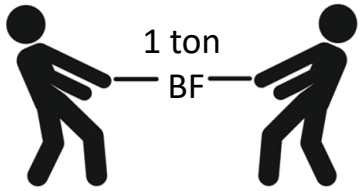
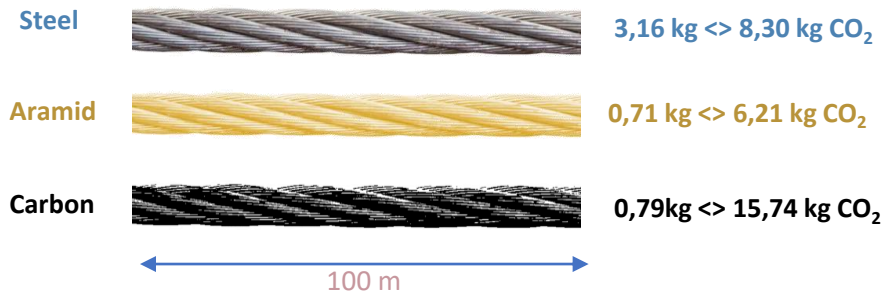
Aritec New Materials Group AG

Synthetic Cords for Rubber Conveyor Belts

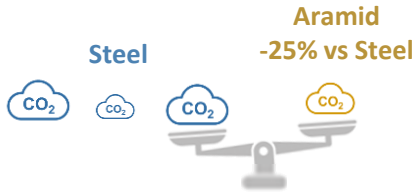
Aritec
New Materials Group AG

MRG reinforcement cord ranking
CO_2 footprint Initial + Complete life cycles



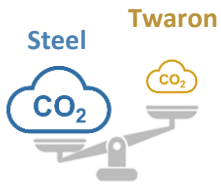


Manufacturing at same BF



	BF with Ø1,2mm (in N)	Masse Ø1,2mm / 1m yarn (in gr)	Nbr of yarn for 10 000N resistance	Mass in g for 100m / 10 000N (in kg)	**eq CO2 for 100m / 10 000N (in kg)**	eq CO2 Gap vs Aramid
Steel	1 688	5,33	6	3,16	**8,30**	Ref
Aramid Cords	1 750	1,25	6	0,71	**6,21**	-25%
PA66 GF30	675	0,88	15	1,30	**8,21**	-1%
Carbon Cords	1 728	1,36	6	0,79	**15,74**	90%
PE GF 30	600	1,12	17	1,87	**3,70**	-55%

Complete life cycle



TCO_2	eq CO2 initial	CO2 during service (bending + Lightweight)	Lifetime	Complete CO2 lifecycle	Price	CO2 + $$
Steel	-	--	+	**--**	+	**-**
Aramid Cords	+	++	++	**+++++**	-	**++++**
PA66 GF30	-	+	0	**0**	+	**+**
Carbon cords	--	+ +	+	**+**	-	**0**
PE GF 30	++	+	-	**++**	++	**++++**

Data Source

Table 2-3 Greenhouse emissions from polymer production, kg CO2eq/kg polymer

Polymer	Polymer production and key upstream contributing processes	Greenhous gas emissions (kg CO_2eq/kg polymer)
PP	Polypropylene, granulate production (Europe)	1.91
LD PE	Polyethylene, low density, granulate production(Europe)	1.98
HD PE	Polyethylene, high density, granulate (RER) production (Europe)	1.93
PVC	Polyvinylchloride bulk polymerised production (Europe)	2.51
PUR	Polyurethane, rigid foam production (Europe)	5.70
PET	Polyethylene terephthalate, granulate, amorphous production (Europe)	2.94
PS	Polystyrene, general purpose production (Europe)	3.68

Source: Ecoinvent database, version 3.6 (7)

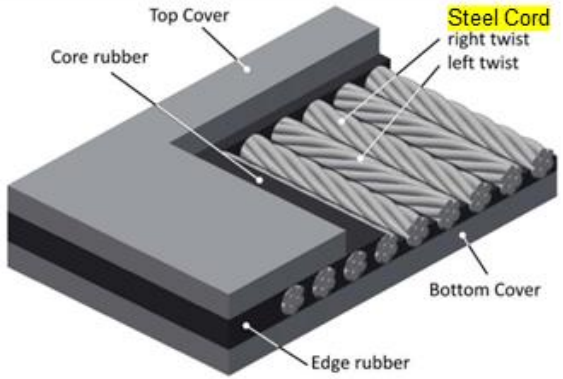
https://www.eionet.europa.eu/etcs/etc-wmge/products/greenhouse-gas-emissions-and-natural-capital-implications-of-plastics-including-biobased-plastics/@@download/file/ETC_2.1.2.1._GHGEmissionsOfPlastics_FinalReport_v7.0_ED.pdf

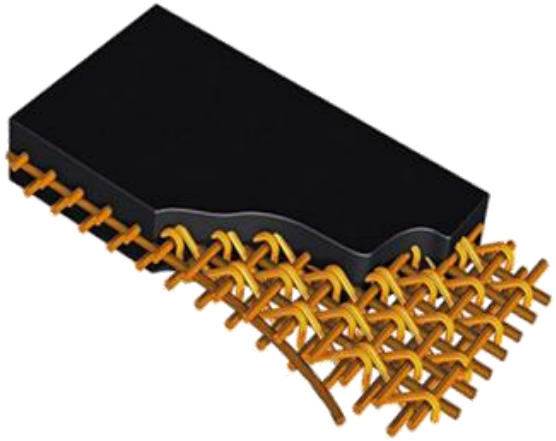
CO2 cost per kg manufactured (*)

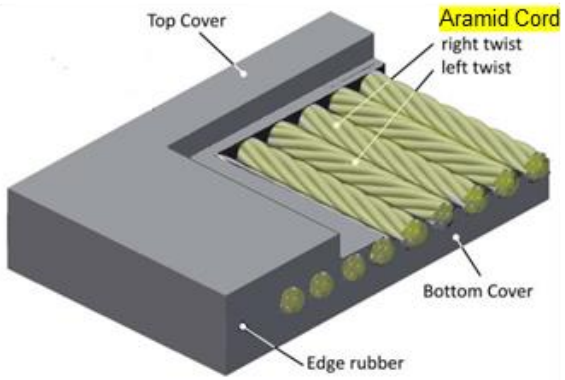
1 kg Steel	2,6 kg CO_2
1 kg Twaron	8,7 kg CO_2
1 kg Glass fiber	2,1 kg CO_2
1 kg Carbon fiber	20,0 kg CO_2
1kg PA6	6,3 kg CO_2
1kg PE	1,9 kg CO_2
1kg Basalt	1,23kg CO_2

(*) No transport considered

Mining Belt Product Type
Improve Efficiency and CO2 footprint







Steel Cords

- Conventional design
- Splicing OK
- Limited length for handling

Aramid Mesh

- Improved weight
- Splicing NOK
- Limited length due to splicing

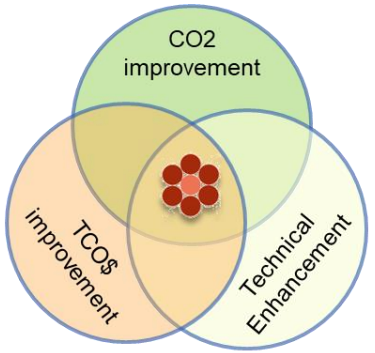
ARITEC ARAMID CORDS

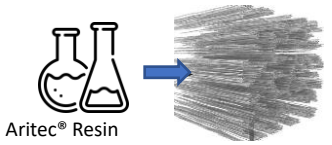
- **Improved weight**
- **Same Belt process as Steel**
- **Chemical bonding improved**
- **Edge rubber potentially removed**
- **Splicing OK**
- **Extended length and easier handling**

Our Expertise and Cord Product

- Our Focus & Technology
  - Partnership with Teijin ®, Improve performance vs Steel Cords
  - Focus on improving TCO$, TCO_2 and Technical Benefits
  - Resin impregnation to extend bending lifetime and enable conventional construction
  - Ready To use including bonding solution for CR/EPDM..

From Ø 0,32mm to Ø 10mm



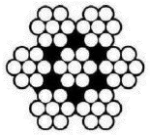


- Specs - CR rubber Bonded cords ∅ 5,4mm

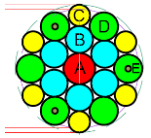
Design suitable for current calendaring process & Conventional splicing

Technora® 1+18 Bonded for CR

Control method		Nominal value
Construction		1+18
Breaking force	N	32802
Weight	g/100m	27.4
Diameter	mm	5.5
T-Test / CR	N/mm	135



Steel construction



Aramid construction

⟺ **Same BF as Steel**

⟺ **¼ of Steel cord Weight**

⟺ Increased up to 130N/mm
by fine tuning the bonding with CR Specific

Internal 3 cords Test

Improved Efficiency and CO2 footprint vs Steel Cords

- Belt Supplier Saving

Freight of Cords

Process easiness
20€/m saving

- Installation

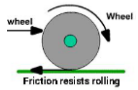
Freight of belt
500 kg

Easier Installation
96h vs 160h

Electrical motor equipment
100€/kWh

- End User

Belt Weight energy saving
0,22 €/kWh

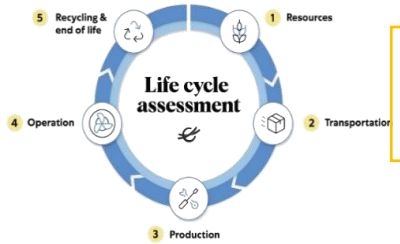


Idler resistance
260 days/y 24h/day
80% Load

Belt lifetime
6y for both belt
2x Change for 18y

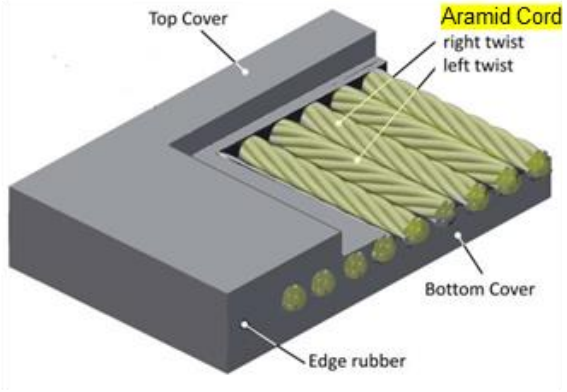
Recycling cost
180€/t vs 240€/t

Saving example:
Conveyor 3400m x 1,4m (Width) |
Capacity 3000t/h |
Energy cost 0,22 €/kWh |
Life cycle considered 18 y balance
➔ **Saving -2,8 M€** -10,7%
Dimensioning according DIN 22101 norms

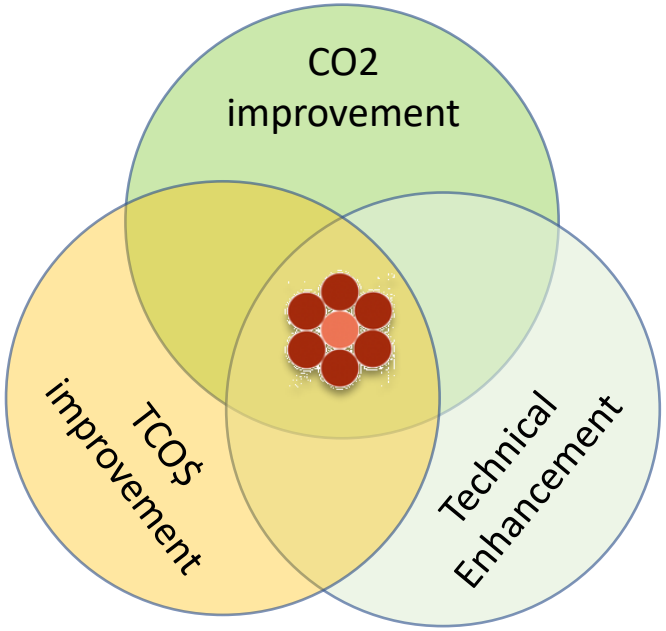


15 820 tCO_2 saved

Mining belt analysis



ARITEC proposal matches the 3 pillars on complete product life cycle



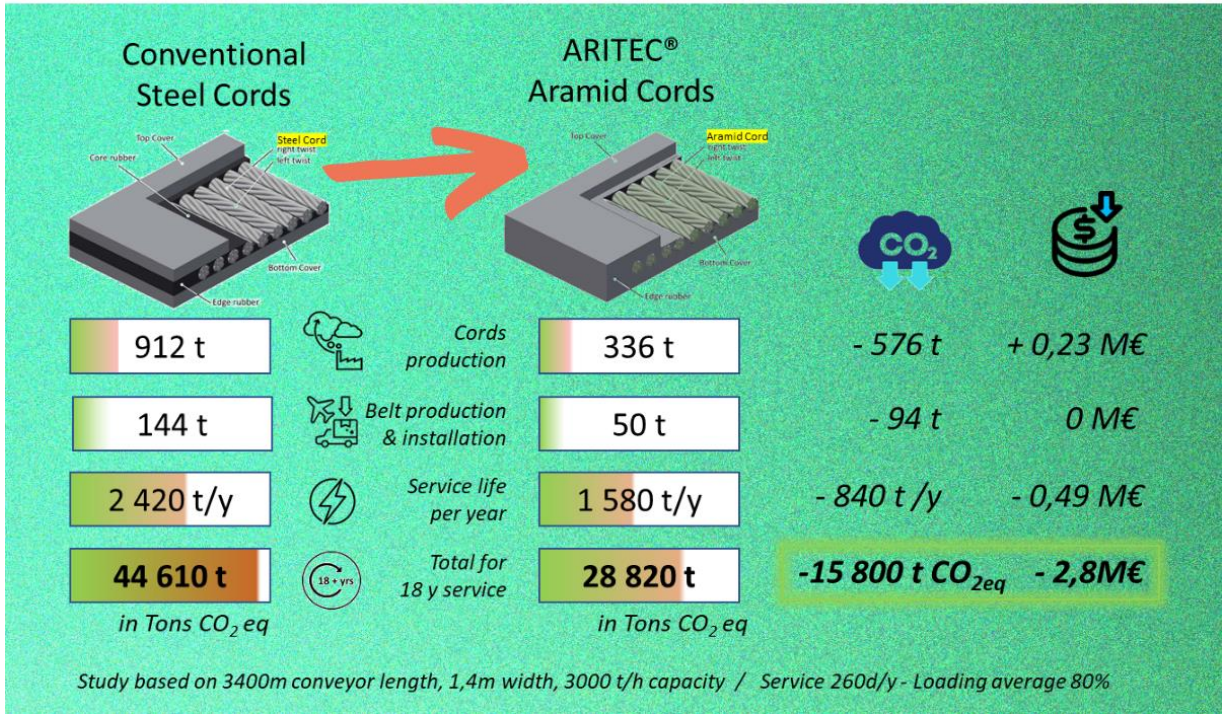
	Design	Process	Service	End Life
CO2 footprint		• Reduction for Freight (cord & belt and components)	• Lower torque on components • Energy saving	• Recycling for Teijin
Technical Enhancement	• **Lighter frame support** • **Lower torque**	• Bonding improvement • Ideal for Pipe Conveyors • Lower Tare -> Higher net capacity	• Speed improvement	
TCO$ Improvement	• **Saving on Structural Design & Components (less rollers needed -> lower belt weight)**	• **Transport** • **Quicker Installation/ uptime higher** • **Cost per ton**	• **Electricity usage** • **Maintenance cost** • **Lower Impact on HSE related injuries**	• **No need for steel cord separation from rubber** • **Recycled for other uses**

When CO2 saving commits also with TCO$ improvement

Up to recently, aramid use for large conveyor belt was limited to mesh, restricting their use for long length belt.

Aritec New Materials AG developed aramid cords and bonding solution to replace steel cords for large conveyor belt.

Do not hesitate to contact us for more informations



TCO

Traction sheave diameter can be reduced

Ready

Pre-bonded cords
No process change vs Steel cords belt

Longer maintenance period & cost
Splicing OK

Weight reduction

Your Contact

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