



# fischertechnik-Workshop

Statik

MINT-Feriencamp, 01.06.2018

Dirk Fox

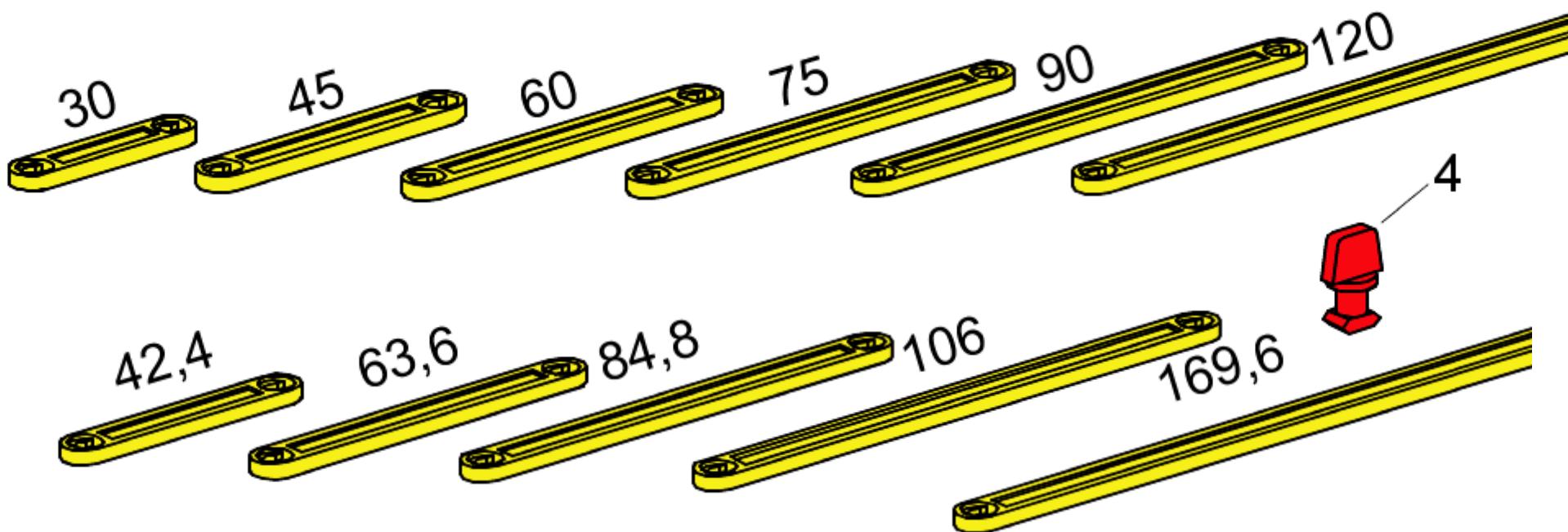
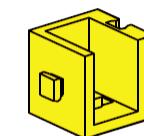
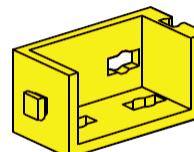
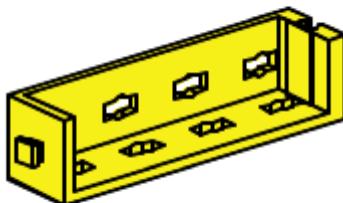
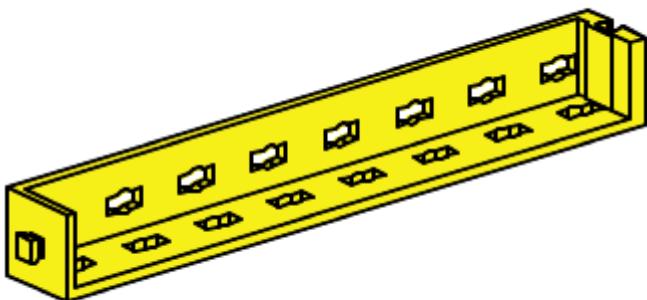


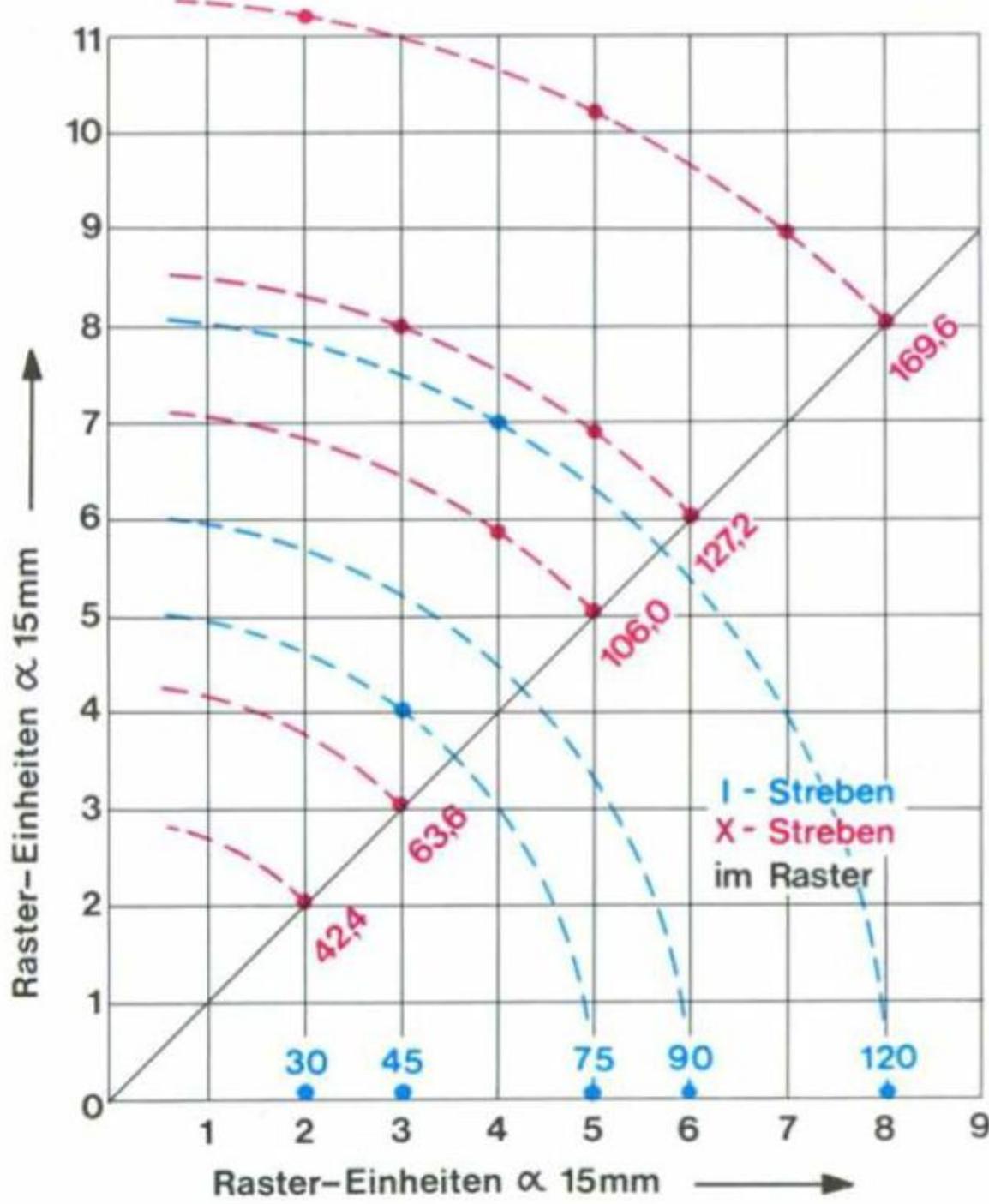
The background of the image is a collage of various engineering components. It includes a large blue and black gear on the left, a white and blue solar panel at the top right, several yellow plastic brackets with holes, red and black metal brackets, and a dark grey metal plate with circular holes. There are also some smaller blue and orange components and a red and white striped fabric-like material.

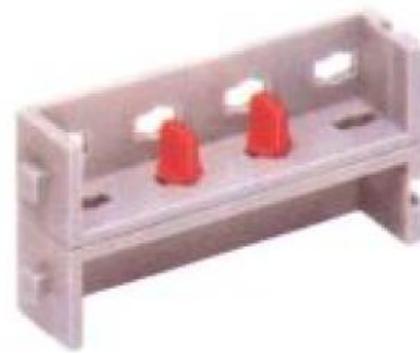
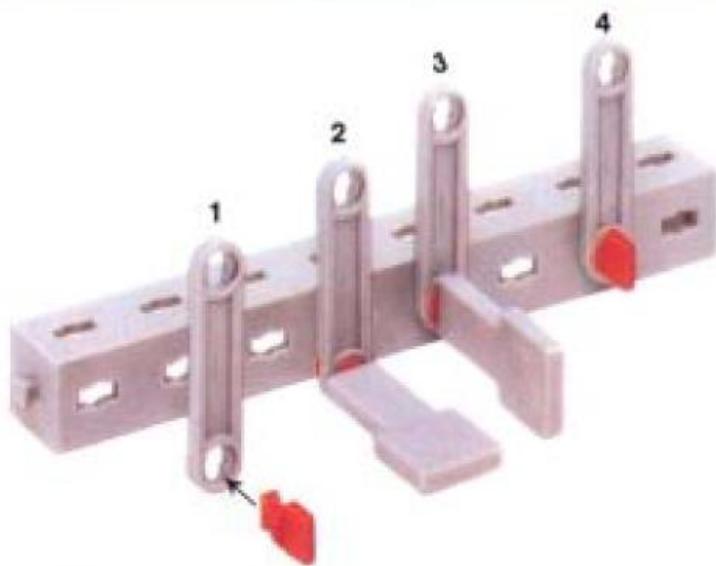
**Statik**

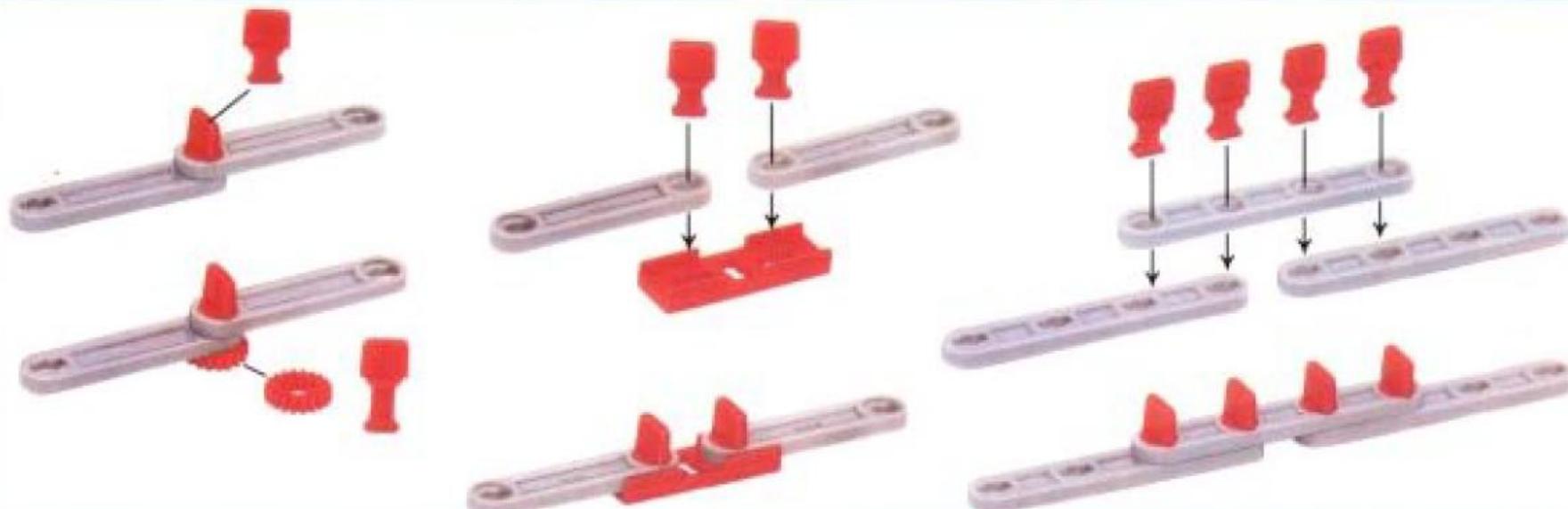


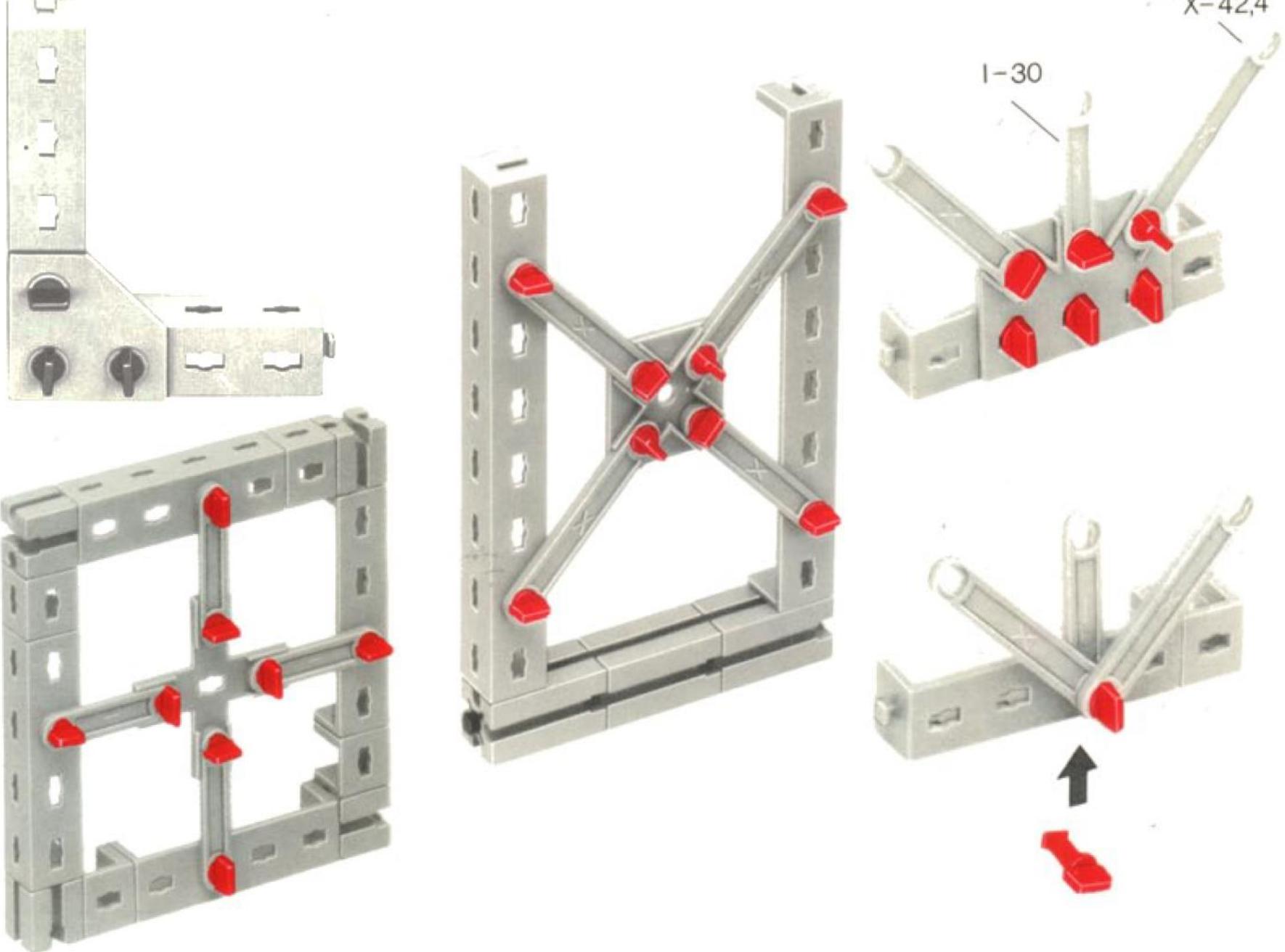
# Die Statikteile







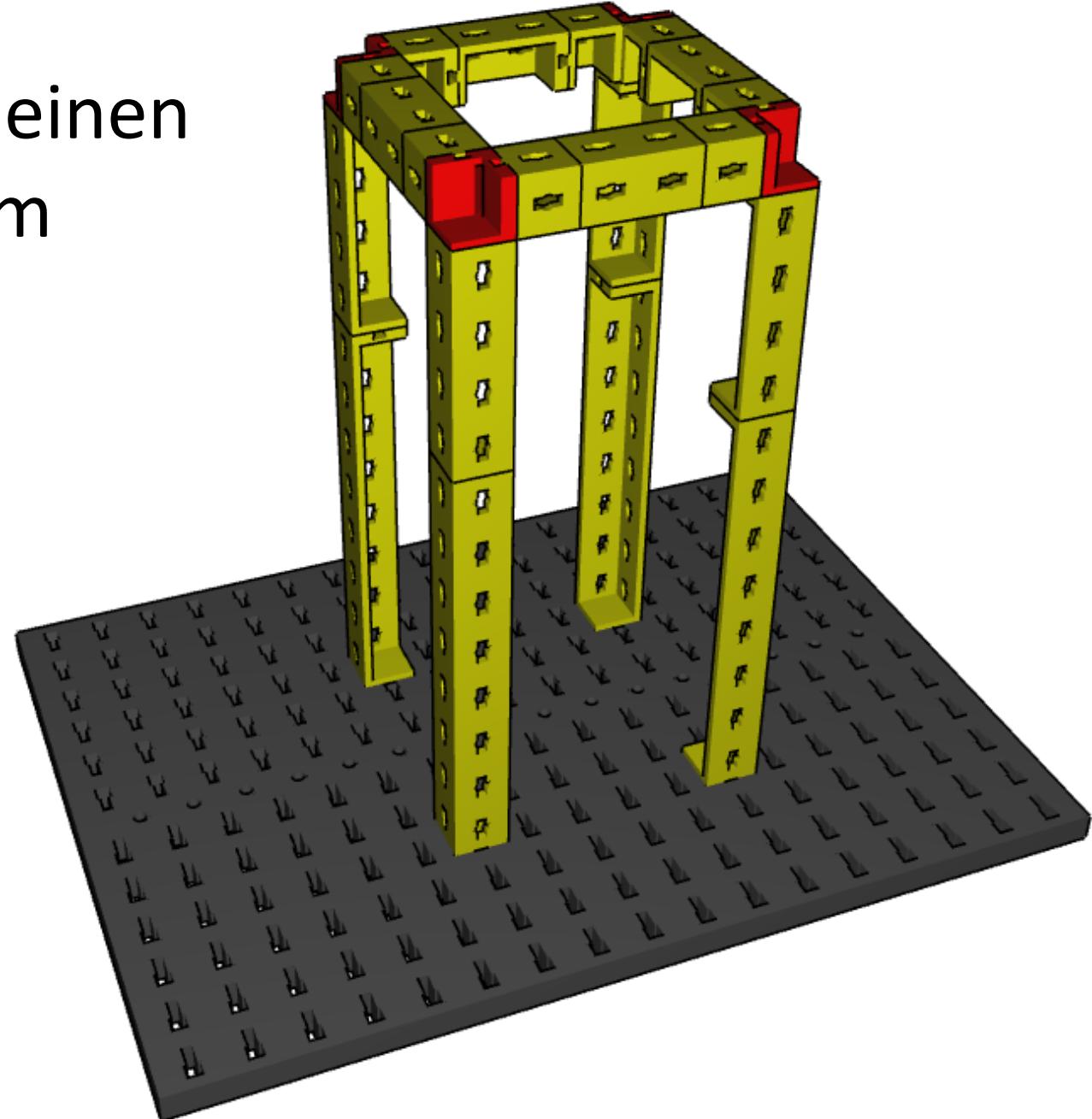


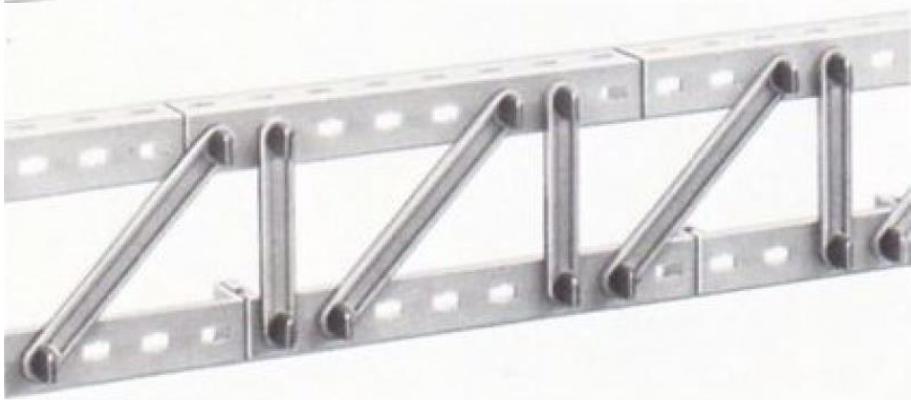
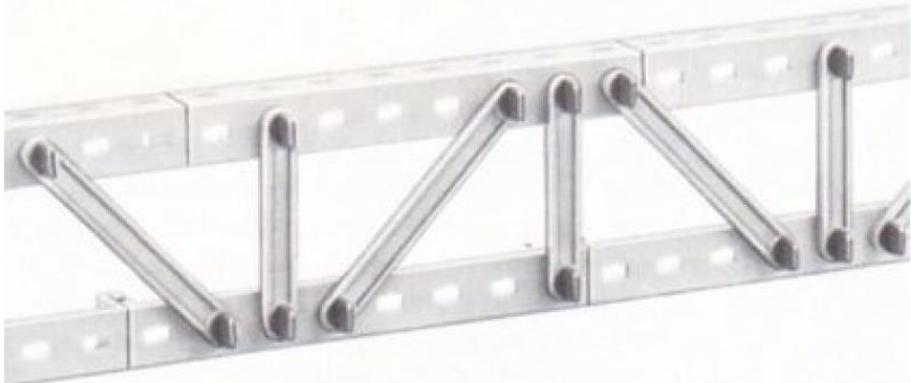


The background of the slide is a vibrant collage of engineering and technology-related items. It includes a large blue and black gear on the left, a white and blue solar panel with black cells in the upper right, several yellow plastic brackets with circular holes, and a red plastic component with a gear-like pattern on the right. There are also smaller black and grey metal parts and a blue rectangular component at the bottom.

# Aufgabe I

# Konstruiere einen stabilen Turm





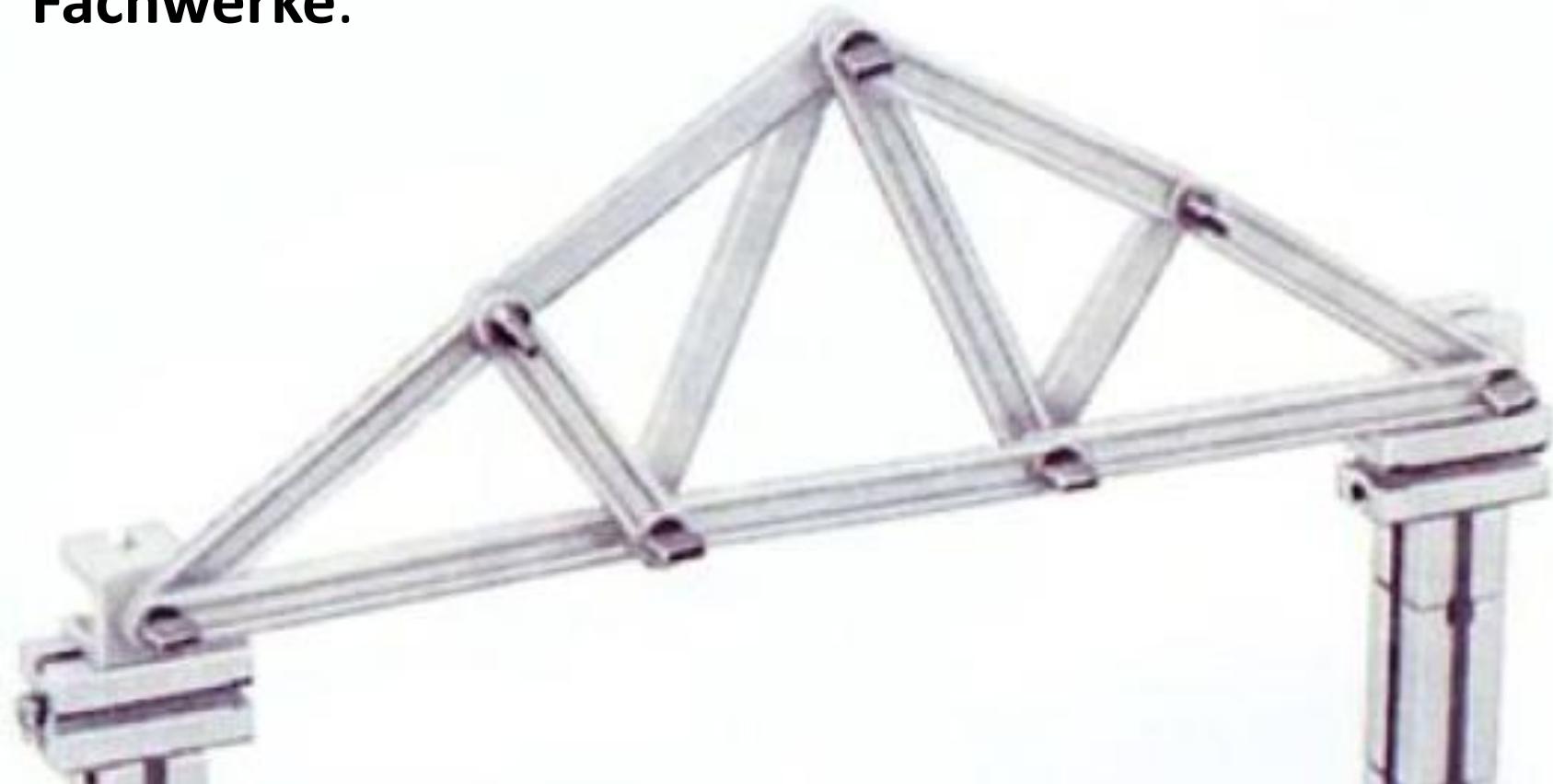
The background image is a vibrant collage of engineering and technology. It features a large blue and black gear on the left, a white and blue solar panel with black cells in the upper right, and several other mechanical parts like red plastic gears, yellow metal brackets, and black metal components. The colors are bright and varied, creating a dynamic and industrial feel.

# Fachwerke

# **Tragwerke**

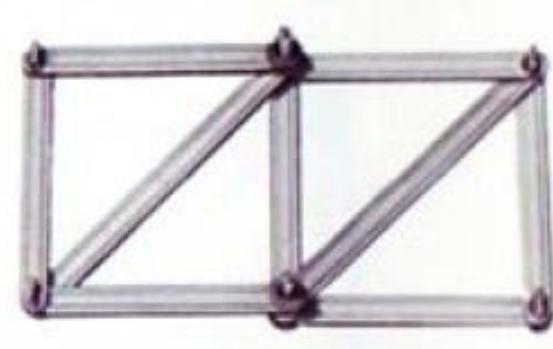
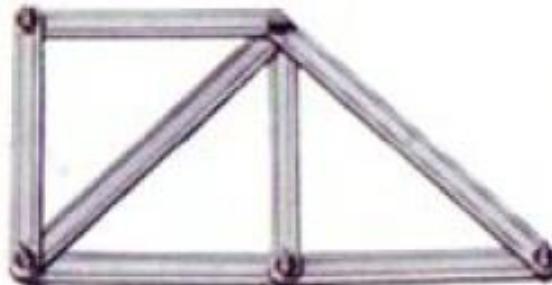
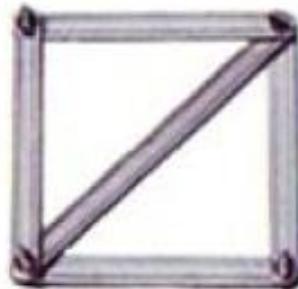
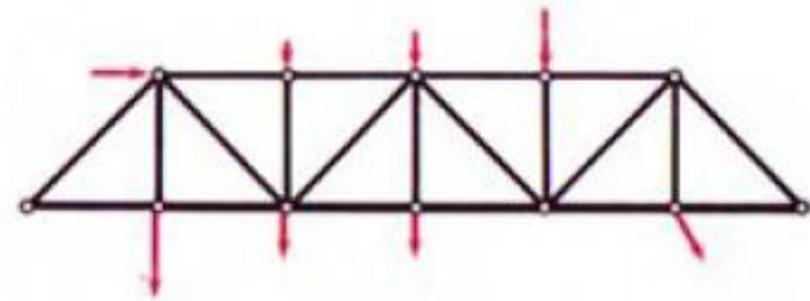
Tragwerke dienen dazu, Kräfte weiterzuleiten und ihr Gleichgewicht zu vermitteln.

Aus Streben zusammengesetzte Tragwerke heißen **Fachwerke**.



# **Innerlich statisch bestimmt**

Gelenkfachwerke



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

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

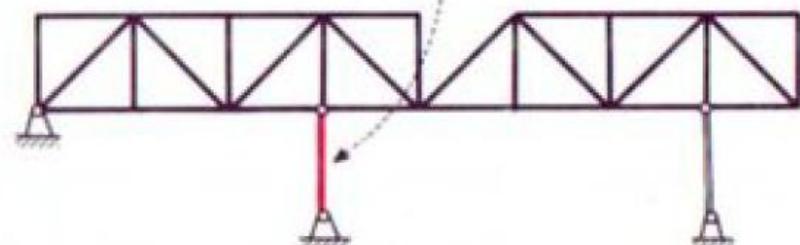
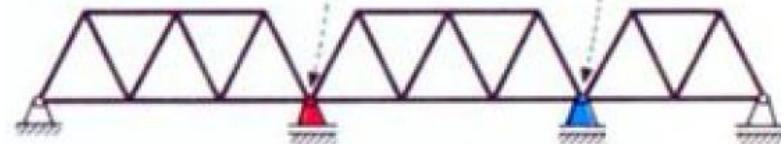
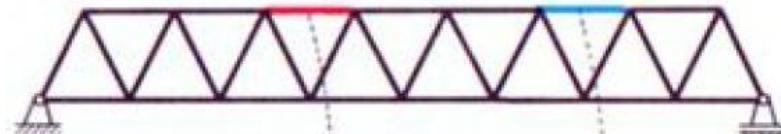
# **Statisch bestimmt gelagert**

Mindestens drei Lager  
("Fesseln")

(Strebe kann durch Lager  
ersetzt werden)

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

(mit  $p$  = Anzahl Lager)



The background of the image is a collage of various engineering components. It includes a large blue and silver gear on the left, a white and blue solar panel with black cells in the upper right, several yellow plastic brackets with holes, a red plastic component with a gear-like pattern, and a dark grey metal plate with circular holes and a central slot. A small red connector piece is visible between the yellow brackets.

**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 meh-  
reren 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

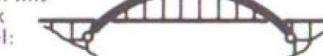
Beidseitig fest ein-  
gespannter Bogen:  
**EINSPANNBOGEN**  
Stützweiten 50 – 300 m



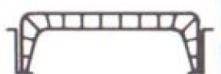
Beidseitig gelenkig  
gelagerter Bogen:  
**ZWEIGELENK-  
BOGEN:**  
Stützweiten 80 – 300 m



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



**Rahmenbrücken**  
Beidseitig eingespannter  
Rahmen:  
**EINSPANNRAHMEN**  
Stützweiten 20 – 50 m



**Beidseitig ge-  
lenkig gelager-  
ter 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

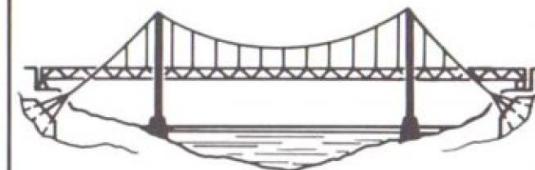


Mehrere sich gegenseitig  
abstützende Bogen:  
**BOGEN ÜBER  
MEHRERE ÖFFNUNGEN**  
Stützweiten je Öffnung: 20 – 80 m



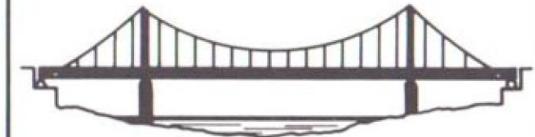
## 1.13 Hängebrücken

### 1.13.1 Erdverankerte Hängebrücken (Echte Hängebrücken)



In Fundamentblöcken verankerte Tragbänder  
(Kabel, Ketten usf.):  
**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



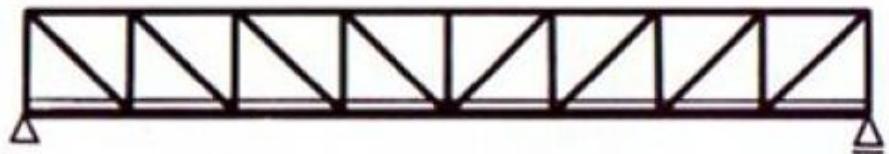
An Versteifungsträger (außen und innerhalb der  
Mittelöffnung) befestigte Tragbänder:  
**ZUGELGURTBRÜCKE**  
Stützweiten der Mittelöffnung 150 – 350 m

A collage of various engineering components, including a large blue and black gear, a solar panel with blue and black cells, a red plastic component, a yellow metal bracket, and several black metal brackets. The components are arranged in a somewhat overlapping, non-linear fashion.

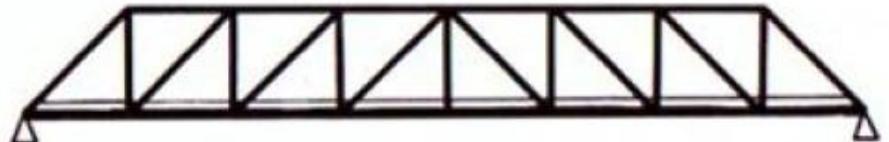
# Balkenbrücken

# Balkenbrücken

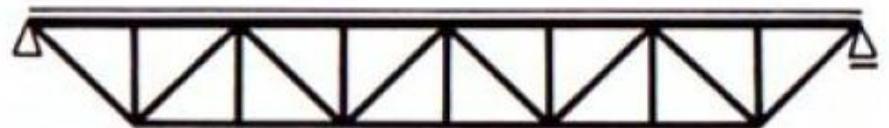
Fachwerkträgerbrücke



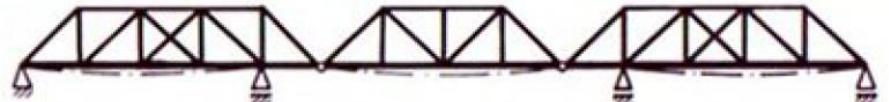
Trapezträgerbrücke



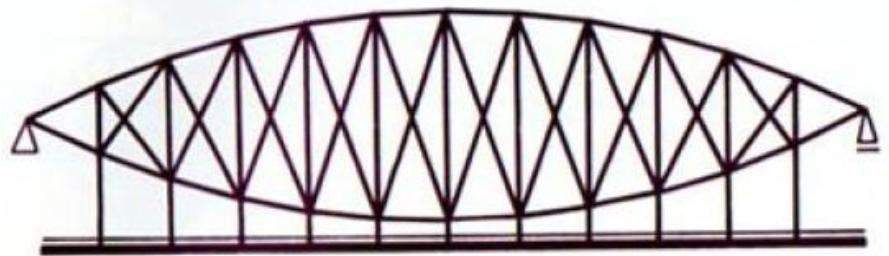
Hängewerkbrücke



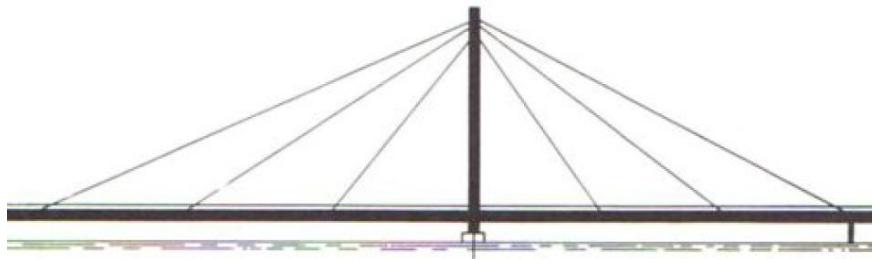
Krag- und Schleppträger  
(Gerberträgerbrücke)



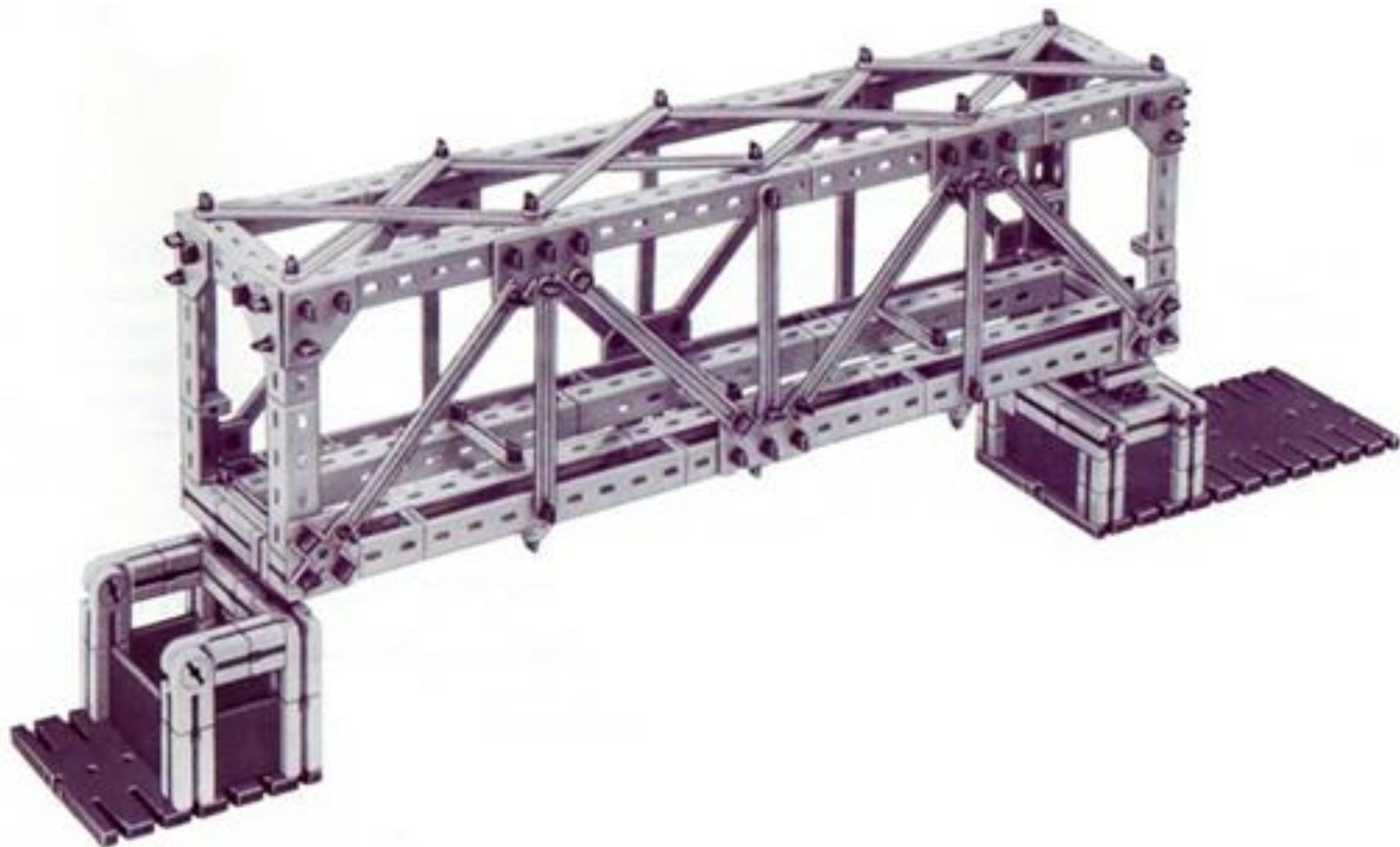
Linsenträgerbrücke



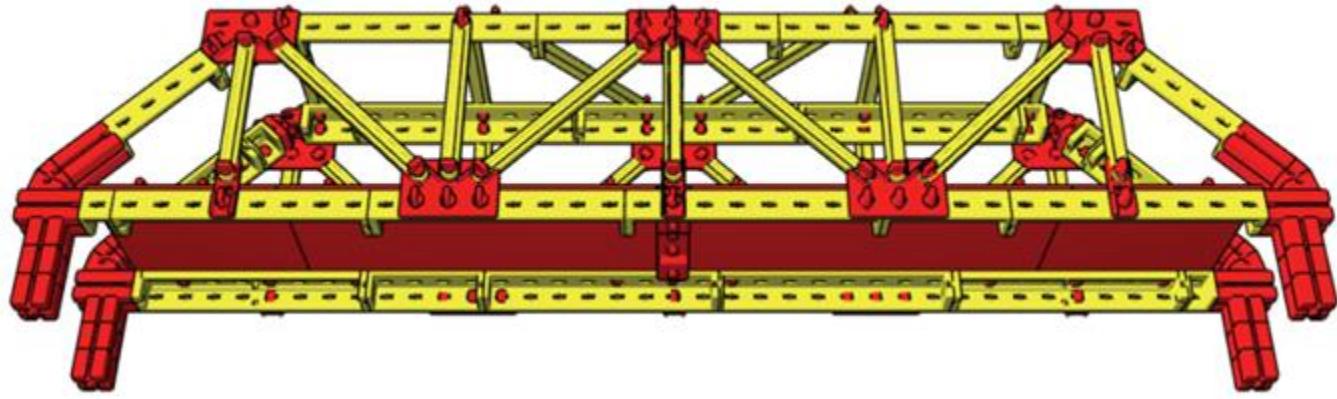
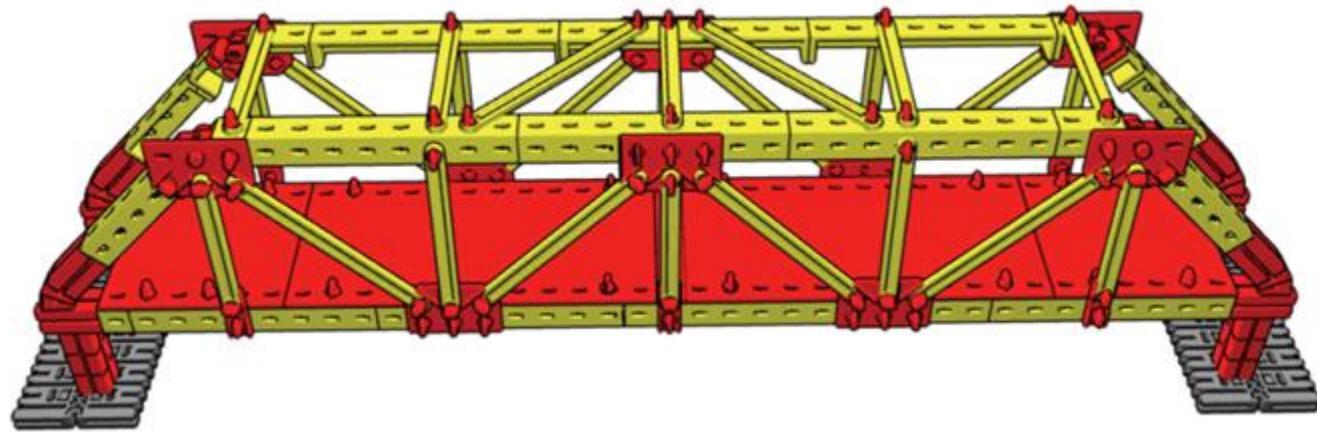
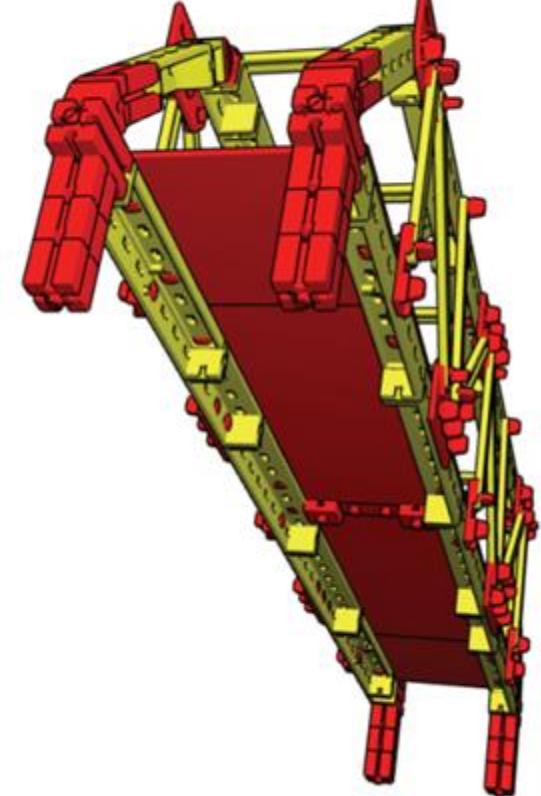
Seilverspannte Balkenbrücke



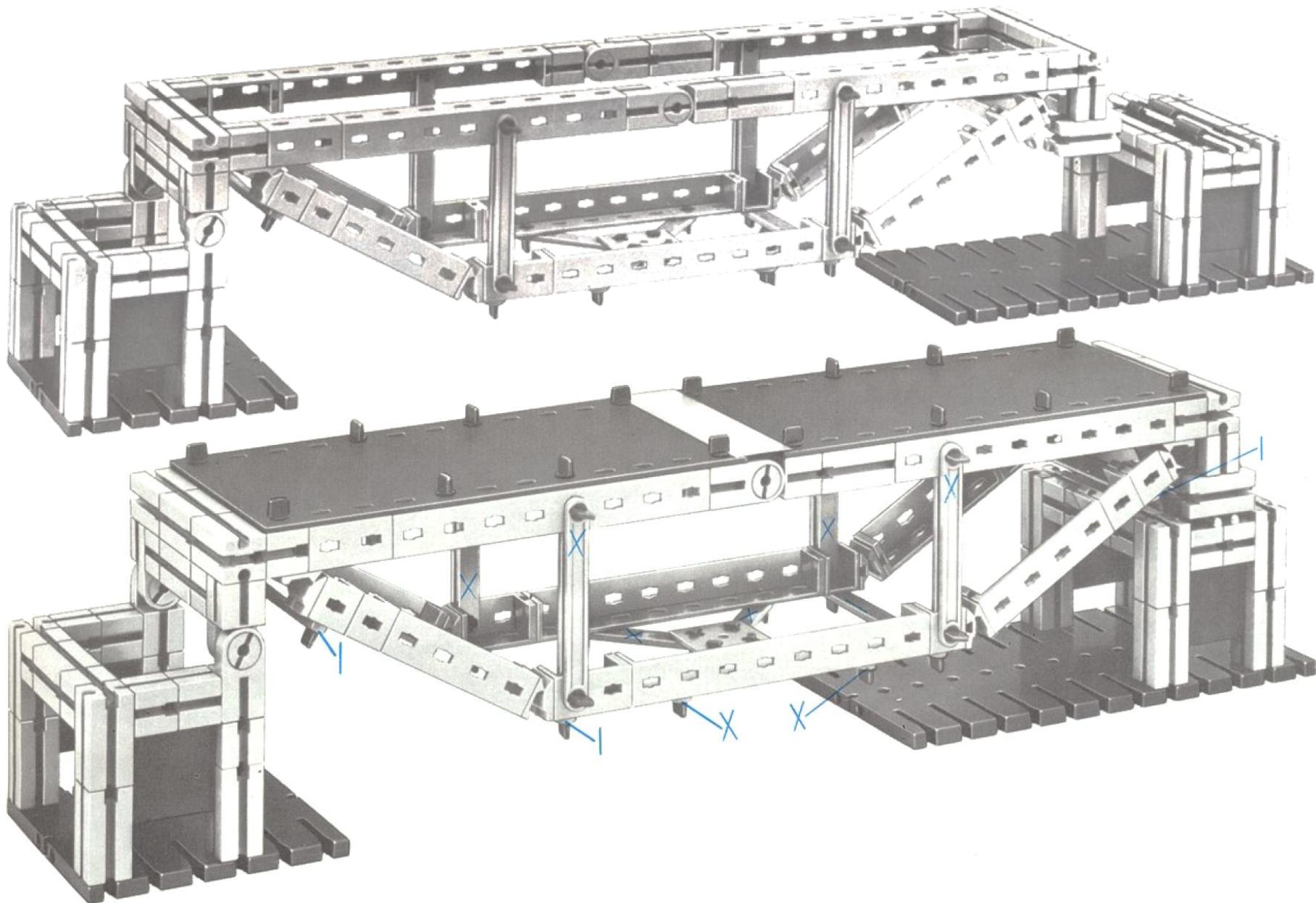
# Fachwerkträgerbrücke



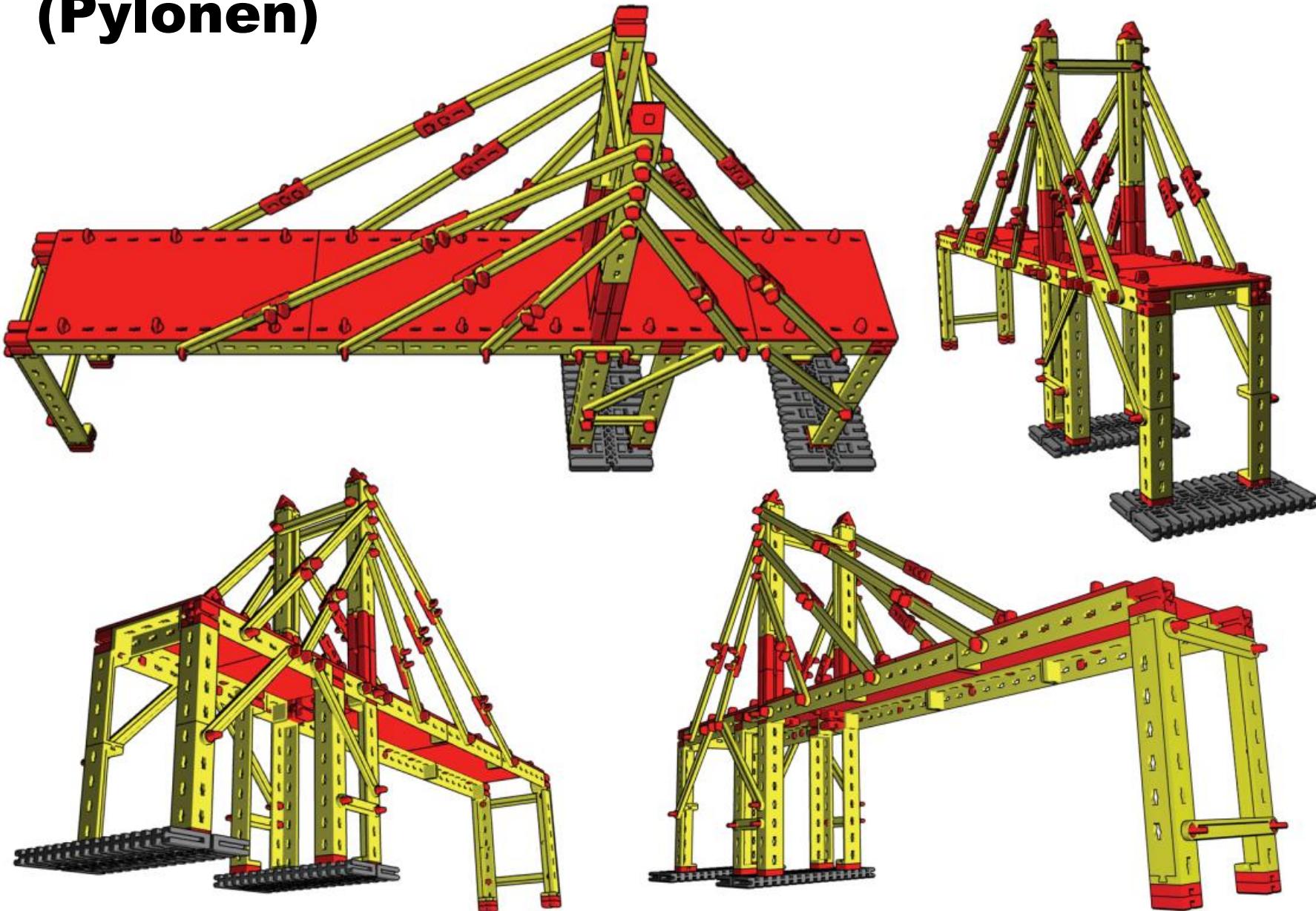
# Trapezträgerbrücke



# Hängewerkbrücke



# **Seilverspannte Balkenbrücke (Pylonen)**



A collage of various engineering components, including a large blue and silver gear, a red and black solar panel, a yellow metal bracket, and several black plastic connectors. The components are arranged in a somewhat overlapping, non-linear fashion.

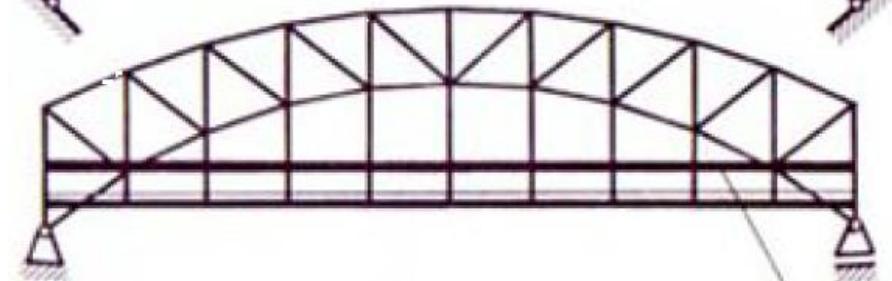
# Bogenbrücken

# Bogenbrücken

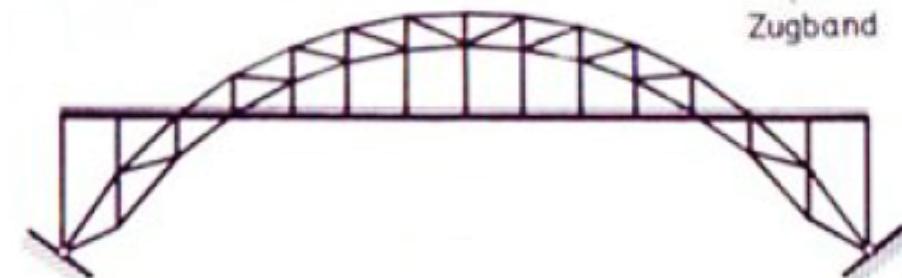
Zwickelfachwerk



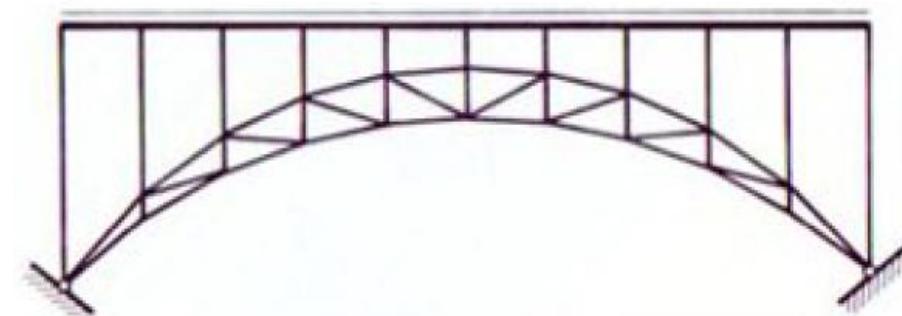
Zweigelenkbogen



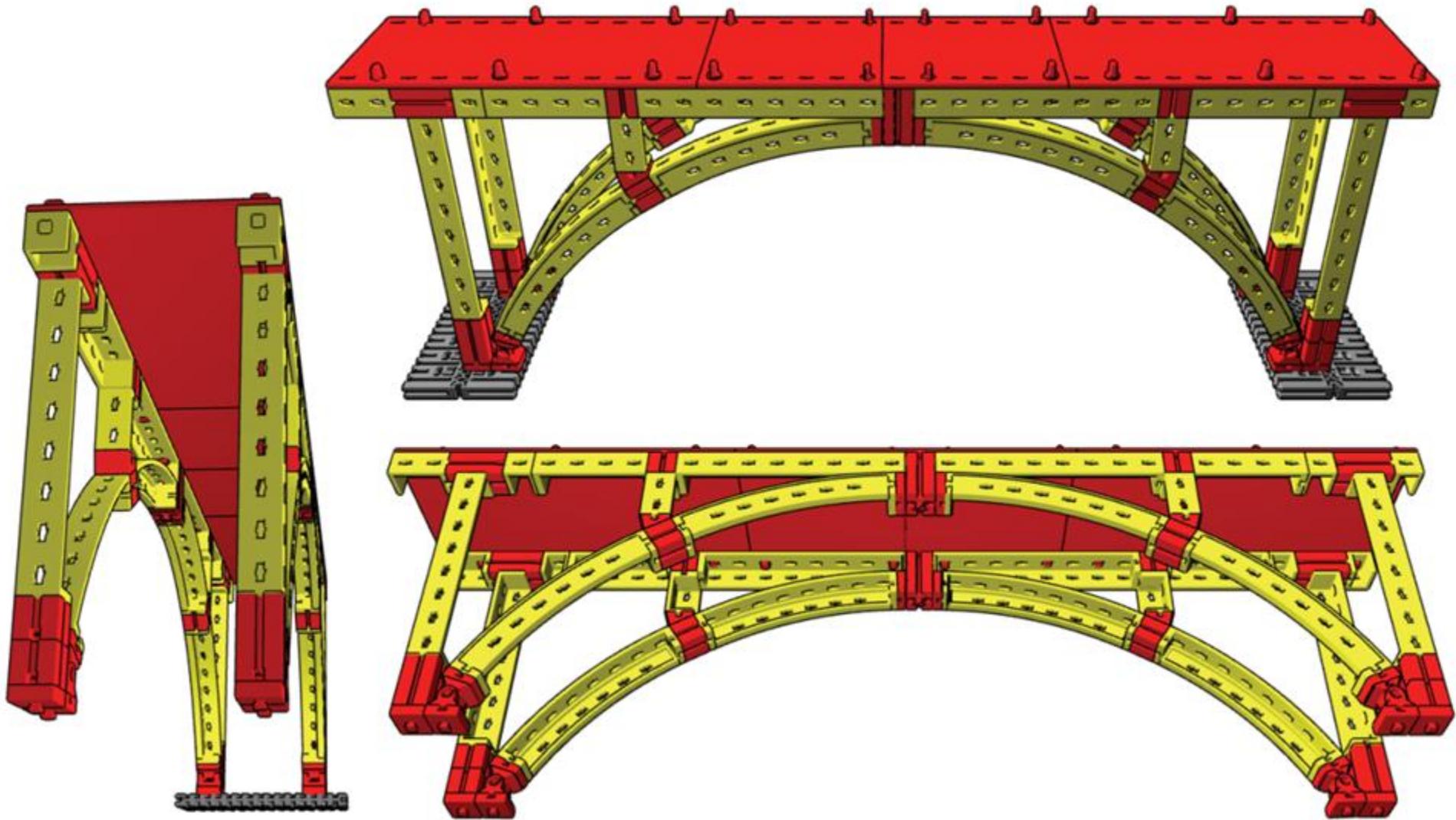
Parallelgurtbogen



Sichelbogen



# Sichelbogenbrücke



# Tragbogenbrücke



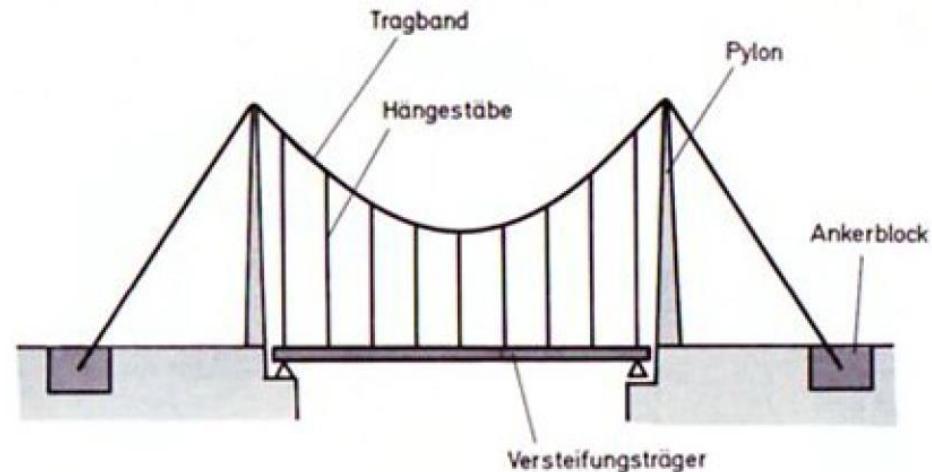
The background of the image is a dense collage of various engineering and technical components. It includes a large blue and black gear on the left, several yellow plastic brackets or connectors in the center, a red plastic component with a circular pattern, and a white and blue solar panel with black cells at the top right. There are also dark grey metal plates and other electronic parts visible.

# Hängebrücken

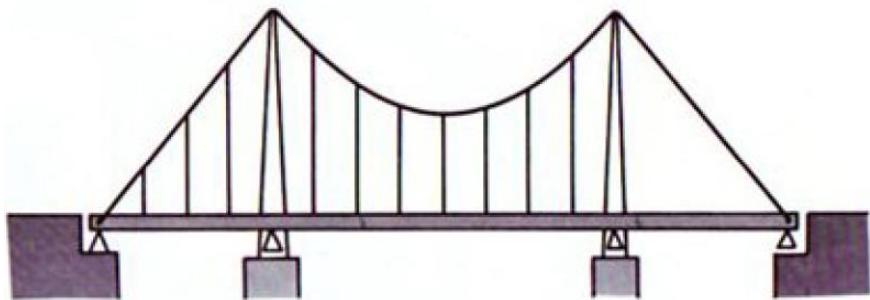
# Hängebrücken

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

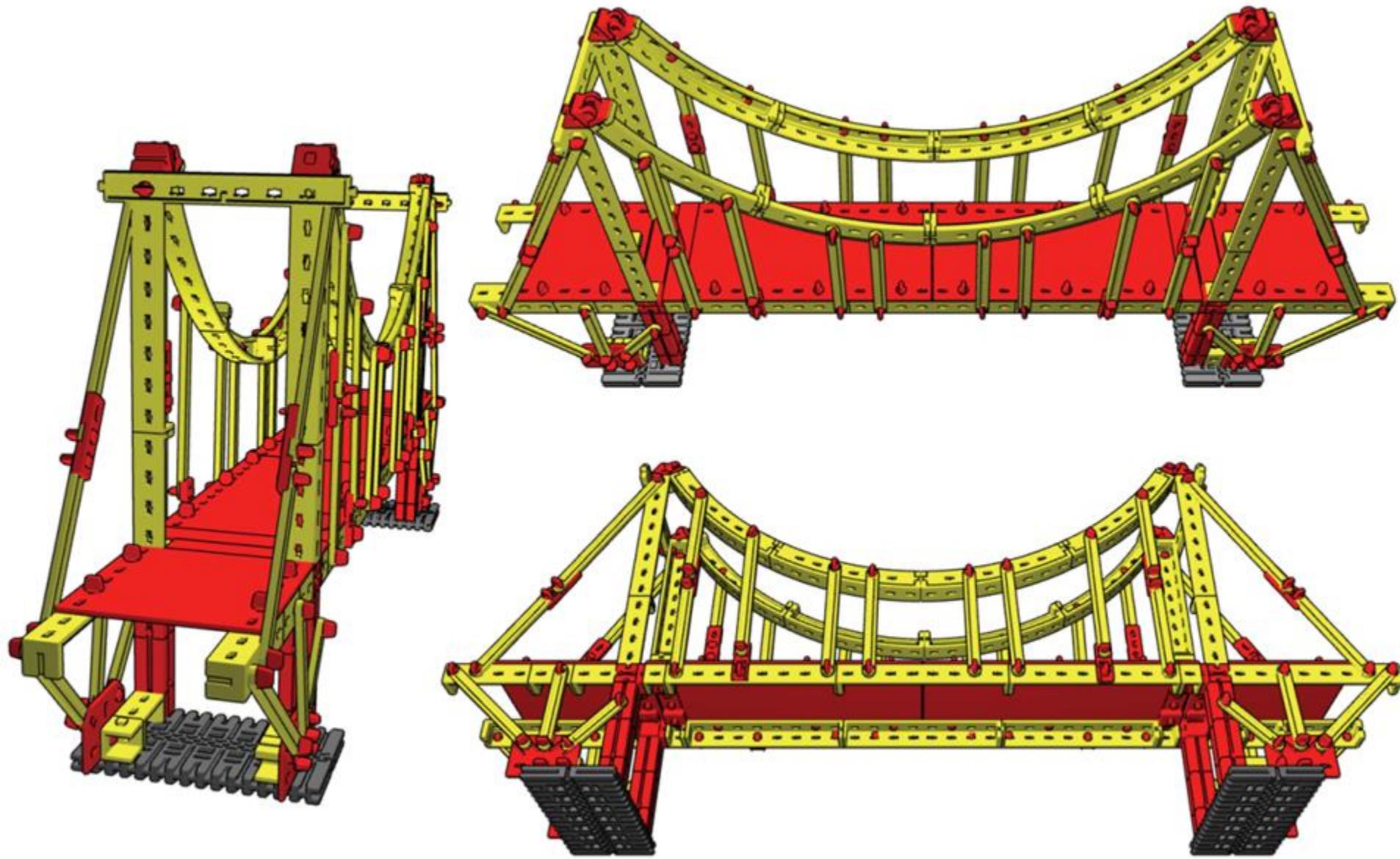
Tragbänder in Fundament



Aufgehobener Horizontalschub

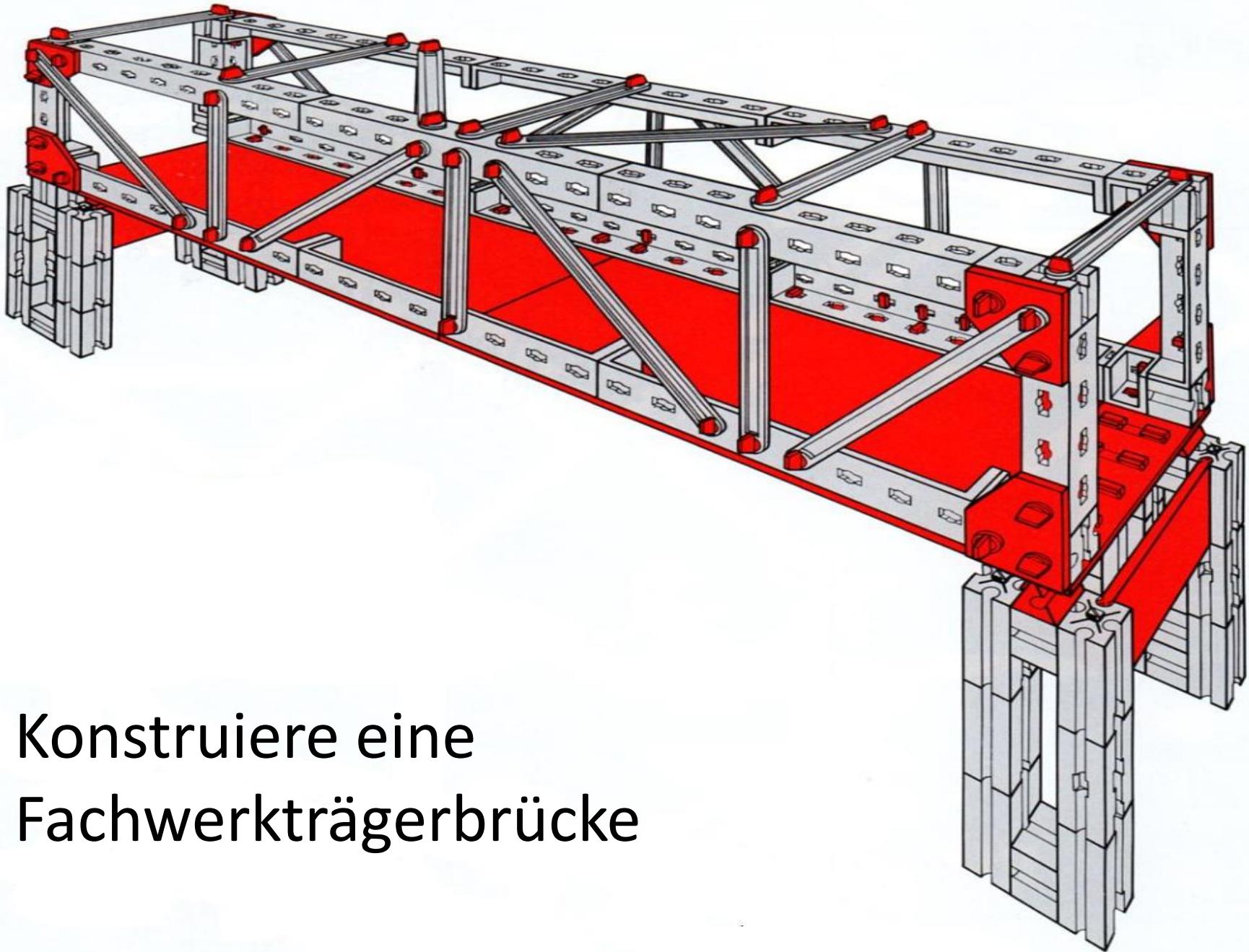


# Hängebrücke

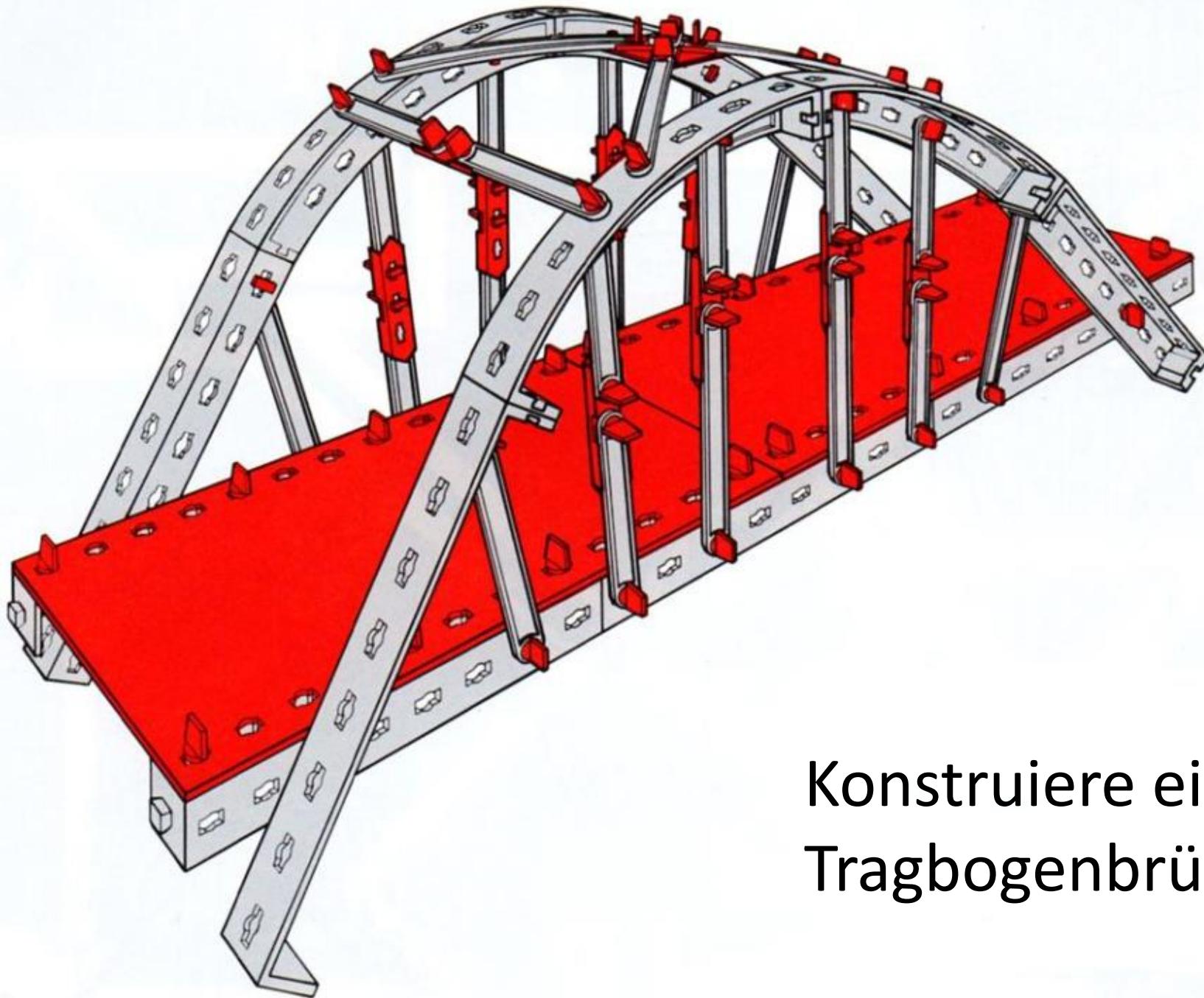


The background of the slide is a vibrant collage of engineering and technology-related items. It includes a large blue and black gear on the left, a white and blue solar panel with black cells in the upper right, several yellow plastic mechanical components in the center, and a red and black printed circuit board with various electronic components and connectors at the bottom right.

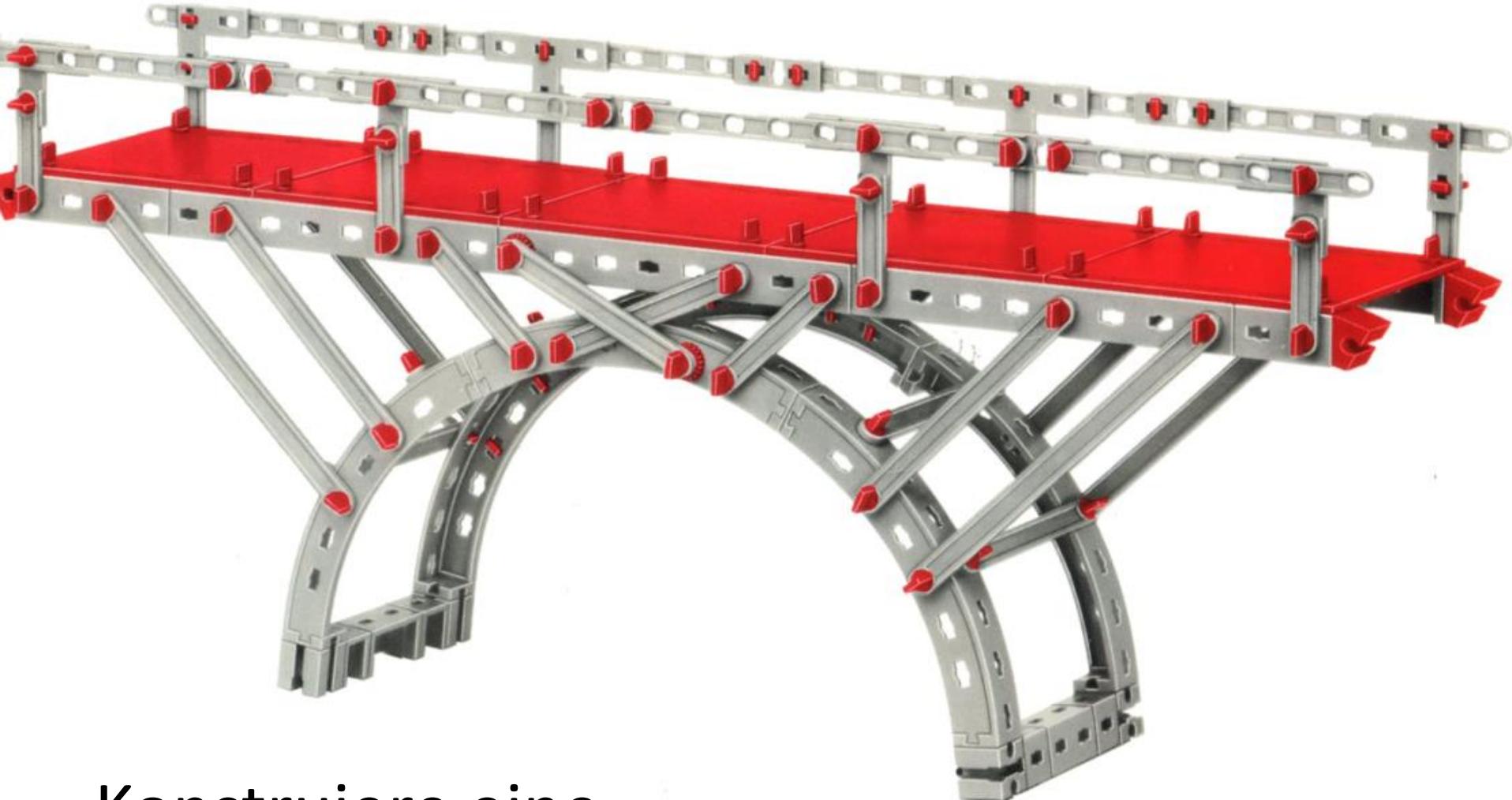
## Aufgabe II



Konstruiere eine  
Fachwerkträgerbrücke

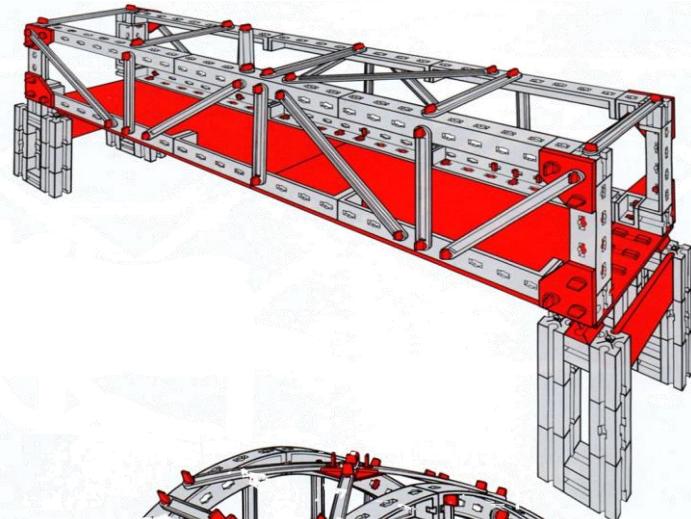


Konstruiere eine  
Tragbogenbrücke

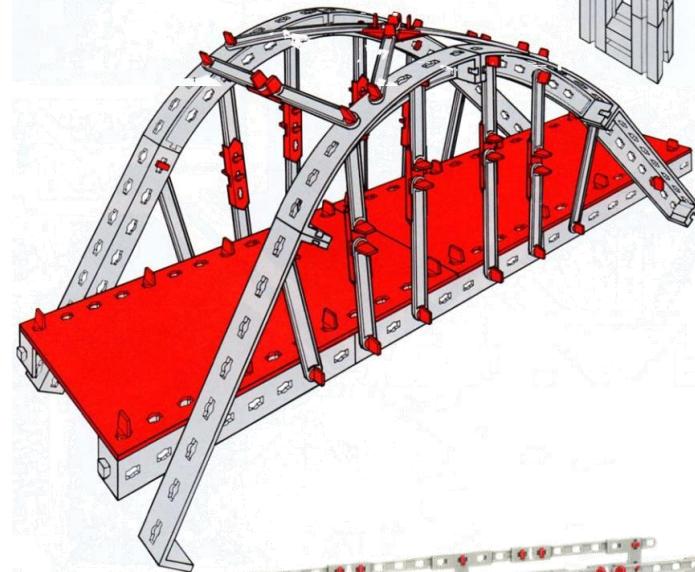


Konstruiere eine  
Sichelbogenbrücke

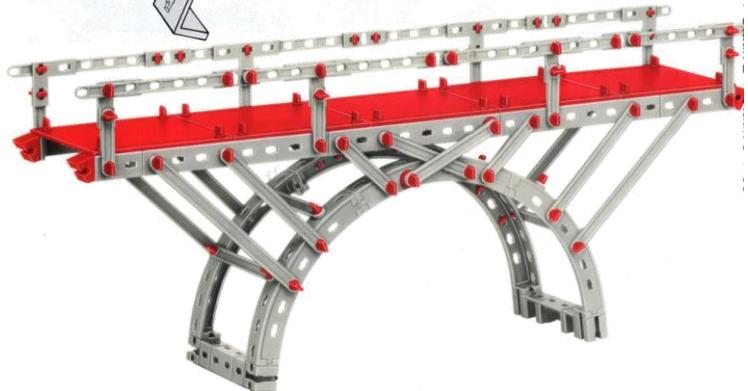
# Fachwerkträgerbrücke



# Tragbogenbrücke



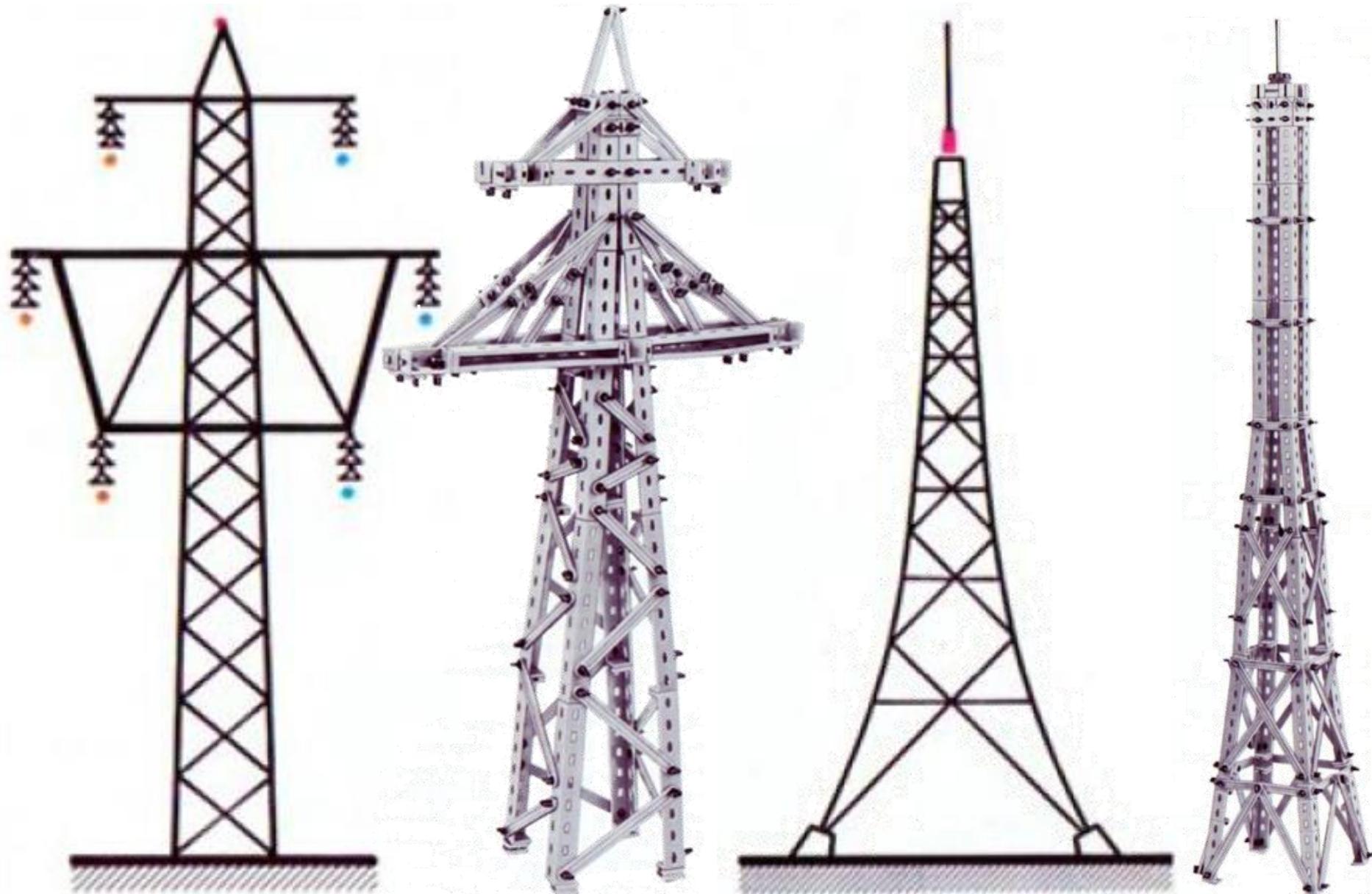
# Sichelbogenbrücke



The background image is a dense collage of various industrial and technical components. It includes a large blue and black gear on the left, a white and blue solar panel with black cells in the upper right, several yellow metal brackets or fasteners, and numerous smaller black, red, and blue plastic parts, nuts, and bolts scattered throughout. The overall theme is mechanical engineering and renewable energy.

**Maste, Türme**

# Gittermaste, Türme



A collage of various model-making components, including a large blue and black gear, a white and blue solar panel, several yellow plastic structural pieces, and red and black plastic parts. The items are arranged in a somewhat overlapping, non-linear fashion.

**Modelle**

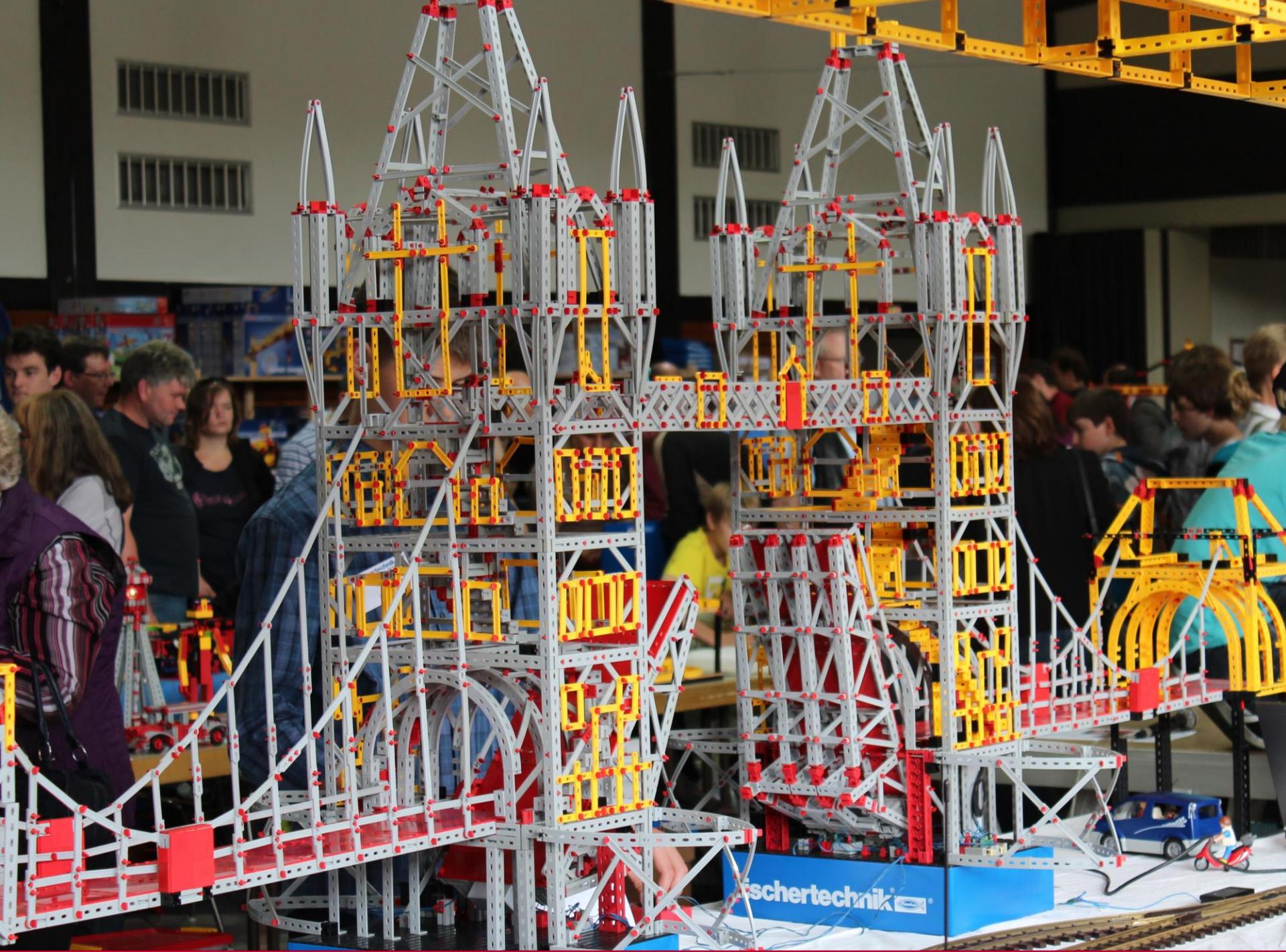


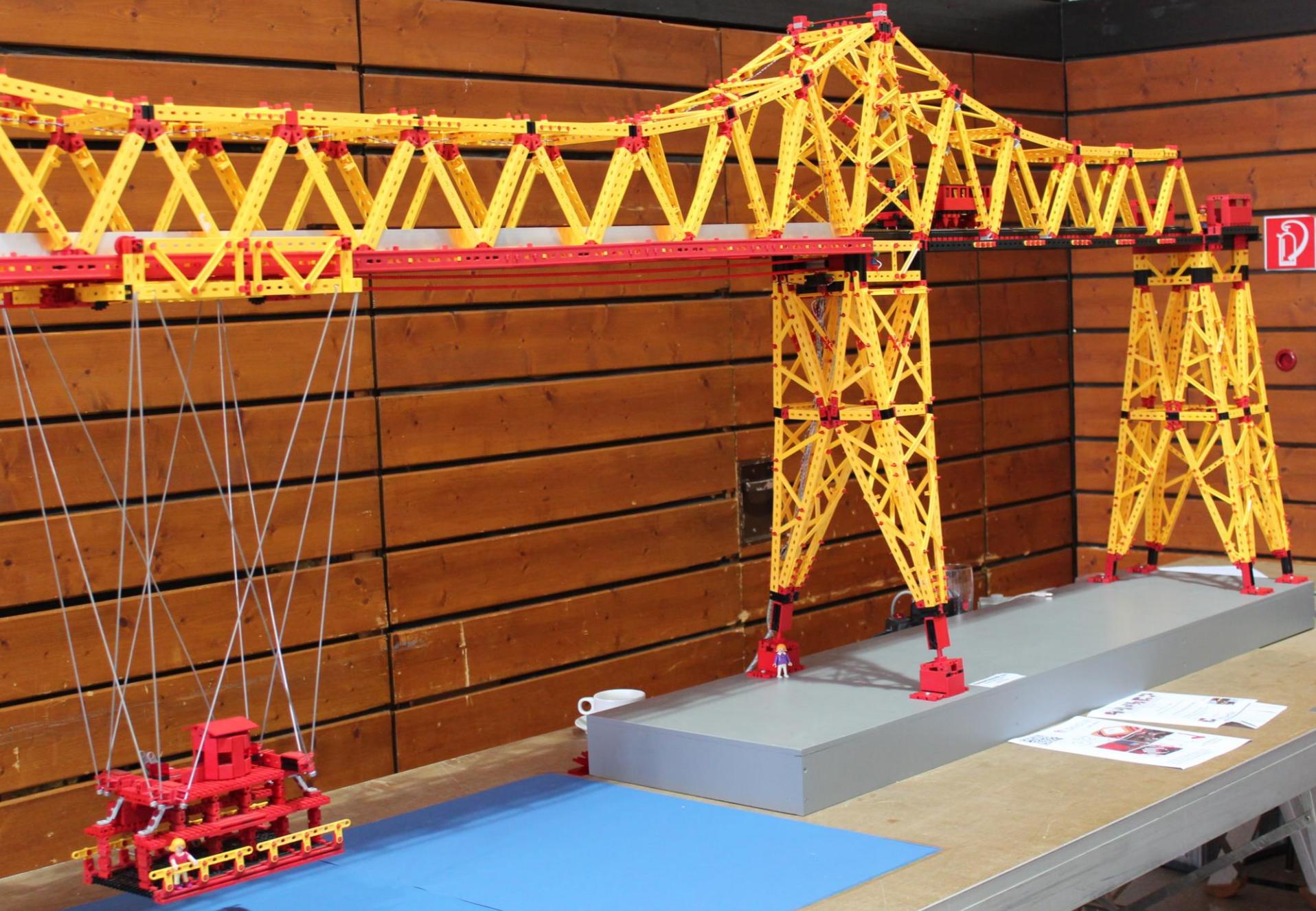
**20m Höhe (ca. 41.000 S-Riegel)**





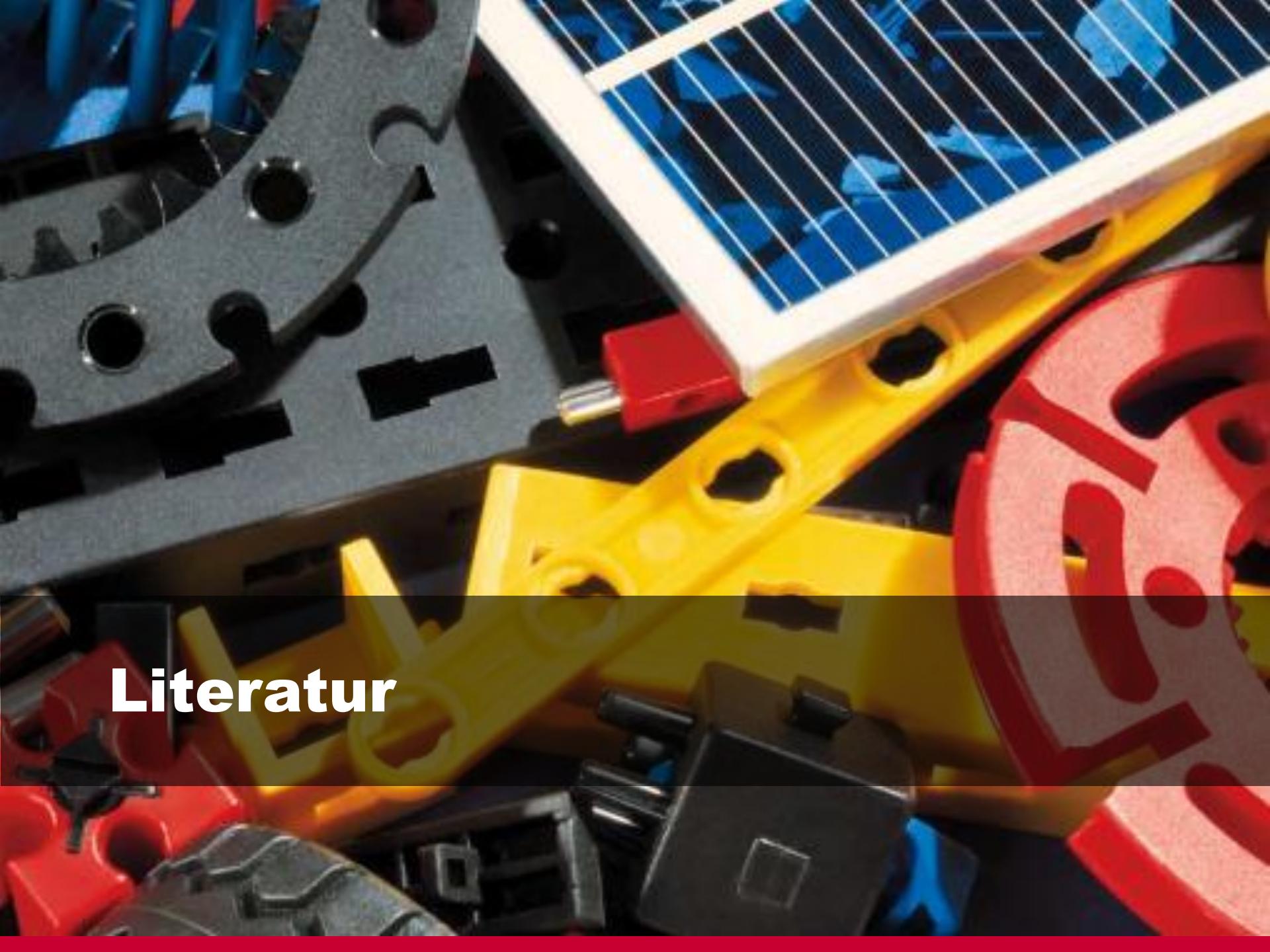
**46m Länge ([Video](#))**





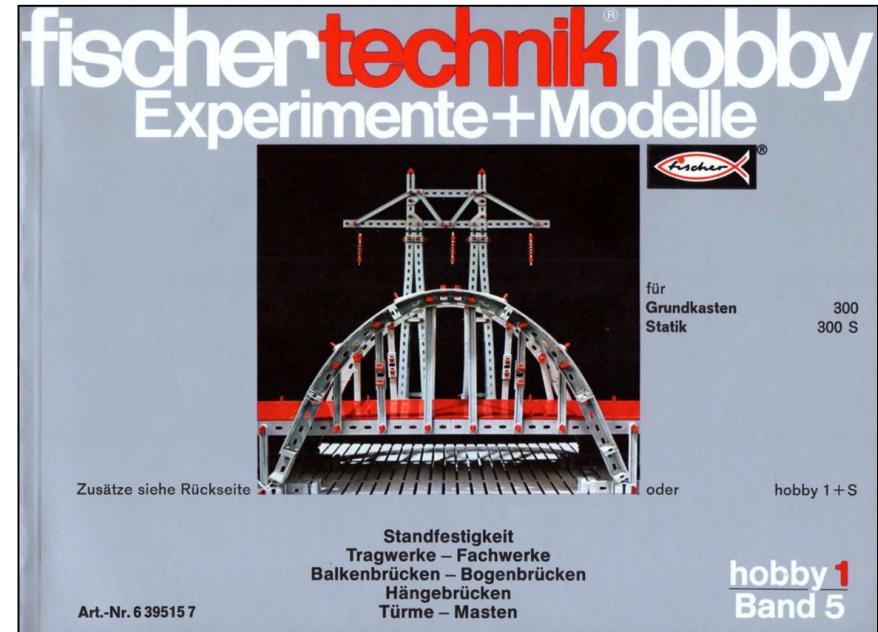




The background of the image is a collage of various objects. At the top right is a blue and black solar panel. To its left is a close-up of a metal gear with several holes. Below the gear is a yellow plastic letter 'E'. In the center, there is a red plastic letter 'I'. To the right of the 'I' is a large red plastic letter 'L'. Below the 'L' is a yellow plastic letter 'T'. To the left of the 'T' is a black plastic letter 'E'. At the bottom left is a red plastic letter 'R'. To the right of the 'R' is a blue plastic letter 'U'.

# Literatur

# Literatur



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



**mint**  
**ferencamp**