Pushing the LEGO Train hobby forward
A plan to use the Fx Bricks brand…

…To develop a new system of LEGO train compatible products…

Whilst embracing the core founding principle of the LEGO group:
Problem

Not enough basic elements, i.e. track, wheels, accessories

Fragile and disconnected 3rd party alternatives

Metal track system displaced by plastic and battery power

No Coherence of system to pull everything together
Difficult to recruit new-comers to hobby
Solution

Develop a complete System of new LEGO train components:
  Track
  Electrics
  Sets / Kits
  Accessories

Fully stocked online store
Worldwide fulfillment and distribution

Build a world-class model train company and galvanize the legitimacy of L-Gauge among the broader model train community
Market

**AFOLs** Adult Fans of LEGO, existing LEGO train fans

**Traditional** railway modellers, collectors

**Newcomers** young and old alike curious about LEGO trains
Product Portfolio
Product Portfolio

Core product silos

Track System

All new LEGO® compatible metal track system
Metal wheelsets
Power feed/distribution

Power System

“PFx System”

Fixed / variable supplies
Connectors and wires
Motor drives
Electrical accessories
Control systems

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Product Portfolio

Future product silos

Train Accessories
- Couplers
- Steam coupling rods/valve gear
- Alternative wheels

Train Kits
- Turn-key rolling stock kits
- Licensed/premium fan models
Track System
Design Principles

Compatible with LEGO® 9V / RC track geometry/interconnect

Metal running rails similar in design to LEGO® 9V (folded/crimped metal rail head)

Conductive metal wheel sets for power pickup

Dark bluish grey ABS plastic

Gentle system geometry closer to model trains and less toy-like

Versatile selection of elements to build interesting layouts
Other Track Systems

A sample survey of some major model train brands...

Kato

Fleischmann

Roco

LGB

Bachmann

Hornby

PECO
## Other Track Systems

### Survey analysis

<table>
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<tr>
<th>Manufacturer</th>
<th>Gauge</th>
<th>Origin</th>
<th>Number of Elements</th>
<th>Curve Radii</th>
<th>Straight Lengths</th>
<th>Switch Pairs</th>
<th>X-ings</th>
<th>Curve Switch</th>
<th>Y / 3-way</th>
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PRELIMINARY
Other Track Systems

At least 5+ curve radii on average

Almost all have “special” elements to align geometry (e.g. return curves, odd-length straights, etc.)

All have at least one crossing element and a Y-switch

Curved switches are not common
Proposed Track System

7x Curve Radii
6x Straight Lengths
R/L Switch Pair (40 studs long)
R/L Crossing Pair (40 studs long)
Y Switch (40 studs)
90° Crossing
19 elements total
Proposed Track System

6x Main Curve Radii:

- R72-22.5°
- R88-11.25°
- R104-11.25°

4x Standard Length Straights:

- S32 Double
- S16 Single
- S8 Half
- S4 Quarter

2x Special Length Straights:

- S3.2 (5x/16-studs)
- S1.6 (5x/8-studs)

1x Special Return Curve Radius:

- R64-22.62°

Ensures perfect parallel return curve at 16-stud separation

Ensures perfect offset alignment for any size yard ladder
Proposed Track System

40-stud Switch (Right/Left Pair)
40-stud Crossings (Right/Left Pair):
  22.62° crossing vee
  16-stud crossover parallel geometry

40-stud Y Switch:
  ±22.62° diverging routes
  32-stud return curve
  parallel geometry

90° Crossing

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Proposed Track System

Grid Aligned Yard Ladders

Crossovers

Return Curve

R64-22.62° ensures perfectly aligned return curves for parallel sidings with Right/Left/Y switches and for yard ladder terminations

Repeating combinations of S1.6 and S3.2 ensure perfect 16-stud X-Y alignment
Power System
Power System

Support a variety of control schemes:

**Variable 9V DC** to track / direct motor speed control

**Fixed 9V DC** to track / replace PF battery box / use with LEGO® IR Receiver, S-Brick, PFx Brick, etc.

**NMRA DCC** to track / use with PFx Brick PRO or OEM DCC decoders

Power Distribution / Interconnect:

Simple 2-terminal conductive stud connectors

Stackable connectors

Variety of cable lengths

Used as the basis of all electrical interconnections
Power System

New high-performance / quality motor drive components

2-axle Motor Bogie similar form factor to PF train motor

Standalone Motor Brick similar form factor to PF XL motor with technic cross axle coupling

Use high quality OEM motors, e.g. Bühler, Canon, etc.

Future Migration to Accessory Products

Point switch machines
Signals
Level crossing gates/lights

Magnetic De-coupler
Track occupancy detectors
Power System

5x Product Categories:

1. Power Supplies
2. Track Interface
3. Control
4. Motors
5. Interconnect
Power System

1  Power Supplies

**Fixed 9 VDC - AC adapter**

Terminated with 1.5m wire + 1x2 plate/conductive stud

“Battery replacement”

**Variable 9 VDC - AC adaptor**

Similar form factor to LEGO® 9V regulator

Terminated with 1.5m wire + 1x2 plate/conductive stud
Power System

2 Track Interface

Power Feeder
Similar form factor to LEGO® 9V power feeder

Metal Wheel Pickup
Similar form factor to LEGO® train wheel set
Metal wheel / plastic insulating hub
Sprung tabs against wheel back
Conductive stud terminals
Power System

3 Control

**PFx Brick “Pro”**

- Similar form factor to existing PFx Brick
- Added DCC compatible decoder firmware
- Injection molded two-tone ABS enclosure
4 Motor Drives

2-axle Motor Bogie

- similar form factor to PF train motor
- Cross-axle holes allow any choice of wheel type/colour

Standalone Motor Brick

- brick form factor motor with technic cross axle coupling
- Use high quality OEM motors, e.g. Bühler, Canon, etc.
Power System

Interconnect

1x2 plate — wire — 1x2 plate
Standardized cable assemblies
128 mm, 256 mm, 1m cable lengths
22-20 AWG wire pair
Conductive studs / anti-studs
Stackable connectors

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