

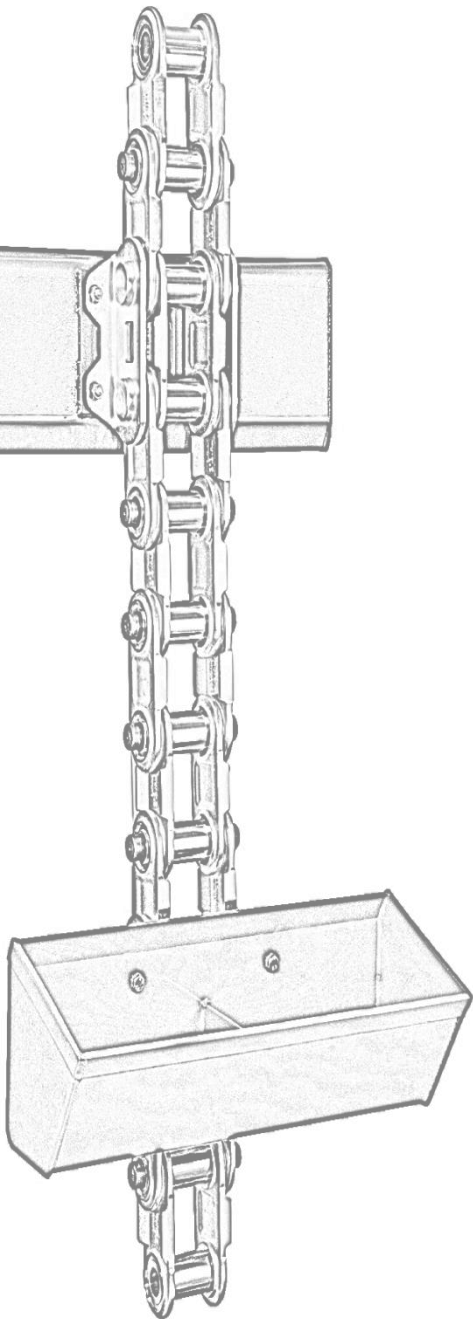


**Forged Link Chains for  
conveying of powdered,  
granulated, abrasive  
and hot bulk materials.**

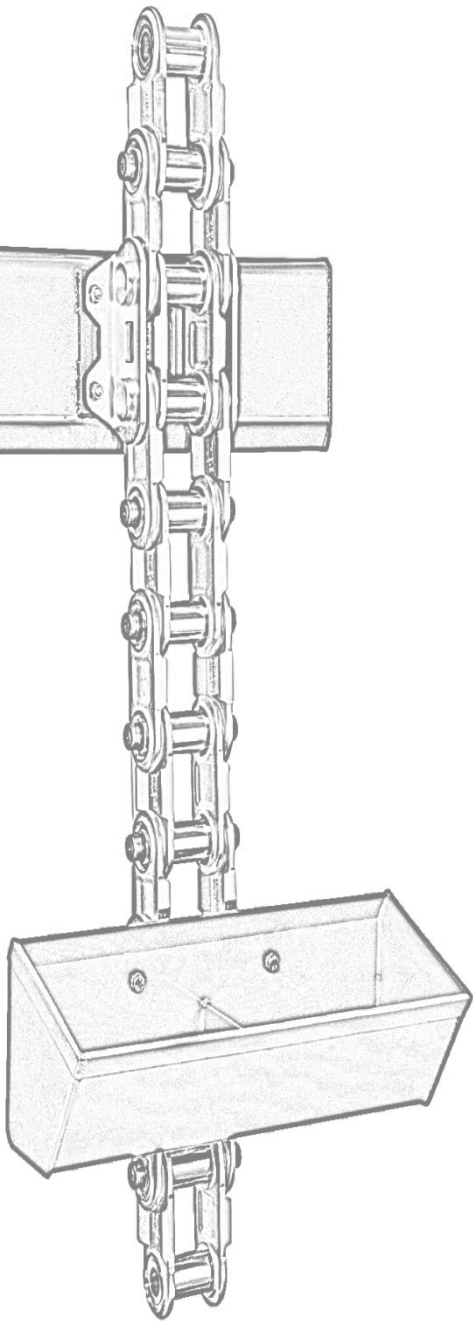
## **Forged Link Chains**

# Table of Content

- **FL-Chains in different Industries**
- **Overview of conveyed Bulk Material by FL-Chains**
- **Major Designs of FL-Chains**
- **Single, Double and Triple Strand**
- **FL-Chains – Practical Applications**
- **FL-Chains – Specific Solutions**
- **FL-Chains – Optimizations**
- **FL-Accessories - Extract of FL-Chain Catalogue**
- **Chain Wheels / Sprocket Discs**
- **Rotation Direction of Chain Wheel and Running Direction of Chain**



# FL-Chains in different Industries



**Cement**



**Fertilizer**



**Chemicals**



**Wood**



**Glass**



**Coal**

# Overview of conveyed Bulk Material by FL-Chains

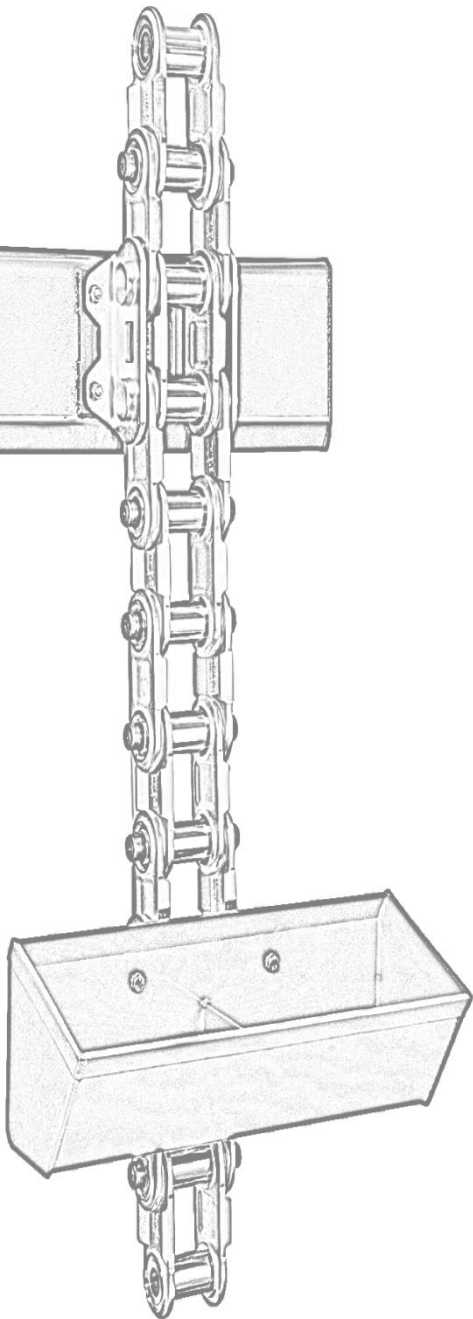
**Limestone – Clinker – Cement – Sinter Ash**

**Alternative Fuels – Fertilizer – Soda**

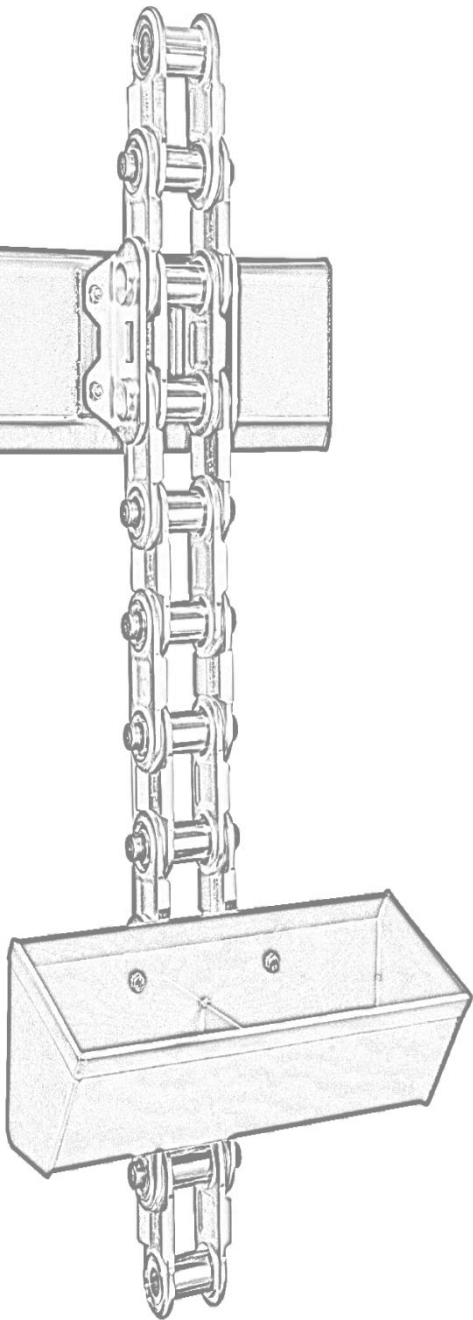
**Coal – Coke – Fly Ash – Potash Salt – Zinc**

**Iron and Copper Ores – Glass Breakage**

**Wood Chips – Grains and Feedstuffs**



# Major Designs of FL-Chains

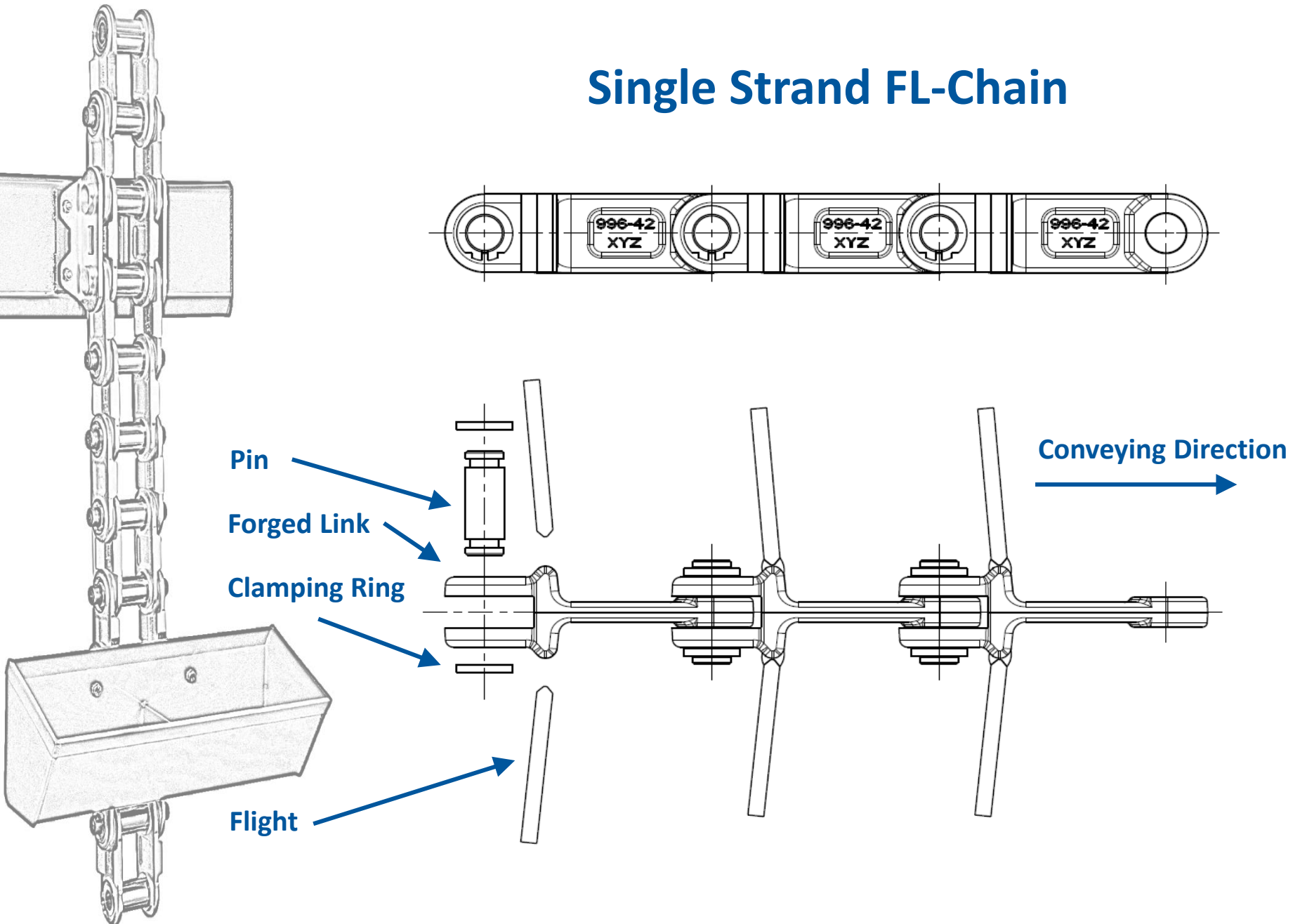


Single Strand Forged Link Chains



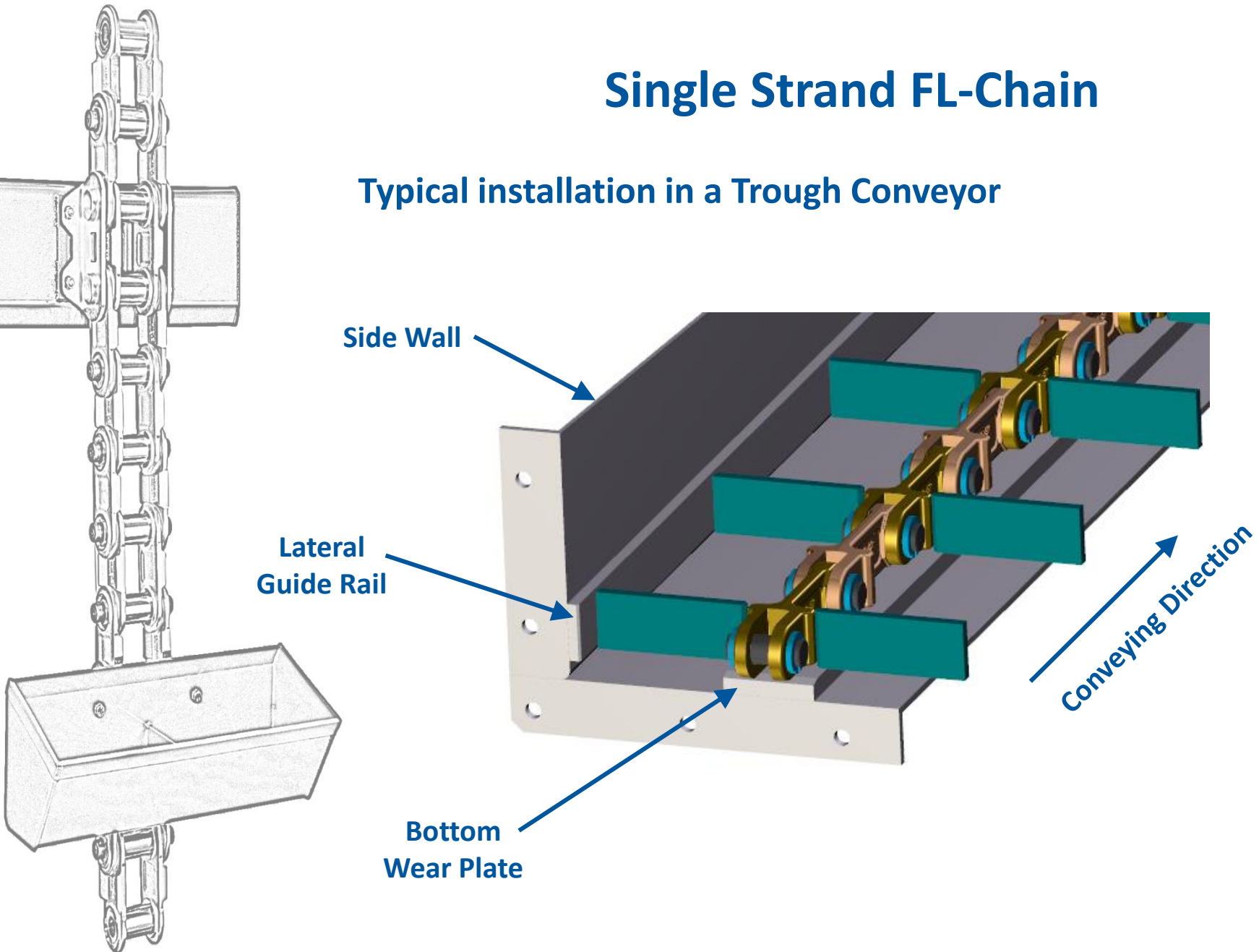
Double Strand Forged Link Chains

# Single Strand FL-Chain

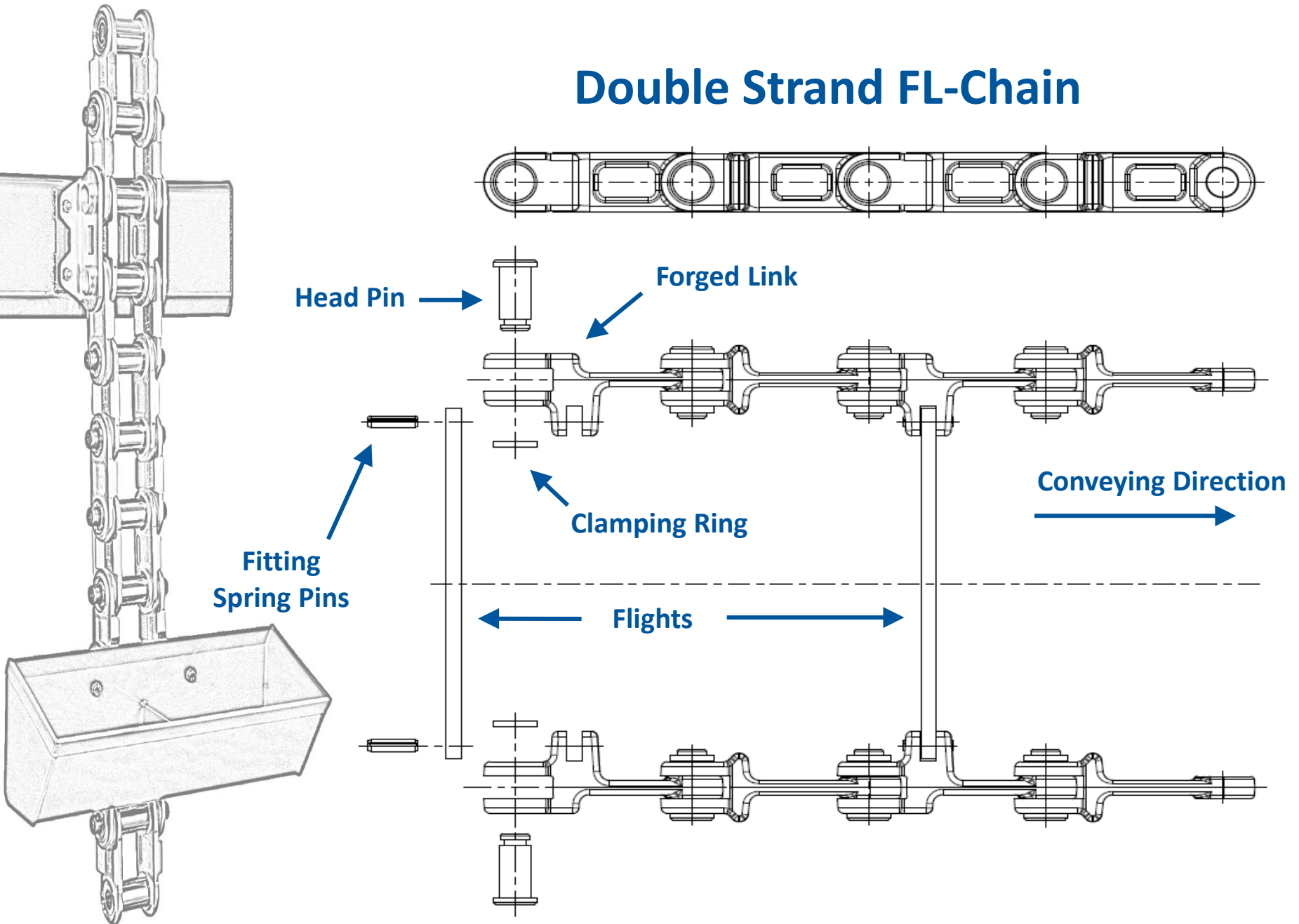


# Single Strand FL-Chain

## Typical installation in a Trough Conveyor

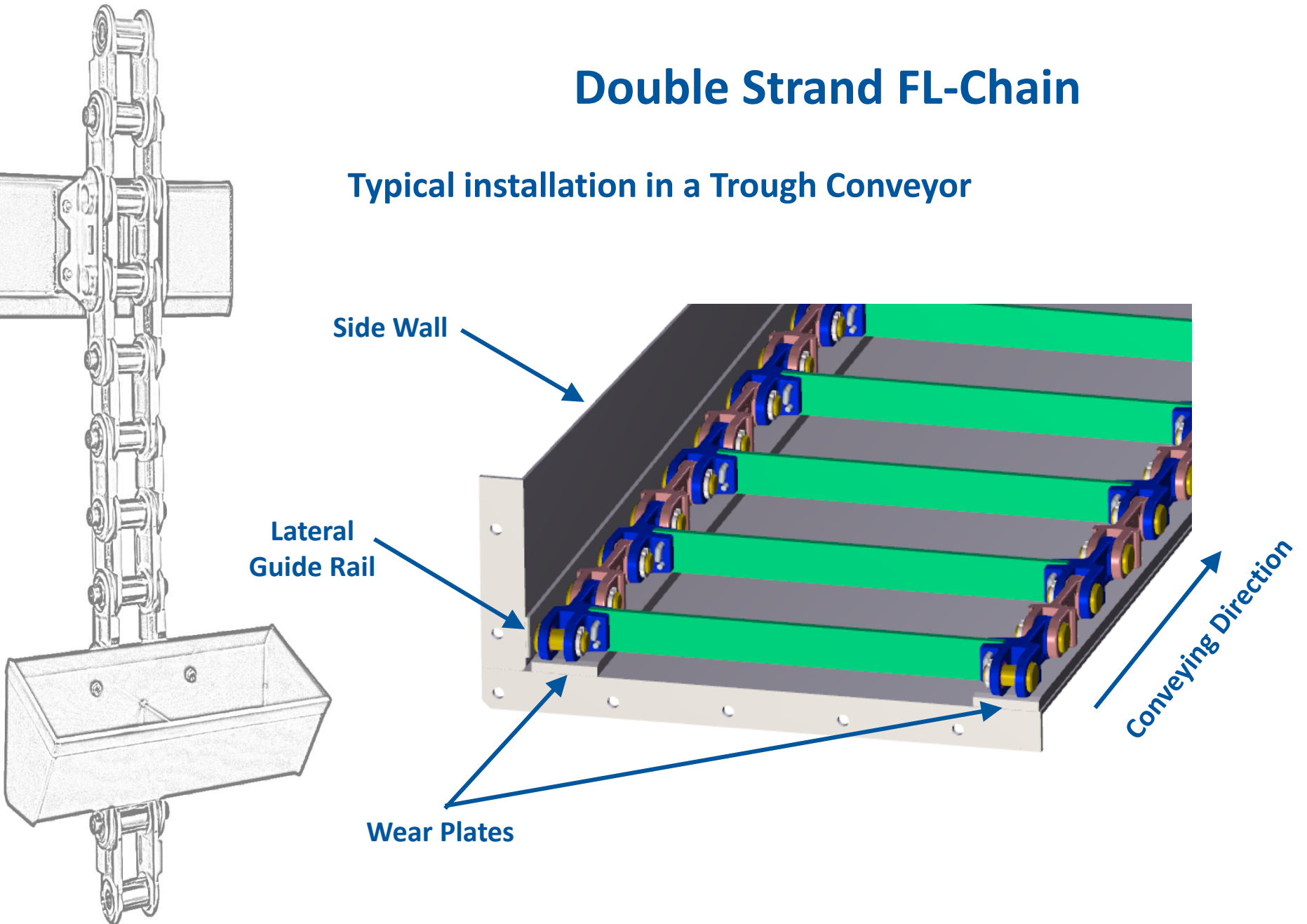


# Double Strand FL-Chain



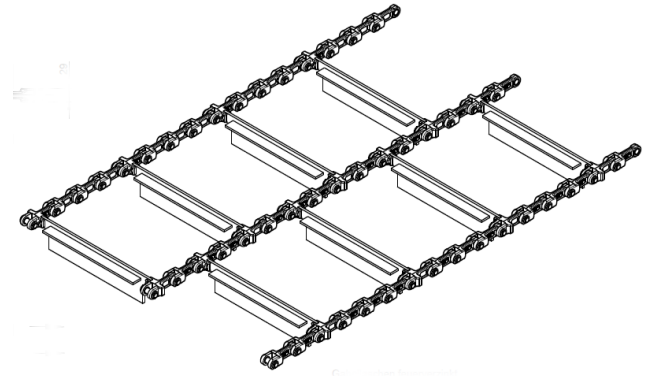
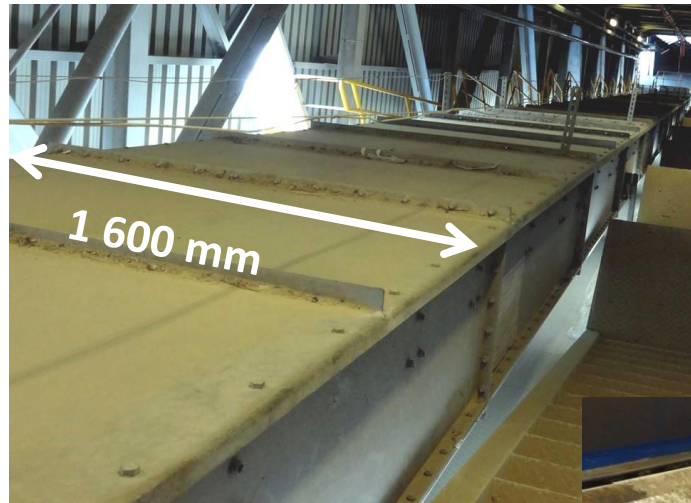
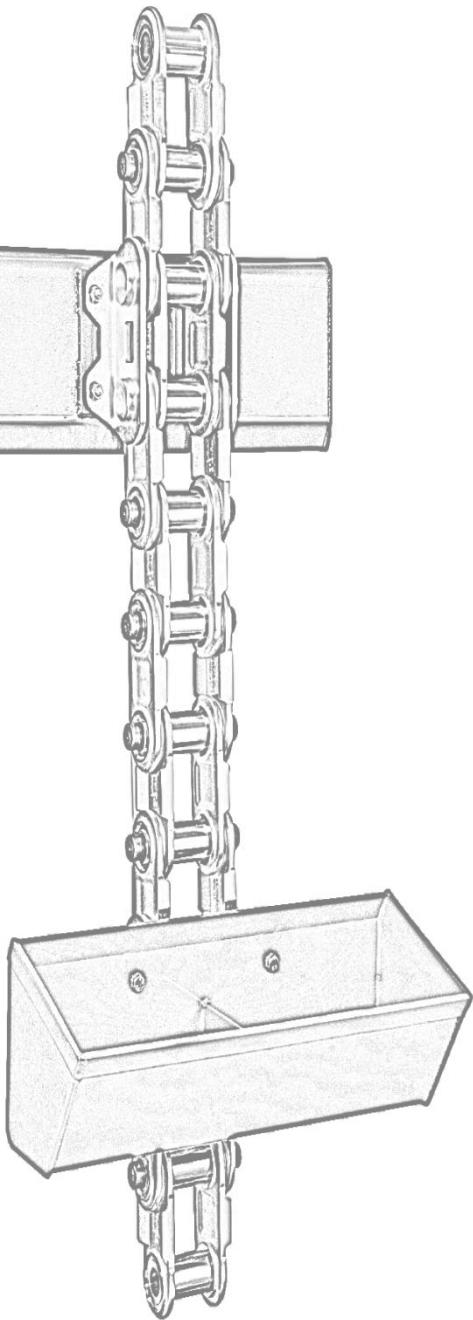
# Double Strand FL-Chain

## Typical installation in a Trough Conveyor



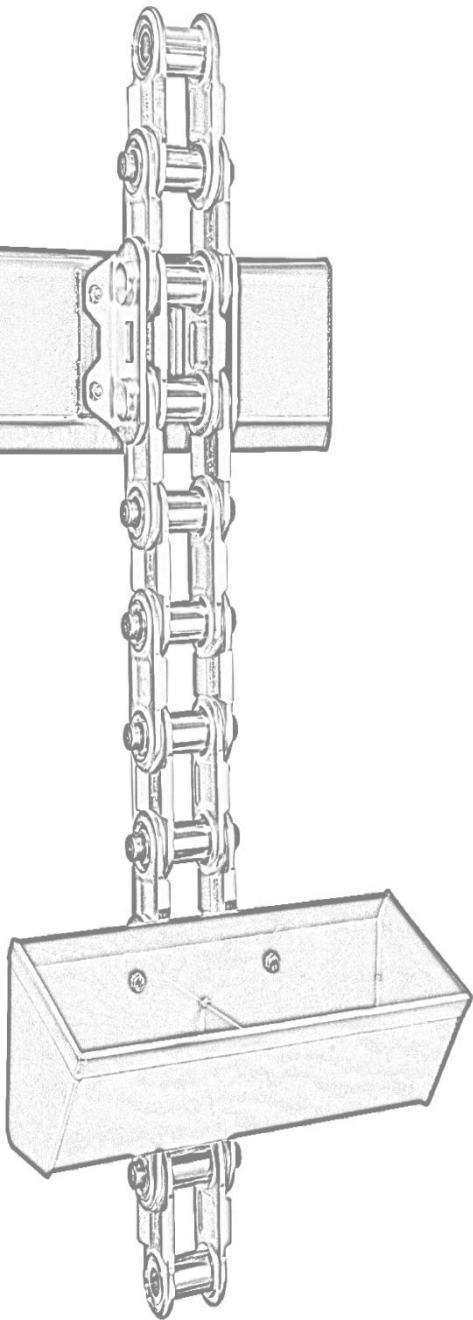
# Triple Strand FL-Chains

For particularly wide Conveyors



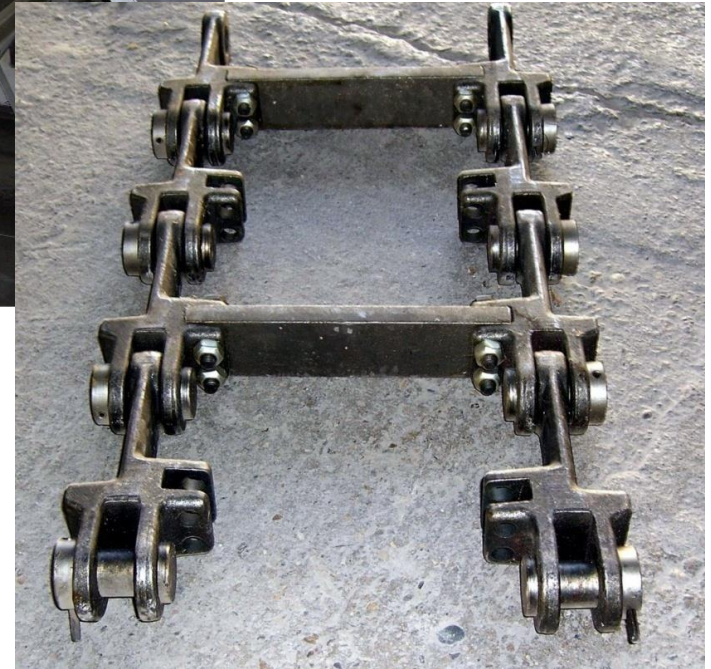
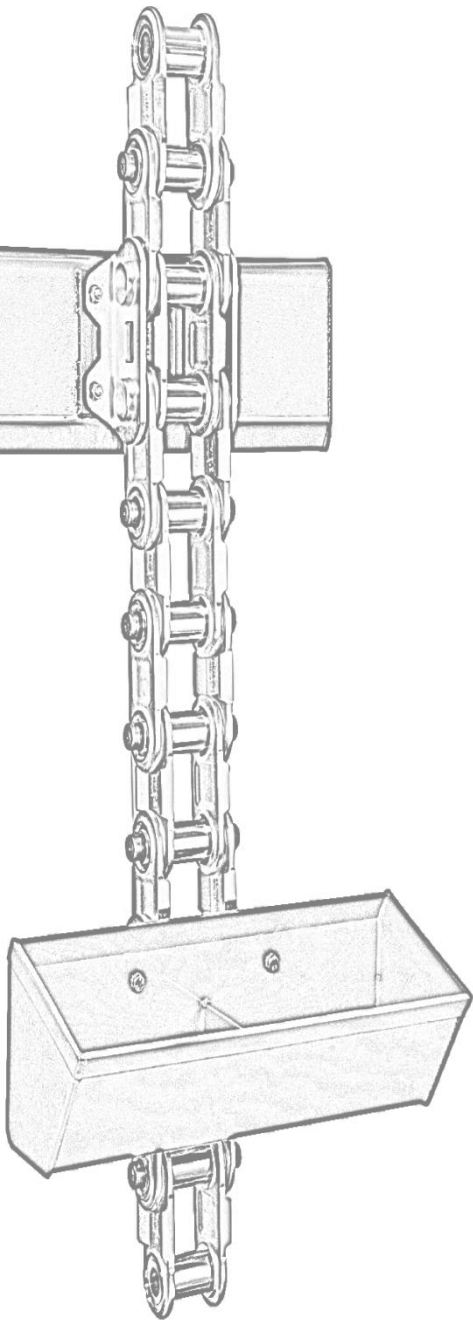
# Applications

## FL-Chain p=142 Single Strand in a Conveyor for Clinker Dust



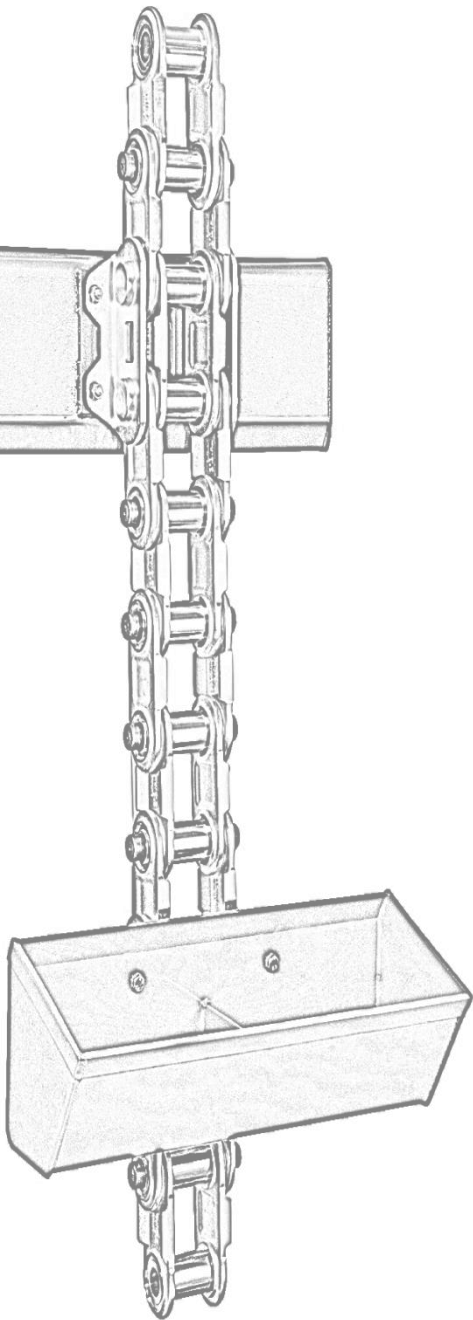
# Applications

## FL-Chain p=142 Double Strand in a Conveyor for Clinker Dust



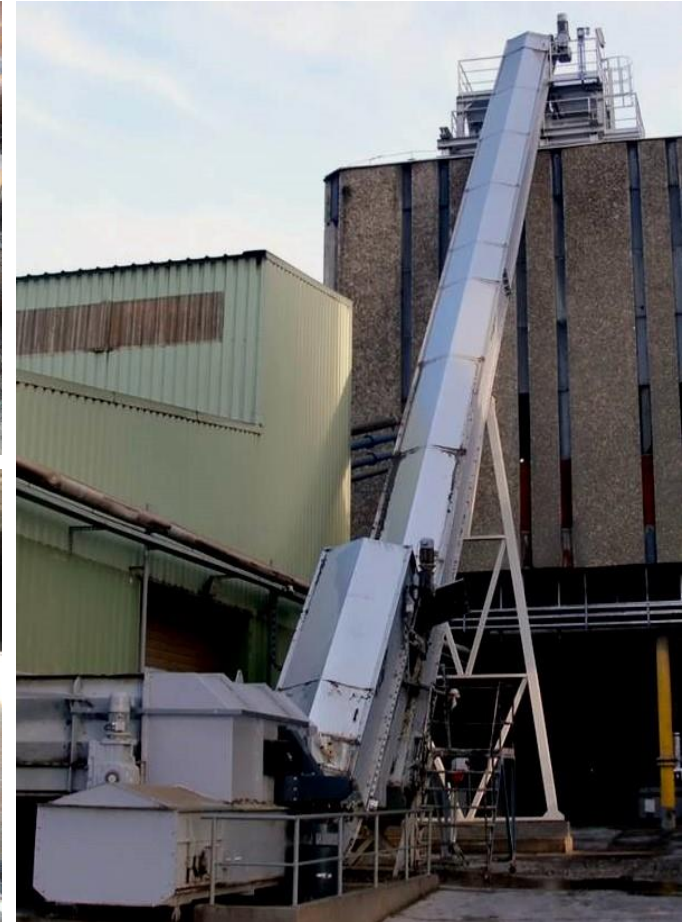
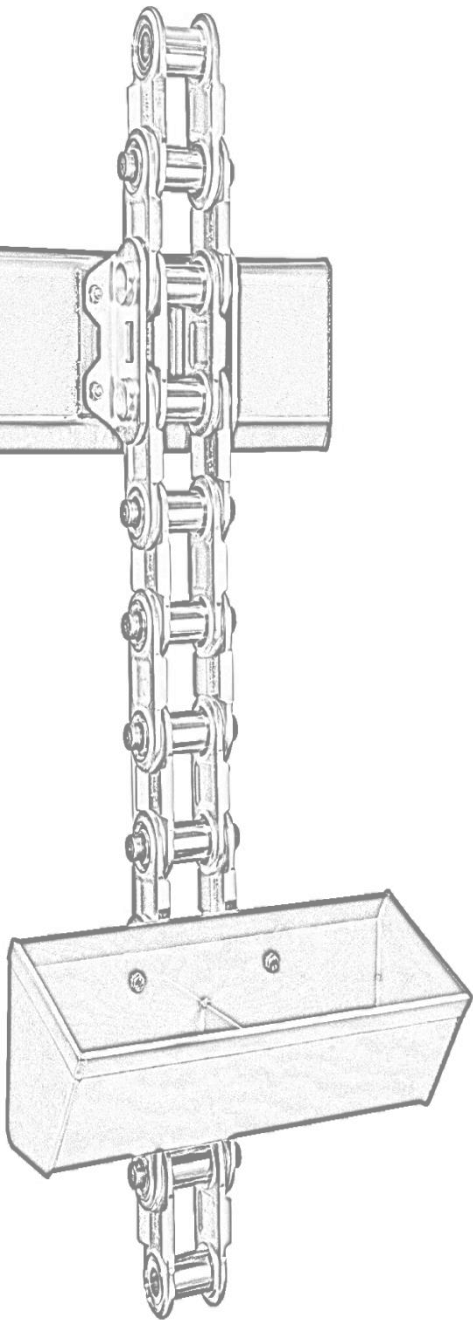
# Applications

## FL-Chain p=250 Double Strand in a Conveyor for Clinker



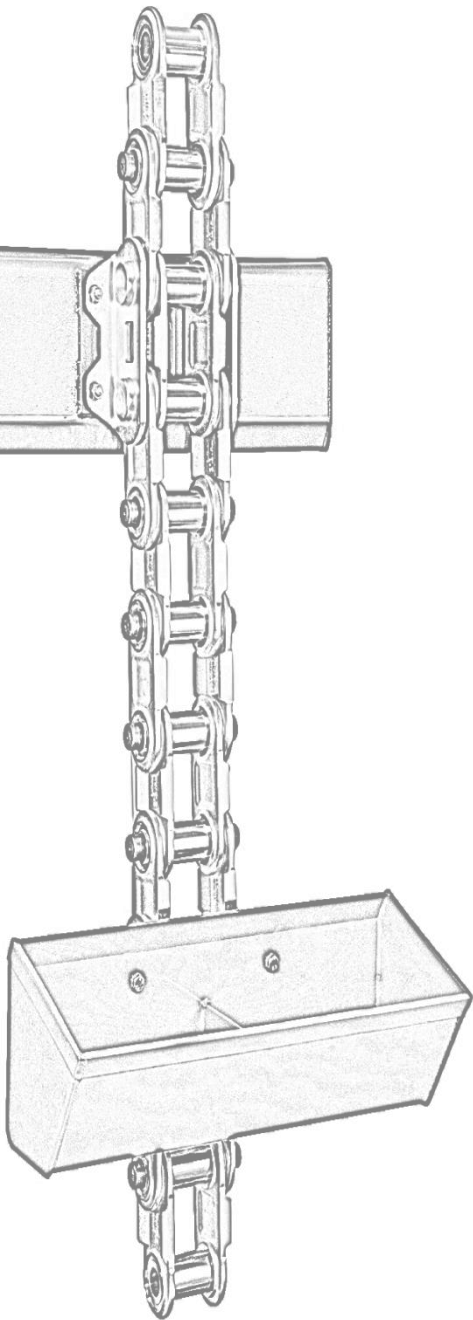
# Applications

## FL-Chain p=142 Double Strand in a Trough Conveyor for Alternative Fuels



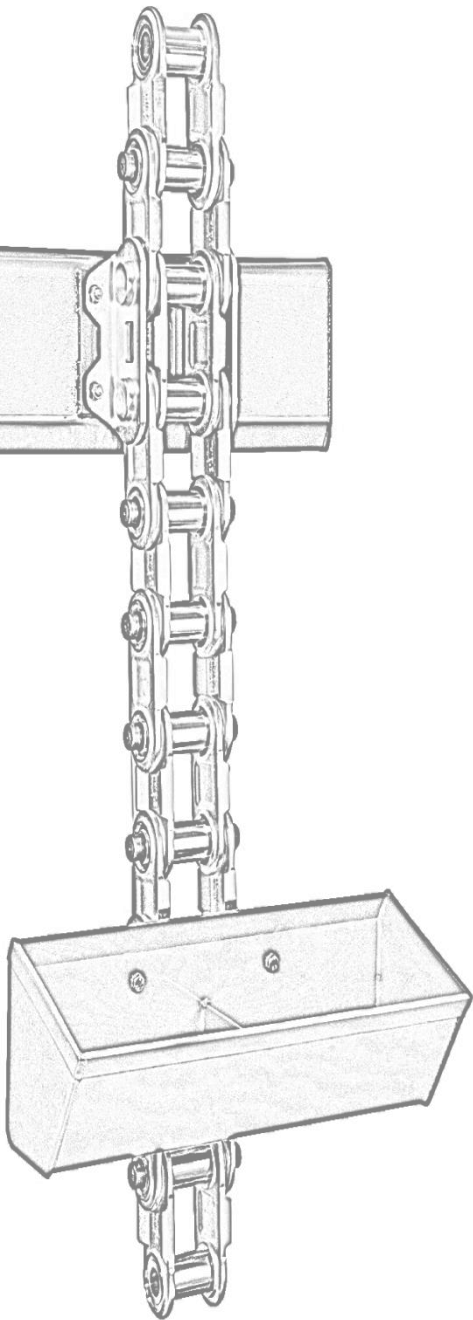
# Applications

## FL-Chain p=260 Single Strand in a Trough Conveyor for Soda



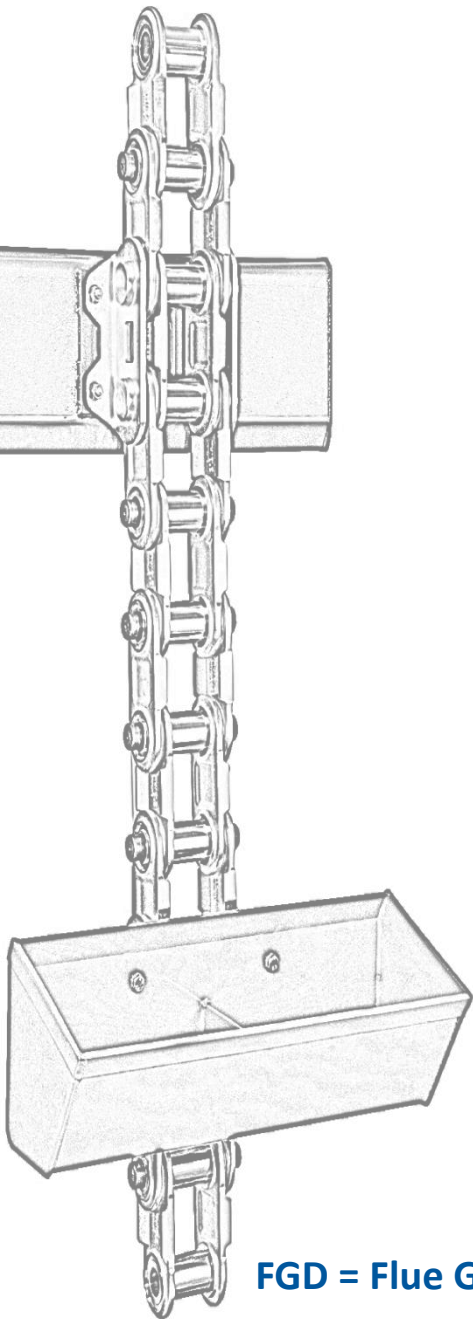
# Applications

## FL-Chain p=250 Single Strand in a Conveyor for Hot Glass Breakage

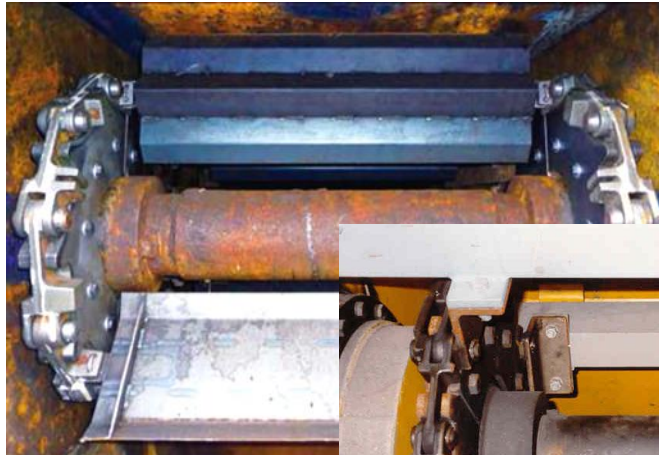


# Applications

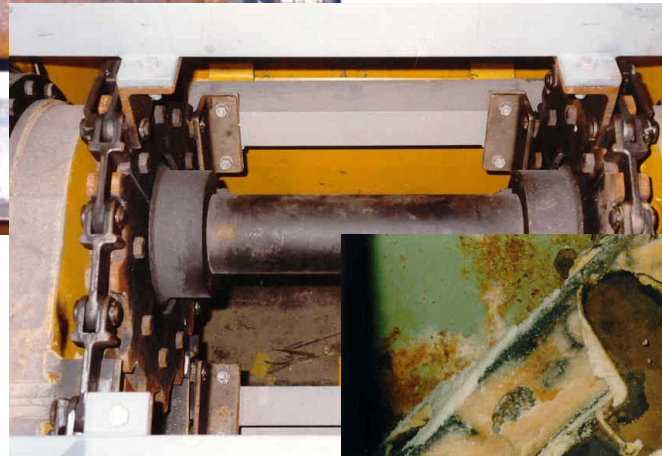
FL-Chains also for following Bulk Materials...



FGD = Flue Gas Desulfurization



Biomass



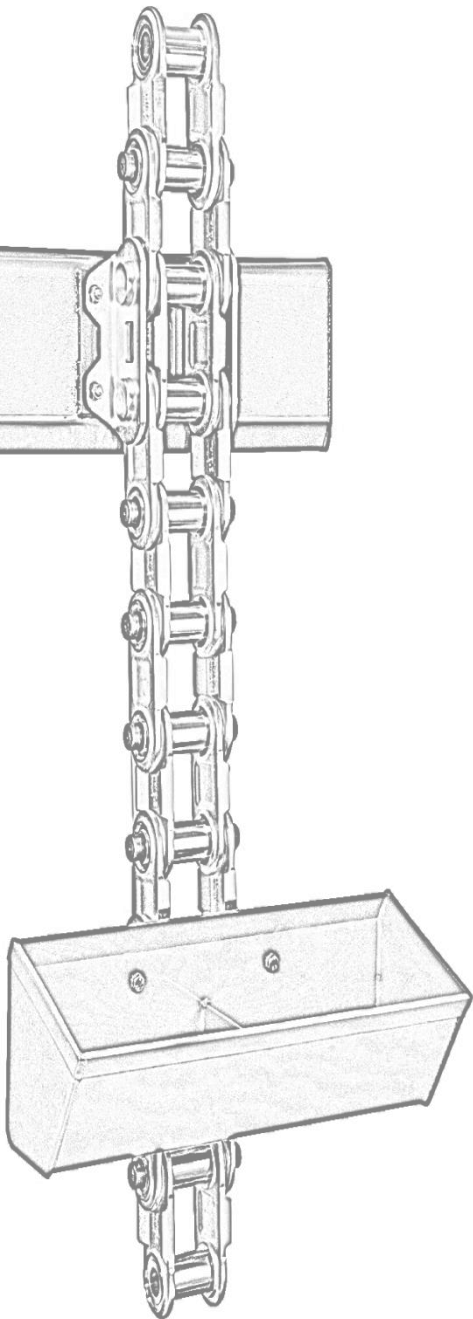
FGD Gypsum



Salt

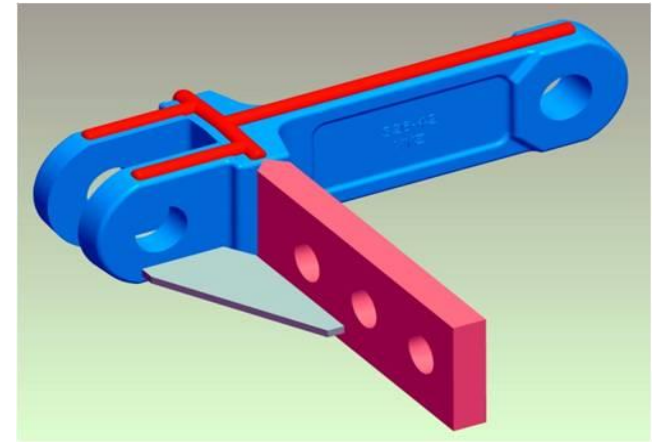
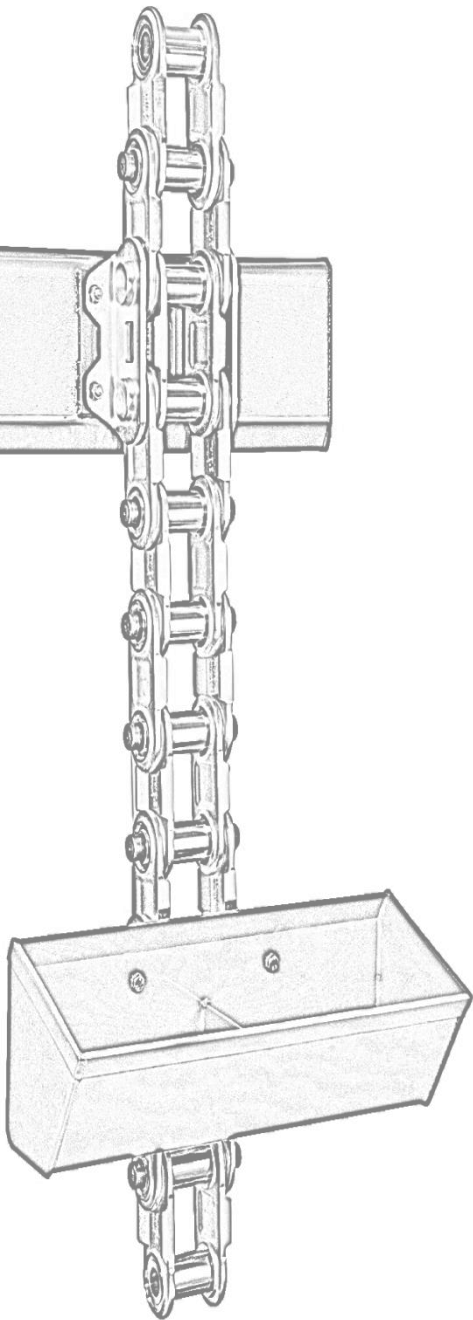
# Applications

FL-Chains p=142 in combination with Flight Bars made of steel + weight reduced Flight Bars made of plastic



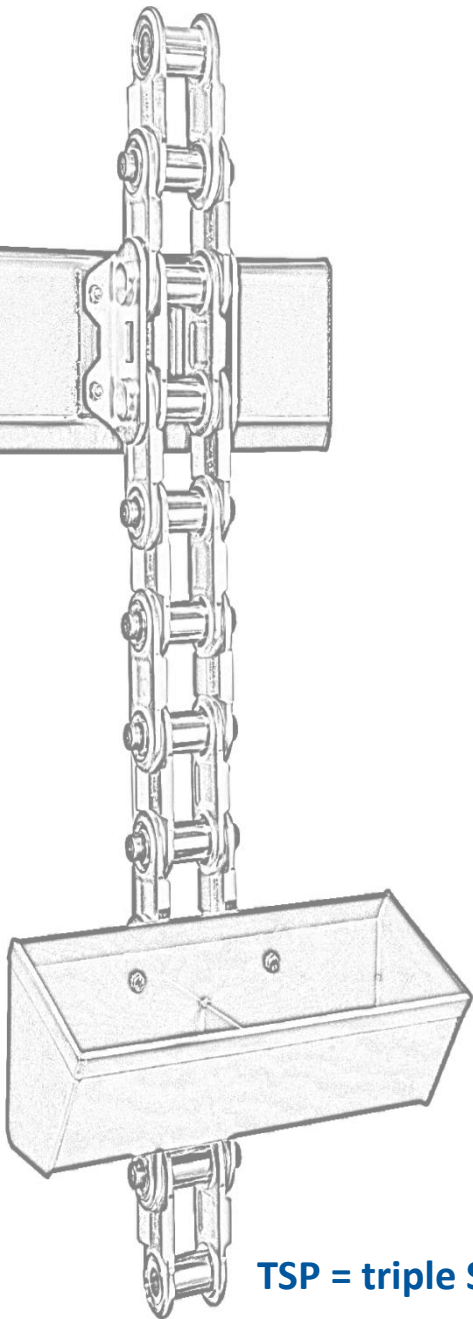
# Specific Solutions

Increased wearing volume by extra hard facing layers



# Specific Solutions

## FL-Chains p=250 with Cleaning Bar



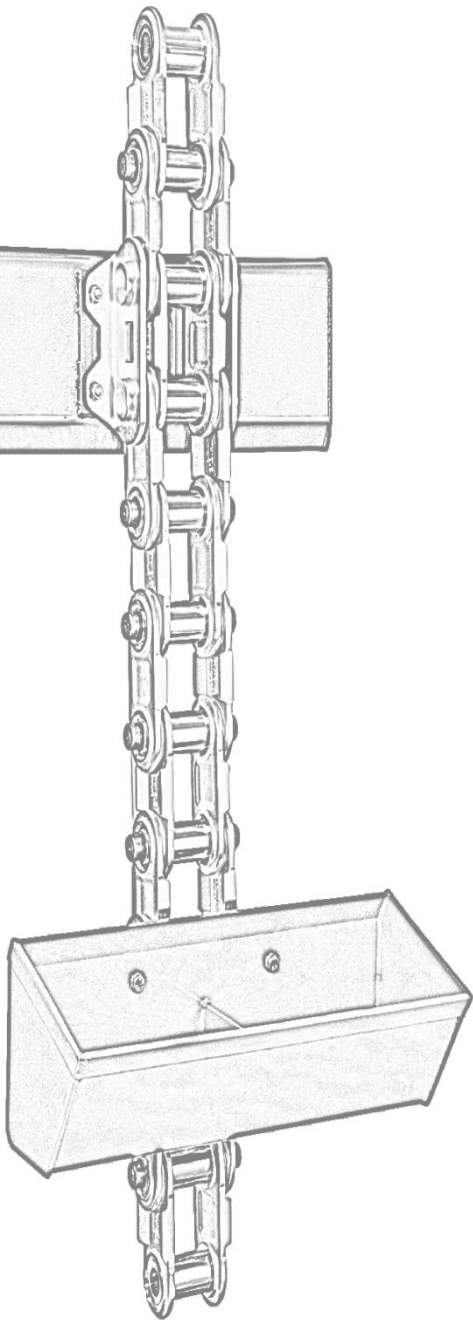
**Bulk Material: TSP fertilizer,  
highly adhesive and caking**

**TSP = triple Super Sulphate**



# Specific Solutions

## FL-Chains in very steeply rising conveyors for alternative fuels



70 Degree  
inclining

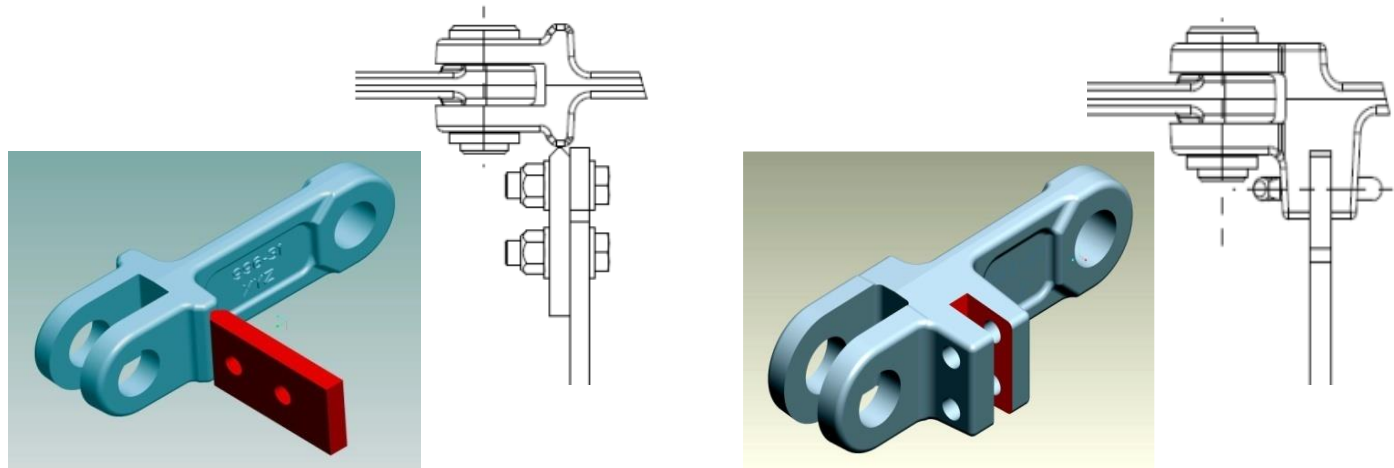
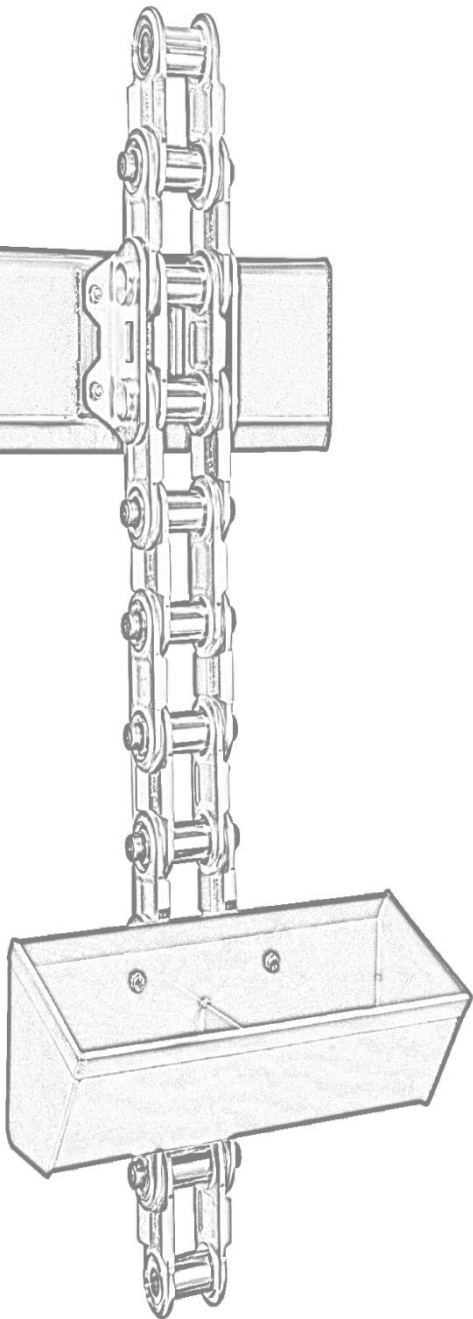
p=250



p=142

# Optimizations

## Advantages of THIELE FL-Chains twin-strand compared to welded flight connections



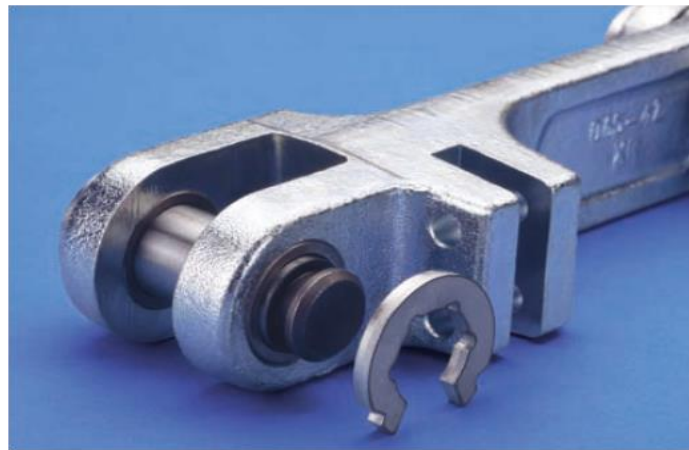
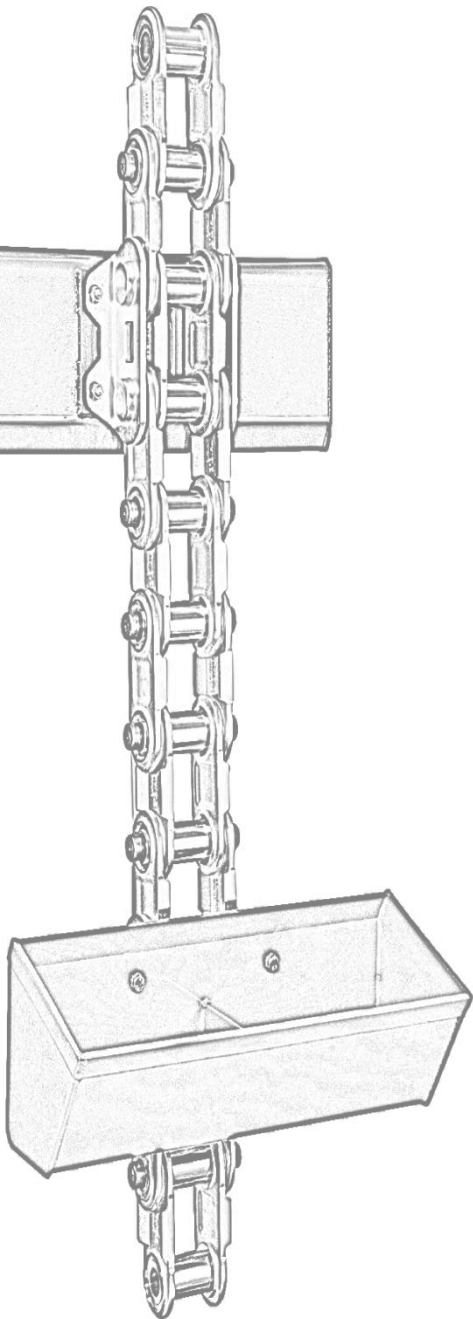
- improved joining of the flights to the FL-Chain
- more compact construction
- higher bending stiffness
- defined clearance between flight and slot of the FL-Chain
  - as a result, avoiding / suppression of constraining forces

# Optimizations

Increase of the life cycle by bushing and hot-dip galvanizing

Reference: Holcim Lafarge Aleřd, Romania

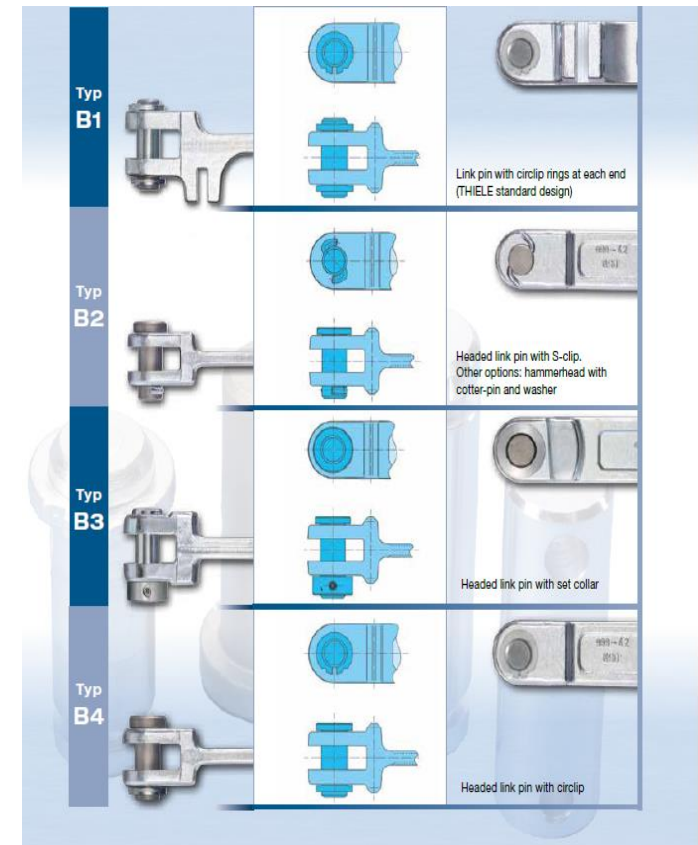
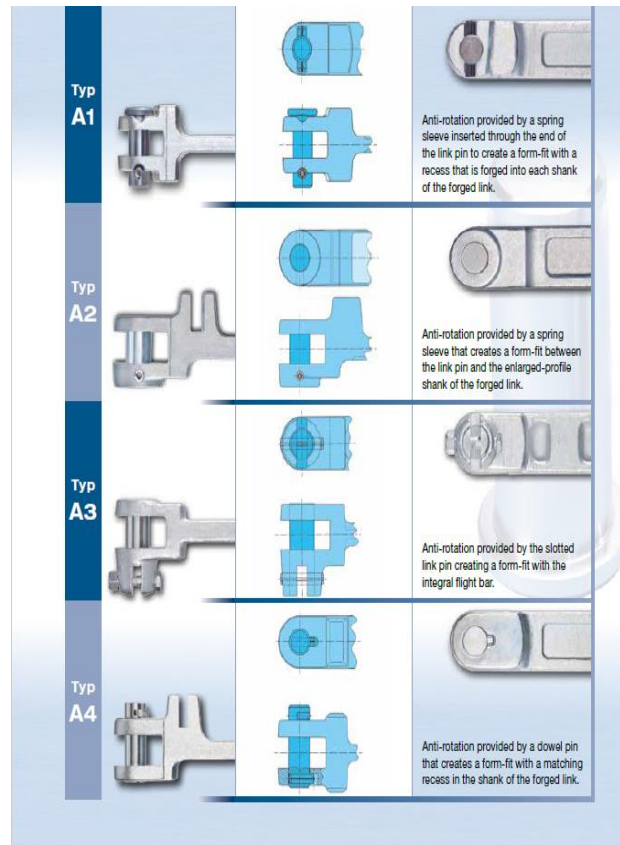
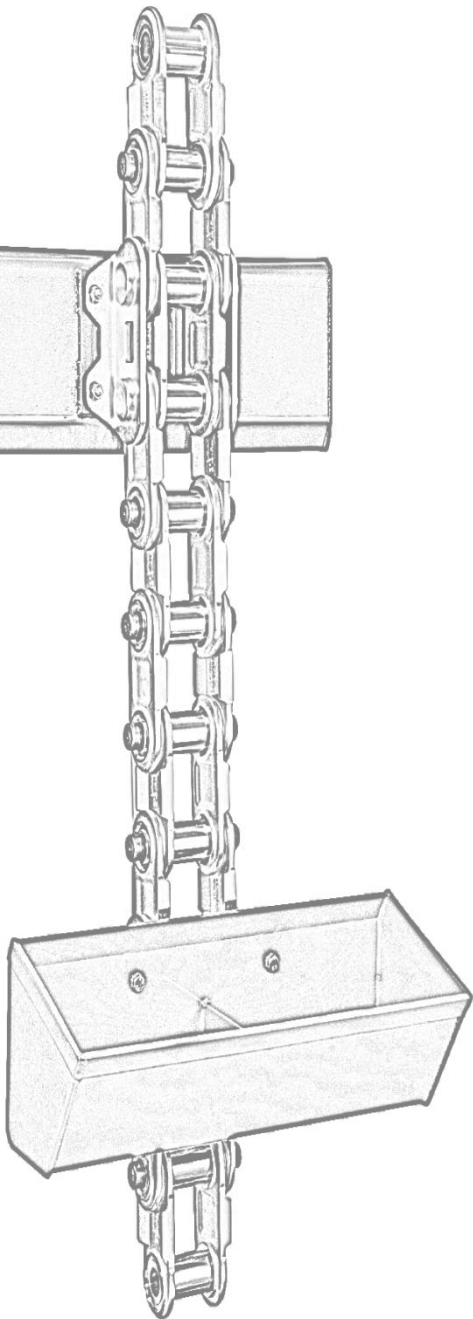
- FL-Chain 142x50x19
- Material: 23MnNiMoCr-54 V bushed / hot-dip galvanized
- Bulk Material: Alternative Fuels
- reached operational performance of 27,000 running hours
- 50% higher product life time in comparison to a FL-Chain, not bushed



Example for hot-dipped  
galvanized forged link chain

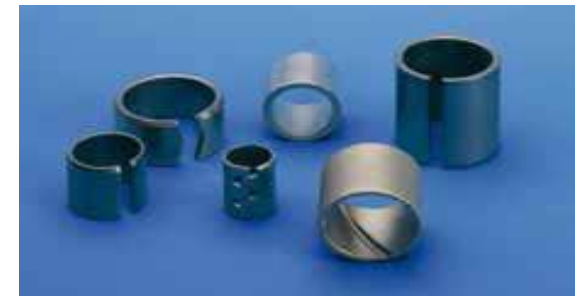
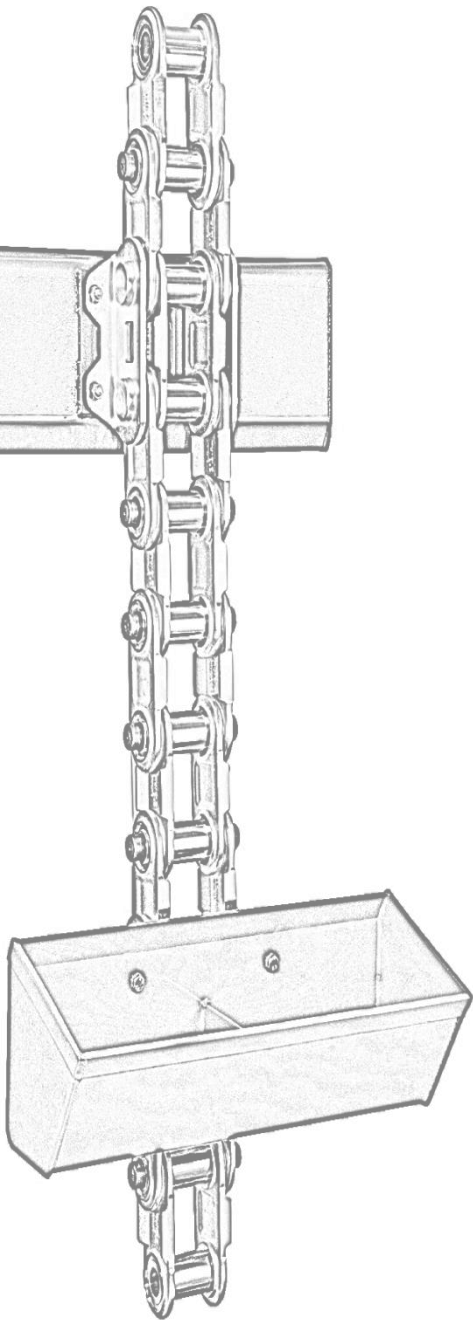
# FL-Accessories – Extract of FL-Chain Catalogue

## Pin Fixings with and without anti-rotation



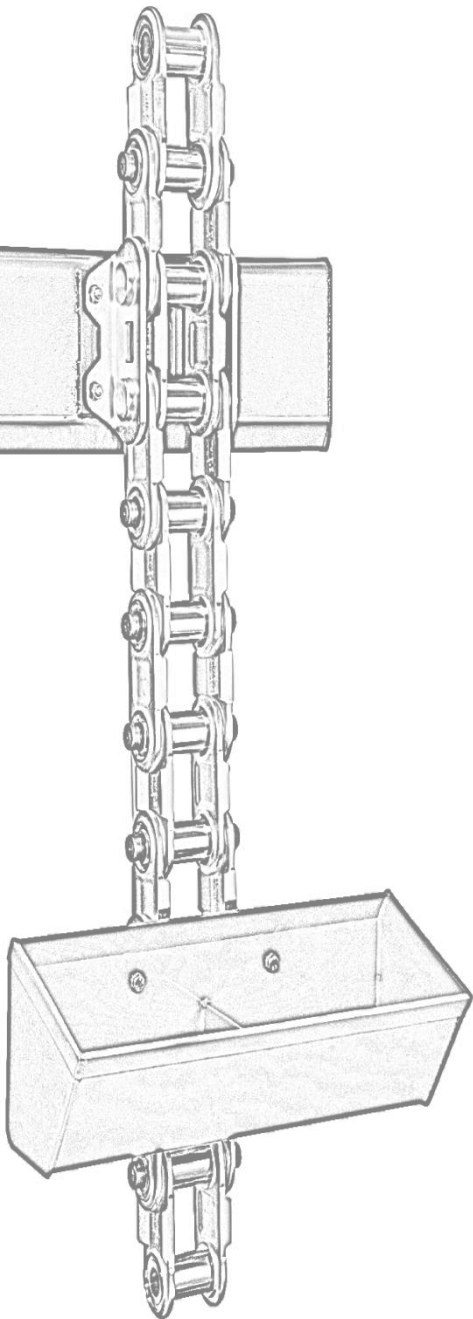
# FL-Accessories – Extract of FL-Chain Catalogue

Pins, Bushings, Dowel Pins, Clamping Rings, Flights



# FL-Accessories – Extract of FL-Chain Catalogue

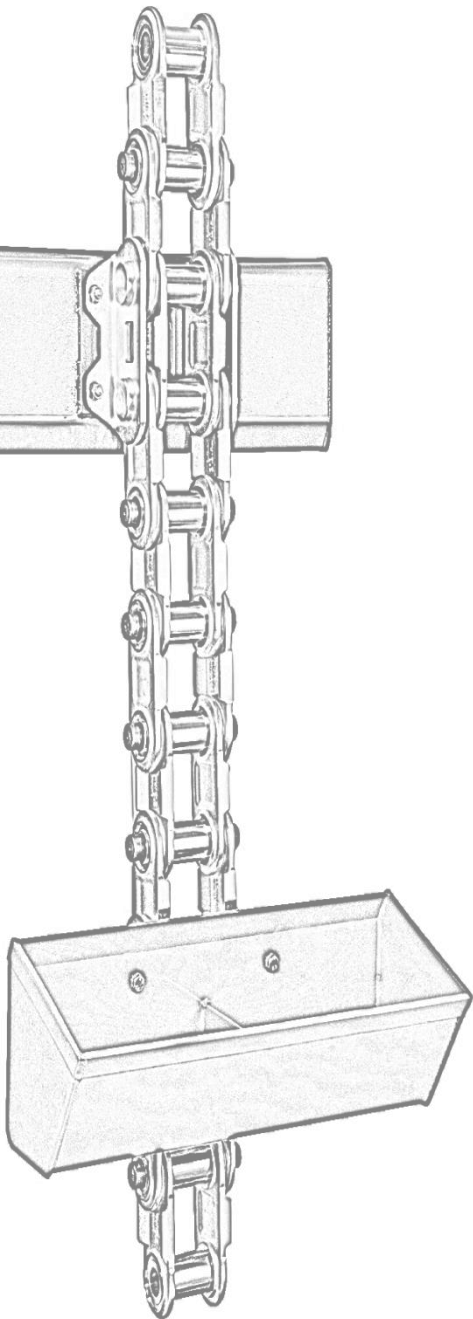
## Material Grades for FL-Chains



Component	Number	Material Designation	Heat treatment	Maximum surface hardness (HRC)
THIELE standard materials for forged links				
Forged link	1.0412	27MnSi5	tempered	
Forged link	1.6758	23MnNiMoCr5-4	tempered	
Forged link	1.7147	20MnCr5	case-hardened	60 ±3 / 0,6+0,3**
THIELE special materials for forged links				
Forged link rust/acid resistant	1.4571	X6CrNiMoTi17-12-2		
Forged link heat resistant	1.4841	X15CrNiSi25-20		
Forged link	1.6758	23MnNiMoCr5-4	case-hardened	60 ±3
Forged link	1.6758	23MnNiMoCr5-4	induction-hardened	50 ±2

# FL-Accessories – Extract of FL-Chain Catalogue

## Material Grades for Fittings

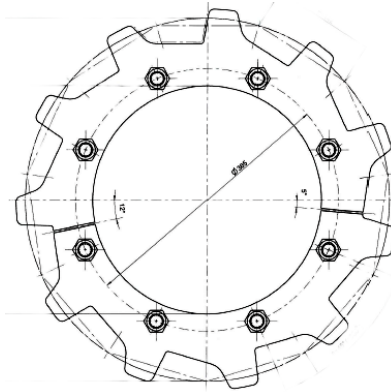
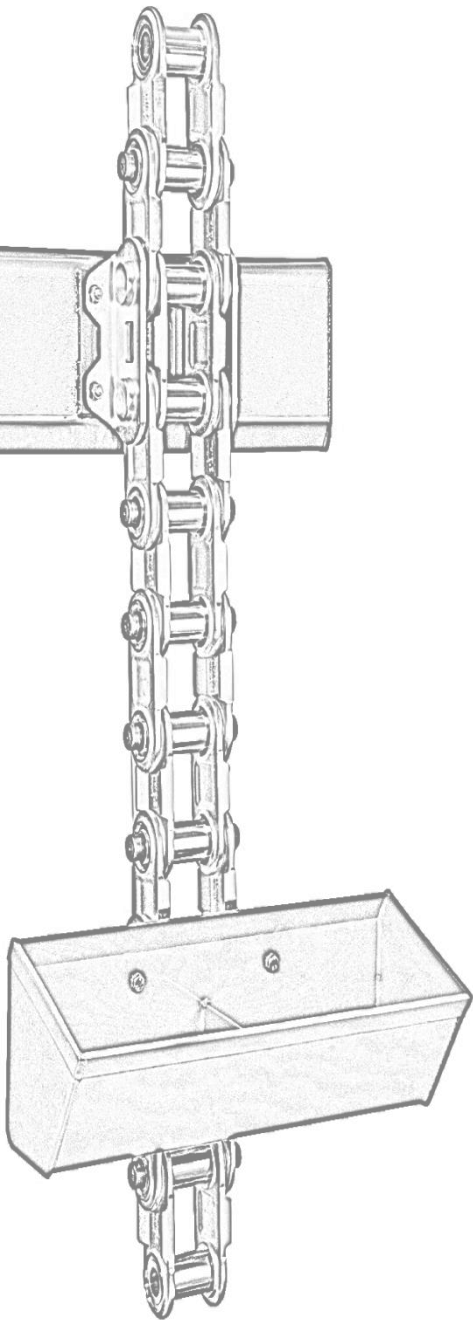


Component	Number	Material Designation	Heat treatment	Maximum surface hardness (HRC)
THIELE special material grades for link pins				
Link pin	1.7225	42CrMo4	induction-hardened	56 ±2
Link pin	1.4034	X46Cr13	induction-hardened	55 ±2
THIELE standard material grades for bushings				
Bushing	1.5026	55Si7	tempered	50
Bushing	1.4034	X46Cr13	tempered	50
THIELE standard material grades for chain-wheel segments				
Chain-wheel segment	1.0503	C45	induction-hardened	55 ±2 / 3+2
Chain-wheel segment	1.7225	42CrMo4	induction-hardened	55 ±2 / 3+2
THIELE standard material for guide wheels				
Guide wheel	1.0503	C45	induction-hardened	55 ±2 / 3+2
THIELE standard material grades for flight bars: S235JR, S355J2, S700MC				
THIELE special material grades for flight bars: 400 HB, X5CrNi18-10, X15CrNiSi25-20				

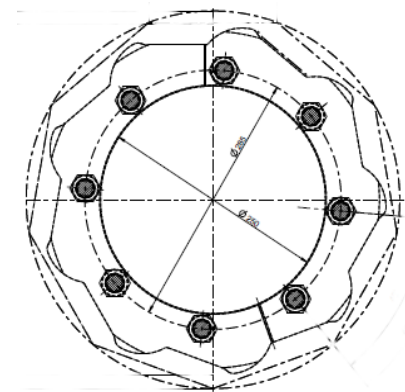


# Chain Wheels / Sprocket Discs

## Main Application



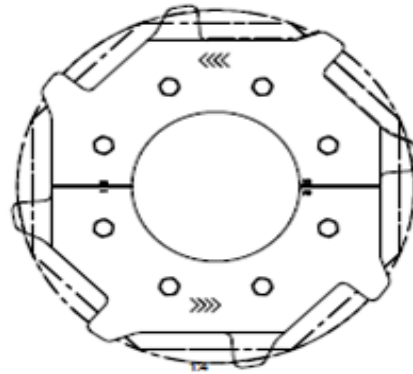
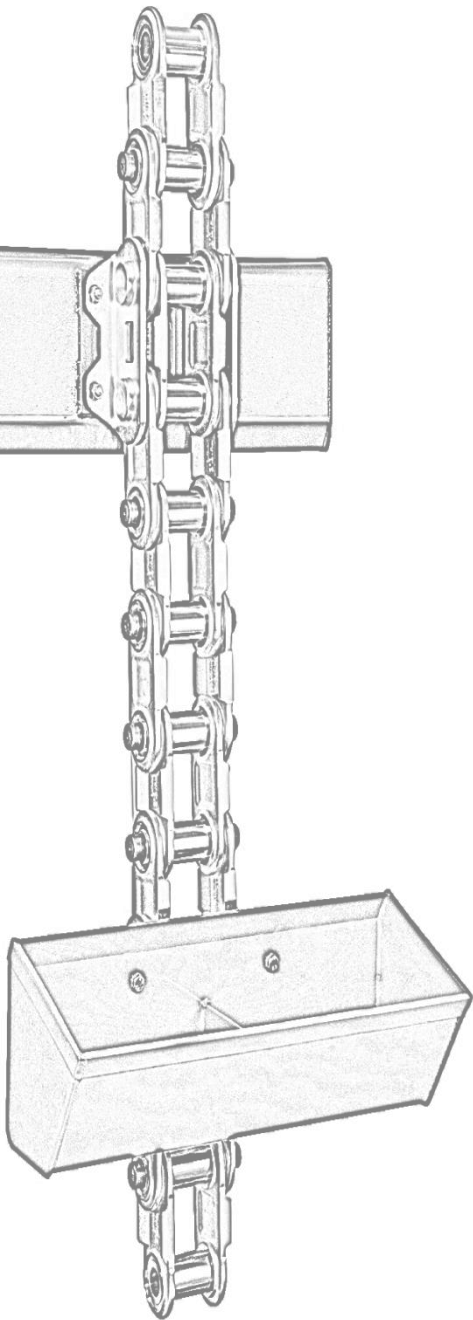
Drive Wheel = long teeth



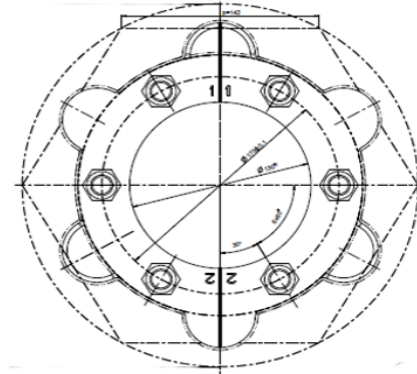
Guide Wheel = short teeth



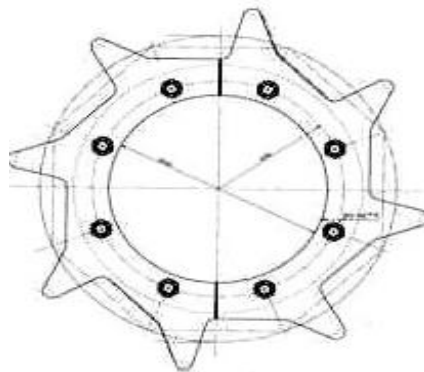
# Special Designs of Sprocket Discs



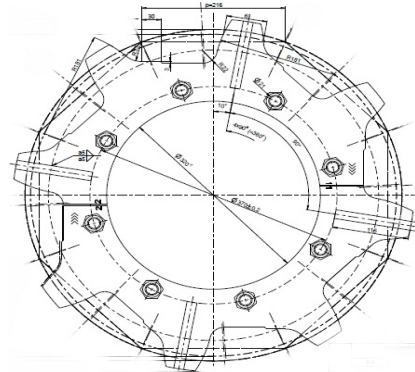
**displaced tooth 4+4**



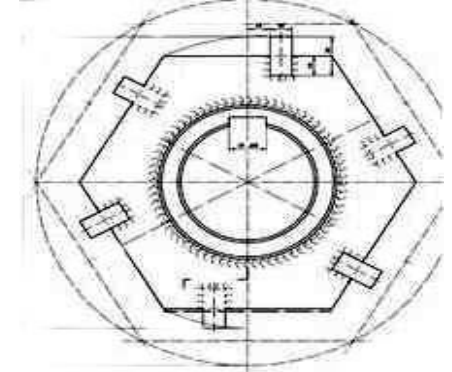
**displaced tooth 3+3  
rounded**



**extra long tooth**

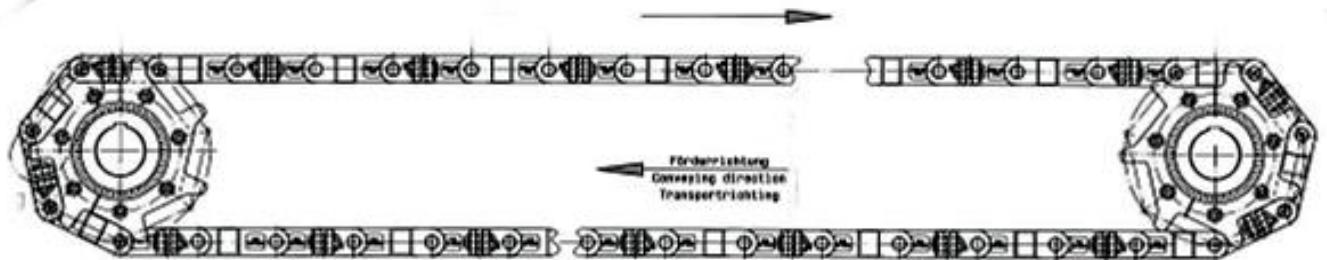
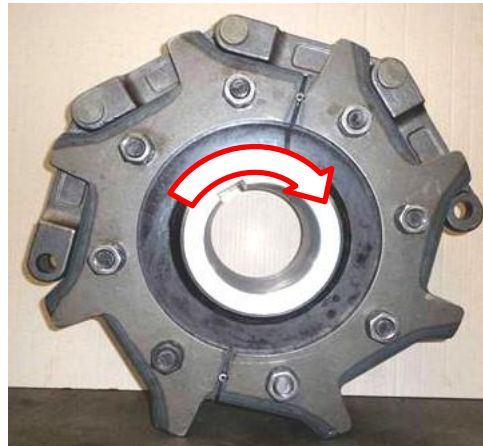
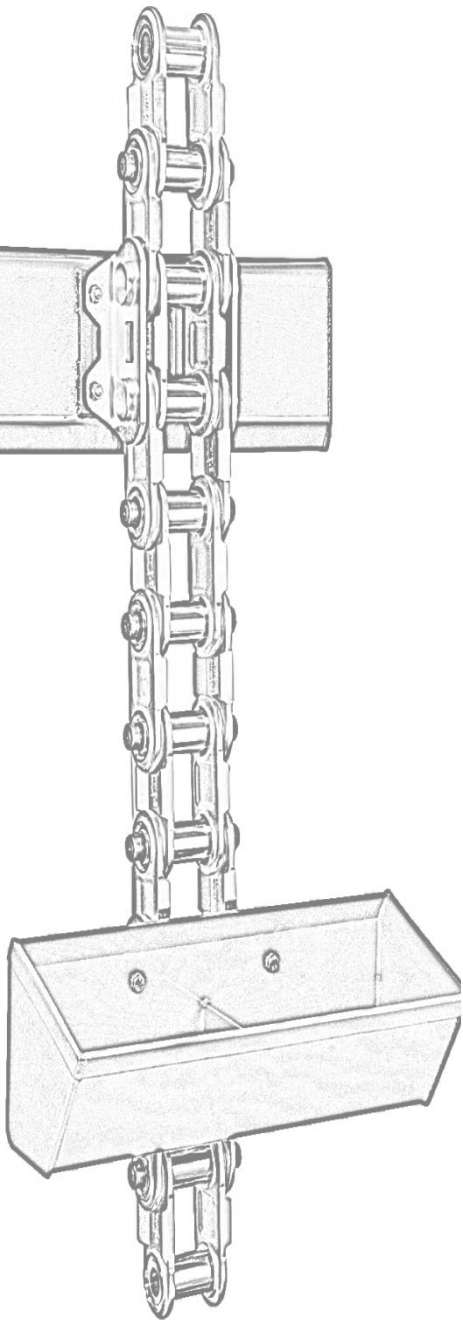


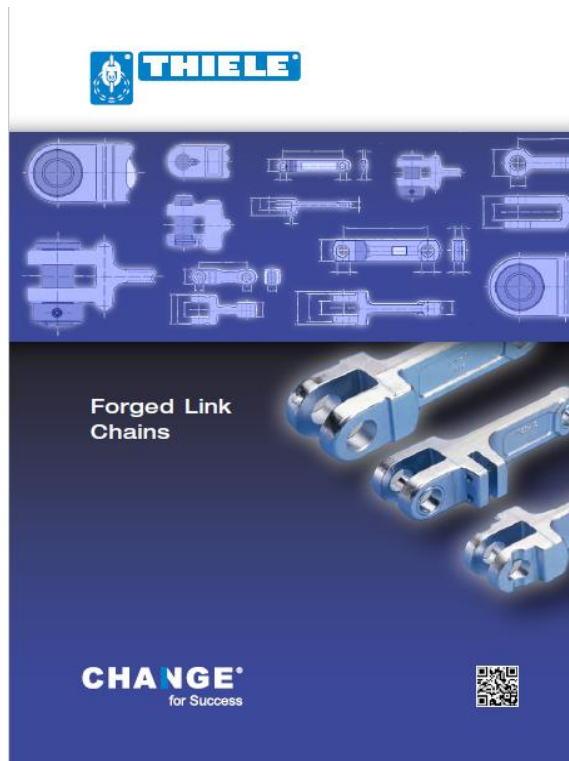
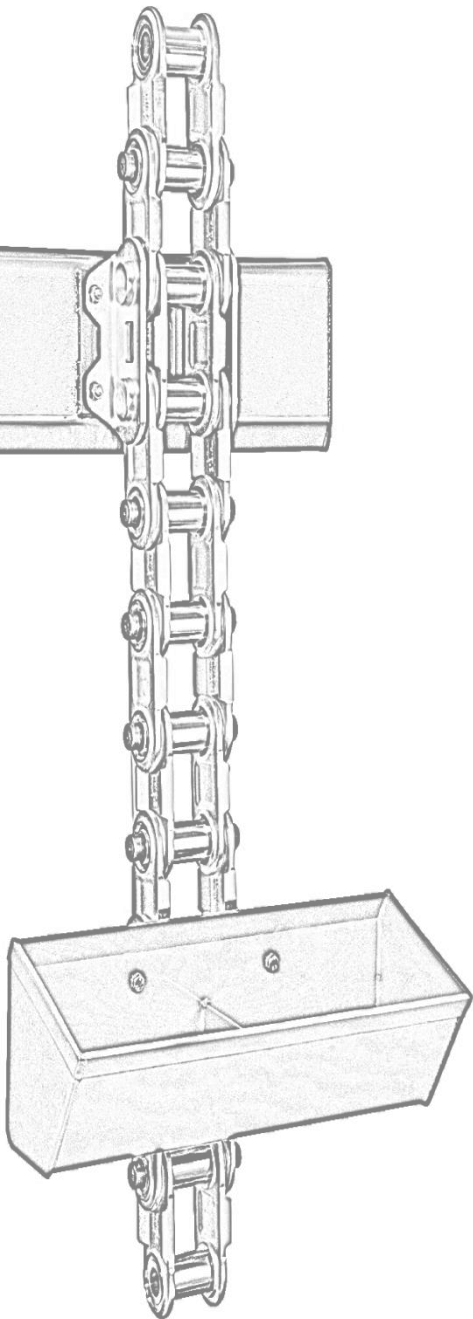
**with side scraper**



**as a polygon**

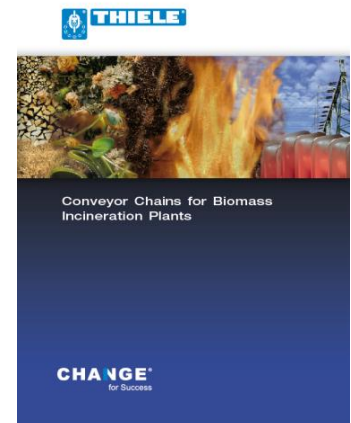
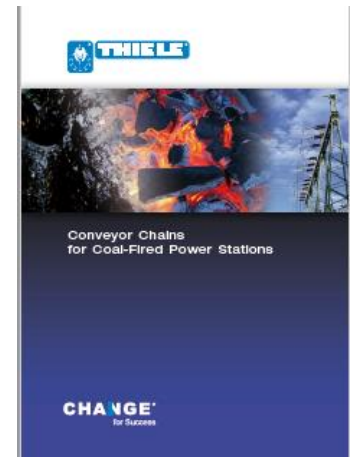
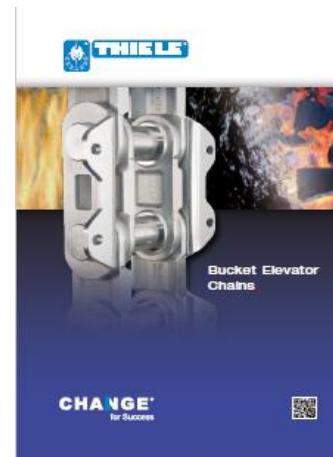
# Rotation Direction of Chain Wheel = Running Direction of Chain

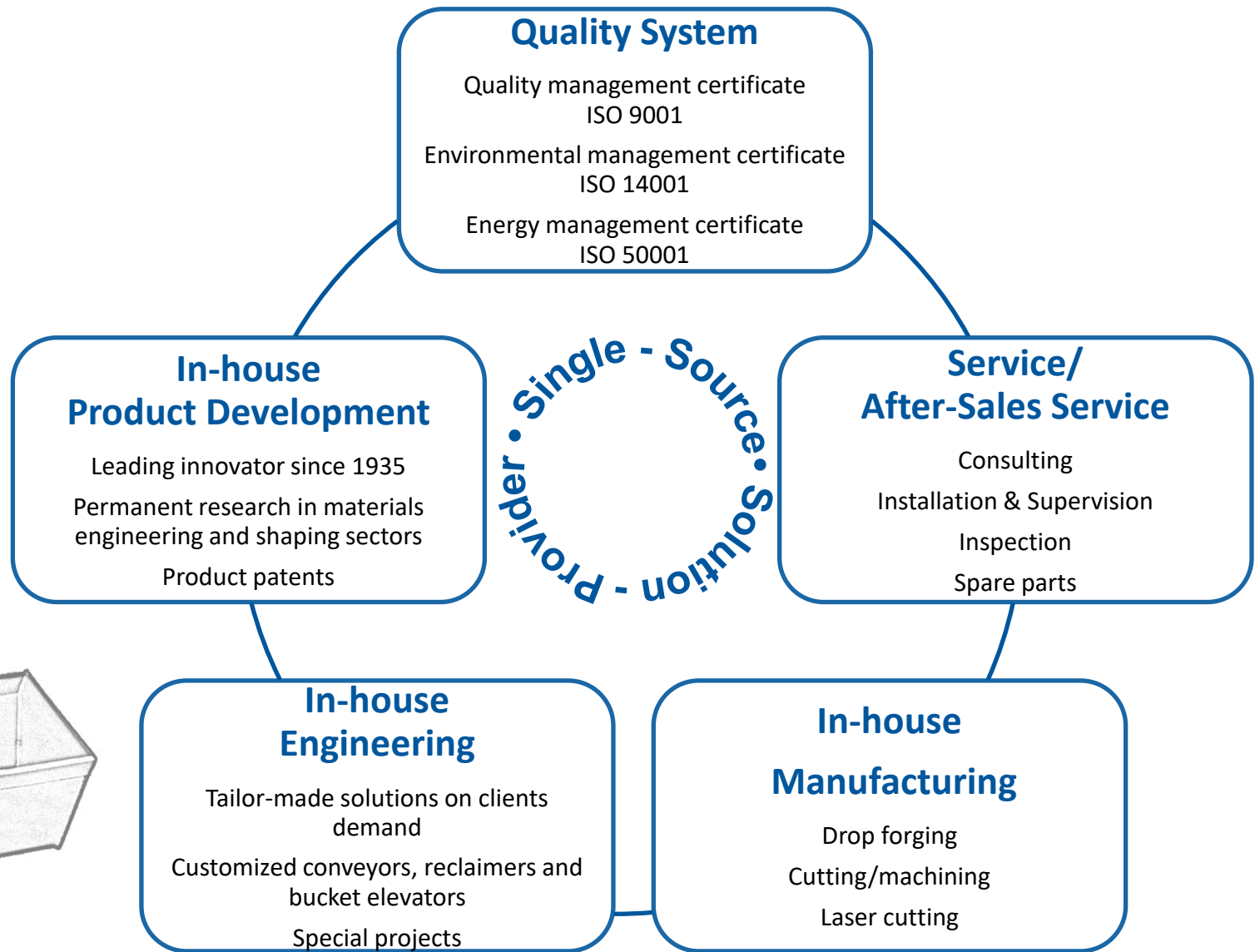
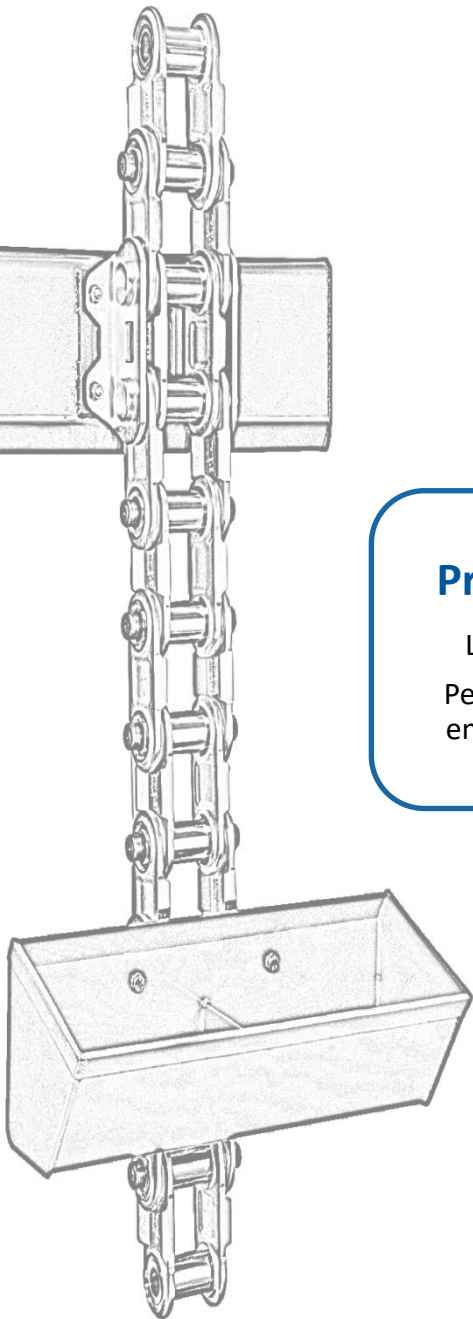




For supplementary details  
for this presentation, see  
**THIELE-Catalogue „FL-  
Chains“.**

You will find further explanations  
for THIELE conveyor chains in below  
inserted catalogues.







**Thank you very much for your attention!**