



fischertechnik-Workshop

Statik

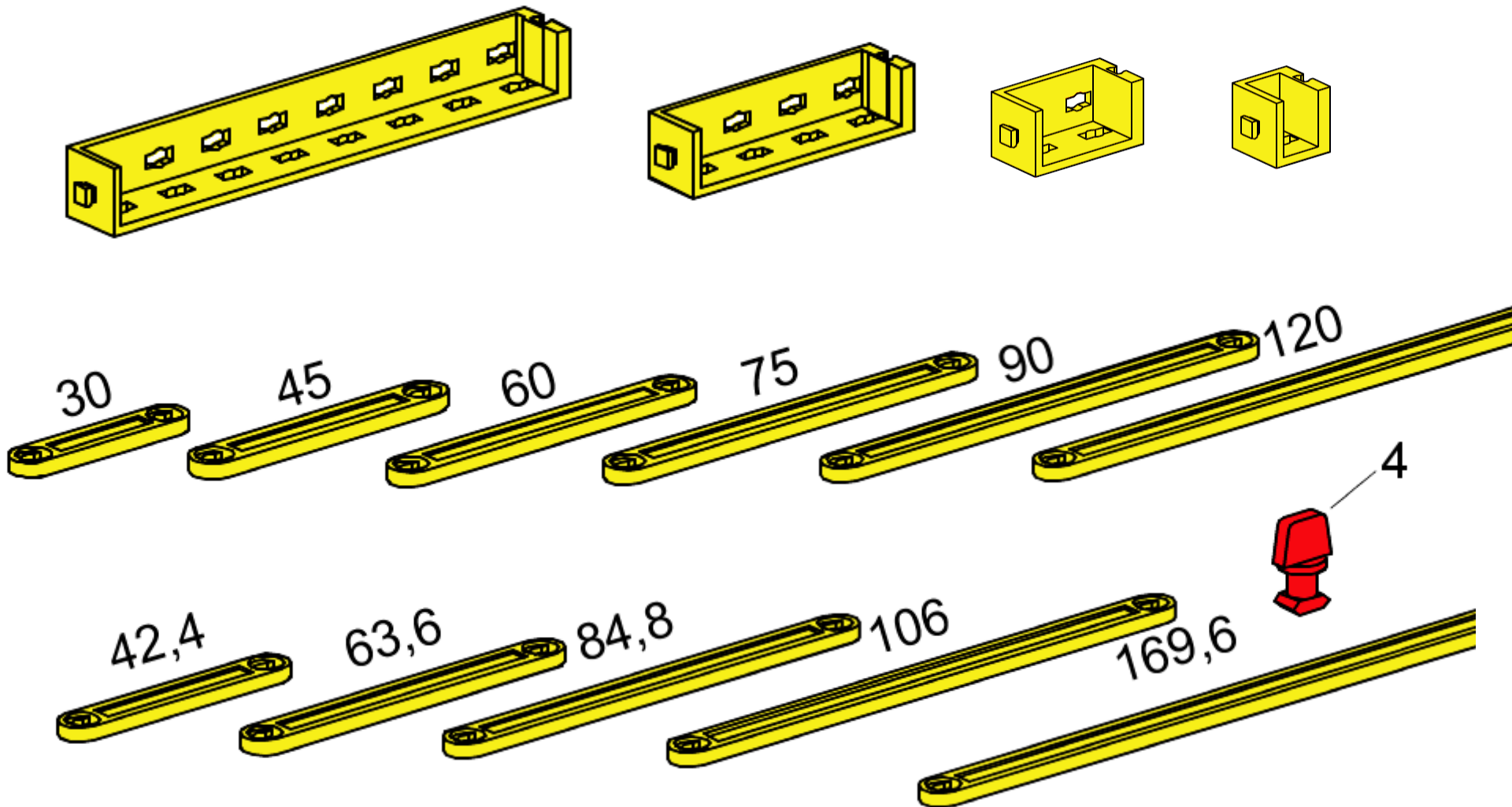
MINT-Feriencamp, 01.06.2018

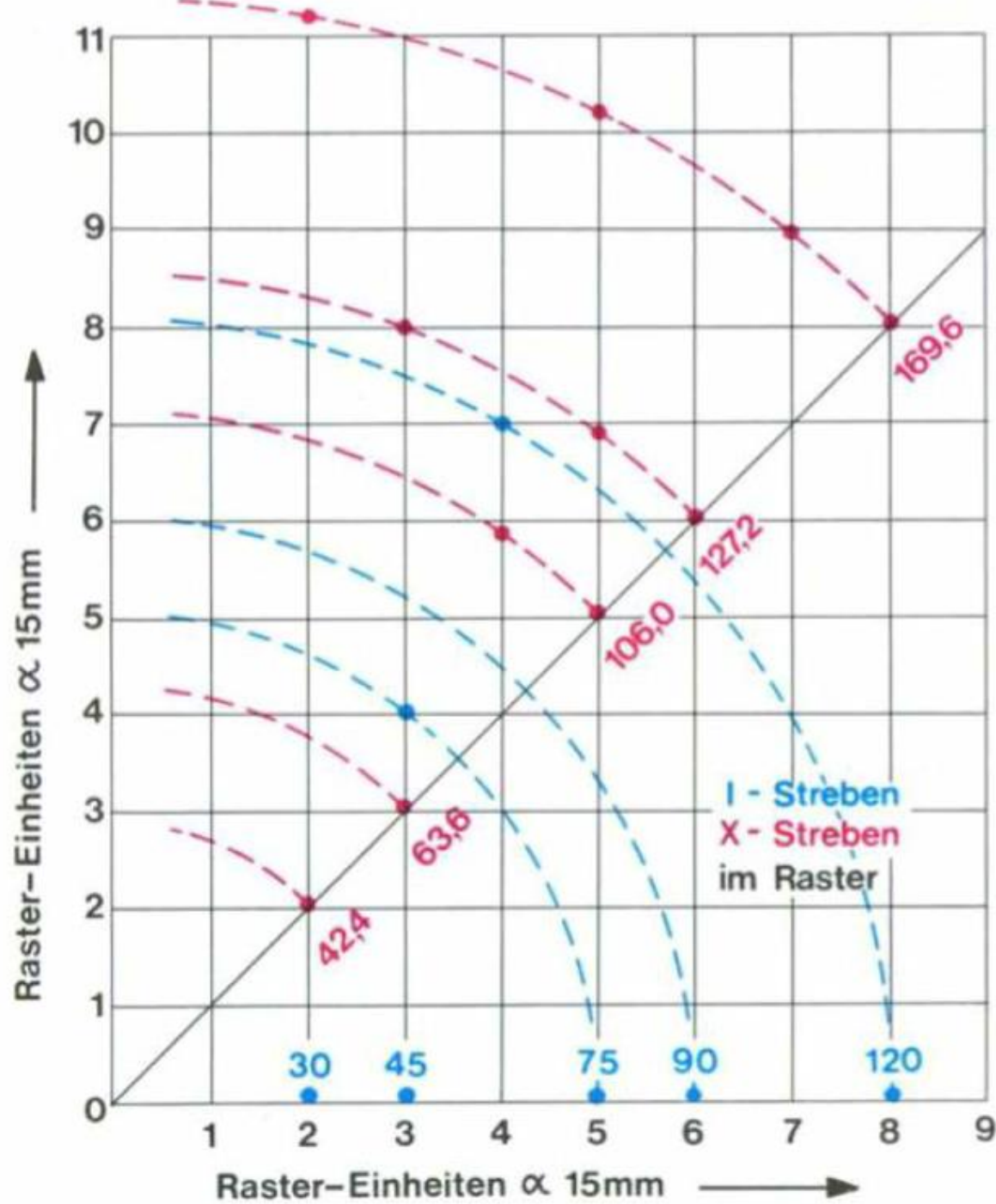
Dirk Fox

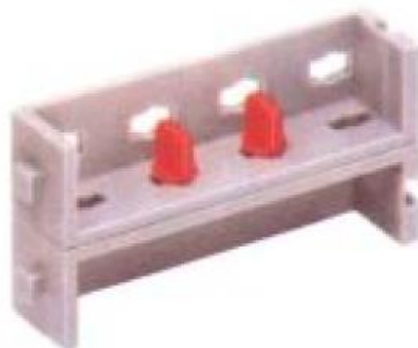
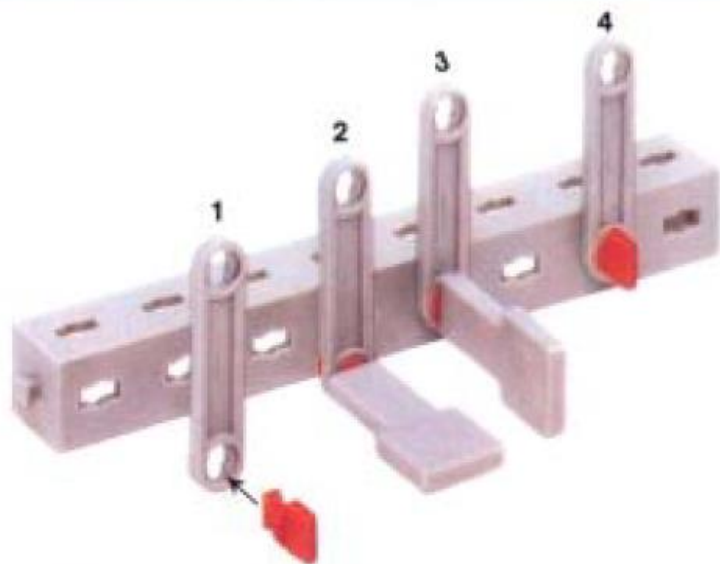
A close-up, high-angle shot of various LEGO Technic components. In the upper left, a grey gear with black teeth is visible. To its right is a white rectangular plate with a blue pattern of diagonal lines. Below these are several yellow Technic beams of different lengths and shapes. On the right side, a large red gear with a complex internal pattern is partially visible. The bottom of the image features a solid red horizontal band.

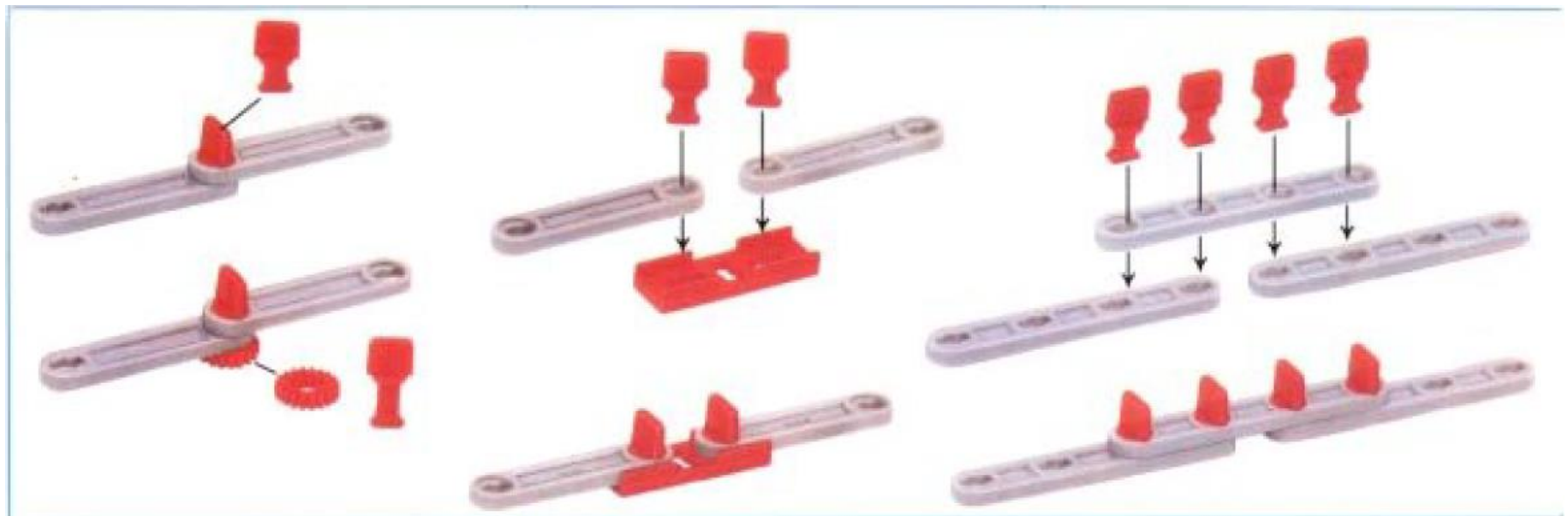
Statik

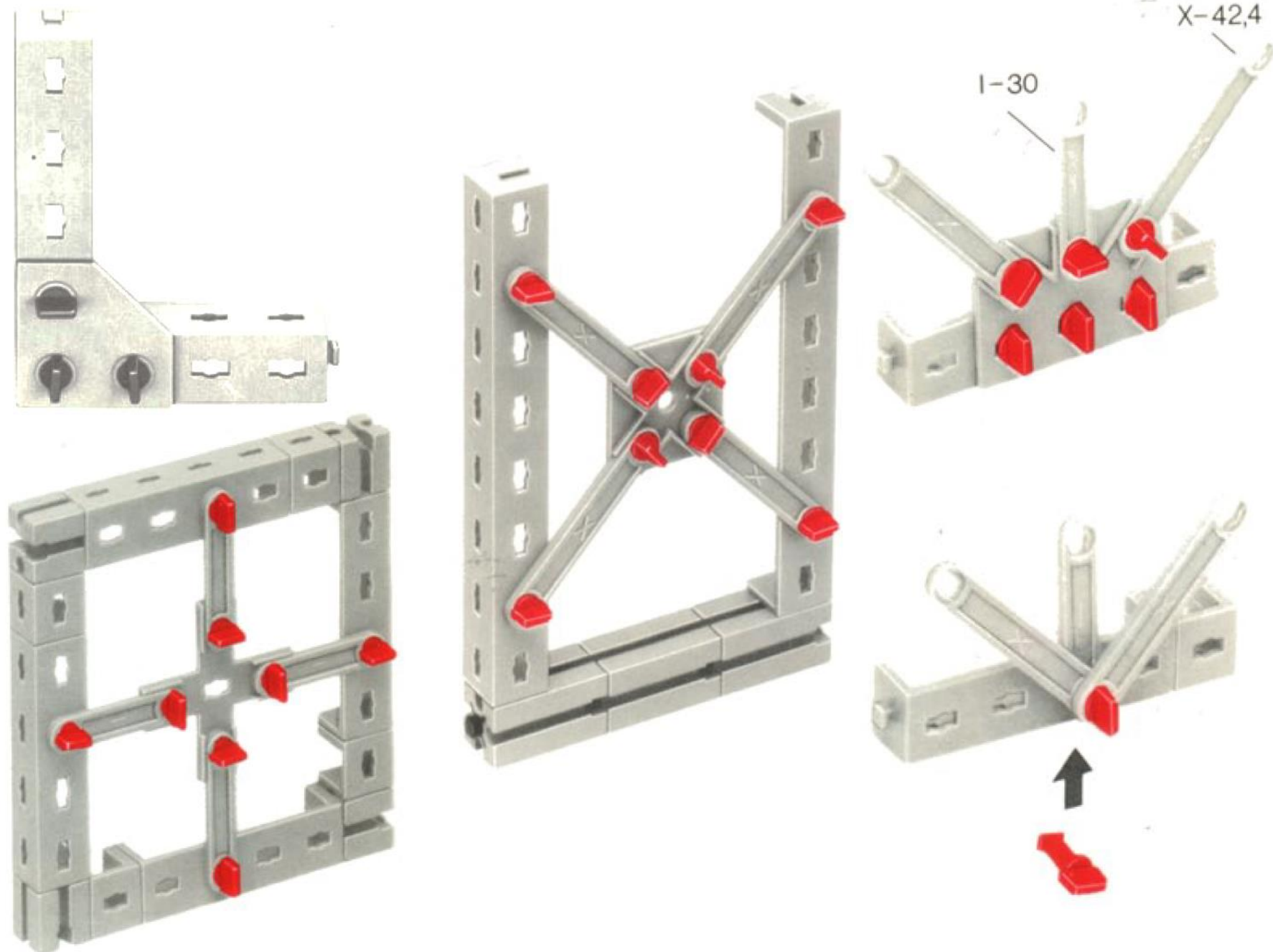
Die Statikteile







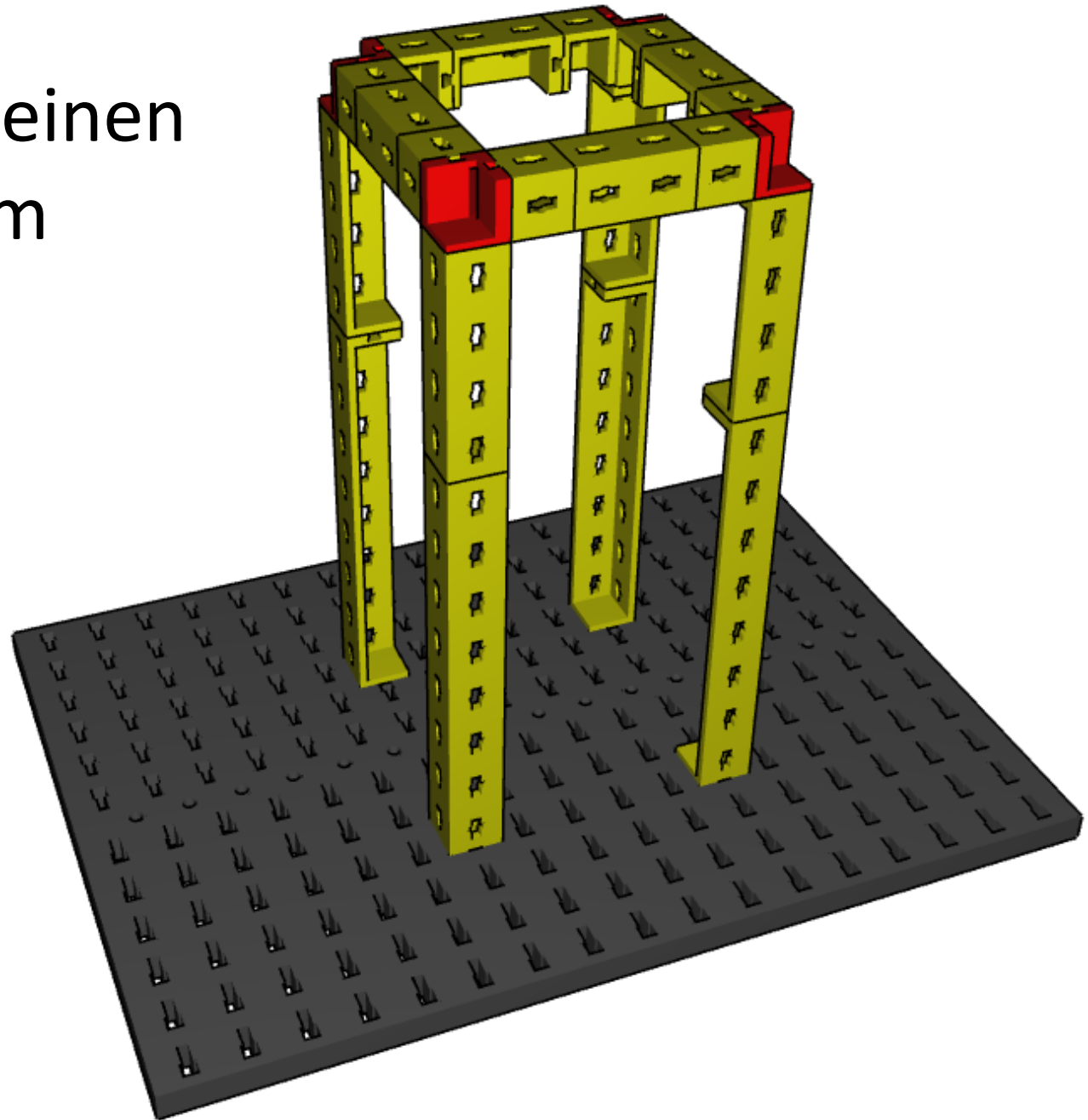


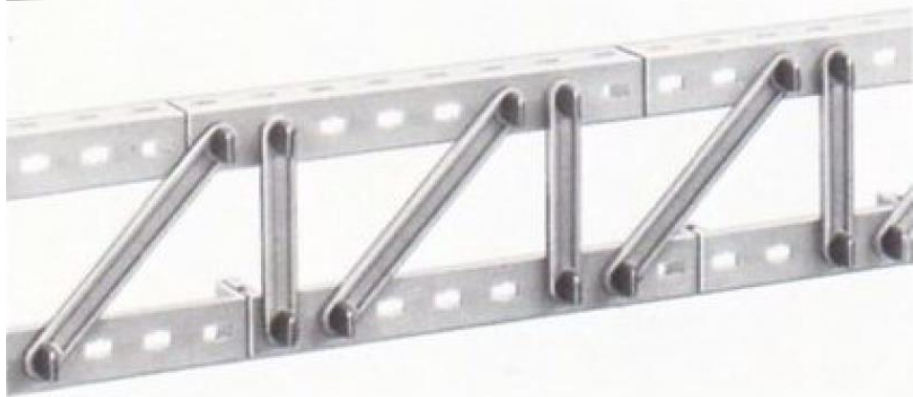
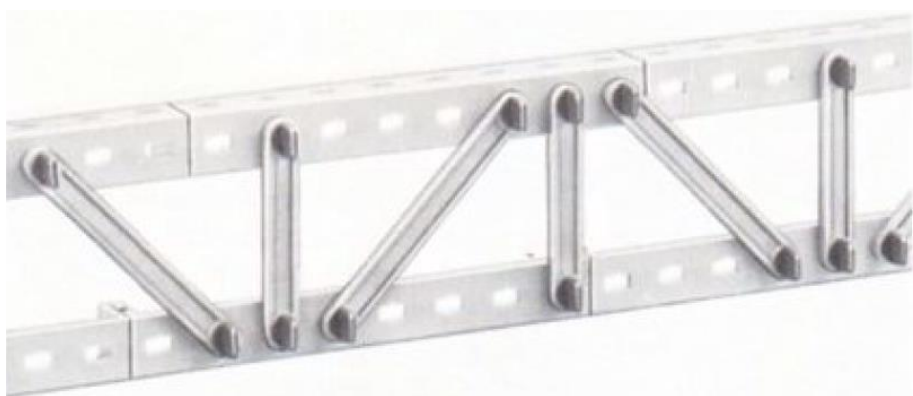


A close-up, high-angle photograph of various LEGO Technic components. The image features a large grey gear on the left, a yellow beam with a red connector in the center, and a red gear on the right. A solar panel with blue cells and a white frame is visible in the upper right. The background is filled with other grey, yellow, and red Technic parts, creating a complex mechanical scene.

Aufgabe I

Konstruiere einen
stabilen Turm





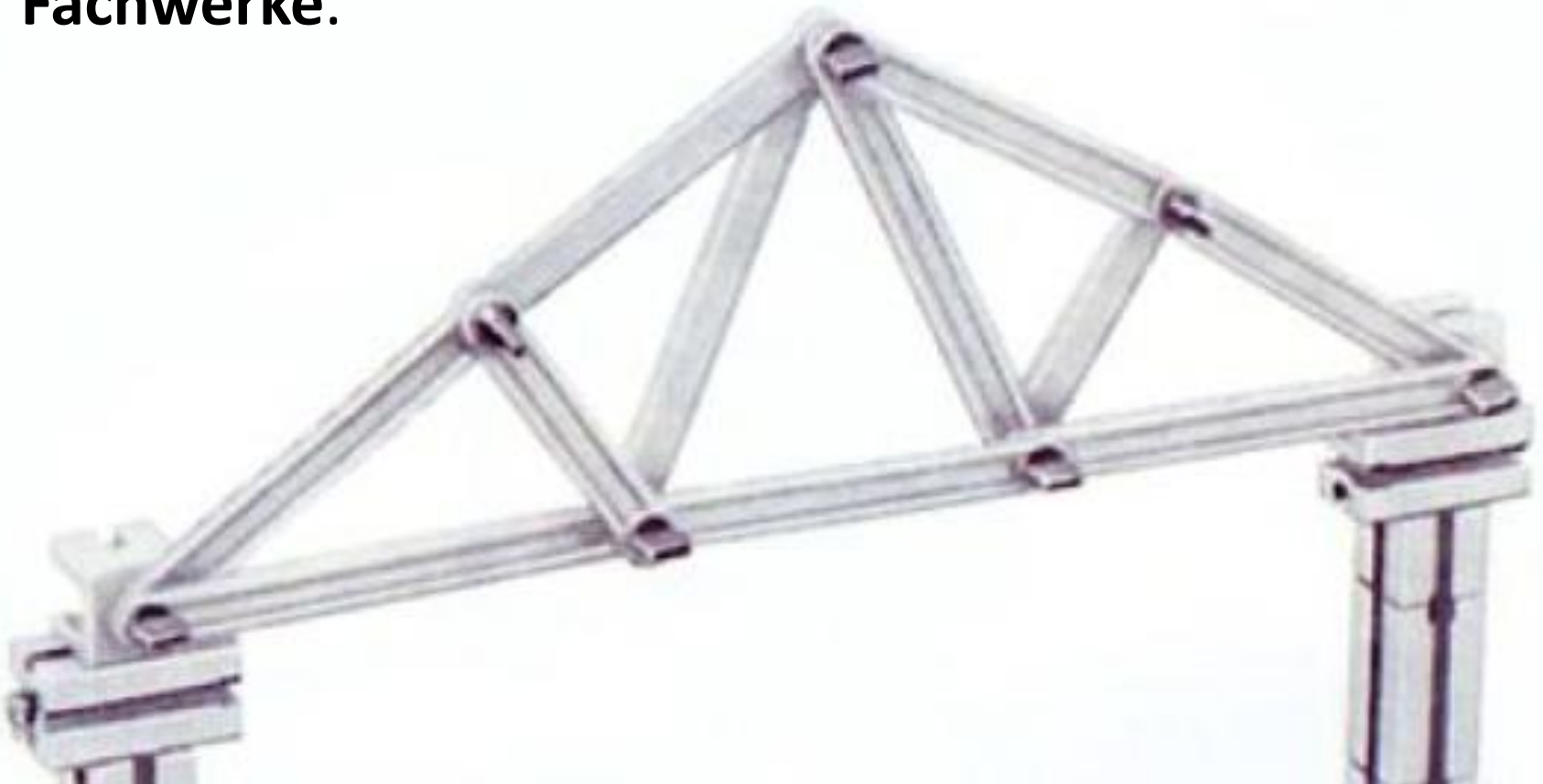
A close-up, high-angle shot of various LEGO Technic components. In the upper left, a grey Technic beam with several circular holes is visible. To its right is a white Technic beam with a blue patterned surface. Below these, a yellow Technic beam with multiple circular holes runs diagonally. On the right side, a red Technic wheel with a complex internal pattern is partially visible. In the foreground, there are several other components, including a red Technic connector, a black Technic connector, and a grey Technic connector. The overall scene is a dense collection of these colorful plastic parts.

Fachwerke

Tragwerke

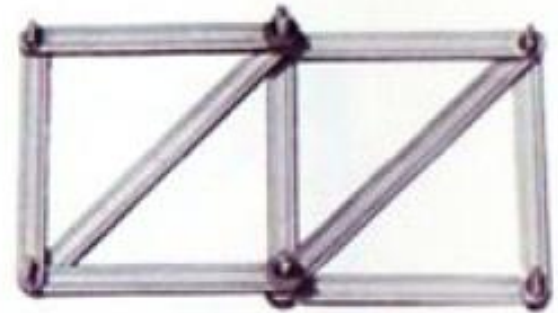
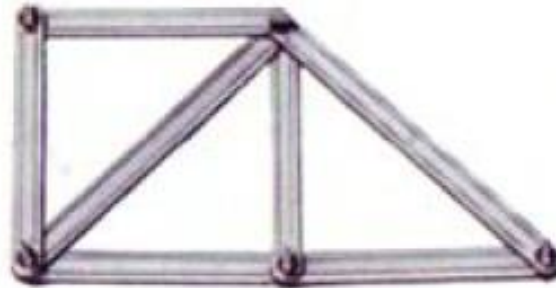
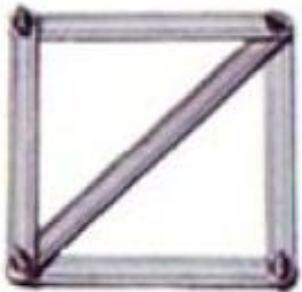
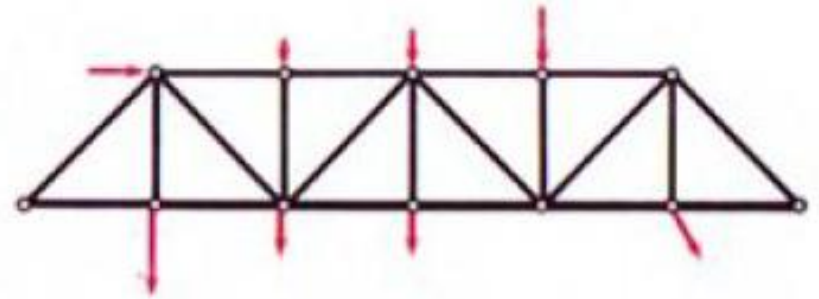
Tragwerke dienen dazu, Kräfte weiterzuleiten und ihr Gleichgewicht zu vermitteln.

Aus Streben zusammengesetzte Tragwerke heißen **Fachwerke**.



Innerlich statisch bestimmt

Gelenkfachwerke



$$s = 2 \cdot k - 3$$

(mit k = Anzahl Knoten, s = Anzahl Streben)

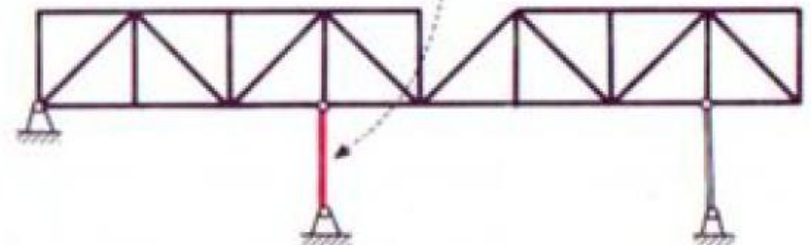
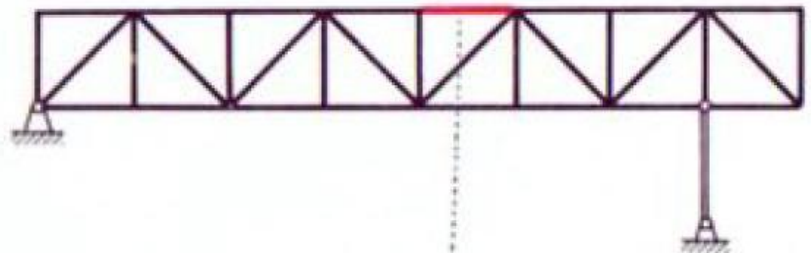
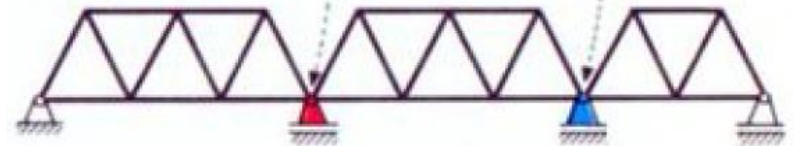
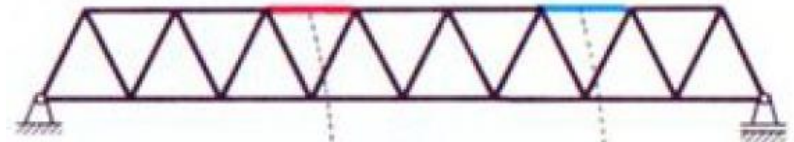
Statisch bestimmt gelagert

Mindestens drei Lager
(„Fesseln“)

(Strebe kann durch Lager
ersetzt werden)

$$2 \cdot k = s + p$$

(mit p = Anzahl Lager)



A close-up photograph of various LEGO Technic components. In the upper left, a grey Technic gear is visible. To its right is a white rectangular frame containing a blue patterned sheet. Below these are several yellow Technic beams and a red circular piece with a complex internal pattern. The word 'Brücken' is overlaid in white text on a semi-transparent dark band across the middle of the image.

Brücken

Brücken nach Konstruktionsprinzip

1.11 Balkenbrücken

1.11.1 Einfache Balkenbrücken

Balken auf zwei Stützen:
BALKENTRÄGER
Stützweiten 5 – 20 m



1.11.2 Zwischengestützte Balkenbrücken

Balken auf mehreren
Stützen ohne Gelenke:
DURCHLAUFTRÄGER
Stützweiten der Hauptöffnungen 30 – 250 m



Balken auf mehreren Stützen mit
Gelenken: GELENKTRÄGER (GERBERTRÄGER)
Stützweiten der Hauptöffnungen 100 – 500 m



1.11.3 Verstärkte Balkenbrücken

Durch geneigte Streben
unterstützter Balken:
SPRENGWERK
Stützweiten 10 – 25 m



Überspannter Balken:
HÄNGEWERK
Stützweiten 10 – 20 m



Unterspannter Balken:
HÄNGEWERK
Stützweiten 10 – 25 m



1.11.4 Seilverspannte Balkenbrücken

SCHRÄGSEILBRÜCKE
Stützweiten 150 – 450 m



1.11.5 Versteifte Balkenbrücken

LANGERBALKEN
(Auch als versteifter
Stabbogen statisch ein
Balken)
Stützweiten 50 – 250 m



1.12 Bogenbrücken

1.12.1 Bogenbrücken mit Horizontalschub

Beidseitig fest eingespannter Bogen:
EINSPANNBOGEN
Stützweiten 50 – 300 m



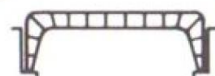
Beidseitig gelenkig gelagerter Bogen:
ZWEIGELENK-BOGEN:
Stützweiten 80 – 300 m



Beidseitig gelenkig gelagerter Bogen mit
weiterem Gelenk im Bogenseitel:
DREIGELENK-BOGEN
Stützweiten 60 – 250 m



Rahmenbrücken
Beidseitig eingespannter
Rahmen:
EINSPANNRAHMEN
Stützweiten 20 – 50 m



Beidseitig gelenkig gelagerter Rahmen:
ZWEIGELENK-RAHMEN
Stützweiten 30 – 250 m



1.12.2 Bogenbrücken mit aufgehobenem Horizontalschub

An Fahrbahntafel oder
besonderem Zugband
befestigter Bogen:
BOGEN MIT ZUGBAND
Stützweiten 40 – 80 m

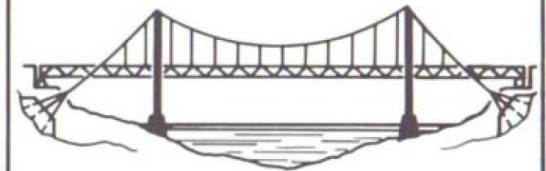


Mehrere sich gegenseitig
abstützende Bogen:
BOGEN ÜBER
MEHRERE OFFNUNGEN
Stützweiten je Öffnung: 20 – 80 m



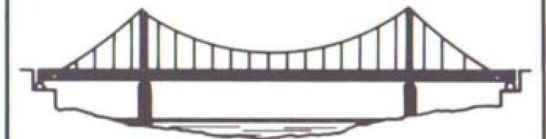
1.13 Hängebrücken

1.13.1 Erdverankerte Hängebrücken (Echte Hängebrücken)



In Fundamentblöcken verankerte Tragbänder
(Kabel, Ketten usw.):
ECHTE HÄNGEBRÜCKE
Stützweiten der Mittelöffnung 300 – 1200 m

1.13.2 Hängebrücken mit aufgehobenem Horizontalschub (In sich verankerte Hängebrücken)



An Versteifungsträger (außen) befestigte
Tragbänder:
IN SICH VERANKERTE HÄNGEBRÜCKE
Stützweiten der Mittelöffnung 250 – 500 m



An Versteifungsträger (außen und innerhalb der
Mittelöffnung) befestigte Tragbänder:
ZUGELGURTBRÜCKE
Stützweiten der Mittelöffnung 150 – 350 m

A close-up photograph of a LEGO Technic bridge model. The image shows various components including a grey gear-like structure on the left, a white frame with blue solar panel-like patterns on the top right, yellow Technic beams in the center, and a red circular gear on the right. The text 'Balkenbrücken' is overlaid in white on a dark red background at the bottom.

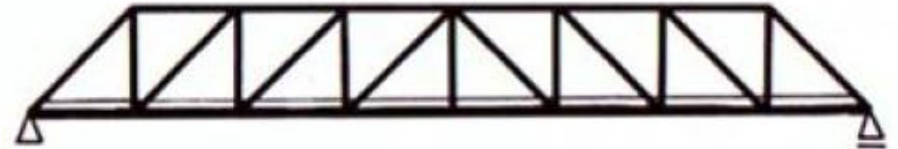
Balkenbrücken

Balkenbrücken

Fachwerkträgerbrücke



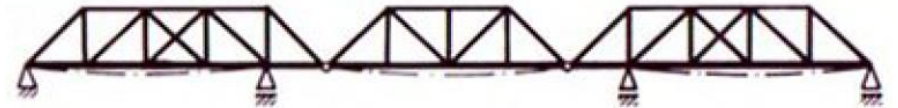
Trapezträgerbrücke



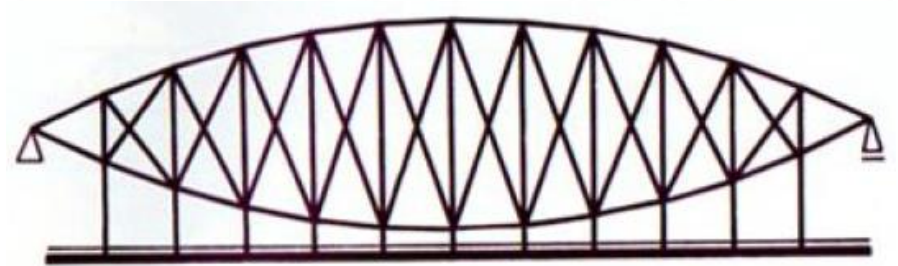
Hängewerkbrücke



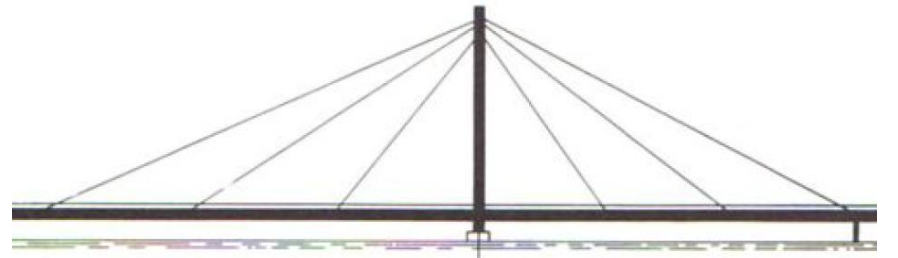
Krag- und Schleppträger
(Gerberträgerbrücke)



Linsenträgerbrücke



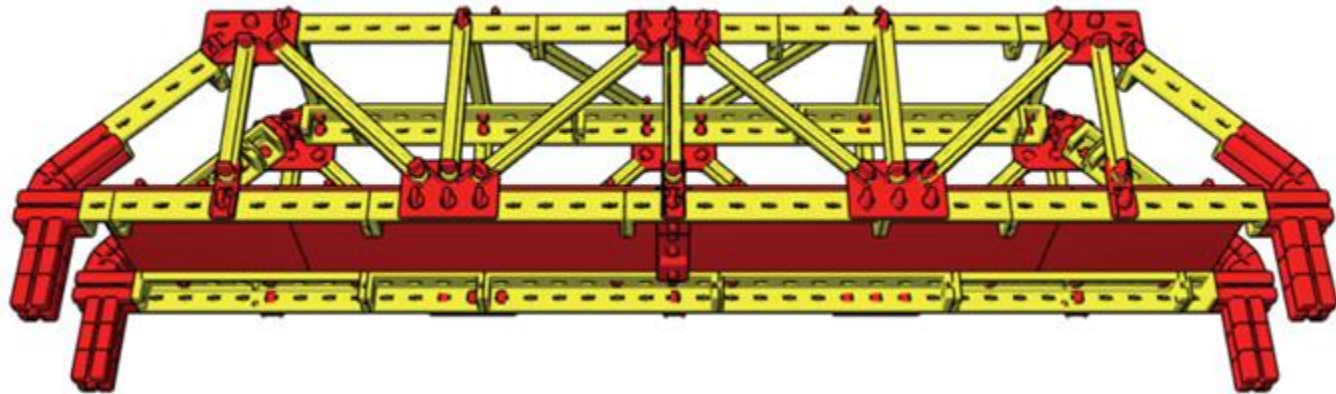
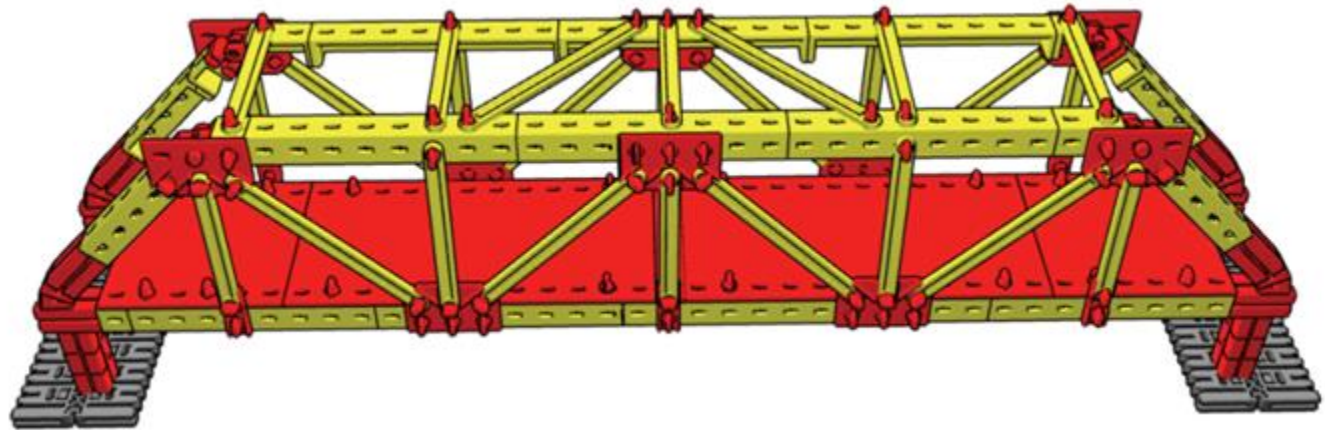
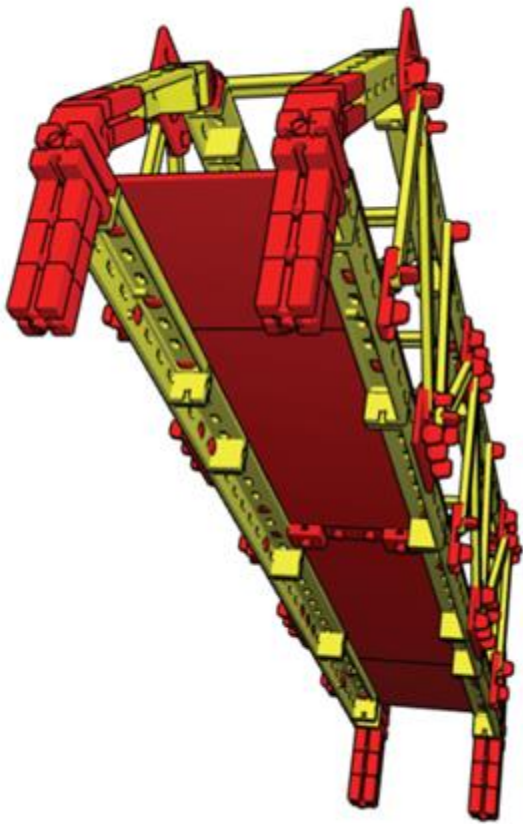
Seilverspannte Balkenbrücke



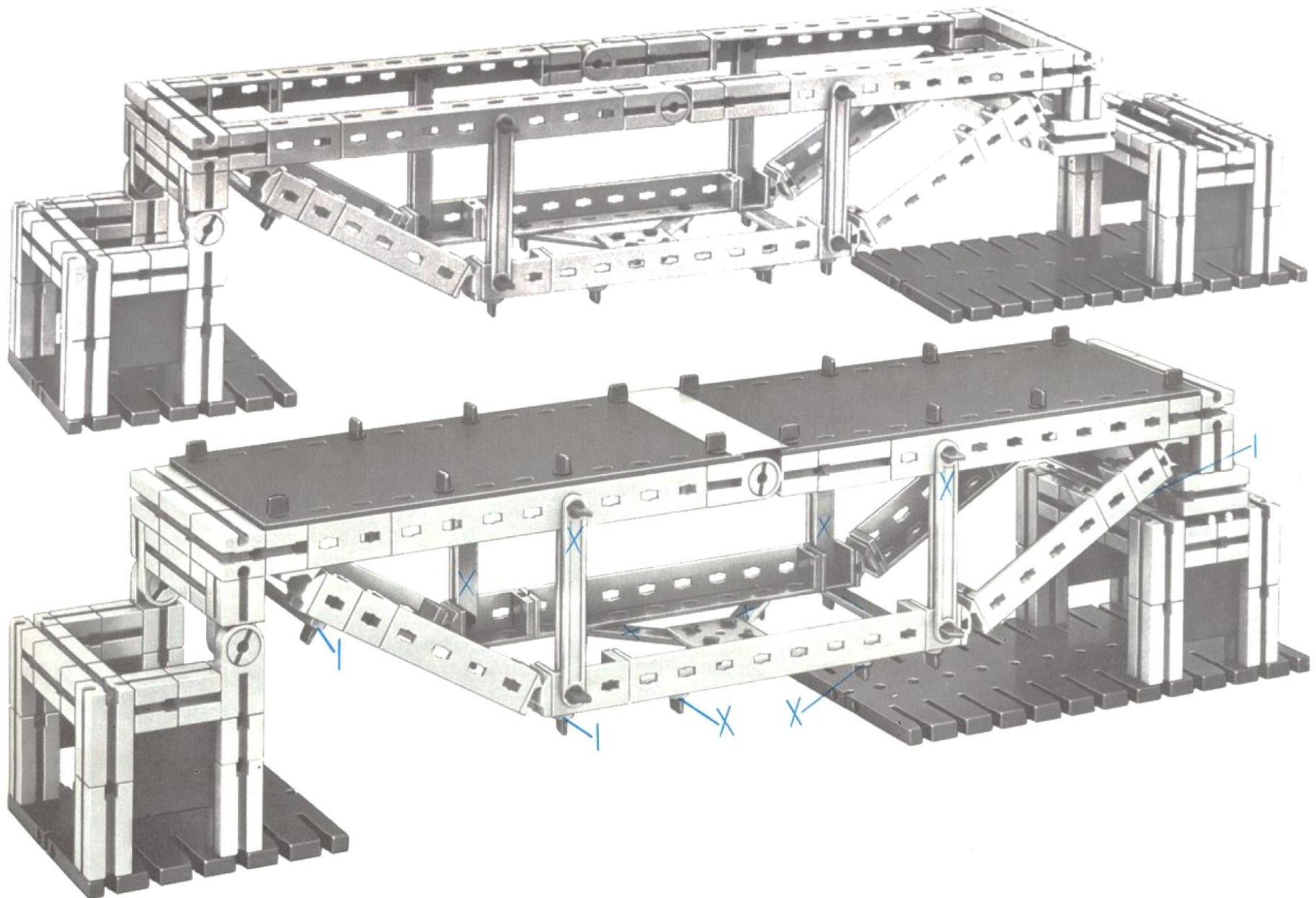
Fachwerkträgerbrücke



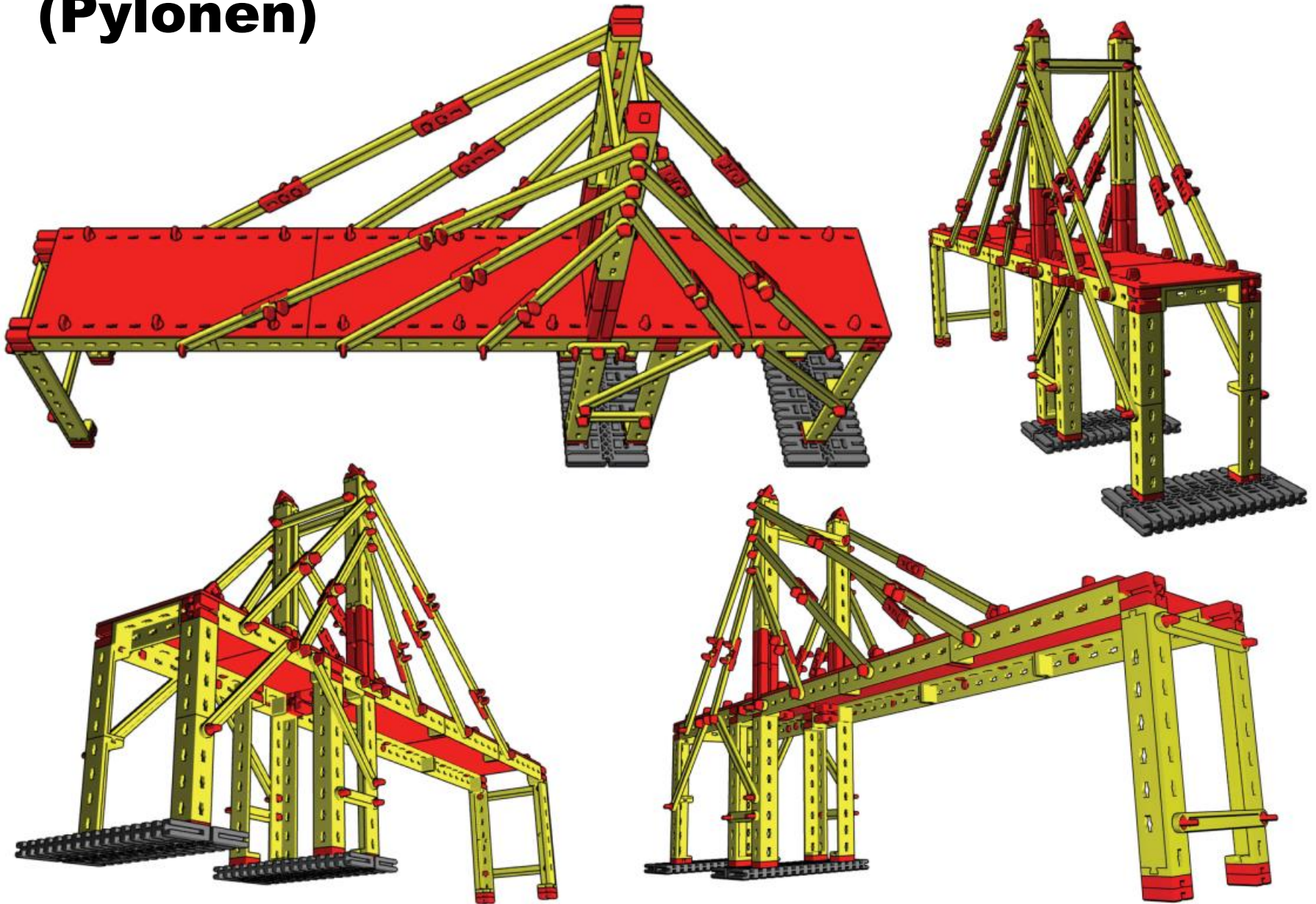
Trapezträgerbrücke



Hängewerkbrücke



Seilverspannte Balkenbrücke (Pylonen)



A close-up photograph of a LEGO Technic model, likely a bridge. The image shows various components: a large grey gear-like structure on the left, a yellow beam running diagonally across the center, and a red circular piece on the right. A solar panel is visible in the upper right corner. The text 'Bogenbrücken' is overlaid on the image.

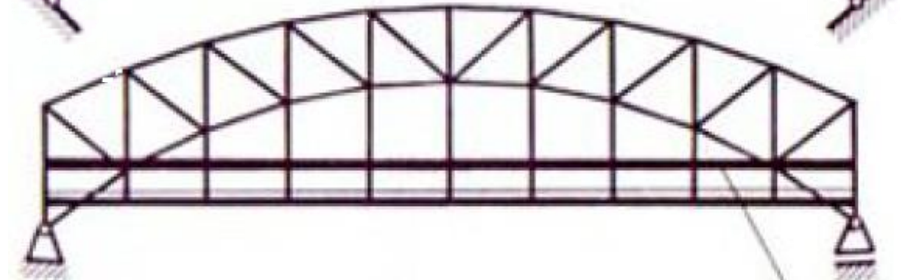
Bogenbrücken

Bogenbrücken

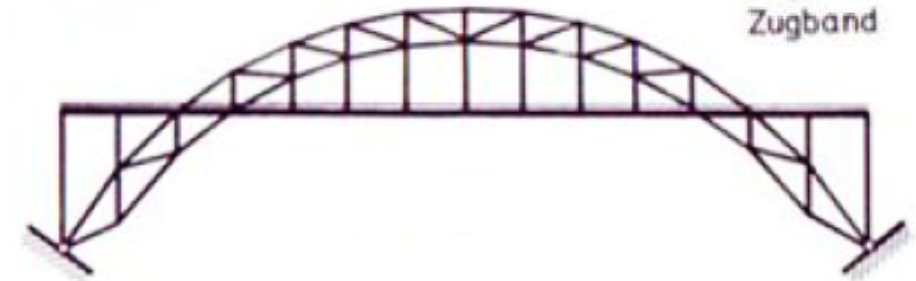
Zwickelfachwerk



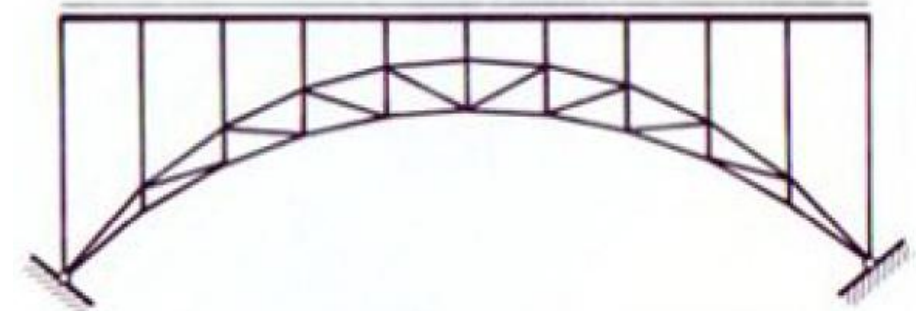
Zweigelenkbogen



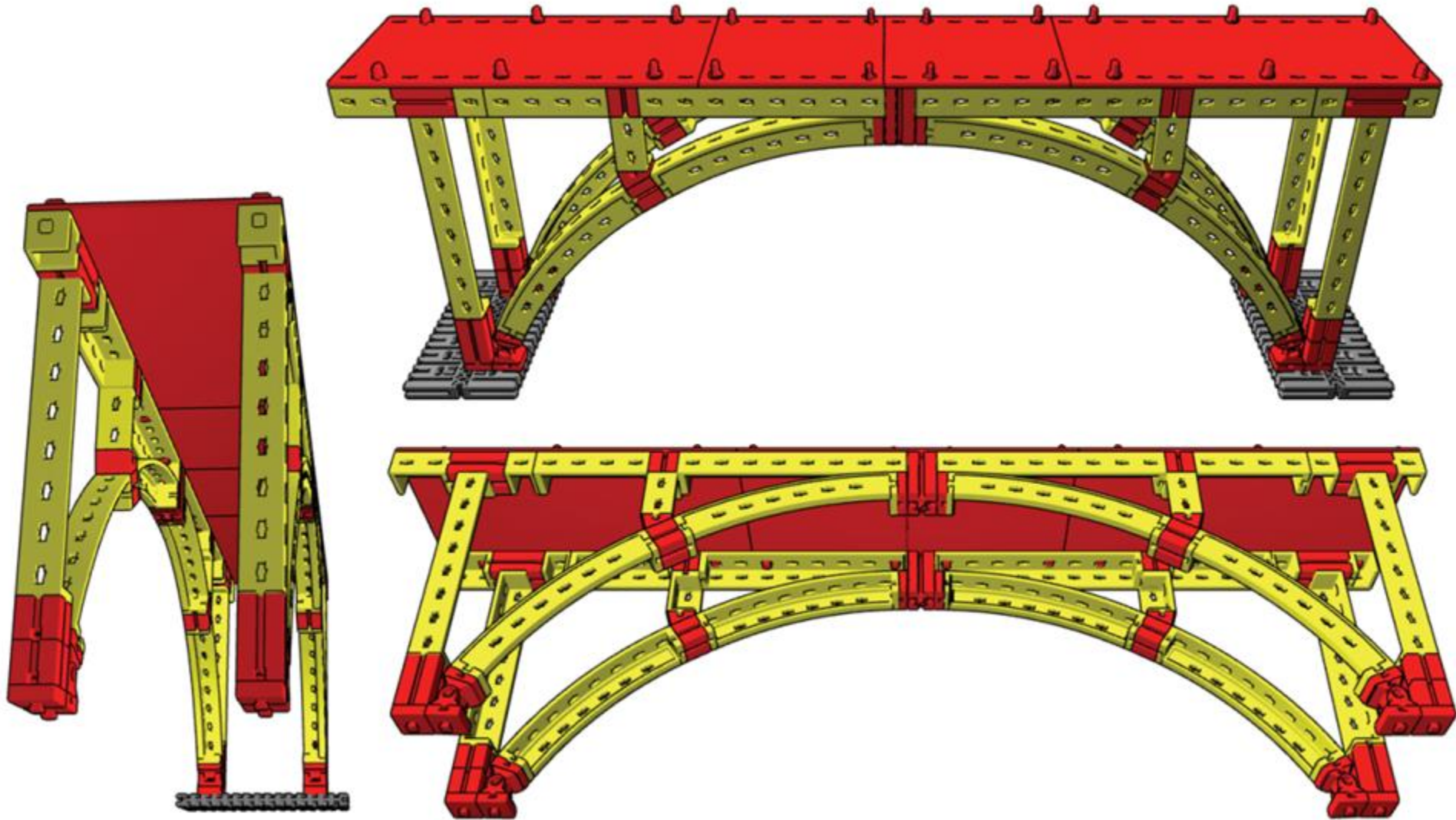
Parallelgurtbogen



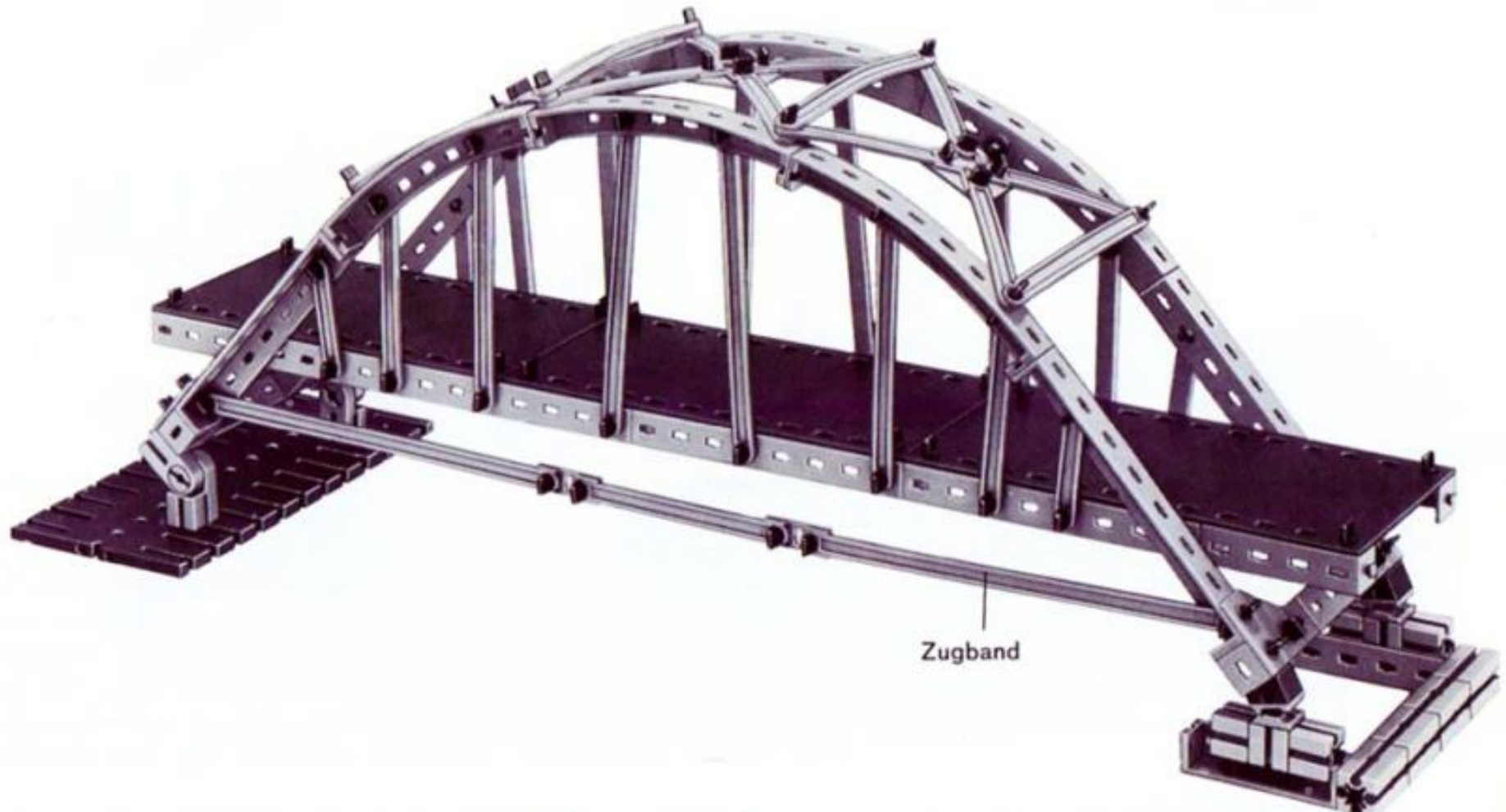
Sichelbogen



Sichelbogenbrücke



Tragbogenbrücke



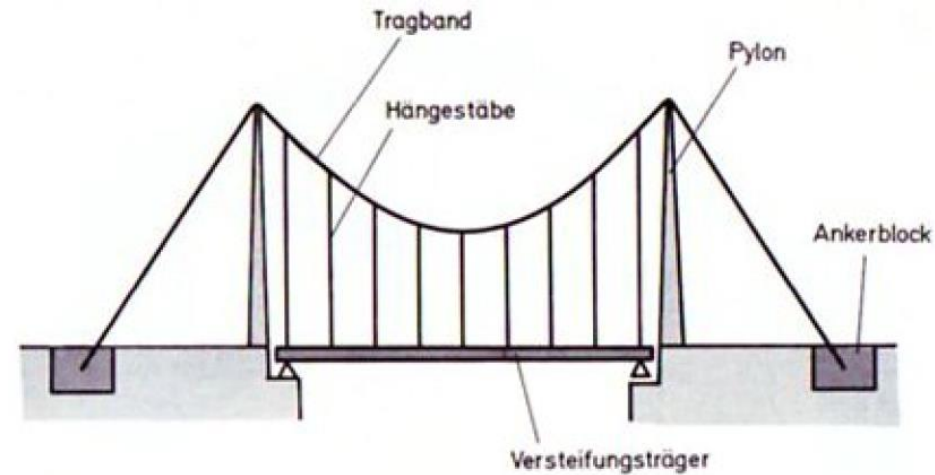
A close-up photograph of a LEGO Technic model, likely a suspension bridge. The image shows various components: a large grey gear-like structure on the left, a yellow beam running diagonally across the center, a red circular piece on the right, and a blue and white patterned panel at the top. The text 'Hängebrücken' is overlaid in white on a dark red background at the bottom.

Hängebrücken

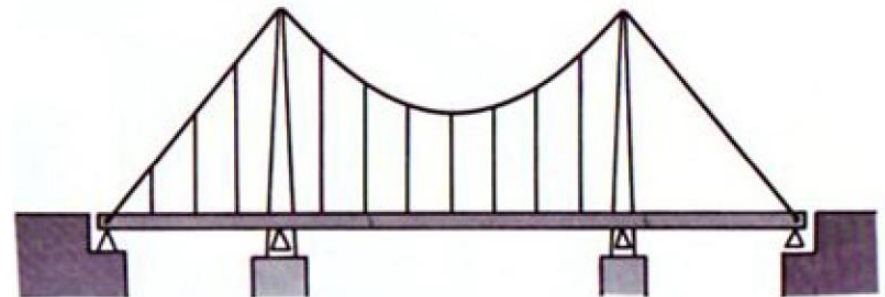
Hängebrücken

Hohe Durchbiegung ($1/250$ der Spannweite); bis 1.500 m

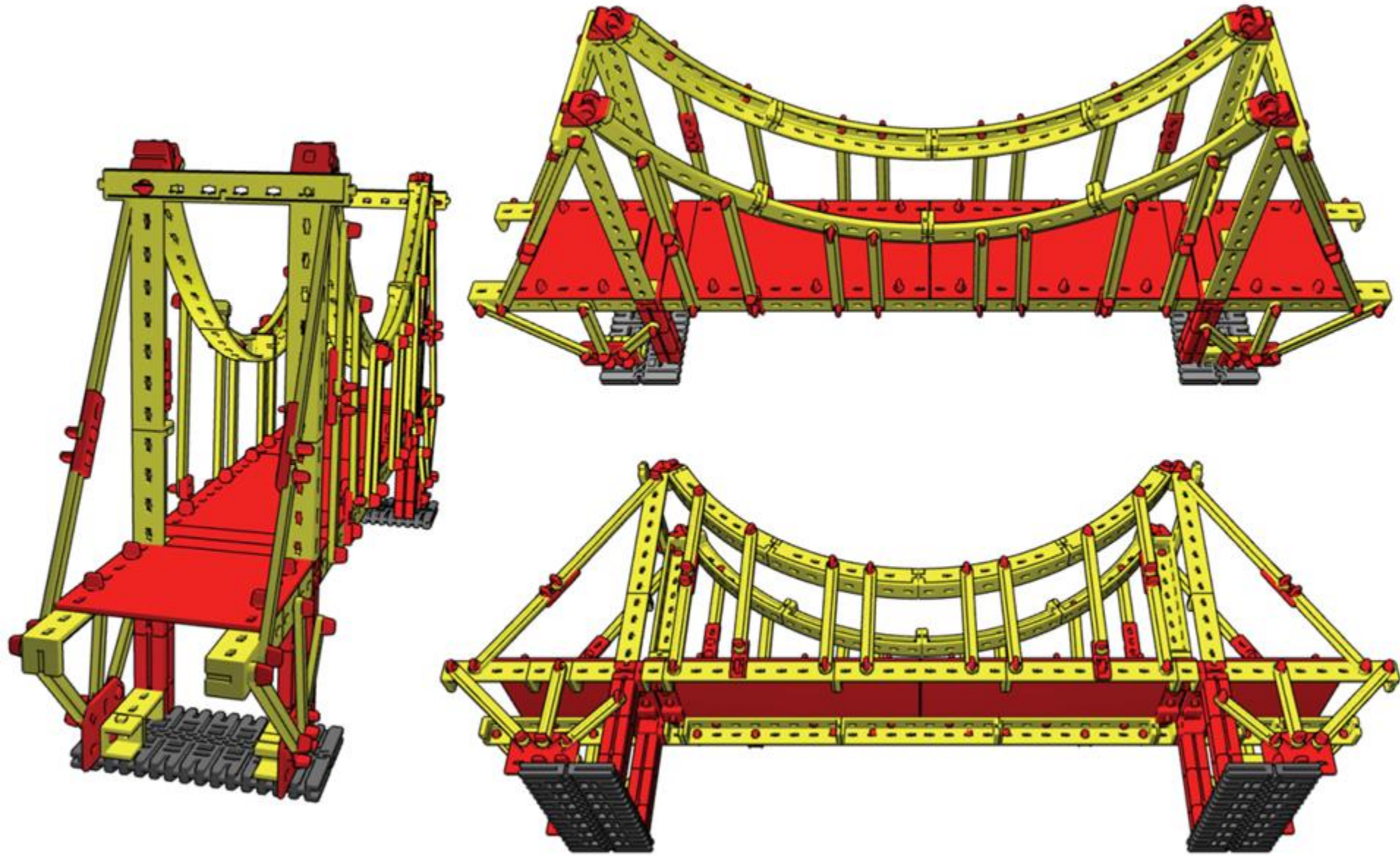
Tragbänder in Fundament



Aufgehobener Horizontalschub

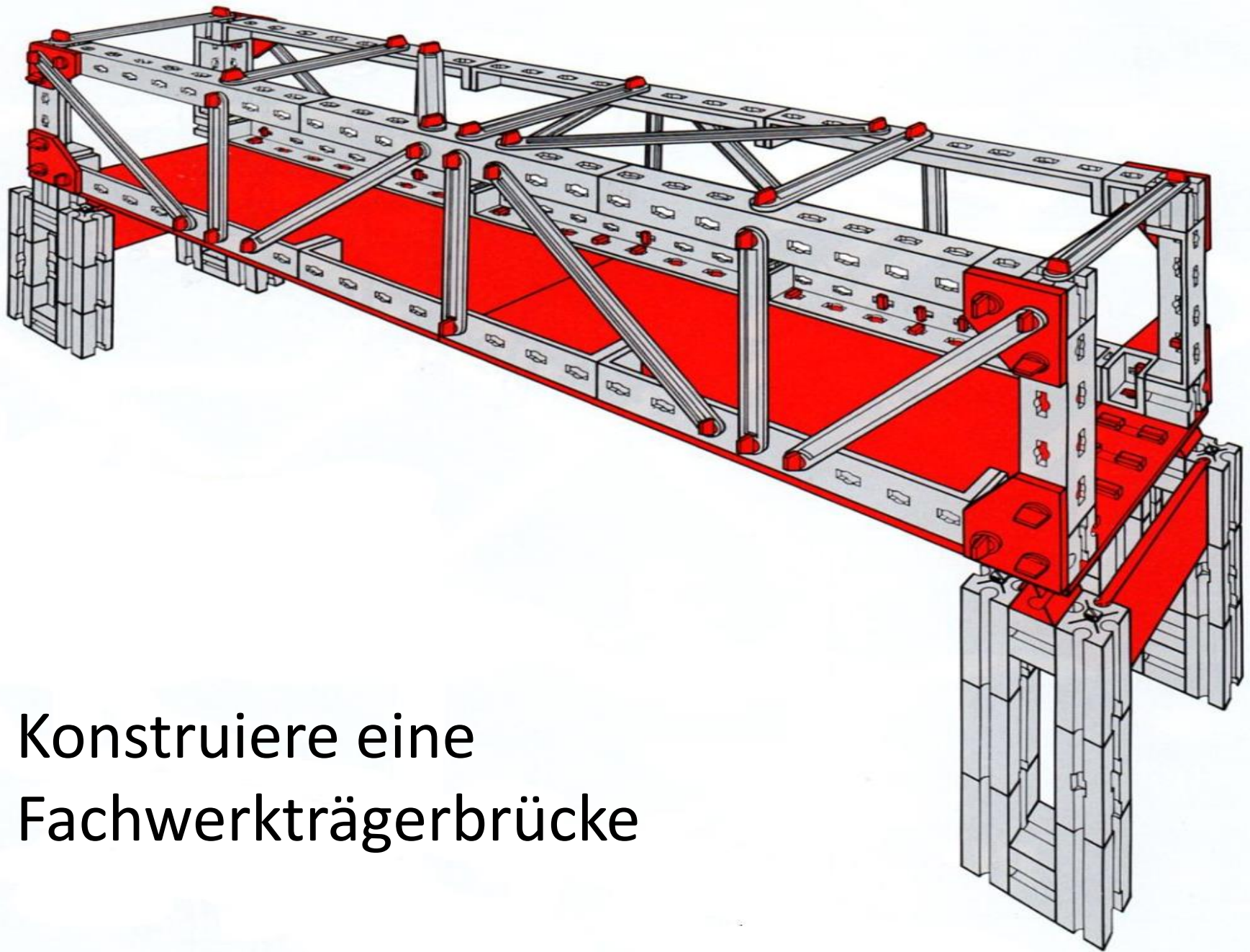


Hängebrücke

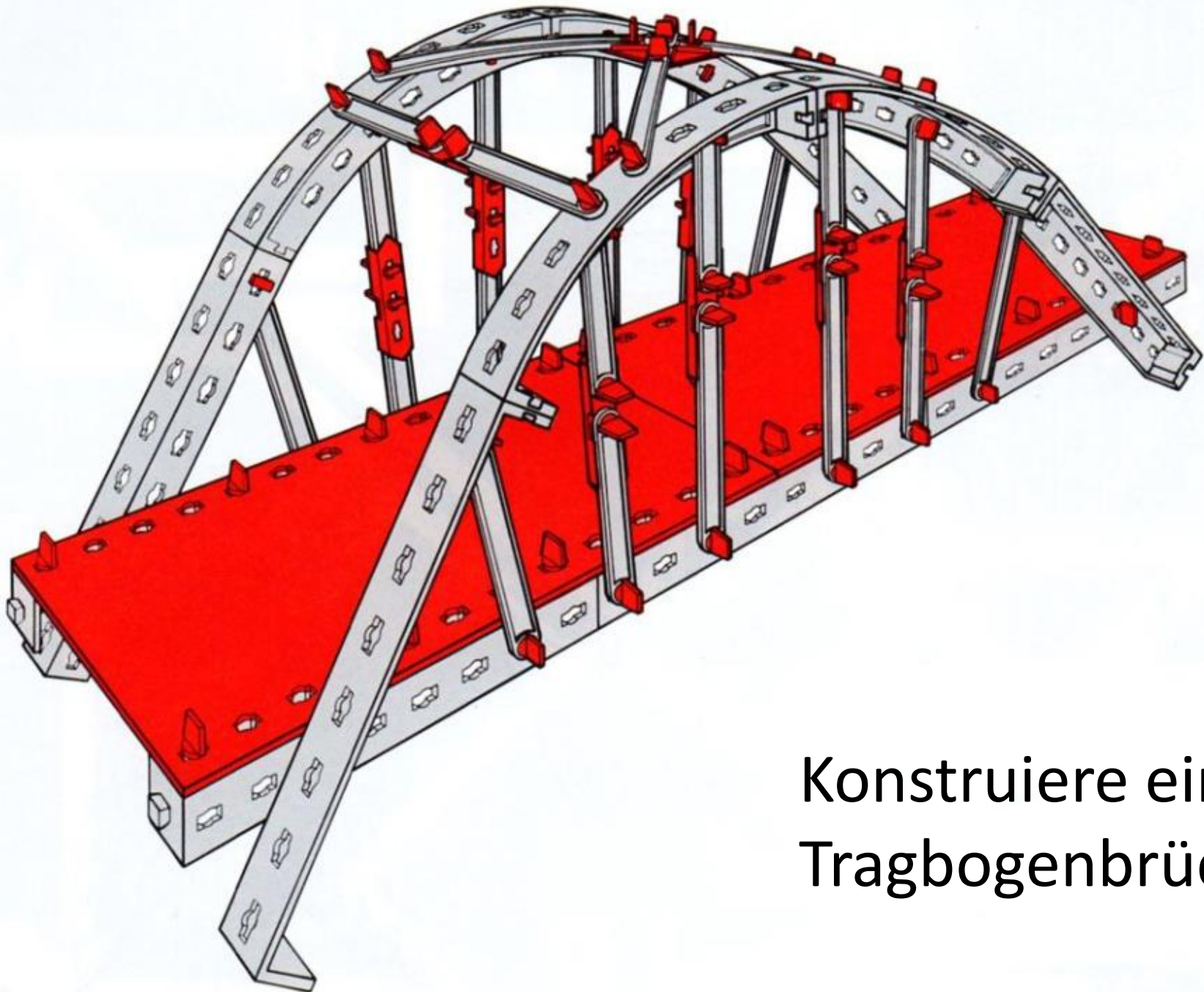


A close-up, high-angle photograph of various LEGO Technic components. The image features a large grey gear in the upper left, a yellow beam with a red connector in the center, and a red gear in the lower right. A semi-transparent dark red horizontal band spans the middle of the image, serving as a background for the title text. The overall composition is dynamic and colorful, typical of LEGO Technic builds.

Aufgabe II



Konstruiere eine
Fachwerkträgerbrücke

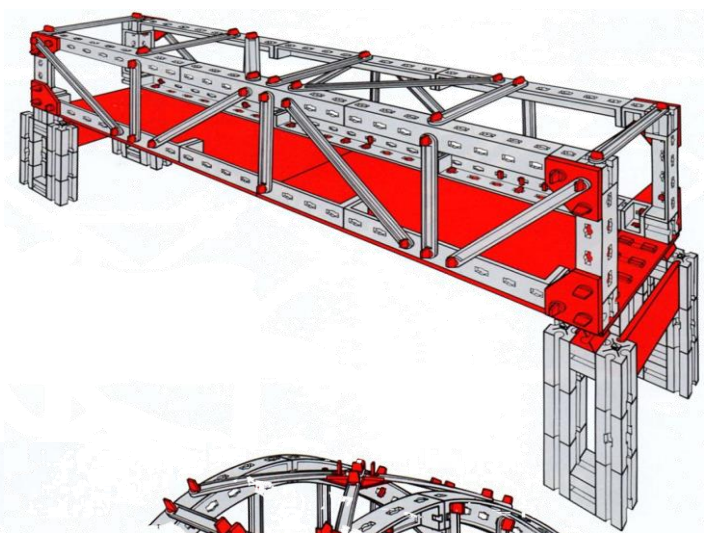


Konstruiere eine
Tragbogenbrücke

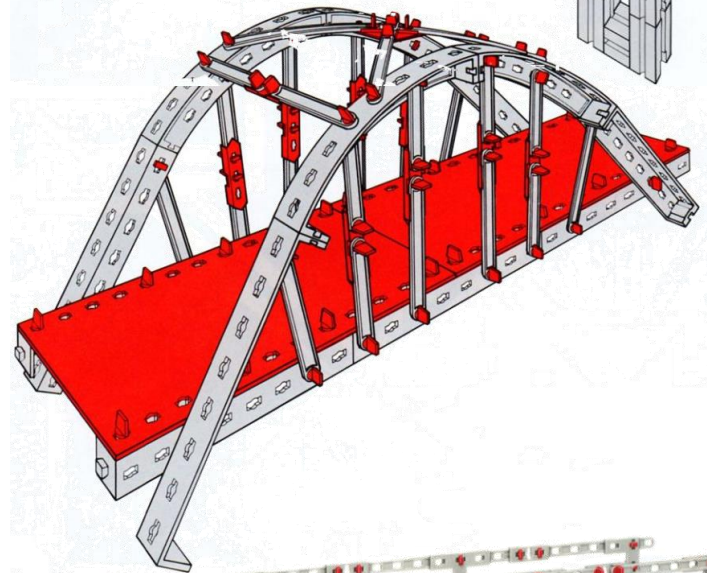


Konstruiere eine
Sichelbogenbrücke

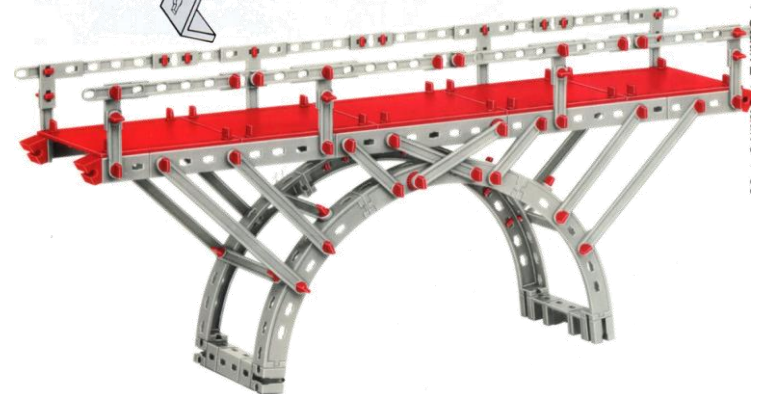
Fachwerkträgerbrücke



Tragbogenbrücke



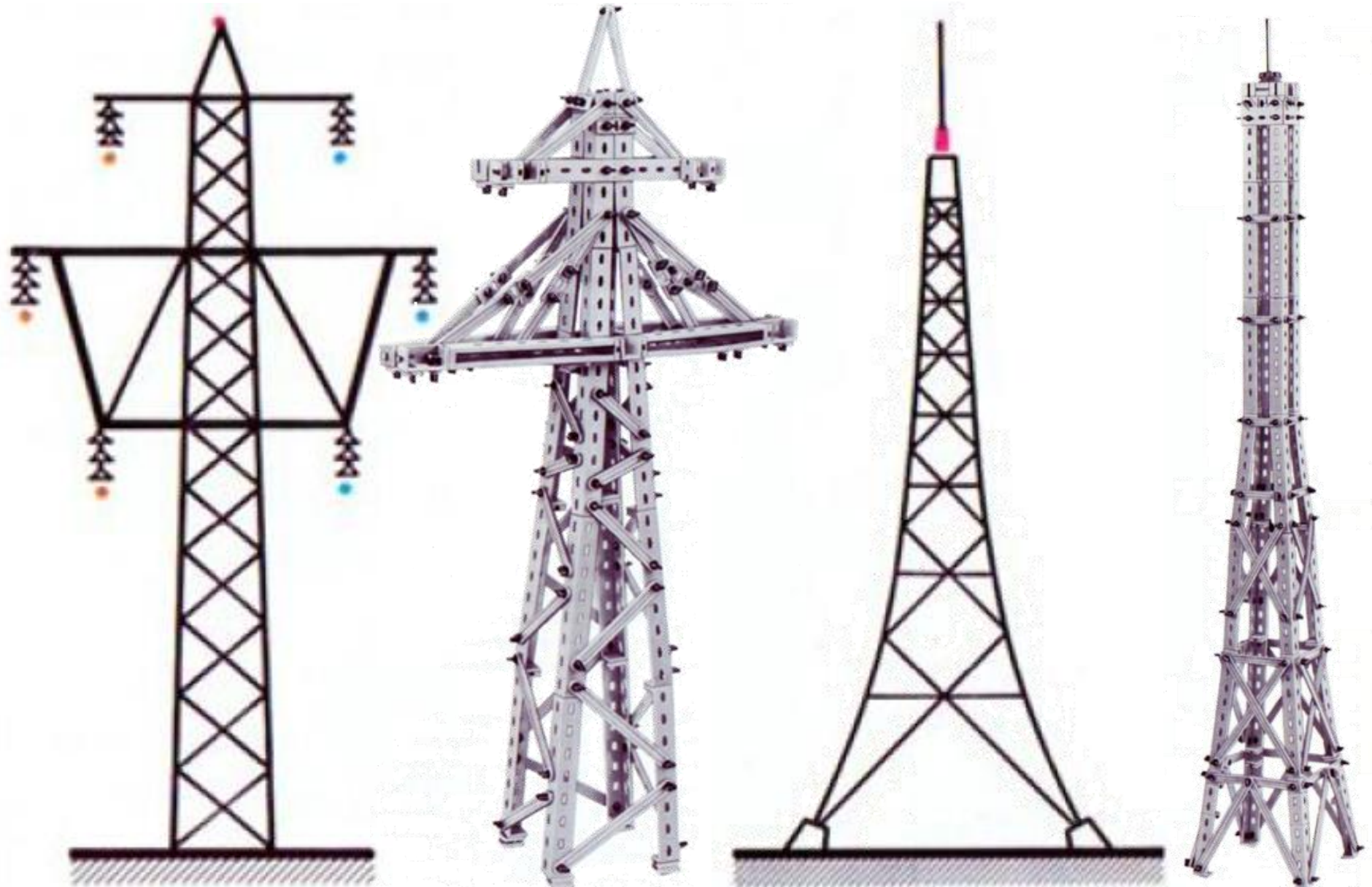
Sichelbogenbrücke



A close-up photograph of various LEGO Technic components. In the upper right, a solar panel with a blue grid pattern is visible. To its left is a large grey gear. Below the solar panel is a yellow Technic beam. On the right side, a red gear is partially visible. The bottom of the image shows a mix of red and grey Technic parts. A semi-transparent dark red banner is overlaid across the middle of the image, containing the text 'Maste, Türme' in white.

Maste, Türme

Gittermaste, Türme



A close-up, high-angle shot of various LEGO Technic components. In the upper left, a grey Technic beam with several circular holes is visible. To its right is a white Technic beam with a blue patterned surface. Below these, a yellow Technic beam with multiple circular holes runs diagonally. On the right side, a red Technic wheel with a complex internal pattern is partially visible. In the bottom left, there are red and grey Technic connectors and a black square component. The overall scene is a dense collection of these plastic building blocks.

Modelle



20m Höhe (ca. 41.000 S-Riegel)





46m Länge ([Video](#))





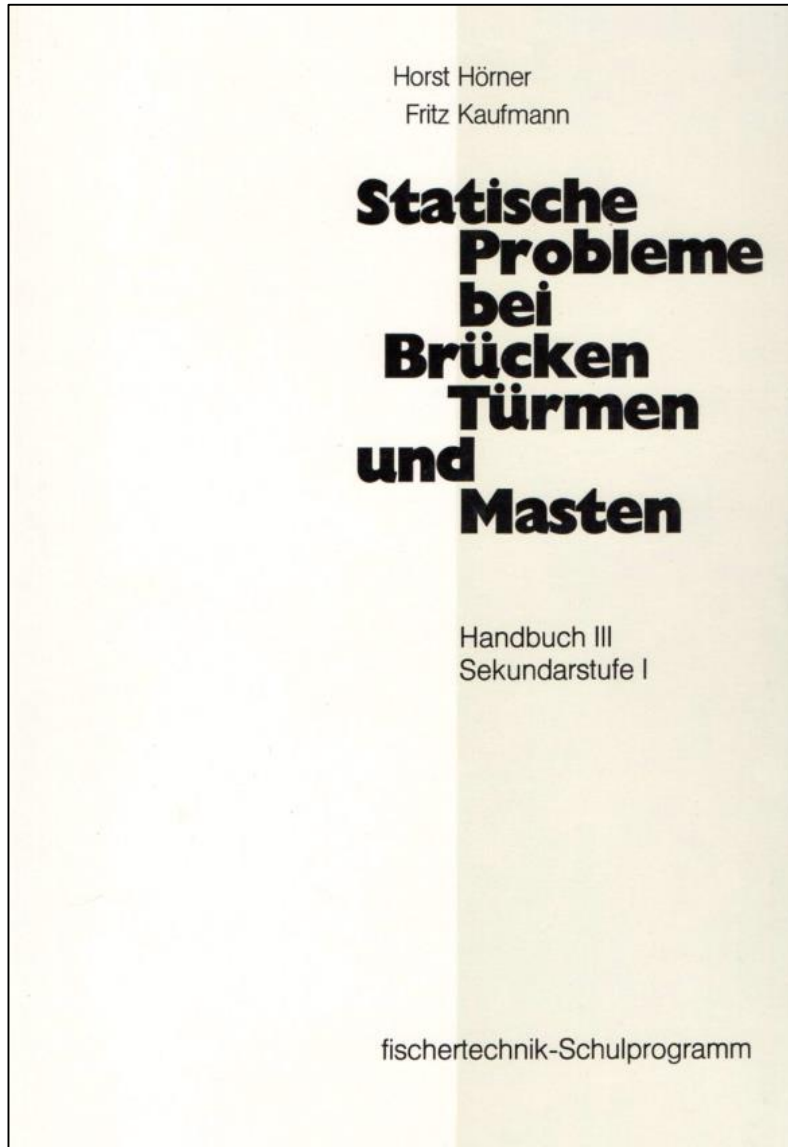




A close-up, high-angle shot of various LEGO Technic components. In the upper left, a grey gear is partially visible. To its right is a white rectangular frame containing a blue and white patterned surface, possibly a solar panel or a decorative element. Below these, a yellow Technic beam runs diagonally across the frame. On the right side, a large red gear with a complex internal pattern is prominent. The bottom of the image is filled with a mix of red, black, and grey Technic parts, including connectors and pins. A semi-transparent dark red horizontal band spans the width of the image, serving as a background for the text.

Literatur

Literatur



<http://fischertechnik-ag.de/Didaktisches+Material>



mint
fer encamp