

# Project Design Document

## “Temporal Engineering”

A Modular Tech Minecraft Mod About Heat, Exotic Matter, and  
Time Manipulation



# Table of Contents

Mod Overview.....	7
Core Design Pillars .....	7
Time control.....	7
Modularity .....	7
User Experience.....	7
Core Gameplay.....	8
Aim of the Mod .....	8
Design Goals.....	8
Non-Goals .....	8
Features.....	9
Gameplay Mechanics.....	9
Heat System.....	9
Coolant System .....	9
Modular Machine Construction .....	10
Tiers .....	11
Exotic Matter .....	11
Time Manipulation System.....	12
Time System Rules.....	12
Time Slow Zone .....	12
Time Speed Zone .....	12
Visual FX for Time Zones .....	13
Core Types .....	13
Input Core .....	13
Energy Core .....	14
Reactor Core .....	14
Coolant Core .....	14
Creation Core.....	14
Processing Core .....	14
Heating Core .....	14
Exotic Core.....	15
Stabilizer Core .....	15
Machines and Blocks .....	16
Machines .....	16
Multiblock Machine Parts .....	16

Blocks .....	16
Fluids and Coolants .....	17
Coolants .....	17
Reactor Fuel.....	17
Other fluids .....	17
Items.....	18
Crafting Recipes .....	19
Machines .....	19
Multiblock Machines Parts.....	20
Blocks.....	20
Fluids .....	20
Coolants .....	20
Reactor Fuel.....	21
Other Fluids.....	21
Items .....	21
Progression Path.....	24
Stage 1 .....	24
Stage 2 .....	24
Stage 3 .....	24
Stage 4 .....	24
Stage 5 .....	24
Artistic Direction.....	25
UI/UX Design .....	26
Design Philosophy.....	26
Machine Interface Structure .....	26
Base Layout.....	26
Dynamic UI Panels .....	26
Visual Language .....	27
UX Flow .....	28
Accessibility Considerations.....	28
Time Zone Block UI.....	28
Technical Systems .....	29
Future Expansions .....	30

# Glossary

- **EM:** Exotic Matter
- **MVP:** Minimum Viable Product

## Relevant Links

- Crafting Recipe Creator: <https://crafting.thedestruc7i0n.ca/>
- Aseprite: <https://www.aseprite.org/>
- Github Repository: <https://github.com/Jobberson/Temporal-Engineering-Minecraft-Mod>

# Mod Overview

Temporal Engineering is a Minecraft tech mod centered around designing modular industrial machines that generate, consume, and manipulate heat, coolant, and Exotic Matter to create coolants and manipulate time.

The mod introduces:

- Modular multiblock machines
- Heat and coolant management
- Exotic Matter generation
- Time dilation and acceleration zones
- Machine core customization

The endgame is all about controlling the flow of time to supercharge automation and processing.

## Core Design Pillars

### Time control

Machines produce Exotic Matter that is used to make other machines that can control time around them. Time manipulation acts on the rate of work and decision-making, not global world time, ensuring compatibility and stability in large modpacks.

- Multiple tiers.
  - Acceleration and deceleration
- 

### Modularity

The player can build their own machines in whatever way they want, as it turns into a multiblock entity.

## User Experience

The player should feel in control of their machines. They should feel that the machines they built themselves in the way they wanted can do more than just simple ore processing, but time control.

The mod should feel useful for other mods inside a modpack as well as being fun, in a middle ground between easy to understand and too complex.

# Core Gameplay

## Aim of the Mod

Develop a modular technology system where players construct customizable machines using specialized cores to generate energy, process materials, and harness Exotic Matter to manipulate time itself.

## Design Goals

1. Immersive tech experience
  - Make the player engaged into getting to the very end of the mod.
2. High quality time manipulation effects
  - Reward the player with cool and useful effects for getting to the end
3. Intelligent balancing
  - Balance the mod's machines and cores for a pleasant experience
4. Ease-of-use
  - Be easy to understand and grasp the mod's ideas.

## Non-Goals

1. No global tick rate changes
2. No modification of vanilla random ticks
3. No permanent world-wide time effects
4. No machine that does “everything”

# Features

## Gameplay Mechanics

### Heat System

All machines generate heat proportional to their workload and tier. If heat is in an area close to the top, efficiency rises drastically but has high risk of collapsing due to overheating.

Optimal heat area:

- Low heat → low efficiency
- Medium heat → higher efficiency
- High heat → highest efficiency but with risks of overheating

If a machine overheats:

- Efficiency drops drastically
- Processing slows
- Exotic Matter generation reduces
- Extreme overheating may cause:
  - Shutdowns
  - Coolant loss
  - Machine destabilization causing temporal anomalies around it, proportional to the machine tier

Heat is affected by:

- Machine tier
- Speed settings
- Installed cores
- Coolant quality

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### Coolant System

To manage heat, machines require coolant. Each higher tier of machine demands a better coolant. Each coolant tier increases maximum sustainable heat and reduces temporal instability per operation.

Coolant Examples:

- Water (basic)
- Oil (mid tier)
- Liquid Nitrogen (advanced)

- Cryofluid (late game)
- Temporal Coolant (endgame, Exotic Matter-based)

Coolants circulate through cooling cores using pipes from tanks and machines that create the coolants.

Each coolant has its own boiling temperature that if they reach the machine starts to malfunction.

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## Modular Machine Construction

Machines are built as  $3 \times 3 \times 3$  (max) multiblock with configurable internals.

Players build machines from

- Controllers
- Frames
- Casings
- Pipes
- Cores

Core Types:

- Input/Output Core
- Energy Core
- Coolant Core
- Reactor Core
- Processing Core
- Creation Core
- Exotic Core
- Stabilizer Core
- Temporal Core

Cores modify:

- Speed
- Efficiency
- Heat generation
- Energy use
- Exotic Matter output
- Time distortion stability
- Energy production

This creates “infinite” machine variations.

## Tiers

Every core can have up to three tiers.

- Tier one: Crude
  - This tier is the most basic one, it's the one that starts the multi block machine constructions.
  - This tier basically only uses vanilla resources to be made, but their performance is atrocious.
  - This is where you can start producing Volatile Exotic Matter to advance to the second tier.
- Tier two: Basic
  - This tier is the medium tier, unlocked after the creation of Volatile Exotic Matter.
  - This tier uses ores like Diamonds and Gold as well as Volatile Exotic Matter for some of the crafting recipes.
  - This tier unlocks the production of Tempered Exotic Matter
- Tier three: Advanced
  - This is the high tier, unlocked after the creation of Tempered Exotic Matter.
  - This tier uses netherite ingots for some of the crafting recipes.
  - This tier unlocks the production of Stabilized Exotic Matter.
- Tier four: Elite
  - This is the Endgame tier, unlocked after the creation of Stabilized Exotic Matter
  - In this tier you can make machine cores with Stabilized Exotic Matter, with time anomalies showing little to no effect.
  - This tier's crafting uses nether stars as well as netherite diamond blocks and Stabilized Exotic Matter.

## Constraints

- One Exotic Core per machine
  - Stabilizers reduce output multiplicatively, not additively
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## Exotic Matter

A rare, unstable resource produced by advanced machines pushed to their limits.

### Exotic Matter Types:

- Volatile Exotic Matter
- Tempered Exotic Matter
- Stabilized Exotic Matter

### Each tier unlocks:

- Better cores
- Better coolants
- Time-manipulation devices

- Refining machines
- Endgame zone blocks

Machines using Exotic Matter generate localized temporal anomalies.

## Time Manipulation System

This is the signature mechanic of the mod.

### Time System Rules

- Speed Zones
  - Apply extra operations per tick.
  - Never affect the world tick rate
- Slow Zones
  - Skip or delay processing probabilistically
  - Use attribute scaling for entities
- Zones never affect:
  - Random ticks
  - Redstone timing
  - Global AI scheduling

### Time Slow Zone

A block that generates a localized time-dilation field.

Effects:

- Mobs move slower
- Projectiles slow
- Items float gently
- AI ticks reduced
- Animations slow
- Explosions expand slowly

Consumes:

- Energy
- Coolant
- Exotic Matter

Machines must remain cool to keep the zone stable.

### Time Speed Zone

A block placed near machines to create a processing acceleration field.

Effects:

- Furnaces smelt faster
- Machines process faster
- Crops grow rapidly
- Spawners tick quicker
- Villagers restock trades faster

Consumes large amounts of:

- Energy
- Coolant
- Exotic Matter

If overheated:

- Field destabilizes
- Speed fluctuates
- Time “stutters”
- Risk of temporal burnout (machine shutdown)

## Visual FX for Time Zones

Both slow and speed zones create atmospheric effects:

Slow Zone:

- Particles float lazily
- Soft blue tint
- Echoing hum

Speed Zone:

- Blurred streak particles
- Slight red/gold tint
- High-frequency hum

*No shaders required.*

## Core Types

### Input Core

Used as the interface to input items into the machine. It has one face with an input port.

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## Energy Core

Used to bring electric energy into the machine so it can start working. Not all machines require energy to function.

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## Reactor Core

Used to generate energy and heat.

Tier one:

- Uses Volatile Exotic Matter in the reactor fuel mix.
- Can use any type of reactor fuel

Tier two:

- Uses both Volatile and Tempered Exotic Matter in the reactor fuel mix.
- Can use any type of reactor fuel

Tier three:

- Uses Volatile, Tempered and Stabilized Exotic Matter in the reactor fuel mix.
  - Can use any type of reactor fuel
- 

## Coolant Core

Used as the input interface for coolant for the machine. Not all machines require coolant, but they drastically improve the machine's performance.

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## Creation Core

Used to process items into different ones. (e.g.: Water and **ITEM** into cryofluid. It produces heat when used.)

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## Processing Core

Used to process ores and food. Essentially acts like a furnace (e.g.: Ores into ingots). It produces heat when installed.

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## Heating Core

Used to produce extra heat to a machine, increasing efficiency without destabilizing the machine.

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## **Exotic Core**

Produces Exotic Matter based on heat and the coolant used. The Processing core and the Heating core can't be used in conjunction with the Exotic core.

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## **Stabilizer Core**

Used to stabilize the Reactor Core and the Exotic Core. The more of them, the more stable the machine will be, but less efficient.

# Machines and Blocks

## Machines

- Temporal Field Generator
  - Creates the time zones
- Coal Generator
  - Generates energy through the power of coal
- Nitrogen Extractor
- Cryo Chamber
- Water Pump

## Multiblock Machine Parts

- Machine Controller
  - The visual interface for the multiblock machines
- Input Core
- Energy Core
- Reactor Core
- Coolant Core
- Processing Core
- Creation Core
- Heating Core
- Exotic Core
- Stabilizer Core

## Blocks

- Pipes
  - Pipe level 1
  - Pipe level 2
  - Pipe level 3
- Gas Pipes
  - Gas Pipe level 1
  - Gas Pipe level 2
  - Gas Pipe level 3
- Cables
  - Cable level 1
  - Cable level 2
  - Cable level 3

# Fluids and Coolants

## Coolants

- Water
  - Regular water from Minecraft
- Oil → Placeholder
- Liquid Nitrogen
  - Transformed into Liquid by the processing core in a sufficiently cooled machine
- Cryofluid
  - Transformed into cryofluid from water and **ITEM** by the processing core in a sufficiently cooled machine
- Temporal Coolant
  - Made using Inert Exotic Matter

## Reactor Fuel

- Energetic Paste Fuel
- Reactor Temporal Fuel

## Other fluids

- Steam
  - Produced when water boils
- Nitrogen
  - Extracted from the air by the Nitrogen Extractor

# Items

- Bucket of Oil → placeholder
- Bucket of Liquid Nitrogen
  - Damages the player when touched
- Bucket of Cryofluid
  - Damages and gives a strong slowness effect to the player when touched
- Bucket of Temporal Coolant
  - Teleports and gives a nausea effect to the player when touched
- Bucket of Reactor Fuel
- Copper Coil
- Temporal Coil
- Cryo Catalyst
- Energized Iron

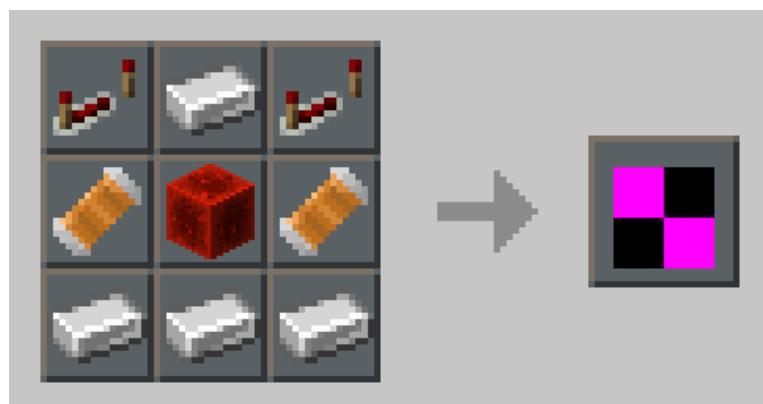
# Crafting Recipes

## Machines

- Coal Generator
  - 4 Iron Ingots + 2 Copper Ingots + 1 Copper Coil + 1 Redstone Dust + 1 Redstone Torch = 1 Coal generator



- Temporal Field Generator
- Nitrogen Extractor
- Cryo Chamber
- Water Pump
- Energizer
  - 4 Iron Ingots + 2 Redstone Repeaters + 2 Copper Coils + 1 Redstone Block = 1 Energizer



## Multiblock Machines Parts

- Machine Controller
  - The visual interface for the multiblock machines
- Input Core
- Energy Core
- Reactor Core
- Coolant Core
- Processing Core
- Creation Core
- Heating Core
- Exotic Core
- Stabilizer Core

## Blocks

- Pipes
  - Pipe level 1
  - Pipe level 2
  - Pipe level 3
- Gas Pipes
  - Gas Pipe level 1
  - Gas Pipe level 2
  - Gas Pipe level 3
- Cables
  - Cable level 1
  - Cable level 2
  - Cable level 3

## Fluids

### Coolants

- Water
  - **Description:**  
Regular water from Minecraft extracted from any body of water using a pump.
  - **Production Chain:**  
Water Pump → Water
- Oil → Placeholder
- Liquid Nitrogen
  - **Description:**  
The **Nitrogen Extractor** pulls **Nitrogen** from the air. The extracted nitrogen

is then processed in the **Cryo Chamber**, where it is cooled into **Liquid Nitrogen**.

- **Production Chain:**

Nitrogen Extractor → Nitrogen → Cryo Chamber → Liquid Nitrogen

- Cryofluid

- **Description:**

**Liquid Nitrogen** and a **Cryo Catalyst** processed together inside a **Cryo Chamber** will be further cooled into **Cryofluid**.

- **Production Chain:**

Liquid Nitrogen + Cryo Catalyst → Cryo Chamber → Cryofluid

- Temporal Coolant

- **Description:**

**Cryofluid** and **Stabilized Exotic Matter** processed together inside a **Creation Core** will be added together and cooled into **Temporal Coolant**.

- **Production Chain:**

Cryofluid + Stabilized Exotic Matter → Creation Core → Temporal Coolant

## Reactor Fuel

- Energetic Paste Fuel
- Reactor Temporal Fuel

## Other Fluids

- Steam
- Nitrogen

## Items

- Bucket of Oil → placeholder
- Bucket of Liquid Nitrogen
  - Damages the player when touched
- Bucket of Cryofluid
  - Damages and gives a strong slowness effect to the player when touched
- Bucket of Temporal Coolant
  - Teleports and gives a nausea effect to the player when touched
- Bucket of Reactor Fuel

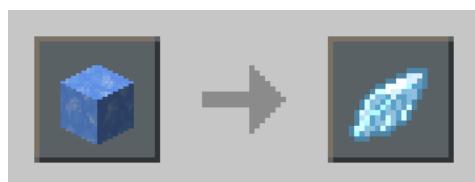
- Copper Coil
  - 2 Iron Ingots + 1 Copper Ingot = 1 Copper Coil



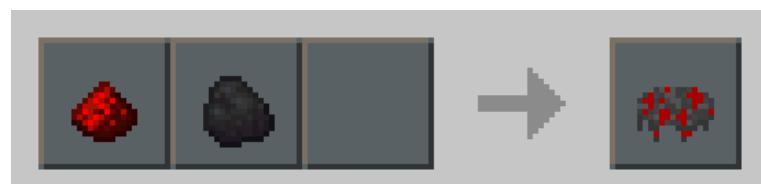
- Temporal Coil
  - 4 Copper Coil + 1 Any type of Exotic Matter = 1 Temporal Coil



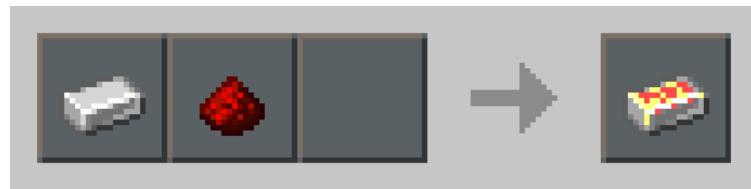
- Cryo Catalyst
  - Processing in the Cryo Chamber
  - 1 Blue Ice = 1 Cryo Catalyst



- Energetic Paste
  - Processing in the Energizer
  - 1 Redstone Dust + 1 Coal = 1 Energetic Paste



- Energized iron
  - Processing in the Energizer
  - $1 \text{ Iron} + 1 \text{ Redstone Dust} = 1 \text{ Energized Iron}$



# Progression Path

## Stage 1

- Simple machines
- Water coolant
- Basic cores

## Stage 2

- Build custom multiblocks
- Oil coolant
- Processing cores
- Begin producing Exotic Matter
- Unlock Volatile Exotic Matter
  - A theatrical moment with visual glitches, subtle time stutter, UI distortion to teach players emotionally what EM does.

## Stage 3

- High heat / high coolant demand
- Unlock Tempered Exotic Matter

## Stage 4

- Temporal Field Generator
- Time Slow Zone
- Cryofluid coolant
- Reactor Core

## Stage 5

- Temporal Accelerator (Speed Zone)
- Max-tier coolant

# Artistic Direction

General aesthetic:

- High-tech but industrial
- Glowing purple Exotic Matter textures
- Clean but rugged machines
- Soft particle effects
- Modular casings with visible pipes

Inspired in the mods Immersive Engineering and Mekanism with a touch of a sci-fi lab.

# UI/UX Design

## Design Philosophy

The UI should reflect the mod's themes of modularity, industrial engineering, and temporal science.

It must be:

- Clear
  - Easy to understand machine states
- Modular
  - Interfaces change based on installed cores
- Informative
  - Show heat, coolant, Exotic Matter, and time effects
- Non-intrusive
  - Minimal clutter, strong visual hierarchy

The player should feel like they're operating advanced scientific equipment, not navigating a cluttered menu.

## Machine Interface Structure

Every modular machine uses a core-driven UI, meaning the interface dynamically updates depending on which cores are installed.

### Base Layout

- Machine Name
- Energy Buffer Bar
- Heat Bar
- Coolant Tank
- Current Status Display (Idle, Processing, Overheating, Unstable, etc.)
- Stability Meter (temporal stability when Exotic Matter is involved)

## Dynamic UI Panels

Input Core → Adds:

- Input slots
- Filtering options
- Auto-pull/auto-push toggles

Processing Core → Adds:

- Progress bar

- Operation details
- Efficiency readout

Coolant Core → Adds:

- Coolant tank details
- Flow rate graph
- Coolant temperature

Exotic Core → Adds:

- Exotic Matter stabilization percentage
- EM purity indicator
- Anomaly warnings

Stabilizer Core → Adds:

- Temporal distortion field readout
- Stability ringing meter (for detecting EM anomalies)

This modularity keeps the UI clean but expandable.

## Visual Language

Heat

- Red-orange color
- Flickering animations for high heat
- Warning pulse at 90%+

Coolant

- Blue-cyan color
- Smooth flow animations

Energy

- Yellow-white-green

Exotic Matter

- Purple

Temporal Fields

- Time Slow → Blue particles drifting slowly
- Time Speed → Gold-red streaks moving quickly

## UX Flow

1. Player interacts with machine → UI opens immediately with an overview.
2. Player hovers elements → Tooltips explain what cores affect what, including numerical values for modpack makers.
3. When a machine overheats or destabilizes → Flashing icon + sound cue + tooltip explaining cause + suggestion for fix.
4. When Exotic Matter is unstable → UI background distortions + glitch effect on EM gauge.
5. When a core is inserted/removed → UI rearranges dynamically without closing.

The experience should feel smooth, reactive, and satisfying.

## Accessibility Considerations

- Icons instead of reliance on color alone
- Tooltip verbosity settings (Simple / Advanced)
- Clean fonts, no tiny text

## Time Zone Block UI

Temporal Field Generator (Slow Zone)

- Radius slider (3 / 5 / 7)
- Field intensity indicator
- Energy usage per tick
- Exotic Matter cost per tick
- Stability bar
- Heat buildup meter
- Diagnostic warnings (field collapse risk, coolant low)

Temporal Accelerator (Speed Zone)

- Strength level display (x1, x2, x3)
- Energy usage per tick
- Exotic Matter cost per tick
- Coolant drain rate
- Heat output

# Technical Systems

Proxy Effects:

- Extra processing operations per tick
- Chance to skip processing operations

Heat System:

- Internal heat value
- Efficiency curves
- Overheat thresholds
- Coolant flow rate

Cores:

- NBT-based configuration
- Machine behavior calculated per-tick
- Per-core modifiers stack

Time Zones:

- Radius-based entity scanning
- Attribute modifiers
- AI slow via attribute modifiers, never tick skipping or doubling

## Possible Future Expansions

- Teleportation nodes
- Phase-shift blocks
- Temporal item duplicators
- Exotic alloy crafting

