	Inner Sphere faction border world	+1
D	-1	7 - 9	+2	Inner Sphere Periphery border world	+2
E	0	10 - 12	+3	Periphery world	+2
F	+2	13 - 15	+4	Major industrial world	-2
X	+5	16 or more	+5	Capital	-1

After the contracts have been determined for each responding company, the players can decide which one they wish to sign, though they have the option of doing business with all of them or none of them. If no contracts are signed, or if the characters wish to seek other corporations to build more of the Blocks, another attempt may be made the next month.

Upon delivery, it takes each Technical Team (3d6 + 2) x 2 weeks (modified by the average skill level of the technical team: -2 weeks for veteran, -4 for expert, +6 for green) to install a Block. Technical Teams may install all of their Blocks at the same time, or one team can work on each Block individually. The production line will only start once all the ordered Blocks are connected.

Obtaining Land

borrowed heavily from p. 133 of Mercenaries Supplemental Update

For some companies, the land area needed for a base may already be within reach if it or its owner has a land grant or significant property. Others may be given the grant of land, in order to lure the company to do business locally. If neither of these apply, the company may instead opt to lease or buy a parcel of land for the purposes of facility construction.

Doing so can be as difficult or as easy as the gamemaster desires, as can the cost of land, based on its area and value. In RPG campaigns, this can be resolved by whatever means the gamemaster wishes. Alternatively, the process may be abstracted into two dice rolls, modified as the gamemaster sees fit. For the first—the roll to locate suitable land—the company spends a week of searching, at the end of which the player rolls 2D6 against a TN of 8 (modified as necessary for negotiation skills or landowner conditions, at the gamemaster's discretion). If the result is equal to or higher than the modified target number, the company has found a suitable tract of land within that week. Failed rolls simply mean that an extra week of searching and negotiations is spent for every point by which the roll misses its modified target. The cost of the land is then determined by rolling 3D6 and subtracting the previous roll's Margin of Success (or adding the Margin of Failure). The result of this second roll, multiplied by the appropriate modifier from the Land Cost Table (below) for every square half-kilometer of remote land desired (or portion thereof), represents the monthly cost to lease the land, in C-bills. Multiply the cost result by 600 if the company is buying the land instead of leasing. (Note: that a square half-kilometer roughly equates to the area of a standard BattleTech mapsheet.)

A general rule of thumb is that the number of hexes needed to be set aside for total land development equals total building hexes multiplied by 1.5. Wet naval assembly installations must be directly located next to water hexes (it

is assumed water is pumped in at the appropriate locations for final assembly).

LAND COST	
Location	Modifier
Within metropolis	135,000
Outskirts of metropolis	60,000
Within major city	90,000
Outskirts of major city	40,000
Within medium city	55,000
Outskirts of medium city	25,000
Within small city	35,000
Outskirts of small city	15,000
Within town	25,000
Outskirts of town	10,000
Remote	2,500

Supplies

Factories don't create products out of thin air. They need resources and supplies to be fed into the 'insert here' side, so that something comes out the 'all finished' side. For the purposes of roleplaying, the players have two general options for their production complexes. One is that they buy all of the resources, components and parts necessary to produce or assemble the final product from a NPC. While the mechanics of procuring these supplies is left up to the players and their gamemaster, it is suggested they simplify the process and not deal with specific items and individual numbers, but instead negotiate a deal that delivers all the general parts & supplies at 50-90% of the final retail value of the end product.

For those that seek to become the ultimate captains of industry, their complex (or complexes, if spread apart) can produce each individual part necessary to assemble a complete product. For example, a 'Mech complex operated by a massive military industrial corporation might have separate production lines for each part of the final 'Mech, to include limbs, myomer, armor, weapon systems, sensors, ejection seats, heat sinks, gyroscopes, engines, jump jets and all of the other myriad components that make up a complete BattleMech. Don't forget that each of the production lines for these components needs sources for its parts as well, which means additional production lines. (This particular level could be simplified by building a number of 'general' parts production lines, where it's the value of the output that matters and not the specifics of the actual product.)

Middle ground between these extremes would be a corporate negotiator that found the individual suppliers for their product and seeks to set up acceptable deals for pricing and delivery of the much-needed supplies. An extensive player campaign could be built around having the corporate representatives jump around the Inner Sphere, to locate supplies and arrange for delivery, all in time to meet the deadline for the factory's first production run, and then maintaining those relationships.

Block Operations

The following portion of the Industry Rules deals with various aspects of Block maintenance, quality assurance, mothballing and salvage.

Time

Unlike tactical BattleTech play, the operation of a production line deals with several interconnected scales of time:

Production Cycle: A factory operates on an 8-hour schedule, with the production lines generally shutdown for maintenance, repair and re-supply for 16 hours. A factory owner may choose to operate his line for additional hours, at the price of increased maintenance requirements and risk of damage. Machinists and Engineers may be kept for up to 16 hours (necessitating additional Machinists and Engineers for over 16 hours), but Laborers may only work 8 hours at a time. Additional shifts of Laborers would have to be employed to work more.

Maintenance Cycle: While maintenance is constantly performed throughout the day, larger tasks can only be completed during the 4-16 hours following a production cycle. The results of this maintenance are determined weekly.

Repair Cycle: Repairs to damaged Blocks can only be performed when the Blocks are not operating. The production cycle may be interrupted by damage (or the intent to fix the damage), but generally owners prefer to handle repairs following a production cycle. Obviously, the greater amount of downtime between production cycles, the better the chances at effective repairs.

Overtime: When Machinists and Engineers are pushed to complete an additional 8 hours in one day, their efforts will take twice as long, providing only 4 additional hours of productive work.

Skill Checks

Skill checks are dice rolls of 2d6 or 3d6 -depending on the situation- made against a target number (TN) based on the Experience Rating of a single Machinist or an Engineer-led Technical Team (see Industry Personnel), modified for

various situations. Each type of roll described in this section includes the name of the roll for clarity, such as Maintenance Check, Replacement Check, Repair Check and so on.

PERSONNEL EXPERIENCE

Experience Rating	Base Skill Target
Green	5+
Regular	3+
Veteran	2+
Elite	1+

Note: these TNs are identical to that of the Tech Base Skill Target from the Support Personnel Experience Table (Strategic Operations, p 168), but with the Factory modifier from the Location Modifiers Table (Strategic Operations, p 171) factored in.

Block Quality

Blocks have a Quality Rating based on their condition. Unlike field units, all new Blocks are initially purchased with a Quality Rating of F (Excellent). On the Quality Rating Table, the Value Modifier column indicates the individual Block value, if the player wishes to buy or sell a previously-owned production line. Alternatively, players can use the more detailed Faction Quality Table (Strategic Operations, p. 167). Blocks with Quality Ratings of D or higher have Value Modifiers that reflect the increased value as installed & operational units (rather than potential value, before their design, production and installation).

Wear and tear, damage and poor maintenance can cause a Block's Quality Rating to decrease over time. The rating is based upon the percentile of a Block's original maximum Structure Points remaining. See the ranges of each rating on the Quality Ratings Table.

BLOCK QUALITY RATINGS

Quality Rating	Description	Structure Points	Value Modifier
A	Salvage	29% or less	0.8
B	Poor	30 – 49%	0.9
C	Fair	50 – 59%	0.95
D	Average	60 – 69%	1.0
E	Good	70 – 89%	1.1
F	Excellent	90% or higher	1.3

Maintenance

Over the eras, production lines have become capable of much more sophistication, quality and output, though with a matching need for consistent, skilled maintenance. Even if a Block has been idled, it must undergo some degree of preventative maintenance to avoid deterioration in its Quality Rating. Machinists constantly perform daily maintenance on Blocks even as they operate, but this daily requirement also demands the type of care that can only safely be done with the Blocks shut down for established periods of time. As such, a Machinist is required to be present not only for the active production cycle, but also post-production. In many cases, a company will hire an on-cycle Machinist to work the 8-hour shift for active maintenance and another Machinist to come in for the post-cycle work. Sometimes only one Machinist is available for a Block and may have to work additional hours. This Machinist will take twice as long to complete the post-cycle work.

Fully automated Blocks do not require maintenance by human Machinists. Instead, the work is done by automatons that exhibit a great deal of skill. Fully automated factories generally operate on the same 8-hour production cycle, but can be ordered to operate for either 2 or 3 production cycles per 24-hour day, with an increased need for maintenance. This is accomplished automatically, without shutting down the whole line, due to a series of processes that secure only those mechanisms that need the required maintenance and still allow the production to bypass affected (and redundant) areas. However, because the amount of maintenance has more than tripled, there is a greater risk that the automatons will not be able to keep

up with the required work and therefore increase the opportunity for damage to the line. A fully automated Block with a Tech Rating of E has an Experience Rating equal to that of a veteran Machinist. A fully automated Block with a Tech Rating of F has an Experience Rating equal to that of an elite Machinist. (See the Personnel Experience Table for TNs.)

For non-fully automated lines, the weekly post-cycle maintenance is usually divided into daily segments accomplished in the normal 16 hours of post-cycle time. If the factory operates for 2 production cycles per day, then the required amount of maintenance (which has also increased) must be fitted into the 8 remaining hours. If a production line performs 3 cycles per day, then there must be a stand-down time scheduled each week to do all of the maintenance at one time, or it will go undone for that week (with the risk of damage to each Block).

The weekly time required for post-cycle maintenance of specific Block types can be found on the Block Maintenance Time Table.

After each week, whether the production line was active or idle (but not mothballed), the Machinists assigned to post-cycle maintenance for each Block must make a Maintenance Check. This check is made by rolling 2d6 and using the Machinist's Base Target Number (TN), modified as appropriate from the Maintenance Check Modifier Tables, to find the Margin of Success (MoS) or Failure (MoF). This value is then cross-referenced with the unit Quality Rating on the Maintenance Check Table to find the results of the maintenance effort. More than one Machinist can be assigned to the effort, but doing so means that another Block may have to go unattended. Unattended Blocks still make Maintenance Checks, but use a base TN of 10 instead of the TN indicated by the Skill Rating of an assigned Machinist.

Damage suffered as a result of a failed Maintenance Check can be repaired before the next production cycle, if time permits. Fully automated Blocks make weekly Maintenance Checks for each production cycle ordered per day. For example, if a fully automated production line operates 24 hours a day, the Maintenance Check is rolled three times that week with cumulative results.

Missed On-Cycle Maintenance: Each active Block requires the presence of an on-site Machinist during the production cycle. If even one production cycle within a week misses the on-cycle maintenance due to an absent Machinist, then a +1 modifier is applied. This is only necessary once per week, regardless of the number of daily production cycles.

Block Tech Rating: A Block's technological sophistication has an impact on ease of maintenance. See the Block Tech Rating Modifiers Table.

Block Quality Rating: The overall quality of the Block likewise affects ease of maintenance. A Block chugging away in the ancient production lines of Hesperus II during the Third Succession War presents a Machinist with a far

BLOCK MAINTENANCE TIME

Block Type	Maintenance Time (weekly)	2 Cycles	3 Cycles
A	2 hours	4.5 hours	7 hours
B	3 hours	6.5 hours	10 hours
B/SA	3.5 hours	7.5 hours	11.5 hours
C	5 hours	11 hours	16 hours
C/SA	6 hours	13 hours	19.5 hours
D	7 hours	15 hours	24 hours
D/SA	8 hours	17 hours	26 hours
E	9 hours	19.5 hours	29 hours
E/SA	10.5 hours	22.5 hours	34 hours
F	11 hours	23.5 hours	36 hours
F/SA	13 hours	28 hours	42 hours

greater challenge than a shiny, new Block on a Word of Blake factory in the Free Worlds League. See the Block Quality Rating Modifiers Table.

Era Modifier (Optional): Players who desire a more authentic setting for campaigns in different eras of the historical game universe can apply Era Modifiers, in addition to other standard modifiers. These modifiers make the acquisition and maintenance of advanced technology progressively harder throughout the Succession Wars era. The quality of individual Blocks tends to degrade in order to produce the characteristic "signature" indicative of that period. See the Era Modifiers Table (Strategic Operations, p. 170).

Machinist Type: The society from which a Machinist originates plays a part in his capacity in understanding the inherent technology utilized in a Block. While Clan Machinists are knowledgeable in Inner Sphere technology, the reverse is not true. Military Technicians may also conduct maintenance on Blocks (if called upon), but must roll 3D6 when making Maintenance Checks and use the lowest two dice as the result. This reflects the fact that Technicians possess similar general abilities, but may lack the specific training to work on Blocks. (Machinists may not, however, perform as Techs on military units, though they may assume the role of an Astech, with a +4 modifier.) Up to two additional Machinists may assist the Block's primary Machinist in performing post-cycle maintenance. See the Machinist Type Modifiers Table.

Location: As by rule, a Block is located within factory conditions and no modifier is applied. However, when there is an exception to the rule, such as with Blocks installed in the cargo bays of DropShips (as may be found with a specialty Die & Tool Block), it is assumed that Transport Bay conditions exist at a minimum and a modifier of +2 is applied.

Planetary Conditions: Environment plays an important part in the level of difficulty a Machinist may

BLOCK TECH RATING MODIFIERS	
Rating	Modifier
A	-4
B	-2
C	+0
D	+1
E	+2
F	+3

BLOCK QUALITY RATING MODIFIERS	
Rating	Modifier
A	+3
B	+2
C	+1
D	+0
E	-1
F	-2

have in performing his maintenance. Factories may be found in the zero-G conditions experienced on a space station, or located in the varied levels of gravity associated with planetary bodies. In some cases, factories may be found in toxic or extreme environments. See the Planetary Conditions Modifiers Table.

Other Factors: Factories producing experimental (defined as an item introduced anywhere from a year to ten

PLANETARY CONDITIONS MODIFIERS	
Planetary Condition	Modifier ¹
Zero-G	+2
Low-G (less than 0.8 Terran standard)	+1
High-G (more than 1.2 Terran standard)	+2
Very High-G (2.0 or more higher than Terran standard)	+4
Vacuum or Tainted Atmosphere (due to bulky suits)	+2
Trace or Very High Pressure Atmosphere	+1
Extreme Temperatures ² (due to suits and/or other apparatus)	+1
Heavy Snow/Ice Storm/Lightning Storm/Strong Gale/Torrential Downpour	+1
Blizzard/Storm/Tornado	+2
Moonless Night/Solar Flare ³	+1
Pitch Black ³	+2

1: if outside of a sealed structure/building (such as a refinery)
 2: if higher than 50 degrees C or less than -30 degrees C
 3: if no lights/cover available

MACHINIST TYPE MODIFIERS	
Machinist Type	Modifier
Inner Sphere Machinist working on Clan Tech	+2
Technician performance Block maintenance	see Machinist Type
Per additional Machinist	+1 ¹

1: to a maximum of 2 additional Machinists per Block

OTHER FACTORS MODIFIERS

Other Factors	Modifier
Experimental or Extinct Product ¹	+2
Extra Time	variable
Overtime ²	+3

1: an Experimental product is any item with an Experimental Rules Level (Tactical Operations, p.275)

2: when the Extra Time and Overtime modifiers are used together, the double-time penalty for working over 8 hours must be the standard time to be increased

years prior to its official production release) or extinct products require Machinists that have to learn as they experience the various aspects of an unfamiliar Block. To increase the potential for successful maintenance, a Machinist may spend extra time conducting the work. If twice the required time is spent on the job, the Maintenance Skill Check receives a -1 modifier to the target number. The maintenance time may be doubled multiple times (to a maximum of 4 times the standard time), but a result of 2 on the dice roll is always a failure, regardless of how low the target number is reduced by taking extra time. A Machinist that has worked more than 8 hours is considered to be working overtime and exhaustion will play a role. See the Other Factors Modifiers Table.

Quality Assurance

Initial production runs (not to be confused with prototype production) often introduce unintended 'features' or 'bugs' into a product. The more positive of these quirks can enhance the reputation of the product, and provide a similar boost to sales. Conversely, a negative quirk can put a damper on any projected profits. Quirks are most likely to occur when a production line has not had a pre-installation review check done (see the Production Line Design section, p.20). In that instance and following installation, the gamemaster shall conduct a review check. Review checks are also rolled following damage repairs or any major changes to the line (such as retooling, expansion or upgrading). When a review check is failed, a result roll of 1d6 is made. A positive quirk is introduced when the result is 1, no quirks for 2-4 and a negative quirk rears its head on 5 or 6. The gamemaster will either assign an appropriate quirk found from the respective Quirk Tables (Strategic Operations, pp. 193-199) or design one to be applied. Oftentimes, these quirks are not realized until the product hits the field with the customer base. When reports filter back to the company and assuming the quirk is not considered too negative, the error in the line will usually be addressed upon the completion of the current production run. However, if it is considered severe enough, production may be ordered to a full stop, to make the necessary line corrections. When that happens, the shutdown lasts 2d6 months (no modifiers) and the quirk is cleared from the line.

MAINTENANCE CHECK TABLES

MERIT OF FAILURE

MoF	A	B	C	D	E	F
7+	Destroyed	Q-A(2)	Q-B(2)	Q-C(1)	Q-D(1)	Q-E(1)
6	(3)	Q-A(1)	Q-B(1)	Q-C(1)	Q-D(1)	Q-E
5	(3)	(1)	Q-B(1)	Q-C(1)	Q-D	Q-E
4	(2)	(1)	(1)	Q-C	Q-D	Q-E
3	(1)	(1)			Q-D	Q-E
2	(1)					
1						

MERIT OF SUCCESS

MoS	A	B	C	D	E	F
0						
1						
2						
3						
4						
5						
6+	Q-B	Q-C	Q-D	Q-E	Q-F	Note 1

Q-N: The Block Quality Rating changes to a new value, with N the new value as noted on the table. The Structure Points are changed to match the upper percentile amount of a Quality Rating when the MoF results in a downgrade and match the lower percentile of a Quality Rating when a MoS results in an upgrade (see the Quality Ratings Table). For example, a MoF of 5 on a D Quality Rating Block would result in the Block downgraded to Quality Rating C, with Structure Points equivalent to 59% of its original amount (see Quality Ratings Table). Machinists can only improve the Quality Rating of a Block by scoring a MoS of 6+.

(X): Roll d6 X times and subtract from the Block's current structure points. For each incident of damage, roll on the Damage Percentile Table.

Destroyed: Block has been rendered inoperative.

Note 1: Award 1 Experience Point, beyond any other Experience Points awarded during that month; a Machinist may only be awarded 1 such extra Experience Point per Maintenance/Repair Cycle (see Experience, Strategic Operations, p. 187).

Mothballing

modified from p. 175 of Strategic Operations

Players can choose to place all or some of their Blocks in mothballs to avoid the ongoing need for maintenance. This process requires a full-strength Technical Team and will take two entire weeks (per Block), during which the Technical Team(s) can perform no other activity. Twice as much time is required to return them to operational status. No Maintenance Check is required during the process (it is presumed to be done in concert with the mothballing process), and no additional Maintenance Checks are necessary until the Block is brought back fully out of mothballs. While in mothballs, no repairs or replacements can be performed—though parts can be removed according to the rules for salvage (see Damages & Repairs). If a production line is only partially mothballed*, it must occur on either end (so that there is no sequential break in the line); standard Blocks must be mothballed or shutdown as complete units, while solitary limited Blocks (i.e., lines using only a limited Block) can have up to 75% of their capacity mothballed or shutdown.

*Partially mothballed lines represent a facility's intent to reduce its costs or maintenance requirements for a line not being fully utilized. Because Blocks represent abstract production capacity, the ability to successfully produce a product with mothballed Blocks (at the end of the line) is also handled abstractly.

Moving the Line

Sometime circumstances lead a corporation to decide to relocate its industrial capacity elsewhere. Maybe the

front lines have gotten uncomfortably close, local resources have dried up or complicated economic strategy suggests "over there" is better than the planet Here. When the decision is made, it's time for the lines to be packed up and shipped to their new designated center of operations.

The first requirement is to prepare the individual Blocks for shipment, which requires mothballing (see Mothballing section). Once that is done, the individual Blocks must be disconnected from one another and their mountings on the factory superstructure. Suitable transportation must be available to convey the Block to its new location. If the Block is too large following the disconnection for available methods of transport, it will have to be dismantled. Both the disconnection and dismantling need to be done with a full industrial Technical Team (per the Salvage section).

Conducting a rushed line move is highly discouraged, because of the potential for massive damage to the Blocks.

Damage & Repairs

Damage

Due to the abstract nature of Blocks in the BattleTech production process, damage incurred upon Blocks is handled in a simple manner, similar to that of tracking damage to armor on a BattleMech. Each ton of the machine equates to an equivalent point of structure. For example, a Tech Level B Block can absorb 475 points of damage (though it will cease working and may actually be destroyed well before that point). Due to the increasing sophistication as technology and complexity increased and

DAMAGE PERCENTILE

Remaining Structure	Block Tech A 1600 tons	B 475 tons	B/SA 665 tons	C 225 tons	C/SA 300 tons	D 144 tons	D/SA 190 tons	E 120 tons	E/SA 160 tons	E/FA 200 tons	F 110 tons	F/SA 145 tons	F/FA 185 tons	TN
>90%	>1440	>428	>599	>203	>270	>130	>171	>108	>144	>180	>99	>131	>167	6
81-90%	1296	385	539	182	243	117	154	97	130	162	89	117	150	7
	1440	428	599	203	270	130	171	108	144	180	99	131	167	
61-80%	976	290	406	137	183	88	116	73	98	122	67	88	113	8
	1295	384	538	405	242	116	153	96	129	161	88	116	149	
41-60%	656	195	273	92	123	59	78	49	66	82	45	59	76	9
	975	289	405	136	182	87	115	72	97	121	66	87	112	
31-40%	496	147	206	70	93	45	59	37	50	62	34	45	57	10
	655	194	272	91	122	58	77	48	65	81	44	58	75	

mass decreased, the highly advanced Blocks were much more susceptible to harm than the older types.

Damage can be received through weapons fire, but it can also be incurred by a lack of proper maintenance. When each incident of damage has been recorded (or following combat, in which multiple incidents of damage may have occurred), compare the remaining structure points to the Block's Damage Percentile Table, and roll 2d6 against the appropriate TN. If the roll equals the TN or higher, the Block remains operational. If the roll fails, the Block comes to an immediate stop, preventing any further production from that entire line (until the damage has either been repaired or bypassed).

Other than when the damage is received, the roll is made at two other times: at the end of each week following the results of the Maintenance Check (when necessary) and whenever 5 points of damage have been repaired (following an unplanned shutdown of a Block). If damage is fully repaired on an otherwise operational Block, then the Damage Roll is not made again until the end of the following week.

Repair

Unlike a 'Mech, vehicle or WarShip, Blocks (for the purpose of gaming) do not have individualized components (i.e., actuators, sensors, weapon systems, etc.); instead, they have generalized 'parts.' Just as Blocks take damage in increments of one-ton points, the replacement/salvaged parts are also generalized as individual one-ton pieces. When originating as salvage from other Blocks, each piece must come from a Block of the same Tech Level, though not necessarily the same production class. The parent Block records the damage as equal in amount to tonnage removed.

Repair parts can be acquired in one of two ways: freshly machined or as replacements through salvage (see Salvage below, for details on the parts recovery process). When ordered as a new replacement through a tool & die shop, the time necessary to produce the part depends upon the weight of the part, the size of the tool & die shop employed and its location. The cost is equivalent to an equal percentage (rounded up to a full percentage point) of the cost of the full Block.

Example: a 75-ton replacement part has to be ordered for a Tech Rating A Block (1600 tons). As the part makes up 5% of the original weight ($75 / 1600 = 0.046875$, rounded up to 0.05), the cost for the new part will equal 5% of the original full cost for the Block.

The part can also be ordered from the original manufacturer of the Block (or any Block manufacturer), if a die & tool shop is either considered unavailable or too inefficient.

Salvage is often considered as an alternative to new parts, especially in the later years of the Succession Wars. Salvaged parts come from one of three possible sources, all

of the same Tech Rating of the Block needing repair. The first is from a Block that was designed to produce the same class of product: a BattleMech Block for a BattleMech Block, a Satellite Block for a Satellite Block, etc. The second is from a donor Block that is compatible with the original. Compatible sources share a majority of capable sub-systems and functions with the Block type needing repair. The third option is from a donor Block that is similar to the original; these Blocks have a few, but far from a majority, of processes that can be modified to work. See the Production Class Comparison table.

No matter the origin of the salvaged Block part (even if from a completely identical Block), modifications will need to be made (by a full industrial Technical Team) in order to allow the newer part to operate correctly and efficiently with its new parent Block. When it comes from a Same Class source, 90% of the salvaged parts may be successfully installed on the Block. Only 65% may be installed, when it comes from a compatible source and a mere 40% from a similar one (all amounts rounded up to a full ton, when necessary). An optional Technical Team check may be made one time to see if additional modifications will allow a greater amount of the salvage to be employed, with an additional 5% allowed for each Margin of Success (up to an additional 30%). The consequence of failure is a reduction of 5% of salvaged parts for each Margin of Failure (with no maximum reduction).

An attempt at installing new or salvaged parts requires eight hours per 10-ton part installed (or one hour per ton for Block parts weighing less than or in excess to 10 tons).

Salvage

heavily modified from pp. 182 & 191 of Strategic Operations

Once a Block degrades to Quality Rating A (Salvage), it can no longer function as a working unit. At this point, the Block must either be repaired back to Quality Rating B (Poor, 30% or less), mothballed or salvaged for parts. If not mothballed, the idle unit will still require weekly maintenance or it will further degrade.

To remove individual Block parts requires a vehicle with sufficient empty cargo capacity to carry it off, once it has been dismantled from its parent Block. Parts that have been "destroyed" (i.e., damaged) cannot be salvaged, unless repaired prior to removal; however, any other undamaged part may. Unlike salvage from the battlefield (Strategic Operations, p. 191), individual parts do not have Quality Ratings and are presumed to be fully functional, in their Block component role.

To salvage a component, a player must have a full industrial Technical Team (one Engineer and six Machinists) available and must make a successful Technical Team Check using the appropriate modifier listed on the Salvage Modifiers Table. Salvaging parts requires eight hours per 10-ton part removed (or one hour per ton for Block parts

weighing less than or in excess to 10 tons; parts can be salvaged more quickly by using the Rush Jobs rule below). If the Line Engineer Check succeeds, the part is salvaged successfully. If the roll fails, the part was not successfully removed. A Technical Team may not attempt to salvage the same part twice, nor may another team of the same or lower Experience Rating attempt the job. Only a Technical Team with a higher Experience Rating may attempt to salvage the part after a failed attempt. If an Elite team fails to salvage a part, the part cannot be removed without destroying it. Whether the Technician Check succeeds or fails, the team still spends the required time.

If the Technician Check roll result is a 2, a mishap has occurred and each Technical Team involved in that attempt suffers 1D6 casualties. The wounded can be returned to duty as normal, but the dead will permanently reduce the strength of a Technical Team (see Strategic Operations, p. 176).

SALVAGE MODIFIERS

Situation	Modifier
General	
Salvage Arm/Lift Hoist	-1
Ground	
Mech	-1
Mobile-Field Base (see SO, p.171)	-2
Space	
Space Operations Adaptation	-1

PRODUCTION CLASS COMPARISON

Type	Compatible	Similar
BattleMech (BM)	IM, ASF	PM, BA, CvF, SC, DS ¹
IndustrialMech (IM)	BM	PM, BA, CvF, SC, Sat, DS ¹
ProtoMech (PM)	n/a ²	BM, IM, BA, Sat, CompE
Battle Armor (BA)	CompW, CompE	PM, CV, SV, ASF, CvF, SC, Sat, OI ³
Combat Vehicle (CV)	SV ⁴	BM, IM, BA, CV ⁵ , SV ⁵ , ASF, CvF, SC, DS
Support Vehicle (SV)	CV ⁴	BM, IM, BA, CV ⁵ , SV ⁵ , ASF, CvF, SC, DS
Aerospace Fighter (ASF)	BM, SC	IM, PM, CV, CvF, DS ¹ , Sat
Conventional Fighter (CvF)	BM, IM, ASF, SC	PM, CV, DS ¹ , Sat
Small Craft (SC)	ASF	BM, IM, CV, DS ¹
Dropship (DS) ¹	SC	BM, ASF, CvF, JS ¹ , WS ¹
Satellite (Sat)	ASF, SC	BM, CvF, CompW, CompE
JumpShip (JS) ⁶	WS, SS	BM, IM, CV ⁷ , SC, DS
WarShip (WS) ⁶	JS, SS	BM, IM, CV ⁷ , SC, DS
Space Station (SS) ⁶	JS, WS	BM, IM, CV ⁷ , SC, DS
Components: Weaponry (CompW)	same weaponry class ⁸	CompW ⁹ , CompE, OI ³
Components: Equipment (CompE)	CompE ¹⁰	OI3
Other Items (OI)	See comment	The compatibility/similarity is left up to the GM, but must be the same Tier

Notes: 1) Applies only to Blocks located in ground facilities, not orbital; 2) No other Block types can be considered compatible to ProtoMech assembly Blocks; 3) Blocks producing Other Items must be of either Tiers II or III; 4) Blocks must produce vehicles intended for the same environment (ground, water, air); 5) Blocks may produce vehicles intended for a dis-similar environment; 6) Compatibility and similarity require target Blocks to match location-type (orbital or ground); 7) Blocks must be for naval Combat Vehicles (and are therefore limited only to ground Blocks); 8) Limited to Blocks that produce the same class of weaponry (ballistic, laser, missile); 9) Blocks may produce different classes of weaponry (ballistic, laser, missile); 10) By definition, a component is Tier II, so the Block must be making Tier II products.

Rush Jobs: Sometimes conditions (or force commanders) require a quick turnaround on salvage efforts. Rush jobs are more difficult than standard salvage operations. Any industrial Technical Team with a Regular or higher Experience Rating may perform a rush job. To do so, they must voluntarily lower their effective Experience Rating for the duration of the rush job. By reducing its Experience Rating by one, a Technical Team can make salvage a ten-ton Block part in half the usual time (i.e. 4 hours); a two-rating experience reduction enables them to conduct the salvage in one-fourth the usual time (2 hours); and a three-rating experience reduction enables them to make the repair in one-eighth the usual time (1 hour). Equivalent reductions are made to the time requirements for parts massing other than 10 tons (per above rule of 1 hour per ton).

If an industrial Technical Team is unavailable, parts of the Block cannot be removed without causing devastating damage. Instead, a military Technical Team (one tech and six astechs) may attempt to separate the entire Block from the remainder of the line and using heavy-lift cranes or multiple 'Mechs, move the entire unit away from the factory. The player rolls 2d6 against the military Technical Team's Base Target Number (Strategic Operations, p. 168), with no modifiers. A successful roll results in all line connections and mountings properly severed, proper tie-down and lift locations identified and the Block's ability to be moved by the proper equipment. A failure results in damage to the Block via a reduction in the overall Quality Rating (rounded up), per the Margin of Failure:

Ex: The target Block, of Average (D) quality (60%), has not been properly disconnected, as the regular military Technical Team rolled a 9, leaving a Margin of Failure of 2. The following efforts to move the Block caused 50% damage to the remaining parts, resulting in a lower Quality Rating of Poor (B) (60 - 50% = 30). The raiding team escapes with a barely operational prize.

As can be seen, not having a properly prepared industrial Technical Team along brings enormous risk of damage to the Block. If an industrial team is available, but there is not enough time to disassemble it, the team may choose to disconnect the Block, per the above. Attempts by either a military or an industrial Technical team will take 30

minutes for each Block, but the industrial team will not need to make a disconnection roll. Blocks always weigh their original, undamaged amount, regardless of Quality Rating. Blocks with a Quality Rating A (Salvage) may not be moved as entire units, as the move attempt would result in total collapse of the Block frame and of the parts it supports; such a targeted Block would need to be either repaired to a minimum of 31% (Quality Rating Poor) before any movement attempt or salvaged for its parts.

Rush jobs cannot be combined with extra time.

Line Changes

Retooling

It's not unheard of that a successful product may become less likely to sell as well years or decades after production first started. Instead of closing up one factory and building a new one for a new product, the existing lines can be re-tooled to produce the new product. Factory owners have the option of retooling their complete production line or dividing the existing Blocks up between differing products. If they do decide to dedicate only some parts of their existing production line to the new product, they must designate whole & contiguous Blocks. The number of Blocks dedicated to the new product is up to the player, and may be limited to only one if so desired. However, each Block on that production line must now be tracked as to what product is being produced (ex: Blocks #1-3 produce the CLN-7V Chameleon, Blocks 4-8 produce the CLN-7Z Chameleon). In essence, two (or more) lines will exist, where one had been originally installed.

Retooling is restricted to products of the same Tech Rating of the existing Line, or lower.

Refineries are restricted to retooling for variants (such as one diesel mixture to another) or similar products (diesel to natural gas). An industrial sand refinery could not be retooled to refine natural gas, for example.

Different Model Variants

BattleMechs come in differing variants of the same model, such as the MAD-1R Marauder with its 16 variants. Other vehicles get regular updates, such as commercial sports vehicles. Military industry is well known for producing several variants based on the same chassis, especially with a truck model set up to operate as freight haulers, personnel transports, ambulances and command vehicles. Factory owners enjoy the benefits of having Blocks that are meant to produce that exact model, which include the ability to tweak parts and processes within the production line in order to make variants.

The cost to do so is minimal, when the basic product remains the same and only a variant is being introduced; multiply the original cost of the Block by 0.1 and then by the number of Blocks modified. The time required for the

MARGIN OF FAILURE: BLOCK DISCONNECTION	
Margin	QR Reduction
-1 to -2	50%
-3 to -4	65%
-5 to -6	85%
-7 or worse	100%

re-tooling (per Block) is $3d6 + 2$ weeks, modified by the average skill level of the Technical Team (-1 week for veteran, -2 for expert, +4 for green). Later variant re-tooling is also based upon the original cost of the Block.

Similar Product

If the owner wishes to re-tool the production line to make a product that is considerably different (i.e., a different model), but still the same type of product ('Mech for 'Mech within 10 tons weight, car for car, laser for laser), then the cost of the original Block purchase price is multiplied by 0.3. The time for the retooling is $(3d6 + 2) \times 2$ weeks, modified by the average skill level of the technical team (-2 for veteran, -4 for expert, +6 for green).

Same Production Class

Re-tooling to create an entirely different type of product, but one that remains in the same production class as the original product (i.e., one Component for another Component, one 'Mech for another 'Mech greater than 10 tons in difference, etc.) still affords considerable savings, with the cost of the original Block purchase price multiplied by 0.6. The time for the retooling is $(3d6 + 2) \times 3$ weeks, modified by the average skill level of the Technical Team (-3 for veteran, -6 for expert, +8 for green).

Different Production Classes

The most extensive re-tooling involves changing the line's originally intended production class altogether (i.e., Battle Armor for Components, IndustrialMech for BattleMech, etc.), with the cost of the original Block purchase price multiplied by 0.8. However, the intended Production Class for the line must be compatible to the class for which the Block is currently geared. Any class in the Similarity column or not listed is not compatible for re-tooling. See the Production Class Comparison Table (in the Repair section) for compatibility, with the original Block status in the Type column. The time for the retooling is $(3d6 + 2) \times 5$ weeks per Block, modified by the average skill level of the Technical Team (-4 for veteran, -8 for expert, +10 for green).

Shipyards

Shipyards (both orbital and wet) are the exception to the above rules for re-tooling, in that their generally open structure and modifiable processes are designed to account for differing classes of ships being assembled throughout the yard's operational lifetime. For that reason, any re-tooling ordered has considerably less associated costs. If the change-over is a reflection of a model variant, then the cost is 5% of the original Block value. For a new model type (i.e., Similar Product description above), it is 10%, with a change in Production Classes equaling 25% that of the original Block value. This only applies to installations that produce DropShips, Space Stations, JumpShips & WarShips (orbital facilities only) and naval Combat and water Support Vehicles.

Expansion

An expansion of an industrial complex may represent an additional production line (or the addition to an existing one) long after the complex has opened (i.e., it is not occurring at the same time as the initial construction of the site). If the expansion involves the addition of capacity for the present products, then there is a great deal of facility infrastructure that is already in place and does not need reproduction. In that case, the cost of the addition to the facility itself is multiplied by 0.6. If the expansion brings in production capability for a new product, but of the same production class, then the addition's costs are multiplied by 0.75. If the product is completely unrelated and of a different production class altogether, then the addition's costs are multiplied by 0.9.

Appropriate amounts of land must be available for the expansion. If the additional facilities are not co-located with the original industrial complex, then it is not considered an expansion, but new construction.

Upgrading

Following the discovery of the Helm Memory Core in 3028, many industrial facilities had the first opportunity to improve their technology ratings in centuries. As economies improved, corporations and state governments began freeing up the funding necessary to take existing factories to higher levels of capabilities and capacities. Of course, if each facility had to be cleared out of all its lower (and older) tech rating Blocks, the expense of upgrading would have been that much more demanding, and possibly out of reach.

Facilities have the option of upgrading their Blocks when the prevalent Tech Rating of their planet, government or parent corporation exceeds that currently employed on the factory lines. The act of upgrading a line refers only to bringing the existing Blocks to a higher tech rating, not the addition of newer Blocks to an existing line. While expansion of the line can occur concurrently as an upgrade effort, the two events are separate.

Designing the 'new' line is exactly the same as designing any new line, with the exception of determining the costs. The difference between the original value of the existing Blocks and the newer ones is increased by 25% (rounded up). For example, if a 9-Block line with a Tech Rating of D (High Tech) is upgraded to E (Advanced Tech), the difference in the line's two values is multiplied by 1.1 for the final upgrade cost. Upgrading is clearly less expensive than starting a new facility from scratch.

The act of installing the Block upgrades requires a complete shutdown of the line for the length of the installation. The existing Blocks on the line are incorporated into the new Blocks upon their arrival, with no changes to installation rules for an upgrade (per the Buying the Block section). The excess weight (i.e., the difference, if any) of the lower Tech Rating Blocks may be sold for parts as salvage.

PRODUCTION CAPACITIES

(In millions of C-bills/year per Block)

Block Tech Level	Product Tech Level					
	A	B	C	D	E	F
A	40	-	-	-	-	-
B	48	40	-	-	-	-
C	58	48	40	-	-	-
D	70	58	48	40	-	-
E	84	70	58	48	40	-
F	102	84	70	58	48	40

TECHNOLOGY RATINGS

Rating	Technology Level
A	Primitive: 19th to early 20th centuries
B	Low Tech: Late 20th century
C	Common Tech: 21st to 22nd centuries
D	High Tech: Age of War & Succession Wars
E	Advanced Tech: Star League/ Post-3050 Inner Sphere
F	Hyper-Advanced Tech: Clan/ Post-3065 Inner Sphere

BLOCK TONNAGE AND PERSONNEL

Block Tech Rating	Tonnage	Laborers
A	1,600	440
B	475	140
B/SA	665	75
C	225	60
C/SA	300	0
D	144	40
D/SA	190	0
E	120	32
E/SA	160	0
E/FA	200	0
F	110	28
F/SA	145	0
F/FA	185	0

BLOCK ERA MULTIPLIERS

Current Era Level	Block Tech Level					
	A	B	C	D	E	F
A	1.0	-	-	-	-	-
B	0.8	1.0	-	-	-	-
C	0.7	0.8	1.0	-	-	-
D	0.6	0.7	0.8	1.0	-	-
E	0.5	0.6	0.7	0.8	1.0	-
F	0.4	0.5	0.6	0.7	0.8	1.0

AUTOMATION MULTIPLIERS

Automation Level	Multiplier
Fully Automated (FA)	x2.25
Semi-Automated (SA)	x1.5
No Automation	x1.0

LOCATION MULTIPLIERS

Location	Multiplier
Inner Sphere internal world	x1
Inner Sphere Clan border world	x1.15
Inner Sphere faction border world	x1.1
Inner Sphere Periphery border world	x1.05
Periphery world	x1.15
Deep Periphery world	x1.4
Clan world	x0.8
Major world	x0.9

PRODUCTION CLASS MULTIPLIERS

Production Class	Multiplier
WarShip	x15
JumpShip, Space Station	x8
ASF, Small Craft, DropShip	x6
Battlemech	x5
ProtoMech, Conventional Fighter, Satellite	x3
Battle Armor, Combat Vehicle, IndustrialMech	x2
Support Vehicle	x1.0
Component	x0.5
Other Item	x0.25

SEALED STRUCTURE BREACH

Target Number (TN) for Breach is (2d6): 10

Structure	Roll Modifier
Light	+2
Medium	0
Heavy	-2
Hardened	-4
Subsurface	Depth / 2 (round up)

PERSONNEL EXPERIENCE

Old Rating	New Rating	XP Required
Green	Regular	5
Regular	Veteran	10
Veteran	Elite	10

TIER MULTIPLIERS

Tier	Multiplier
Tier I	x1.0
Tier II	x1.25
Tier III	x1.75

LAND COST

Location	Modifier
Within metropolis	135,000
Outskirts of metropolis	60,000
Within major city	90,000
Outskirts of major city	40,000
Within medium city	55,000
Outskirts of medium city	25,000
Within small city	35,000
Outskirts of small city	15,000
Within town	25,000
Outskirts of town	10,000
Remote	2,500

BASE SALARY

Position	Monthly	Annual
Primary		
Line Engineer	1,500	18,000
Machinist	640	7,680
Laborer	320	3,840
Administration		
Executive	variable	variable
Department Head	1,500	18,000
Administrator	640	7,680
Secretarial Staff	320	3,840
Optional		
Security	700	8,400
Utility Emp.	500	6,000
Transportation Emp.	500	6,000
Medic	640	7,680
Doctor	1,500	18,000

STRUCTURE COMPONENTS

Component Type	C-bill Cost (per Level)	Max. Size (Hexes/Levels)	Man-Hours (per Level)	CF	Notes
Hangers (per hex)	8,000 x CF				May not be armed or armored
Light		10 / 7	30	1-8	
Medium		14 / 10	90	9-20	
Heavy		18 / 13	150	21-45	
Hardened		20 / 14	200	46-75	
Standards (per hex)	10,000 x CF				May not be armed or armored
Light		6 / 5	100	1-15	
Medium		8 / 8	300	16-40	
Heavy		10 / 10	500	41-90	
Refineries (per hex)	15,000 x CF				May not be armed or armored
Light		10 / 5	500	1-10	Minimum of 3 levels
Medium		20 / 7	1,000	11-30	Minimum of 4 levels
Heavy		30 / 9	1,500	31-70	Minimum of 5 levels
Fortresses (per hex)	20,000 x CF				May be armed/armored at extra cost
Light		12 / 15	600	16-40	
Medium		15 / 20	1,000	41-90	
Heavy		20 / 30	1,800	91-150	
Castles Brian (per hex)	? x CF				Max armor = CF x 2
Heavy		20 / 10	?	35-90	
Hardened		30 / 15	?	91-150	
Tunnels (per hex)	15,000 x CF				May be up to 4 hexes wide; at least 2 opposing hex-sides must be considered walls. Entrance/exit hexes must include doors.
Light		- / 6	40	1-8	
Medium		- / 6	100	9-20	
Heavy		- / 6	160	21-45	
Hardened		- / 6	220	46-75	
Fence (per hex-side)	800	- / 0	2	1	
Walls (per hex-side)	5,000 x CF	- / -			
Light		- / 4	10	1-15	
Medium		- / 6	20	16-40	
Heavy		- / 8	40	41-90	
Hardened		- / 10	60	91-150	
Pavement (per hex)	7,500	- / 0	10	-	
Environmental Sealing	x 1.5	- / -	x 2	-	
Subsurface	x 5	Half Normal	x 5	x 1	

OPTIONAL EQUIPMENT

Additional Equipment	Cost (C-bills)	Min. Size (Hexes/Levels)	Man-Hours (per Level)	Notes
Weaponry				
Light/Medium	As RPG weapon		1 / weapon	Available to all but Fences (see Note 1)
	Heavy	As BattleTech weapon	3 / weapon	Available to Fortresses only (see Note 1)
Turret	5,000 x Turret Mass		2 / turret	Available to all but Fences (see Note 2)
	Ammo	As weapon	2 / ammo ton	Available to all but Fences
Heat Sinks	2,000 x Heat Sink		1 / Heat Sink	Standard Heat Sinks only
Armor	60,000 x Armor Mass		40 / hex	Available to Fortresses/Walls only
Fuel Storage	100 x Total Storage Tonnage		TBD	
Large Door	10,000 x Levels		8 / door	When open, units of equal or smaller height may pass through unhindered
Industrial Elevators	15,000 x Total Elevator Tonnage		TBD	
Other Equipment	5,000 x CF (per Hex)		4 / item ton	Enables equipment feature, as appropriate
Weapon Automation	1,000 x Total Weapon Tonnage		TBD	
Power Generators				1 Level Height per 100 tons (Min: 1 Level)
Steam-based	4,000 x Tons	2 / 2	40 x Tons	Min height represents smokestacks (see Note 4)
IC-based	5,000 x Tons	1 / 2	35 x Tons	Min height represents smokestacks (see Note 4)
Fuel Cell-based	7,000 x Tons	1 / 1	40 x Tons	See Note 4
Solar-based	8,000 x Tons	3 / 1	50 x Tons	Panels add 1 hex per 50 tons
Fission-based	15,000 x Tons	2 / 2	100 x Tons	Min height represents cooling towers
Fusion-based	10,000 x Tons	1 / 1	150 x Tons	
External source	5,000 x Tons	1 / 1	30 x Tons	1-day power supply if external source is lost

Note 1: Max number of light/medium weapons per hex of structure = 6 x structure height (in Levels); max tonnage of heavy weapons (discounting ammo, turret and heat sinks) per Fortress hex = CF / 10 (round down)

Note 2: Turret mass = tonnage of turreted weapons / 10, round down (minimum: 0.5 tons)

Note 3: Max armor points per fortress hex/wall hexside = CF of fortress/wall being armored. Armor must be destroyed before structure can be entered or sustain damage.

Note 4: These facilities require fuel to operate.

PRODUCT DESIGN TIME

Production Class	Design Length (months)	Review Modifier	Extension (months)
BattleMech	6d6 + 24	+2	3d6
IndustrialMech	4d6 + 18	+1	2d6
ProtoMech	6d6 + 24	+2	3d6
Combat Vehicle	3d6 + 18	+1	1d6 + 3
Support Vehicle	3d6 + 6	0	1d6 + 3
Battle Armor	3d6 + 18	+1	1d6 + 3
Conventional Fighter	3d6 + 18	+1	2d6
Aerospace Fighter	6d6 + 24	+2	3d6
Small Craft	6d6 + 24	+2	3d6
DropShip	6d6 + 24	+2	3d6
Satellite	3d6 + 18	+1	1d6 + 3
Space Station	10d6 + 60	+3	5d6
JumpShip	6d6 + 36	+3	3d6
WarShip	10d6 + 60	+3	5d6
Component	2d6 + 4	-1	1d6 + 2
Other Item	2d6 + 2	-2	1d6 + 1

BLOCK AVAILABILITY

Production Class	Availability Code
BattleMech	C-E-C
IndustrialMech	C-E-C
ProtoMech	X-X-E
Combat Vehicle	C-D-C
Support Vehicle	B-C-B
Battle Armor	E-X-D
Conventional Fighter	C-D-C
Aerospace Fighter	C-E-C
Small Craft	B-D-C
DropShip	C-E-D
Satellite	C-E-D
Space Station	D-X-E
JumpShip	C-F-D
WarShip	D-X-E
Component	B-D-C
Other Item	B-D-C

DESIGN TEAM

Product Size	Team Size
less than 30 tons	3
less than 200 tons	1 per 10 tons
200-1,000 tons	1 per 50 tons
1,001-10,000 tons	50
greater than 10,000 tons	50 per 10,000 tons

MANUFACTURING EQUIPMENT AVAILABILITY MODIFIER

Availability Rating	Modifier	Quantity Blocks	Modifier	Location of Factory	Modifier
A	-4	1 limited	-1	Inner Sphere internal world	0
B	-3	1 - 3	0	Inner Sphere Clan border world	+3
C	-2	4 - 6	+1	Inner Sphere faction border world	+1
D	-1	7 - 9	+2	Inner Sphere Periphery border world	+2
E	0	10 - 12	+3	Periphery world	+2
F	+2	13 - 15	+4	Major industrial world	-2
X	+5	16 or more	+5	Capital	-1

PERSONNEL EXPERIENCE

Experience Rating	Base Skill Target
Green	5+
Regular	3+
Veteran	2+
Elite	1+

Note: these TNs are identical to that of the Tech Base Skill Target from the Support Personnel Experience Table (Strategic Operations, p 168), but with the Factory modifier from the Location Modifiers Table (Strategic Operations, p 171) factored in.

MACHINIST TYPE MODIFIERS

Machinist Type	Modifier
Inner Sphere Machinist working on Clan Tech	+2
Technician performance Block maintenance	see Machinist Type
Per additional Machinist	+1 ¹

1: to a maximum of 2 additional Machinists per Block

BLOCK QUALITY RATINGS

Quality Rating	Description	Structure Points	Value Modifier
A	Salvage	29% or less	0.8
B	Poor	30 - 49%	0.9
C	Fair	50 - 59%	0.95
D	Average	60 - 69%	1.0
E	Good	70 - 89%	1.1
F	Excellent	90% or higher	1.3

OTHER FACTORS MODIFIERS

Other Factors	Modifier
Experimental or Extinct Product ¹	+2
Extra Time	variable
Overtime ²	+3

1: an Experimental product is any item with an Experimental Rules Level (Tactical Operations, p.275)

2: when the Extra Time and Overtime modifiers are used together, the double-time penalty for working over 8 hours must be the standard time to be increased

BLOCK MAINTENANCE TIME

Block Type	Maintenance Time (weekly)	2 Cycles	3 Cycles
A	2 hours	4.5 hours	7 hours
B	3 hours	6.5 hours	10 hours
B/SA	3.5 hours	7.5 hours	11.5 hours
C	5 hours	11 hours	16 hours
C/SA	6 hours	13 hours	19.5 hours
D	7 hours	15 hours	24 hours
D/SA	8 hours	17 hours	26 hours
E	9 hours	19.5 hours	29 hours
E/SA	10.5 hours	22.5 hours	34 hours
F	11 hours	23.5 hours	36 hours
F/SA	13 hours	28 hours	42 hours

PLANETARY CONDITIONS MODIFIERS

Planetary Condition	Modifier ¹
Zero-G	+2
Low-G (less than 0.8 Terran standard)	+1
High-G (more than 1.2 Terran standard)	+2
Very High-G (2.0 or more higher than Terran standard)	+4
Vacuum or Tainted Atmosphere (due to bulky suits)	+2
Trace or Very High Pressure Atmosphere	+1
Extreme Temperatures ² (due to suits and/or other apparatus)	+1
Heavy Snow/Ice Storm/Lightning Storm/Strong Gale/Torrential Downpour	+1
Blizzard/Storm/Tornado	+2
Moonless Night/Solar Flare ³	+1
Pitch Black ³	+2

- 1: if outside of a sealed structure/building (such as a refinery)
 2: if higher than 50 degrees C or less than -30 degrees C
 3: if no lights/cover available

BLOCK TECH RATING MODIFIERS

Rating	Modifier
A	-4
B	-2
C	+0
D	+1
E	+2
F	+3

BLOCK QUALITY RATING MODIFIERS

Rating	Modifier
A	+3
B	+2
C	+1
D	+0
E	-1
F	-2

MAINTENANCE CHECK TABLES

MERIT OF FAILURE

MoF	A	B	C	D	E	F
7+	Destroyed	Q-A(2)	Q-B(2)	Q-C(1)	Q-D(1)	Q-E(1)
6	(3)	Q-A(1)	Q-B(1)	Q-C(1)	Q-D(1)	Q-E
5	(3)	(1)	Q-B(1)	Q-C(1)	Q-D	Q-E
4	(2)	(1)	(1)	Q-C	Q-D	Q-E
3	(1)	(1)			Q-D	Q-E
2	(1)					
1						

MERIT OF SUCCESS

MoS	A	B	C	D	E	F
0						
1						
2						
3						
4						
5						
6+	Q-B	Q-C	Q-D	Q-E	Q-F	Note 1

Q-N: The Block Quality Rating changes to a new value, with N the new value as noted on the table. The Structure Points are changed to match the upper percentile amount of a Quality Rating when the MoF results in a downgrade and match the lower percentile of a Quality Rating when a MoS results in an upgrade (see the Quality Ratings Table). For example, a MoF of 5 on a D Quality Rating Block would result in the Block downgraded to Quality Rating C, with Structure Points equivalent to 59% of its original amount (see Quality Ratings Table). Machinists can only improve the Quality Rating of a Block by scoring a MoS of 6+.

(X): Roll d6 X times and subtract from the Block's current structure points. For each incident of damage, roll on the Damage Percentile Table.

Destroyed: Block has been rendered inoperative.

Note 1: Award 1 Experience Point, beyond any other Experience Points awarded during that month; a Machinist may only be awarded 1 such extra Experience Point per Maintenance/Repair Cycle (see Experience, Strategic Operations, p. 187).

MARGIN OF FAILURE: BLOCK DISCONNECTION

Margin	QR Reduction
-1 to -2	50%
-3 to -4	65%
-5 to -6	85%
-7 or worse	100%

SALVAGE MODIFIERS

Situation	Modifier
General	
Salvage Arm/Lift Hoist	-1
Ground	
Mech	-1
Mobile-Field Base (see SO, p.171)	-2
Space	
Space Operations Adaptation	-1

PRODUCTION CLASS COMPARISON

Type	Compatible	Similar
BattleMech (BM)	IM, ASF	PM, BA, CvF, SC, DS ¹
IndustrialMech (IM)	BM	PM, BA, CvF, SC, Sat, DS ¹
ProtoMech (PM)	n/a ²	BM, IM, BA, Sat, CompE
Battle Armor (BA)	CompW, CompE	PM, CV, SV, ASF, CvF, SC, Sat, OI ³
Combat Vehicle (CV)	SV ⁴	BM, IM, BA, CV ⁵ , SV ⁵ , ASF, CvF, SC, DS
Support Vehicle (SV)	CV ⁴	BM, IM, BA, CV ⁵ , SV ⁵ , ASF, CvF, SC, DS
Aerospace Fighter (ASF)	BM, SC	IM, PM, CV, CvF, DS ¹ , Sat
Conventional Fighter (CvF)	BM, IM, ASF, SC	PM, CV, DS ¹ , Sat
Small Craft (SC)	ASF	BM, IM, CV, DS ¹
Dropship (DS) ¹	SC	BM, ASF, CvF, JS ¹ , WS ¹
Satellite (Sat)	ASF, SC	BM, CvF, CompW, CompE
JumpShip (JS) ⁶	WS, SS	BM, IM, CV ⁷ , SC, DS
WarShip (WS) ⁶	JS, SS	BM, IM, CV ⁷ , SC, DS
Space Station (SS) ⁶	JS, WS	BM, IM, CV ⁷ , SC, DS
Components: Weaponry (CompW)	same weaponry class ⁸	CompW ⁹ , CompE, OI ³
Components: Equipment (CompE)	CompE ¹⁰	OI3
Other Items (OI)	See comment	The compatibility/similarity is left up to the GM, but must be the same Tier

Notes: 1) Applies only to Blocks located in ground facilities, not orbital; 2) No other Block types can be considered compatible to ProtoMech assembly Blocks; 3) Blocks producing Other Items must be of either Tiers II or III; 4) Blocks must produce vehicles intended for the same environment (ground, water, air); 5) Blocks may produce vehicles intended for a dis-similar environment; 6) Compatibility and similarity require target Blocks to match location-type (orbital or ground); 7) Blocks must be for naval Combat Vehicles (and are therefore limited only to ground Blocks); 8) Limited to Blocks that produce the same class of weaponry (ballistic, laser, missile); 9) Blocks may produce different classes of weaponry (ballistic, laser, missile); 10) By definition, a component is Tier II, so the Block must be making Tier II products.

CLASSIC BATTLETECH™

INDUSTRIAL WORKSHEET

FACTORY:

YEAR: _____ ERA: _____ TECH LEVEL: _____ LOCATION: _____

PRODUCT:

PRODUCTION CLASS: _____ TECH RATING: _____ TIER: _____ RETAIL VALUE: _____

BLOCKS

TECH RATING: _____

STANDARD - CAPACITY: _____ TONS: _____ LABORERS: _____

LIMITED - % STANDARD: _____ CAPACITY: _____ TONS: _____ LABORERS: _____

LINE CAPACITY

PRODUCTION CAPACITY QUANTITY (PCQ): _____ PRODUCTION CAPACITY VALUE (PCV): _____

BLOCKS - STANDARD: _____ LIMITED: _____

FACILITY DIMENSIONS

PRODUCTION LINE HEXES: _____ LEVELS PER HEX: _____ ORBITAL REQUIREMENT

STRUCTURE TYPE: _____ CF: _____

SUPPORT HEXES: _____ LEVELS PER HEX: _____

STRUCTURE TYPE: _____ CF: _____ ADJOINED TO LINE

TOTAL HEXES: _____ TOTAL BUILDINGS: _____



ORBITAL FACILITY - UNDIVIDED / DIVIDED (CIRCLE) # BLOCKS (ORBIT): _____ INDUSTRIAL TONS: _____

BLOCK COSTS

STANDARD: 250,000,000 X _____ (BLOCK ERA) X _____ (PRODUCTION CLASS) X _____ (TIER) X _____ (AUTOMATION)

X _____ X _____ X _____ (LOCATION) = _____ C-BILLS

LIMITED: STANDARD COST X 0. _____ (% STANDARD) = _____ C-BILLS

TOTAL BLOCK COST: (_____ (STANDARD) X _____ (# STANDARD)) + _____ (LIMITED) = _____ C-BILLS

FACILITY COSTS

ORBITAL

STRUCTURE #1 - _____ C-BILLS _____ MAN-HOURS

STRUCTURE #2 - _____ C-BILLS _____ MAN-HOURS

STRUCTURE #3 - _____ C-BILLS _____ MAN-HOURS

STRUCTURE #4 - _____ C-BILLS _____ MAN-HOURS

TOTALS - _____ C-BILLS _____ MAN-HOURS

Notes: _____
