



STRUCTURAL STRENGTHENING WITH FRP.

AVAILABLE SYSTEMS AND CARBODUR SOFTWARE TOOL

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AGENDA

1. Understanding the Need for Structural Strengthening

Explore the reasons behind reinforcing existing structures and the benefits it provides.

2. Designing with FRP: Standards and Guidelines

Review current industry standards and best practices for designing with Fiber-Reinforced Polymer (FRP) systems.

3. Overview of FRP Systems and Applications

Examine the types of FRP systems available and their practical uses in structural engineering.

4. Introducing the Enhanced CarboDur Design Software

Discover the latest features and improvements in the CarboDur software tailored for structural designers.

WHAT WE DO BUILDING TRUST

- Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and motor vehicle industry.



SIKA AT A GLANCE

25,000	EMPLOYEES
100	COUNTRIES
300+	PLANTS WORLDWIDE
6	NEW & EXPANDED PLANTS IN 2020
83	NEW PATENTS IN 2020
1	ACQUISITION IN 2020
7.88 BN	NET SALES IN 2020 (IN CHF)

WE ARE THERE

Our products might not always be visible but the results they achieve bring clear added value to customers and society.



TARGET MARKETS – FOCUS ON ATTRACTIVE MARKETS

SOLUTIONS, LIFE-CYCLE MANAGEMENT, ONE STRONG BRAND

Concrete



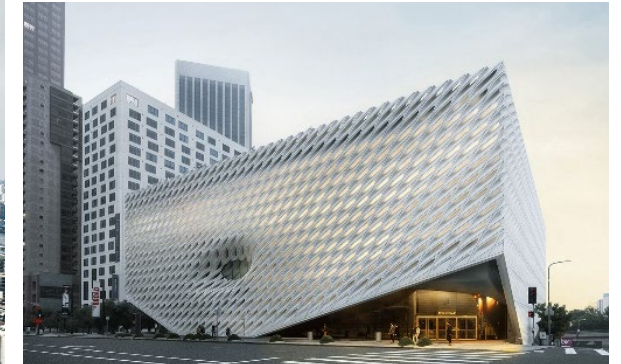
Waterproofing



Roofing



Building Finishing



Flooring & Coating



Sealing & Bonding



Engineered Refurbishment



Industry



UNDERSTANDING STRUCTURAL STRENGTHENING

Three overlapping yellow triangles pointing to the right, positioned behind the main title text.

Optional Subtitle

WHY DO STRUCTURES NEED STRENGTHENING

6



So that our structures are not zip-tied or strapped together to prevent failure!



WHY DO STRUCTURES NEED STRENGTHENING?

- Insufficient reinforcement
- Corrosion damage
- Change in use
- Structural damage
- Seismic upgrade



HOW ARE STRUCTURES STRENGTHENED

TYPICAL STRENGTHENING METHODS



Externally bonded FRP or Steel

Traditionally done with steel, most bonded strengthening is nowadays done with FRP



Section enlargement

Used frequently, this method is intrusive to the structure, adds a lot of weight, and takes longer to implement



External Post-tensioning

For cases where high-capacity contribution is required, external PT is great solution. Traditionally done with steel, PT strengthening can also be done with FRP



Supplemental Support

Supplemental supports are a great solution, though they take headspace and can be tricky to install.

WHAT ARE FRP SYSTEMS?

FABRIC



Fabrics are made from glass or carbon fiber.

RESIN



Most used resins to saturate the fabrics are epoxy and more recently PU.

REINFORCED CONCRETE



Reinforced concrete is a composite. Bonding FRP to it creates a complex system. Understanding how to design with it properly is critical for successful strengthening.

MOST COMMON FRP MATERIALS

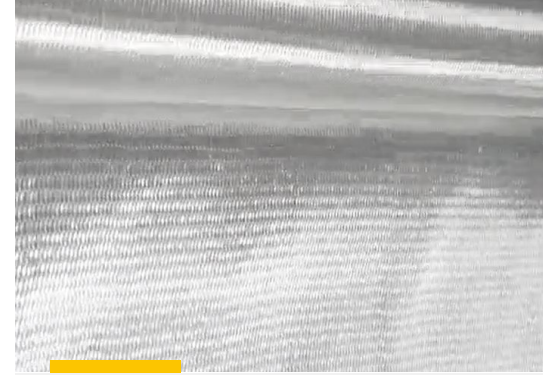
GLASS VS CARBON



Carbon Systems (CFRP)

- Damp/wet conditions
- Stiffness driven
- Extreme alkaline conditions

**Stronger, stiffer, more durable
CFRP**



Glass Systems (GFRP)

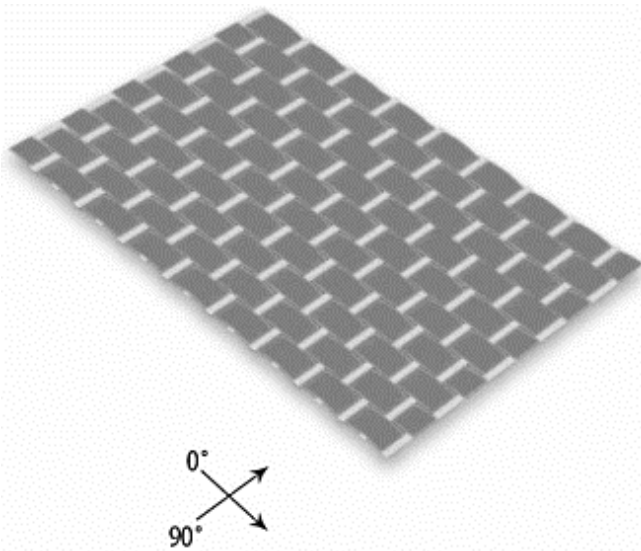
- Seismic strengthening
- Dry conditions
- Extreme acidic conditions
- Economical

**Economical, used commonly for
seismic retrofit
GFRP**

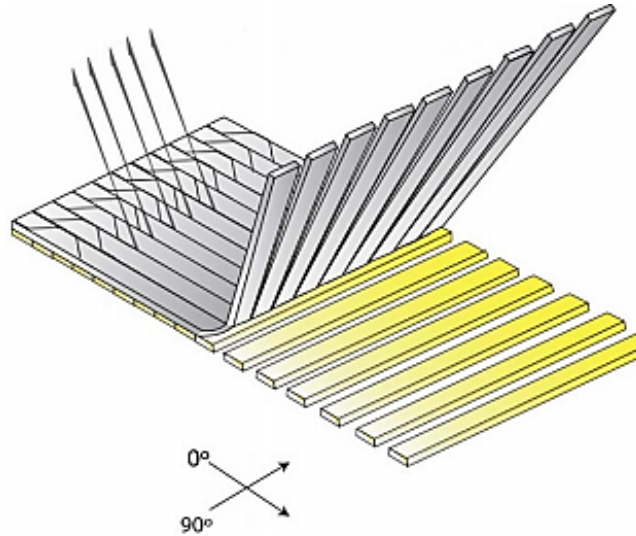
FRP FABRIC TYPES

11

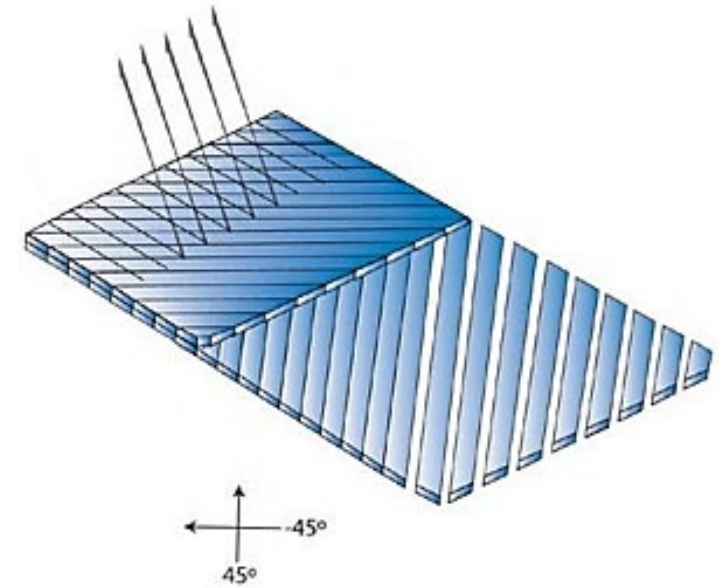
Uniaxial Fabrics



Biaxial Fabrics



+/-45d Fabrics



ADVANTAGES OF FRP REPAIRS

12

- Cost/scheduling benefits
- Reduced maintenance costs
- Light weight materials puts less strain on the structure
- Non-corrosive, designed for long-term performance
- Great for limited access



TYPICAL APPLICATIONS

Three overlapping yellow triangles pointing to the right, arranged in a horizontal sequence. The first triangle is on the left, the second is in the middle, and the third is on the right. They overlap such that the right side of one triangle is behind the left side of the next.

Optional Subtitle

TYPICAL APPLICATIONS

PARKING STRUCTURES

- Shear Strengthening
- Corrosion Damage
- Column strengthening



TYPICAL APPLICATIONS BUILDINGS



- Modifications (wall or slab openings)
- Change in use
- Seismic upgrades
- Wall strengthening



TYPICAL APPLICATIONS

BRIDGES



- Girder Strengthening
- Column Wrapping
- Pier Upgrades
- Pier cap strengthening
- Deck Stiffening

TYPICAL USAGE OF FRP MATERIALS

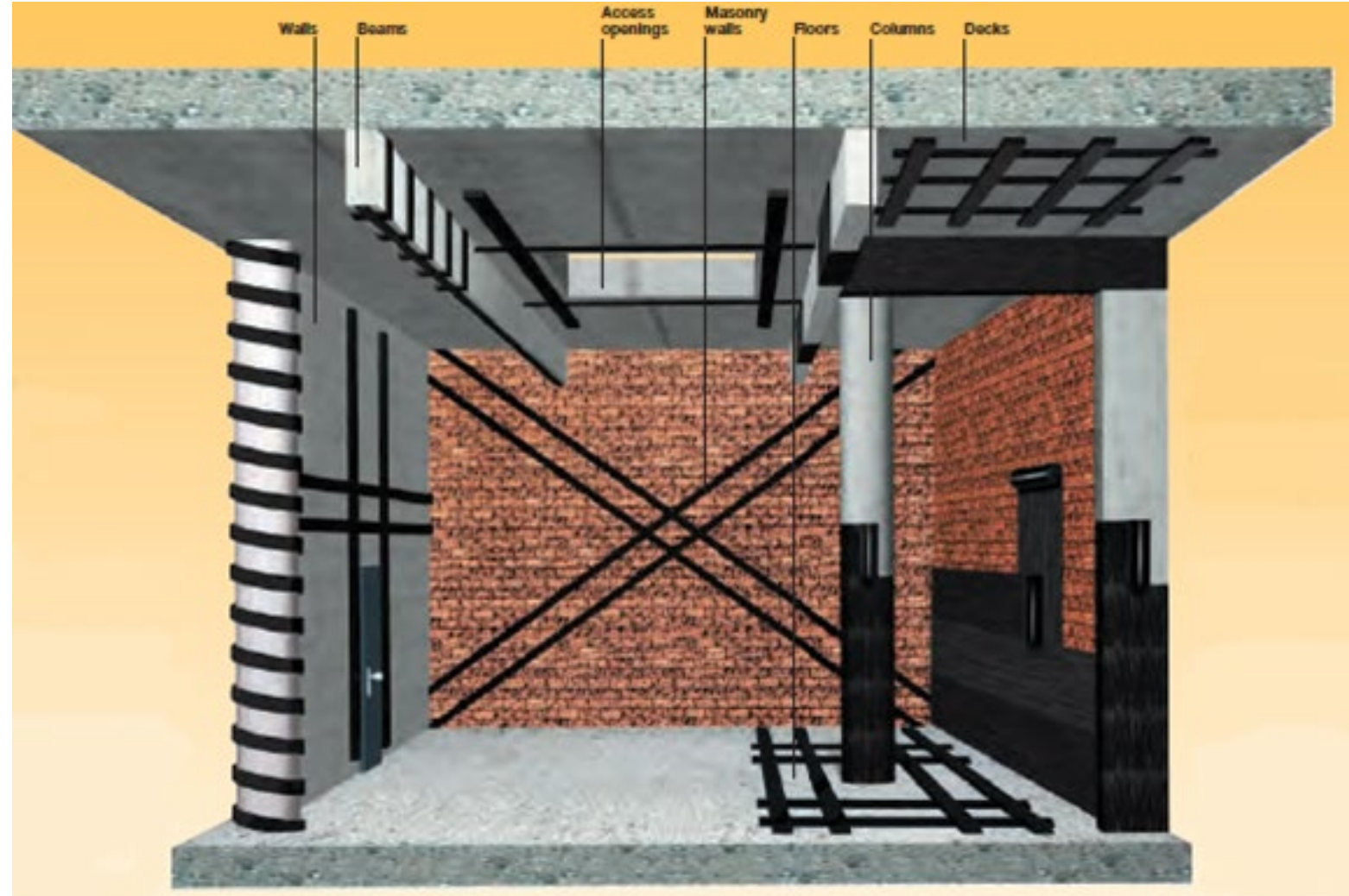
17

Flexural

Shear

Confinement

Seismic



INTERNAL

TYPICAL USAGE OF FRP MATERIALS

SUMMARY

- Load Increases
 - Increased live loads
 - Increased traffic volumes on bridges
 - Installation of heavy machinery in industrial buildings
 - Vibrating structures
 - Changes of building utilization
- Seismic Strengthening
 - Column wrapping
 - Masonry walls
- Damage to Structural Parts
 - Aging of construction materials
 - Vehicle impact
 - Fire
 - Blast resistance
- Change in Structural System
 - Removal of walls or columns
 - Removal of slab sections for openings
- Design or Construction Defects
 - Insufficient reinforcements
 - Insufficient structural depth

OVERVIEW OF FRP SYSTEMS AND APPLICATIONS

Three overlapping yellow triangles pointing to the right, positioned behind the main title text.

Optional Subtitle

AVAILABLE FRP SYSTEMS

20



PRIMER APPLICATION FOR FRP SYSTEMS

21

- Mix & Apply Epoxy Primer



FIELD SATURATED FRP SYSTEMS

SATURATE FABRIC WITH RESIN – TABLE OR SATURATOR

22



INTERNAL



CFRP PLATES

CLEAN, CUT, AND INSTALL STRIPS

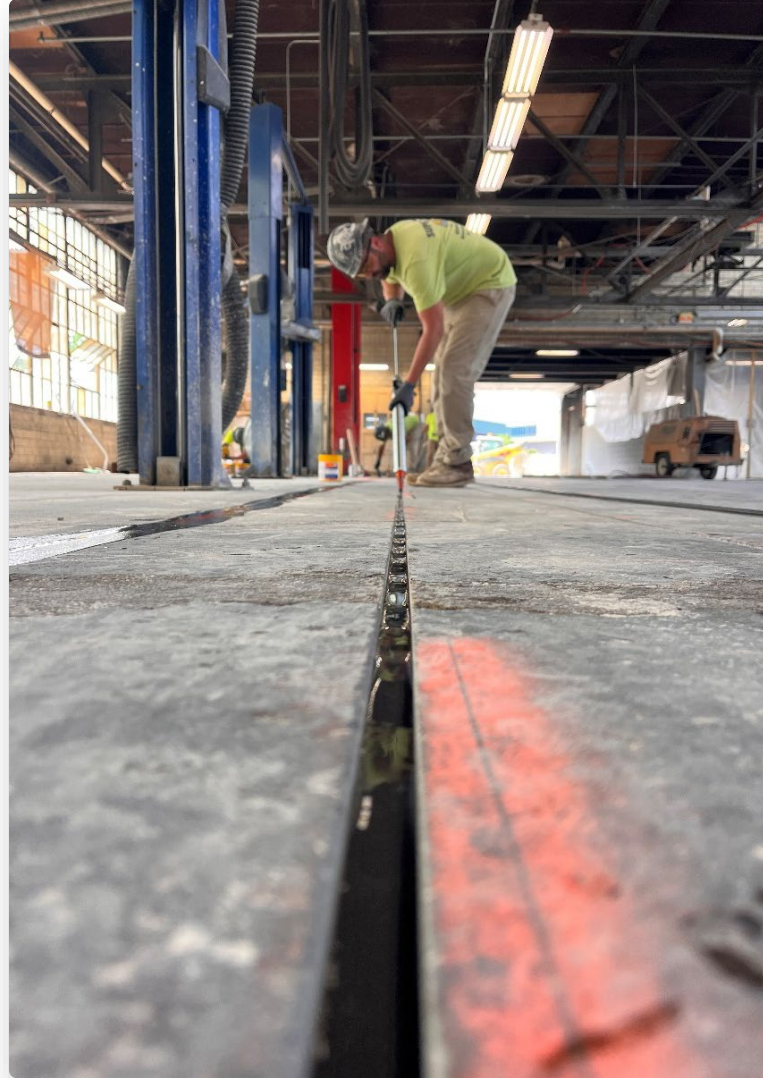
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INTERNAL

FRP RODS

NSM REINFORCEMENT

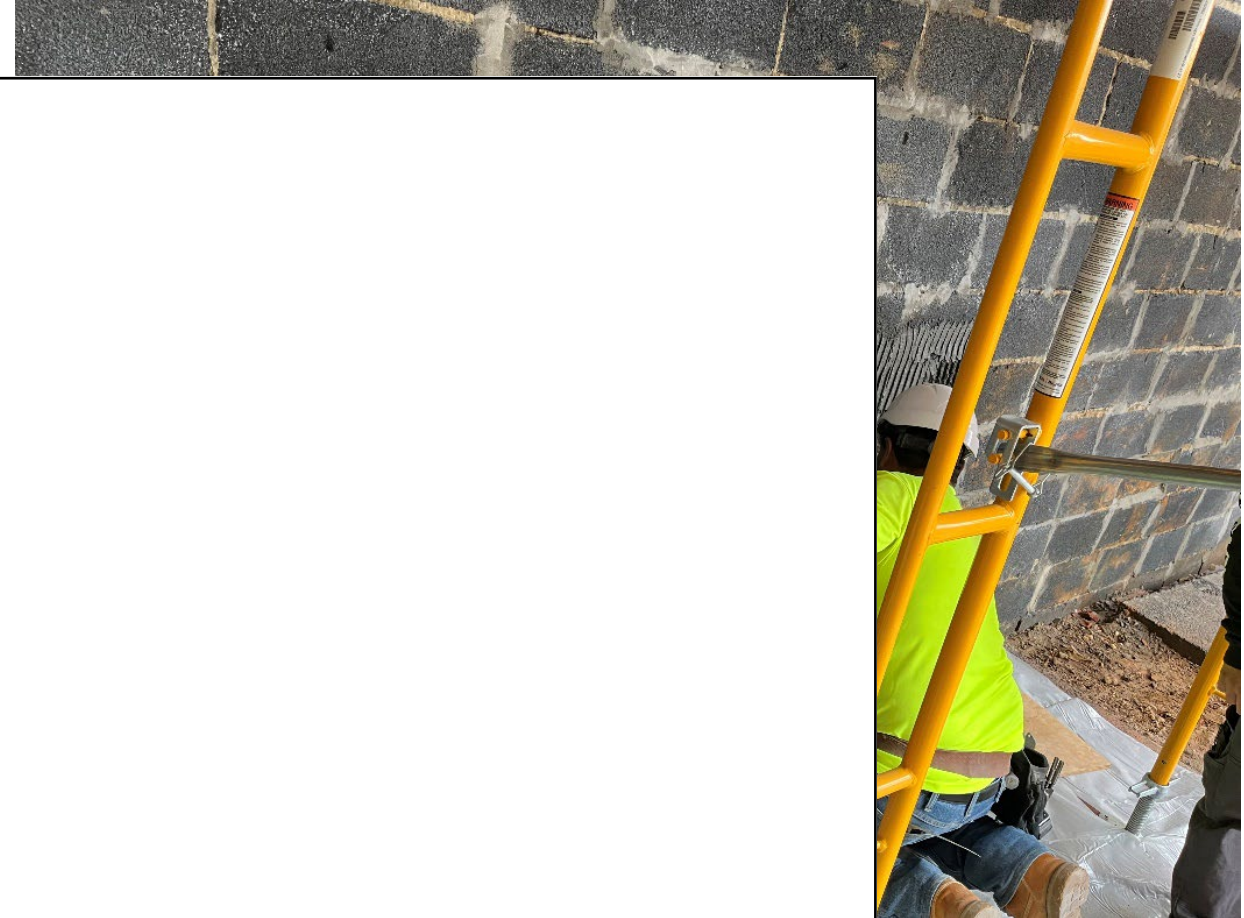
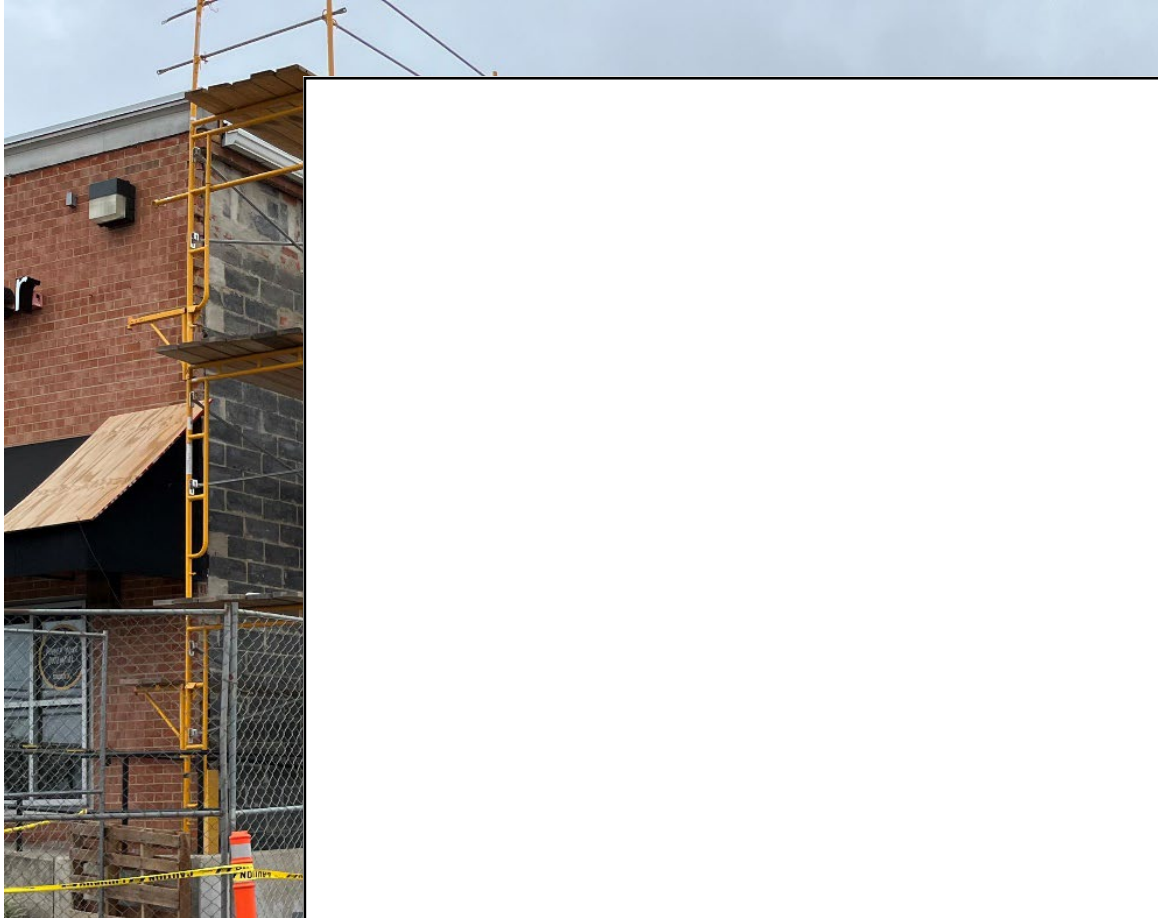


INTERNAL

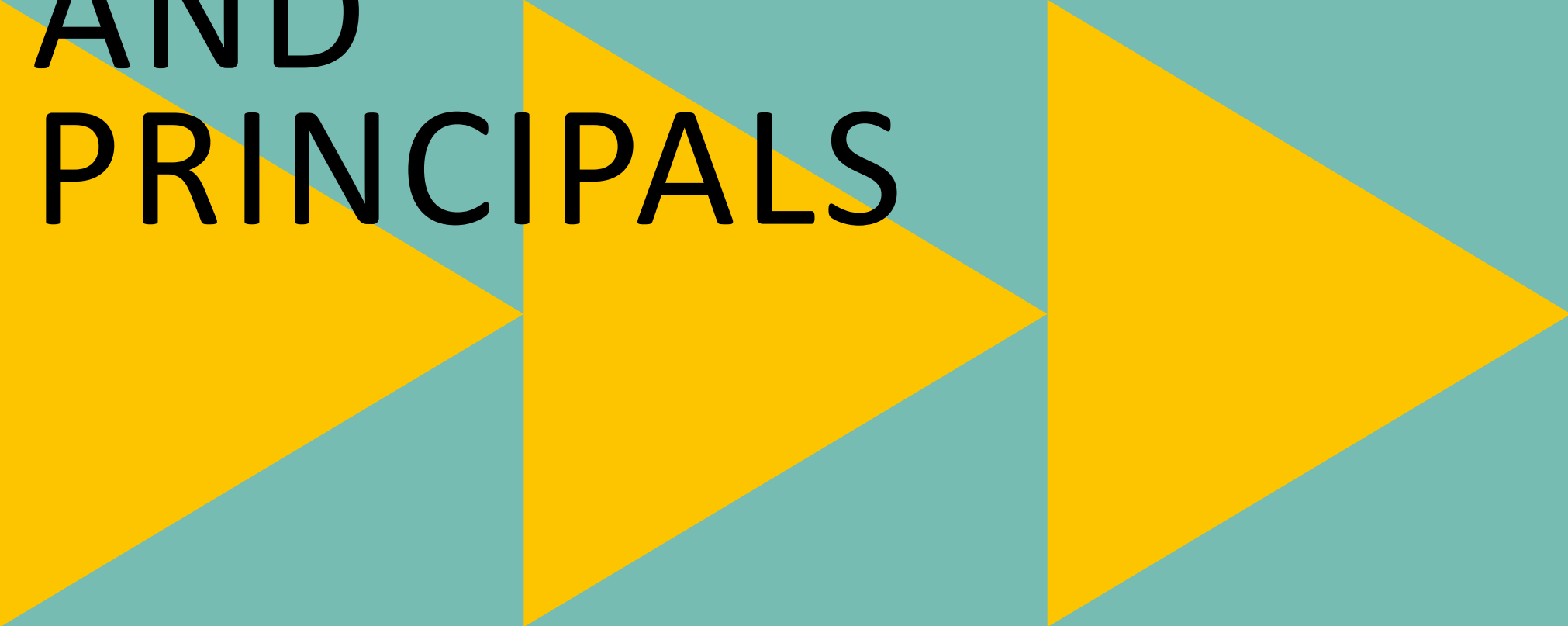


FRCM REINFORCEMENT

25



DESIGN GUIDES AND PRINCIPALS

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Optional Subtitle

CODES AND STANDARDS

ACI & AASHTO

- ACI 440.2-23
 - Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures – Guide
- ACI 562-17
 - Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings
- AASHTO Guide 2nd Ed
- ICC Evaluation Service Report



“SUPPLEMENTAL REINFORCEMENT”

FRP Limitations

$$(\phi R_n)_{existing} \geq (1.1S_{DL} + 0.75S_{LL})_{new}$$

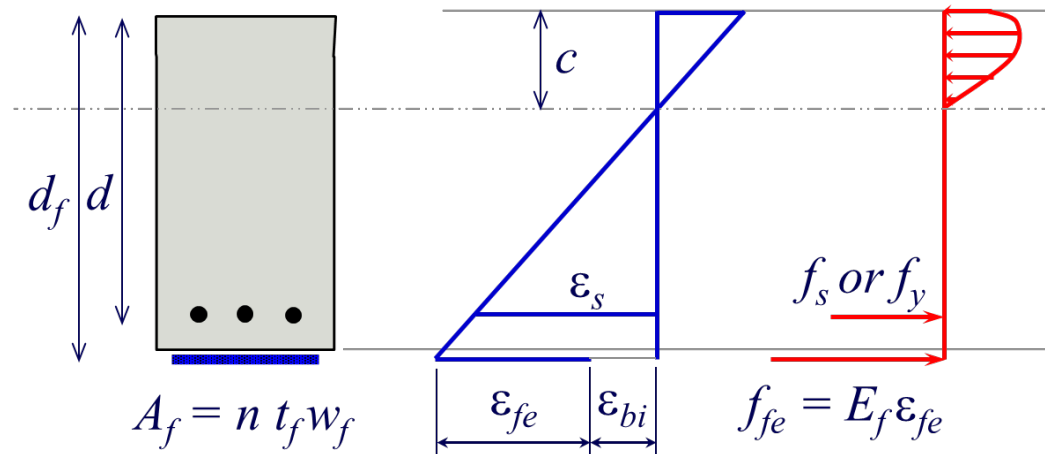
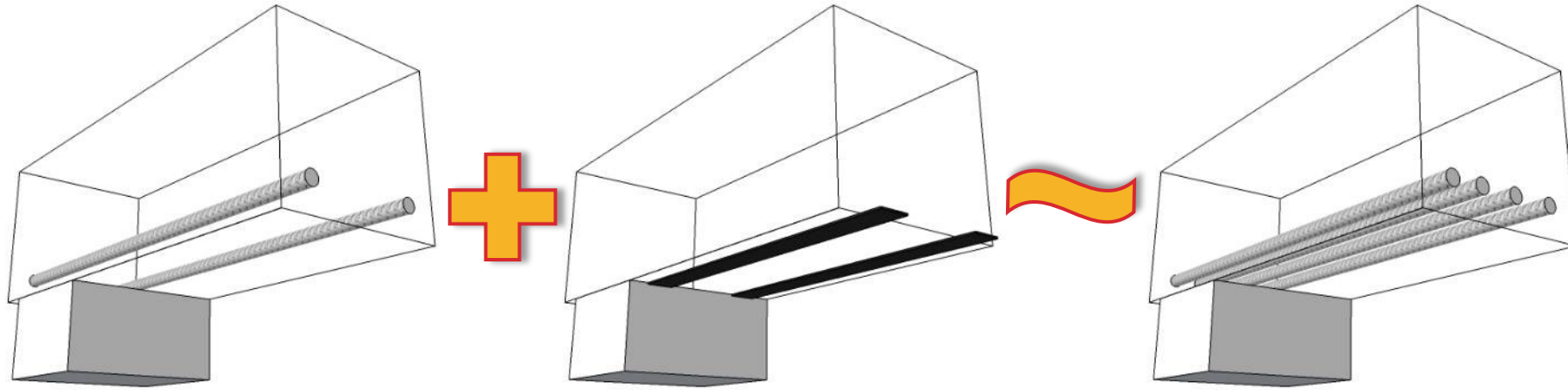
Existing Capacity $\geq$ Load demand:
1.1DL + .75LL



FLEXURAL REINFORCEMENT

HOW DOES CFRP AFFECTS A REINFORCED BEAM?

FLEXURAL STRENGTHENING



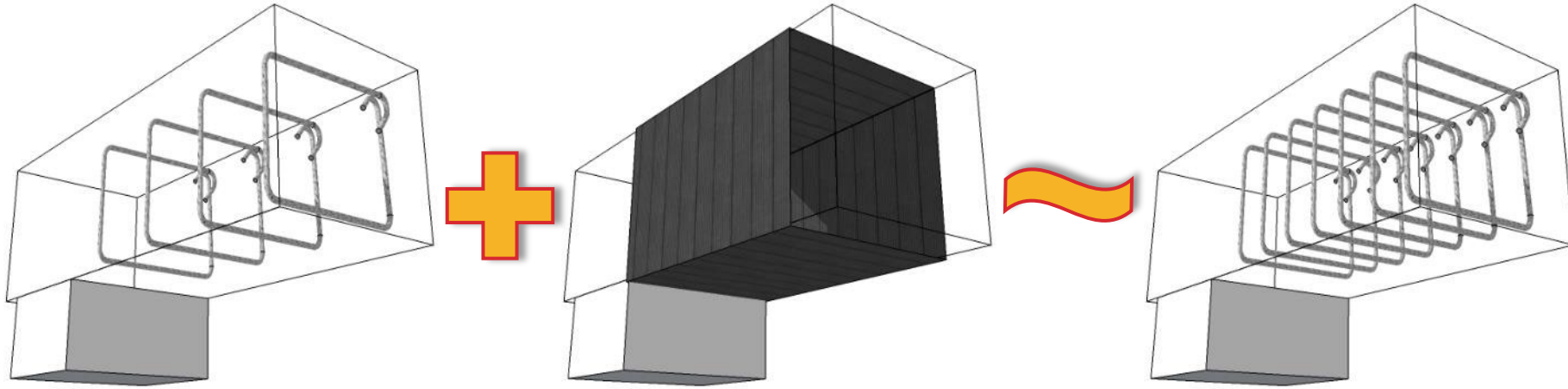
$$M_n = \underbrace{A_s f_s \left(d - \frac{\beta_1 c}{2} \right)}_{\text{Steel Contribution}} + \underbrace{\Psi_f A_f f_{fe} \left(d_f - \frac{\beta_1 c}{2} \right)}_{\text{FRP Contribution}}$$



SHEAR REINFORCEMENT

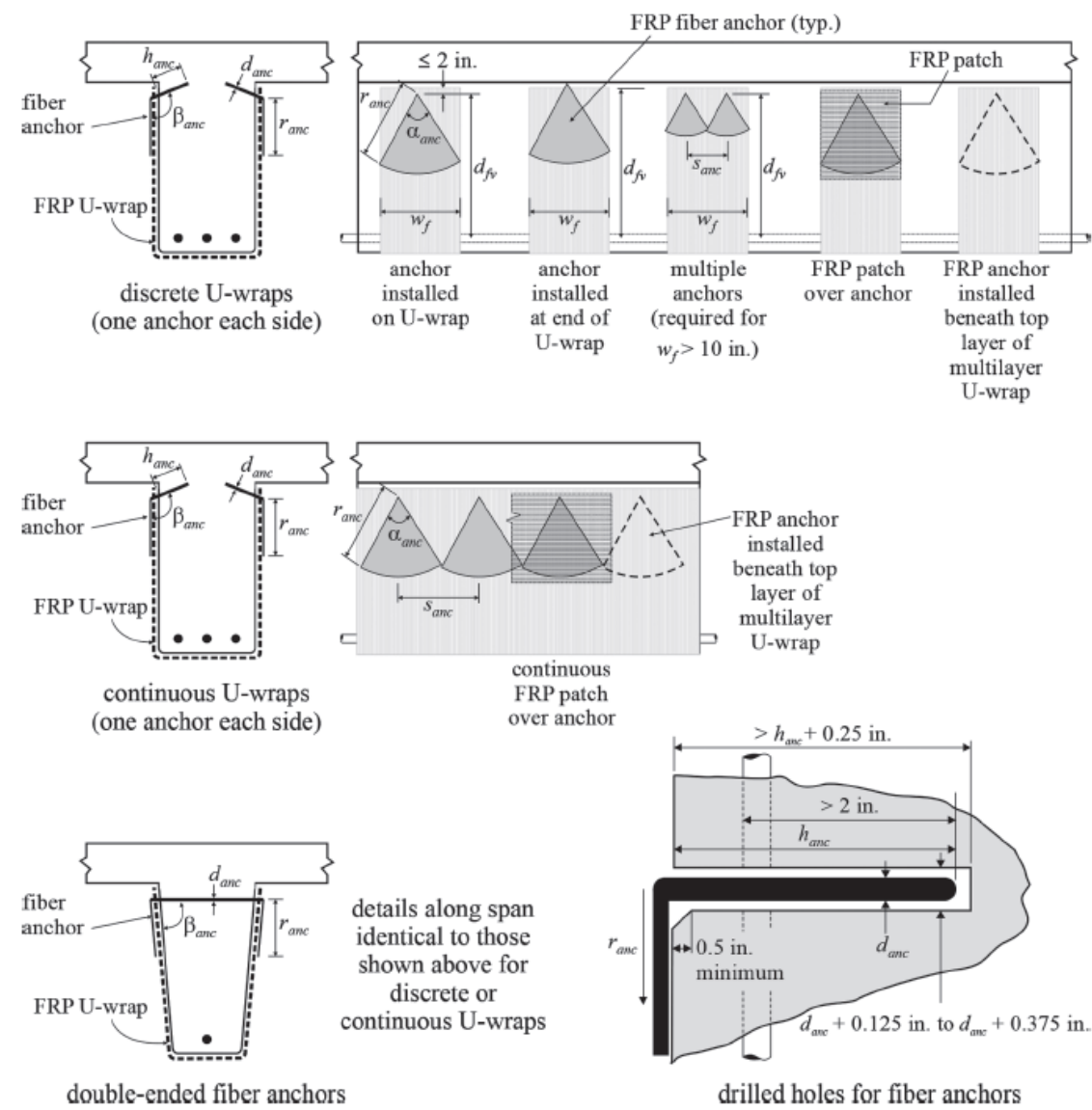
HOW DOES CFRP AFFECTS A REINFORCED BEAM?

SHEAR STRENGTHENING



$$\phi V_n = \underbrace{\phi(V_c + V_s)}_{\text{Steel and concrete contribution}} + \underbrace{\Psi_f V_f}_{\text{FRP Contribution}}$$

U-WRAP ANCHORAGE – FIBER ANCHORS



$$A_{anc} \geq R_A(Nt_f s_{anc})$$

Table 8.7.6.1—Fiber anchor design parameters and detailing requirements, in.-lb

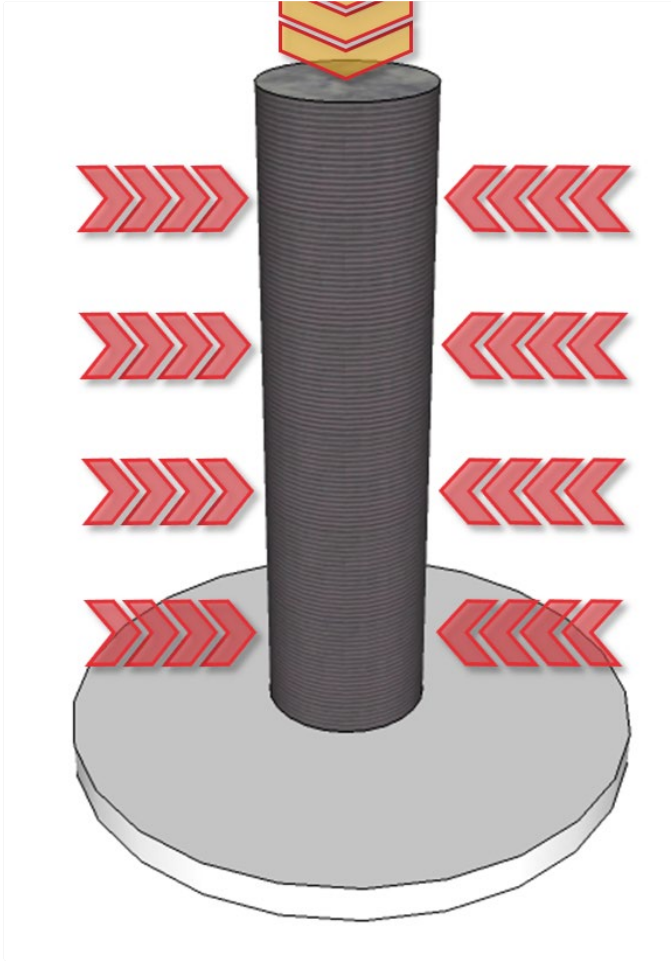
s_{anc} , in.	U-wrap NE_{ftf} , kip/in.	R_A		r_{anc} , in.	h_{anc} , in.		
		90 degrees	125 degrees		90 degrees	110 degrees ≤ 125 degrees	125 degrees $< \beta_{anc} \leq 180$ degrees
≤ 4	$NE_{ftf} \leq 288$ $288 < NE_{ftf} \leq 575$ $575 < NE_{ftf} \leq 863$ $863 < NE_{ftf} \leq 1150$						6.0 6.0 6.0 8.0
$4 < s_{anc} \leq 6$	$NE_{ftf} \leq 288$ $288 < NE_{ftf} \leq 575$ $575 < NE_{ftf} \leq 863$ $863 < NE_{ftf} \leq 1150$						6.0 6.0 8.0 10.0
$6 < s_{anc} \leq 8$	$NE_{ftf} \leq 288$ $288 < NE_{ftf} \leq 575$ $575 < NE_{ftf} \leq 863$ $863 < NE_{ftf} \leq 1150$						6.0 8.0 10.0 12.0
$8 < s_{anc} \leq 10$	$NE_{ftf} \leq 288$ $288 < NE_{ftf} \leq 575$ $575 < NE_{ftf} \leq 863$ $863 < NE_{ftf} \leq 1150$						6.0 8.0 10.0 12.0





COLUMN CONFINEMENT

COLUMN STRENGTHENING CONFINEMENT



- CFRP strengthening
- Increase in both axial and flexural strength
- Commonly used for seismic retrofitting
- Most efficient reinforcement in circular columns

CONFINEMENT DESIGN

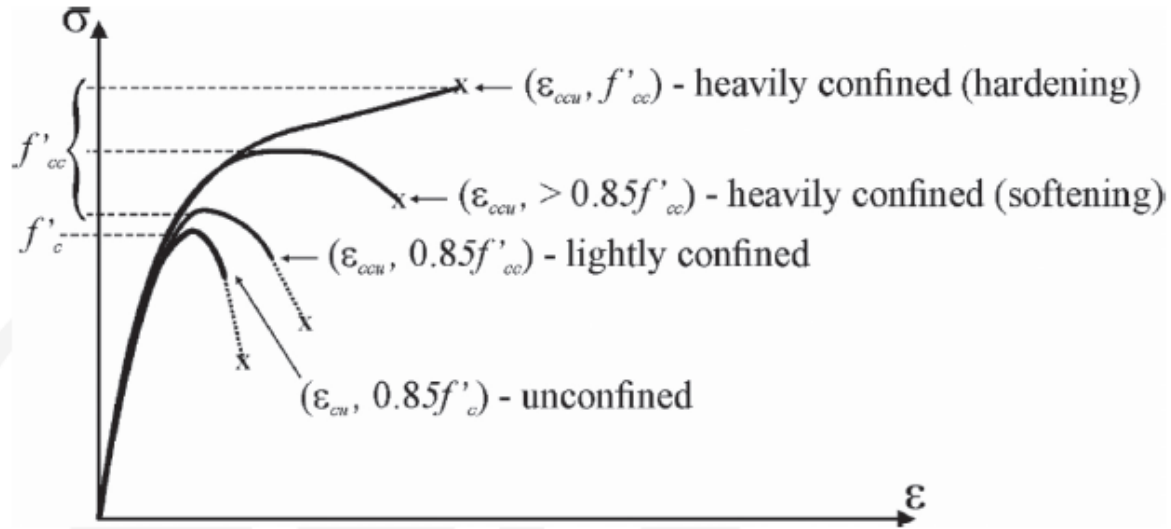


Fig. R9.2.4.1.3—Schematic stress-strain behavior of unconfined and confined reinforced concrete columns (after Rocca et al. [2006]).

Reduction
factor for non-
circular
members

$$f'_{cc} = f'_c + \Psi_f 3.3 \kappa_a f_l$$

$$\epsilon_{ccu} = \epsilon'_c \left(1.5 + 12 \kappa_b \frac{f_l}{f'_c} \left(\frac{\epsilon_{fe}}{\epsilon'_c} \right)^{0.45} \right)$$

$$\phi P_n = 0.85 \phi \left[0.85 f'_{cc} (A_g - A_{st}) + f_y A_{st} \right]$$

CONFINEMENT DESIGN

- For combined axial compression and bending
- Axial-moment interaction for an FRP confined column is found based on strain compatibility and stress resultants.

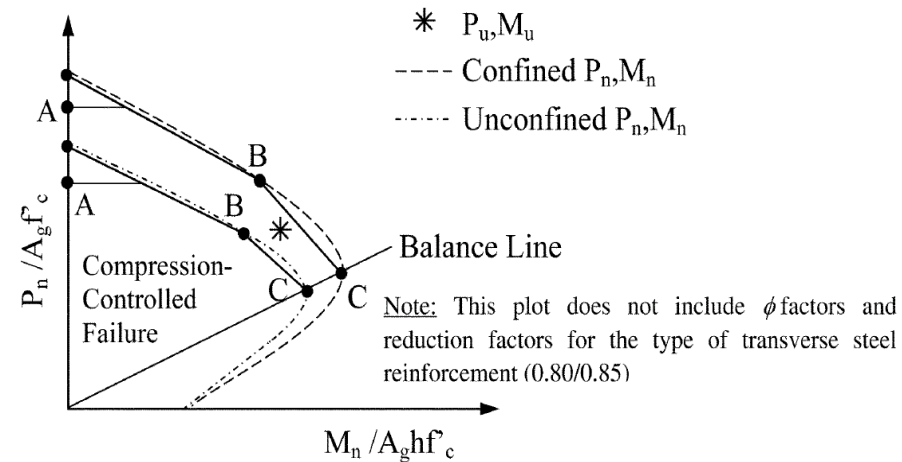


Figure 12.4 in ACI-440.2R

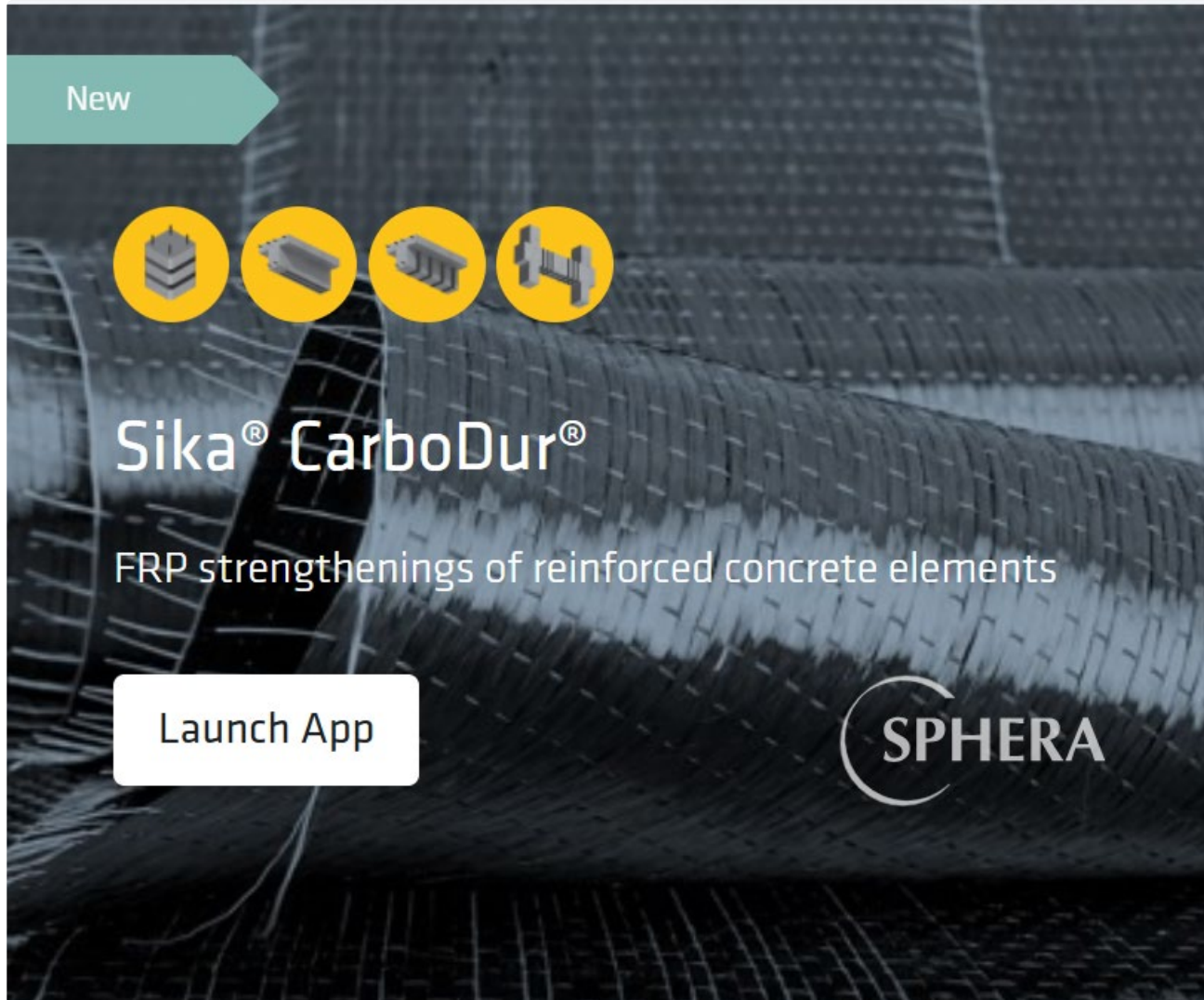
CARBODUR SOFTWARE



Optional Subtitle

SIKA CARBODUR SOFTWARE

NEW AND IMPROVED CLOUD BASED TOOL



Features of the new Sika® CarboDur® Software

- Free licensed, cloud-based software
- No installation needed
- Compatible with all web browsers
- Modernized interface and easy navigation
- User has full control of complete design process
- Available in multiple languages and design guidelines
- Supported by Sika technical assistance

SIKA® CARBODUR® SOFTWARE – CLOUD BASED



NEW

ADVANTAGES

- Powerful tool
- Free license
- Excellent user interface
- Multi language/ Multi design standard
- Cloud based. No installation needed
- Accessible from any internet connected device
- New functionalities

Old version:

- ~~Required installation~~
- ~~Several issues with firewall and antivirus~~
- ~~No control on the activities done by users~~
- ~~Not sure everybody works with latest version~~
- ~~License valid only on 1 single PC/laptop~~



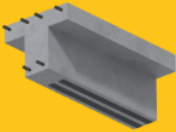
CARBODUR SOFTWARE

LANDING PAGE

 CarboDur® Home

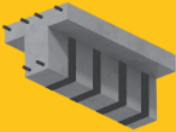
[Licence Agreement](#) [Website](#) [English](#) [Profile](#) [Sign Out](#)

New project



Section flexural-strengthening

+ Flexural



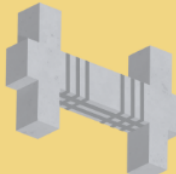
Section shear-strengthening

+ Shear



Column confinement

+ Confinement



Beam strengthening

COMING SOON

My projects

Search all projects...

Name	Element	Type	Code	Country	Last Modified	Status	Open for assistance
FRP Torsion Wrap WZ - Shear	2B10		ACI PRC-440.2-23	United States	9/25/2025, 1:42:58 PM	In Progress	 No
FRP Torsion Wrap WZ	2B10		ACI PRC-440.2-23	United States	9/25/2025, 12:57:35 PM	Complete	 No

< 1 >

Show 10



NEW SIKA® CARBODUR® SOFTWARE

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The screenshot displays the Sika CarboDur Software interface. At the top, a yellow header bar contains the Sika logo, the text "CarboDur® Software", and links for "Contact Us", "Website", and "Sign In".

On the left side, a sidebar shows project information: "GSTM 2024", "EXAMPLE", "Last edited 6/5/2024", "Confinement of column", "CNR-DT 200 R1/2013", and "Catalogue: Italy" with an Italian flag. Below this is a vertical list of icons representing different sections: Project details, Concrete, Steel, Column section, Loads, Strengthening, and Fire. The "Steel" icon is highlighted with a red circle. At the bottom of the sidebar, a red box indicates "There are issues in: • Steel". A blue "Save project" button is at the very bottom.

The main content area features a list of sections with expand/collapse arrows. The sections are: Project details, Concrete, Steel, Column section, Loads, Strengthening, and Fire. The "Steel" section is highlighted with a red circle. A large "DRAFT" watermark is visible across the center of the interface.

Three red boxes with arrows point to specific features:

- Always displayed the standard and the catalogue used**: Points to the "CNR-DT 200 R1/2013" and "Catalogue: Italy" information in the sidebar.
- Each section can be opened and closed**: Points to the expand/collapse arrows on the right side of the section list.
- Lateral bar showing which sections are complete (green), which one contain errors (red), which one are not started yet (grey)**: Points to the vertical list of icons in the sidebar, where the "Steel" icon is red and the others are green.

PROFILE PREFERENCES/UNITS

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Licence AgreementWebsiteProfileSign Out

Eri Vokshi
vokshi.eri@us.sika.com
Preferences

Preferences

Current System:

Units of measure:

International System	US Customary
Plan length (e.g. length of beams, distance between uprights)	
Section length (e.g. width of a beam, thickness of a slab)	
Plan area (e.g. area of slabs)	
Section area (e.g. cross-section of rebars)	
Torque (e.g. bending moment)	
Force (e.g. point loads)	
Force per unit length (e.g. line loads)	
Force per unit area (e.g. uniform loads)	

☐ International System ☒ US Customary

International System

US Customary

mm

ft.

mm

in.

m²

ft²

mm²

in²

kNm

kip-ft

kN

lbf

kN/m

kip/ft

kN/m²

kip/ft²



NEW SIKA® CARBODUR® SOFTWARE – CLOUD BASED



GSTM 2024

EXAMPLE

Last edited 6/5/2024

Confinement of column

CNR-DT 200 R1/2013

Catalogue: Italy 

Project details

Concrete

Steel

Column section

Loads

Strengthening

Fire

All steps completed

Generate report

Save project

Column section

Rectangular



Circular



Dimensions

Column section dimensions.

Width (b)

300 mm

Height (h)

500 mm

Mechanical covering

Distance of bars from concrete border.

Left and right (c_x)

30 mm

Top and bottom (c_y)

30 mm

Corner bars

Reinforcing bars at the corners.

Number of bars

4

Bars diameter

16 mm

Horizontal bars

Reinforcing bars along the sides.

Number of bars

1

Bars diameter

16 mm

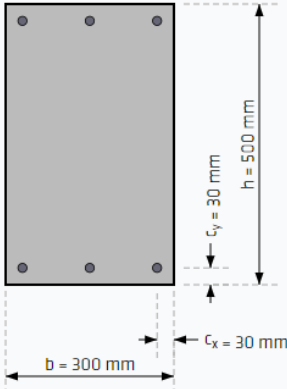
Vertical bars

Reinforcing bars along the sides.

Number of bars

0

Bars diameter



Reinforcements:

- n. 4 $\varnothing$ 16 mm
- n. 2 $\varnothing$ 16 mm



NEW SIKA® CARBODUR® SOFTWARE – CLOUD BASED



GSTM 2024
EXAMPLE
Last edited 6/5/2024

Confinement of column

CNR-DT 200 R1/2013

Catalogue: Italy 

Project details

Concrete

Steel

Column section

Loads

Strengthening

Fire

 All steps completed

 Generate report

Save project

Loads

Ultimate limit state (ULS) loads
Combination loads for strength checks.

Quasi permanent (QP) loads
Combination loads for accidental damage and fire.

Checks for accidental damage
Set whether structural verifications for accidental damage must be performed.

Axial force (N_{SLU})

Bending moment ($M_{x,SLU}$)

Bending moment ($M_{y,SLU}$)

1500 kN

100 kN·m

110 kN·m

Axial force (N_{QP})

Bending moment ($M_{x,QP}$)

Bending moment ($M_{y,QP}$)

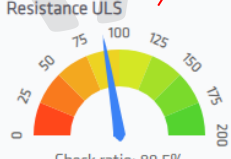
1200 kN

60 kN·m

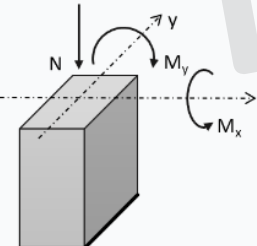
Perform checks? ☒



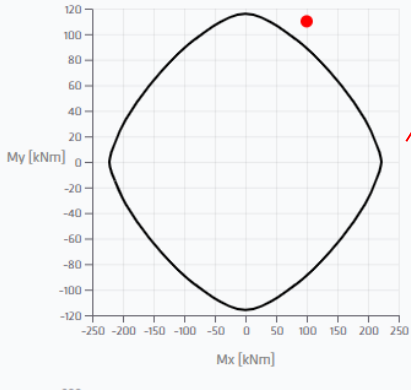
Resistance ULS



Check ratio: 89.5%



Resistance Accidental Damage



Design and resistance

Compression $N_{Rd,c} = f_{yd} A_s + 0.8 A_c f_{cd}$

Tension $N_{Rd,t} = f_{yd} A_s$

Limit states

	ULS	Accidental damage	Fire (t=0)
336.3 kN	3382 kN	3382 kN	
349.7 kN	402.1 kN	402.1 kN	

NEW - Possibility to work directly with design values

NEW - Graphic real time indicator of the current situation of the column

Real time interaction diagram

INTERNAL

NEW SIKA® CARBODUR® SOFTWARE – CLOUD BASED

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CONCLUSIONS

- FRP's are cost and time effective solutions for reinforcement of infrastructure
- Typical FRP strengthening applications in RC include flexural, shear, confinement, and seismic strengthening
- Proper repair and application is critical to ensure successful and long-lasting reinforcement
- Current FRP code and design guidelines are ACI CODE 440.13 and AASHT 2nd Ed.
- Sika new CarboDur cloud base software is a powerful design tool to help you with the design and specification process

THANK
YOU.

HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

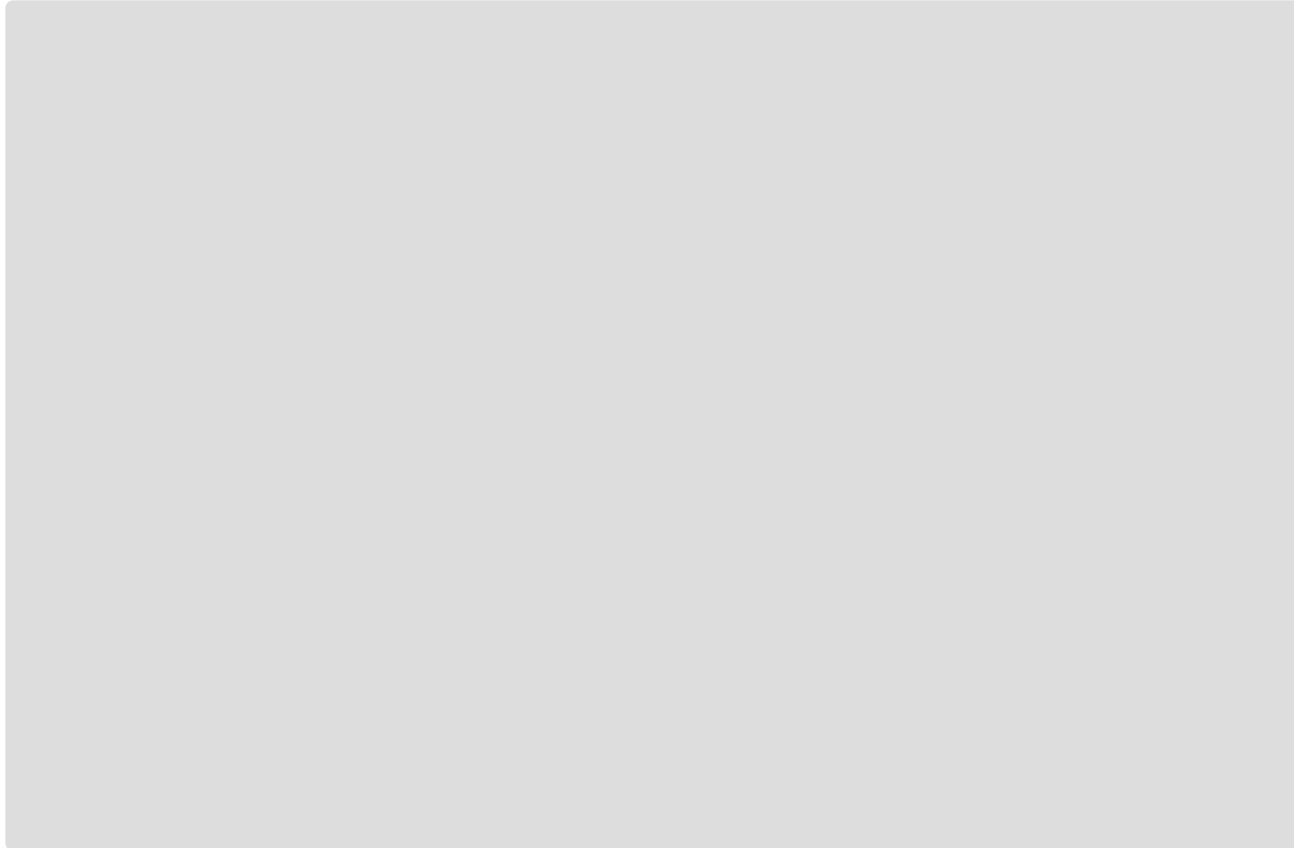


Image Caption Optional Title

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Nulla facilisi.

Typsize Big – Text – Optional Title

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HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

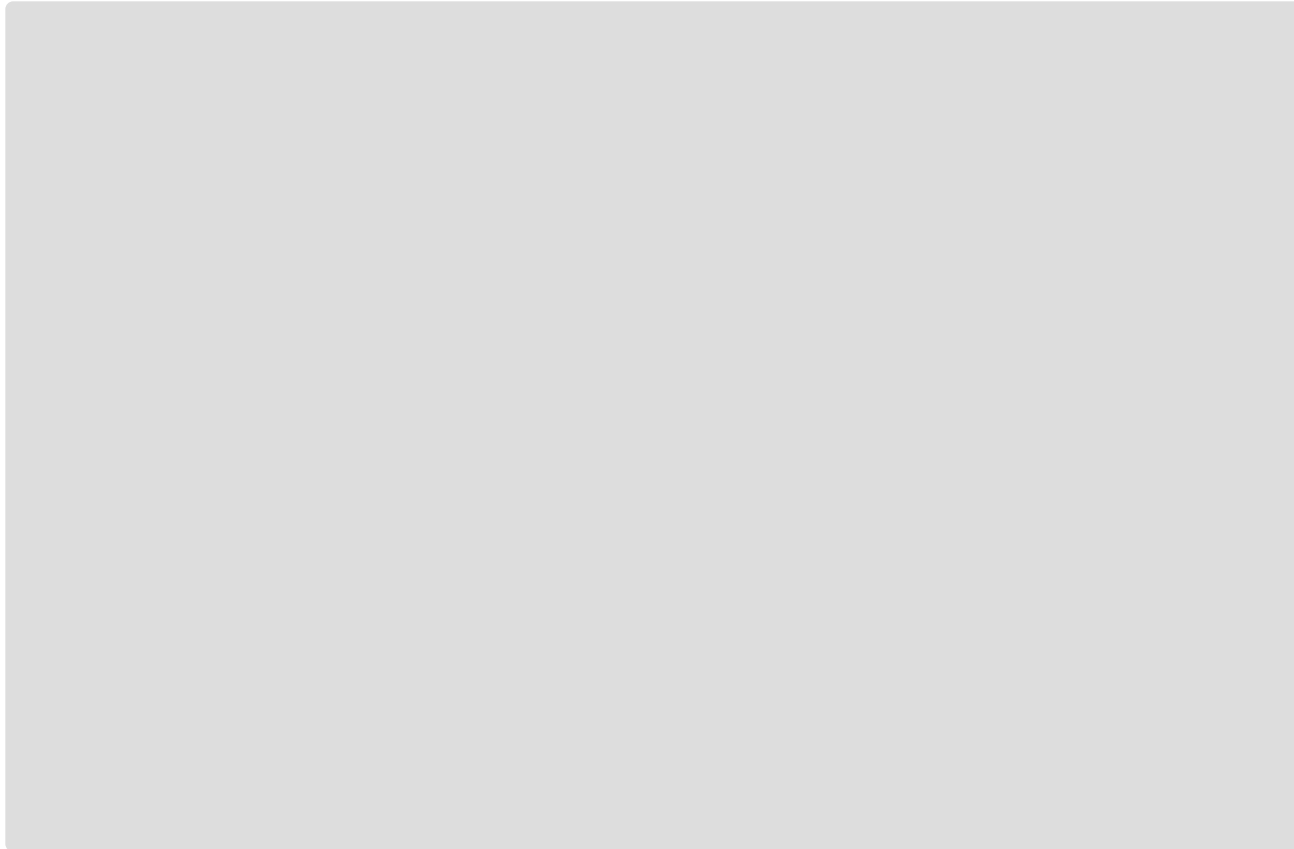


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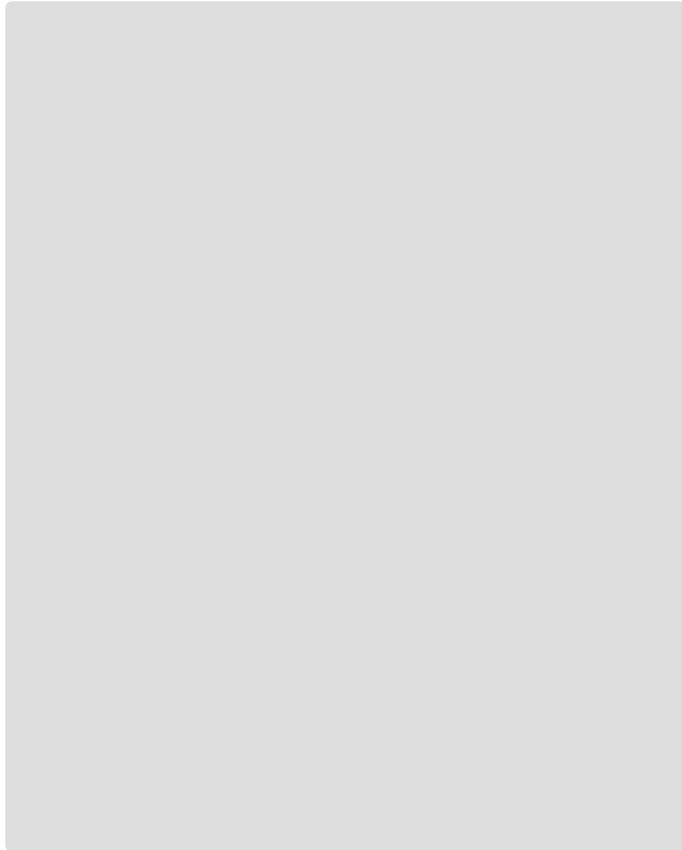
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HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM



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Image Caption Optional Title

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Nulla facilisi.

HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

Growth across multiple dimensions

Sika aims for organic growth fueled by innovative drive and entrepreneurial spirit. Growth is further strengthened by carefully targeted acquisitions that add complimentary technologies and increase our access to markets and channels. Sika always strives to ensure a smooth integration – paying close attention to the local corporate culture and needs of our new team members.

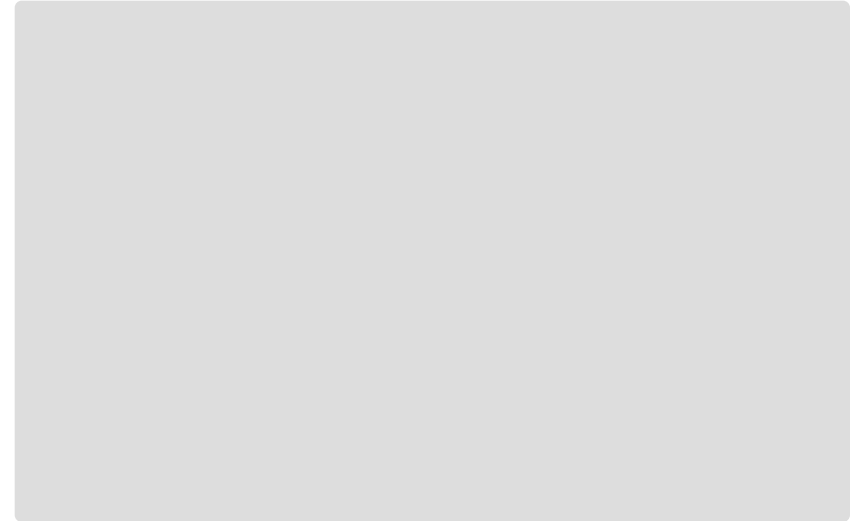


HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

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HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

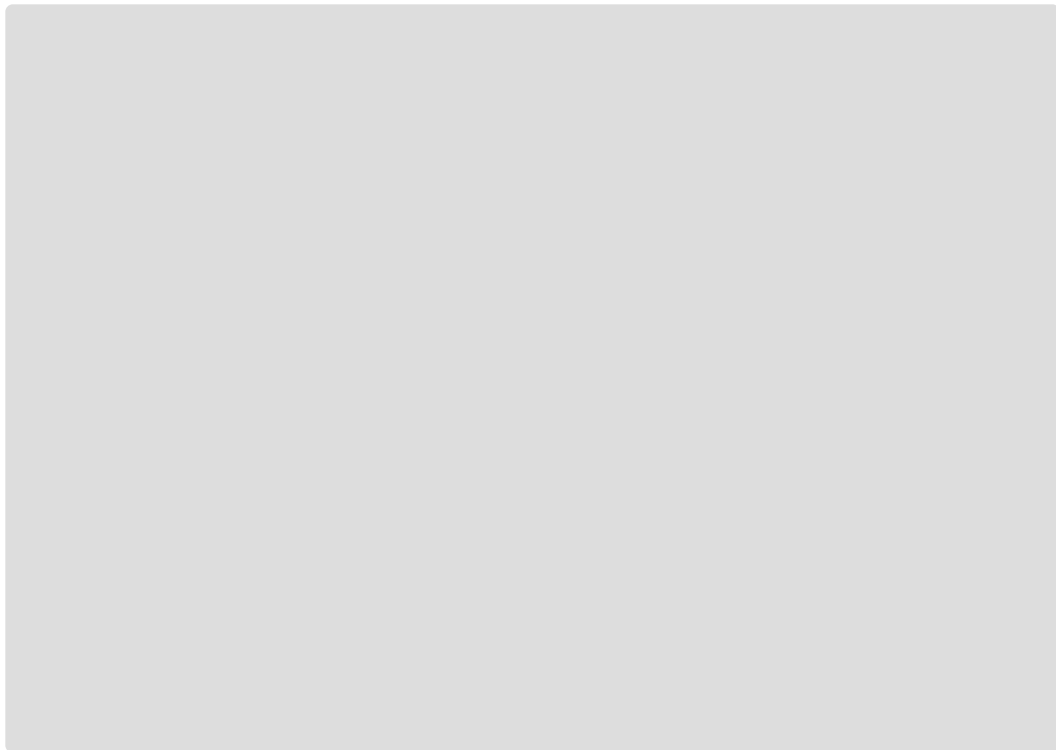


Image Caption Optional Title

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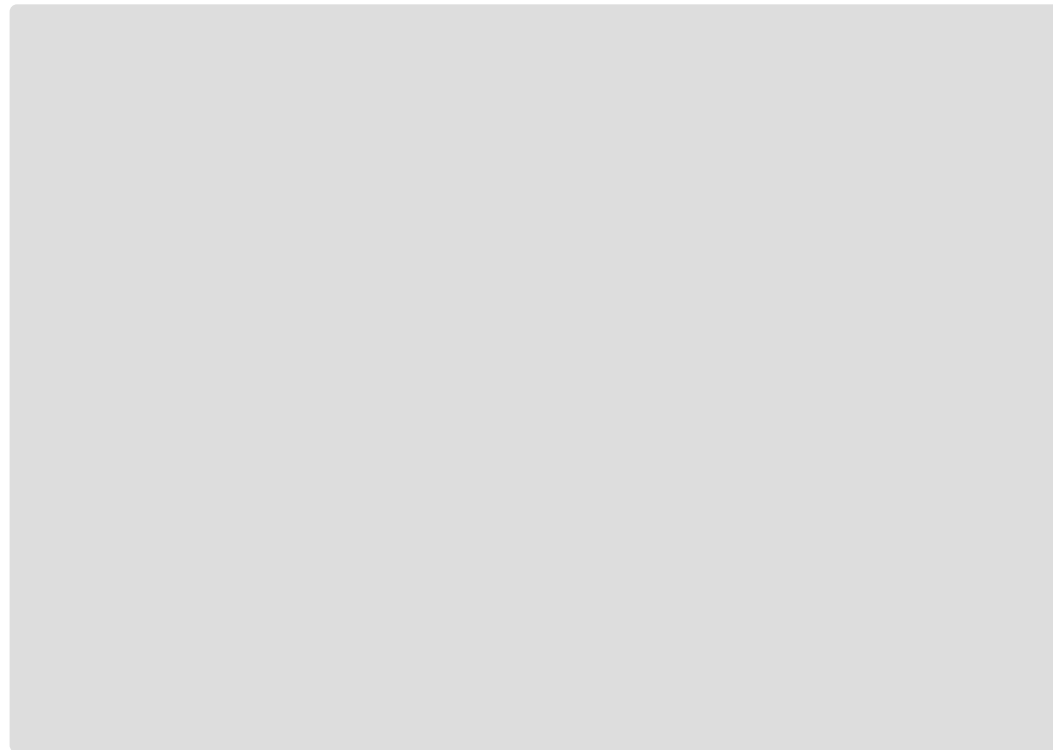


Image Caption Optional Title

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HEADLINE LOREM IPSUM

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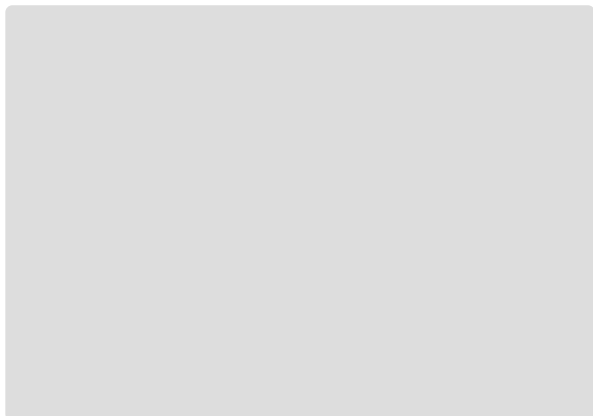


Image Caption Optional Title

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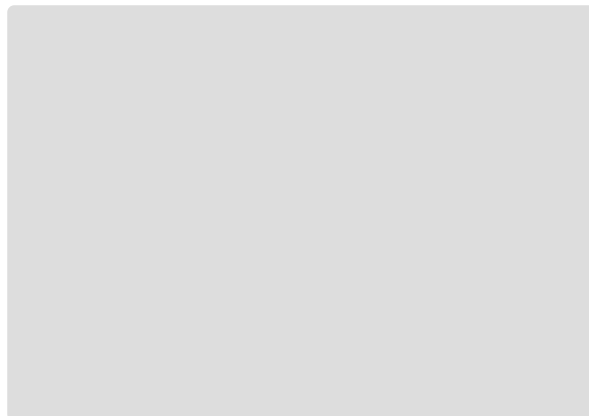


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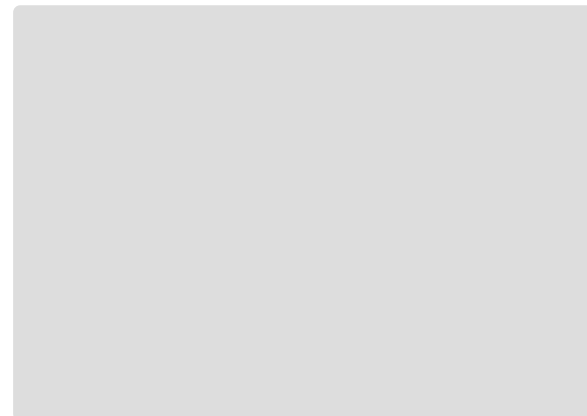


Image Caption Optional Title

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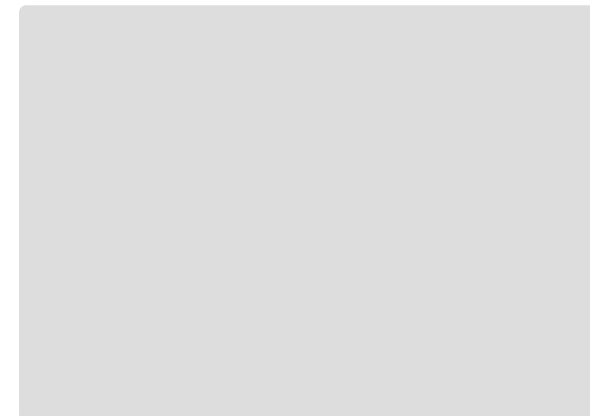


Image Caption Optional Title

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HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

Caption

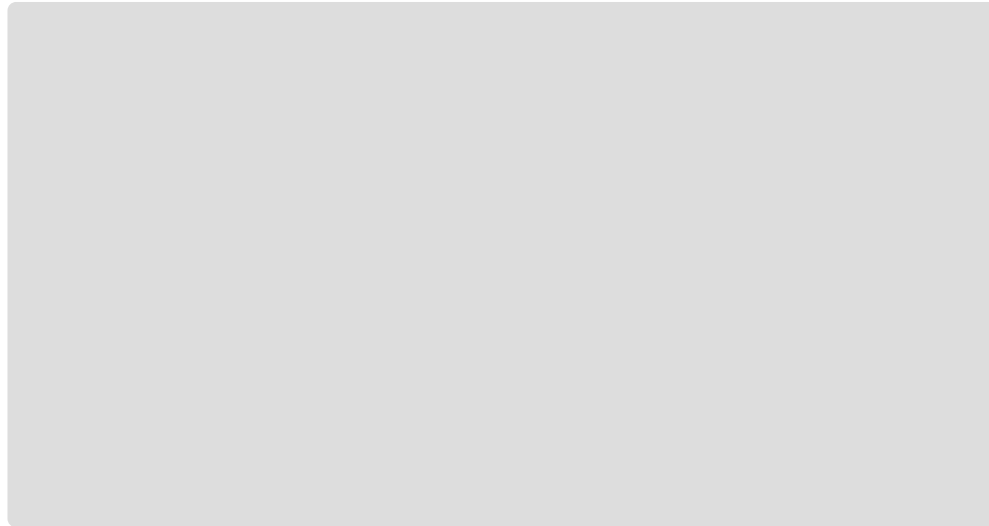
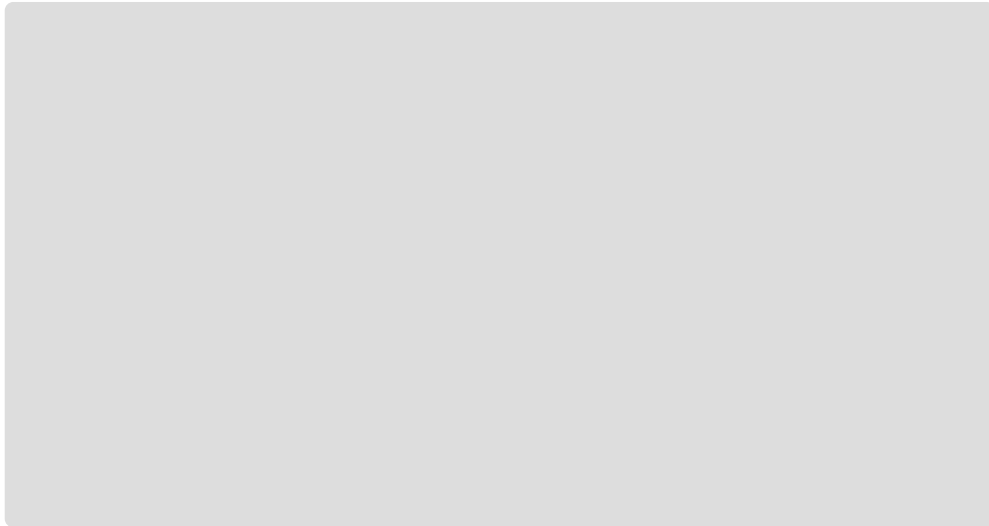
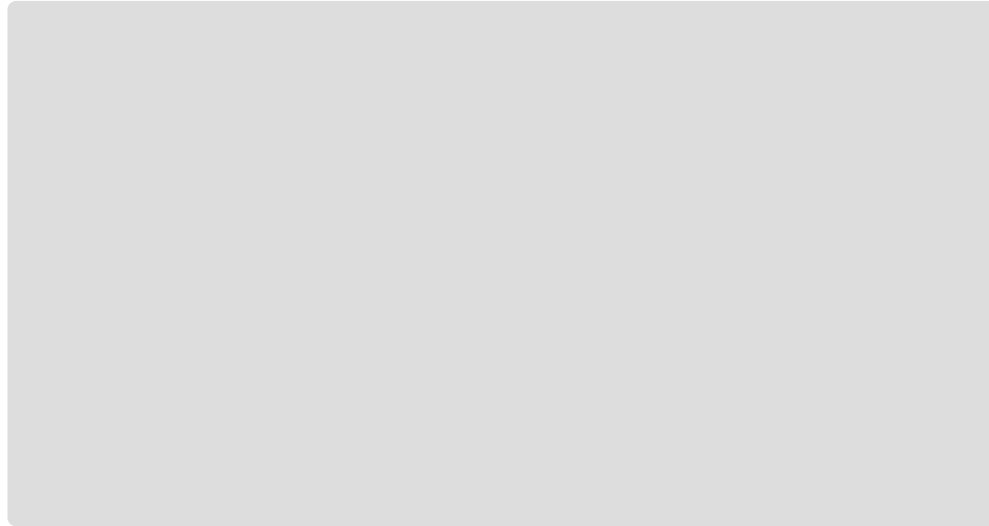
Sika aims for organic growth fueled by innovative drive and entrepreneurial spirit. Growth is further strengthened by carefully targeted acquisitions that add complimentary technologies and increase our access to markets and channels.

Caption

Acquisitions have proven to be a major growth driver that allows us to increase market penetration through market share, technology as well as channel access.

HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM



HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

Image Caption Optional Title

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HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

Topic 1

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Topic 2

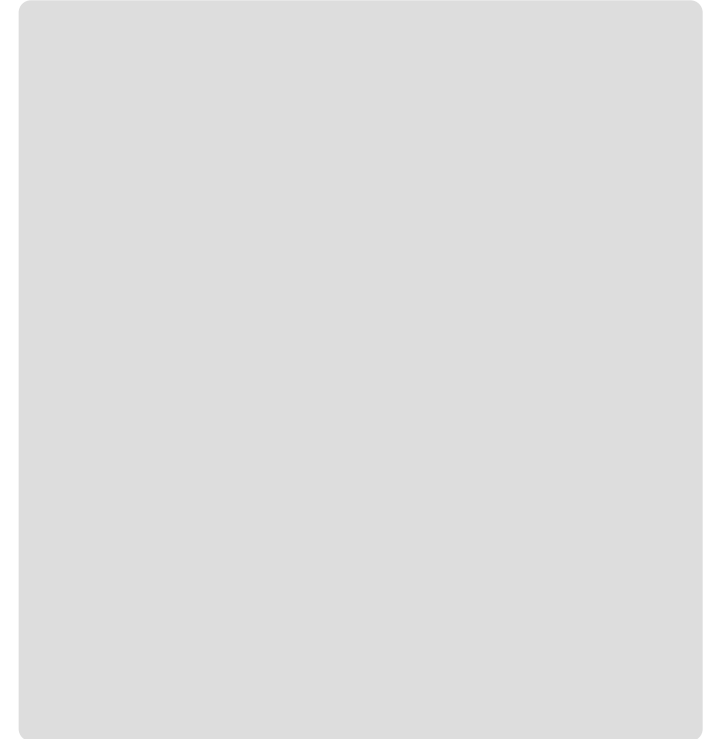
Donec tempus massa arcu, id interdum nunc eleifend ut. Integer viverra fringilla nibh. Integer fermentum nisi nec ante vestibulum, et accumsan orci tincidunt. Donec consequat neque nec justo posuere, mattis feugiat turpis aliquam. Donec fringilla in lectus a pellentesque. Nam nunc mauris, commodo vitae arcu sit amet, imperdiet gravida tortor.

Topic 3

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- Blandit euismod eu eu leo
- Vivamus suscipit
- Finibus blandit
- Maecenas nunc sapien
- Vehicula eu tortor nec
- Euismod tristique massa.
- Integer id cursus turpis.
- Sed sed quam
- vitae velit euismod accumsan
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Name
Company



“Proin sodales ante facilisis malesuada tincidunt. Nunc ac dolor ut nibh facilisis lobortis. Integer vitae neque vel orci suscipit elementum a quis odio. Aliquam nisi lacus, ultricies varius ultricies at, lobortis at justo. Etiam euismod, consequat, purus massa pulvinar lectus, non molestie elit ex malesuada nunc.”

Name
Company

“ Proin sodales ante facilisis malesuada tincidunt. Nunc ac dolor ut nibh facilisis lobortis. Integer vitae neque vel orci suscipit elementum a quis odio. Aliquam nisi lacus, ultricies varius ultricies at, lobortis at justo. Etiam euismod, massa in vehicula consequat, purus massa pulvinar lectus, non molestie elit ex malesuada nunc.”

Name Lastname
Company



INSERT YOUR VISION
THERE'S A GRADIENT ON THE IMAGE
TO HELP WITH READABILITY.

EXAMPLE

TABLE ON WHITE BACKGROUND

IN €	2005	2006	2007	2008	2009	2010
LOREM	1.230	1.230	1.230	1.230	1.230	1.230
IPSUM	2.340	2.340	2.340	2.340	2.340	2.340
DOLOR	3.450	3.450	3.450	3.450	3.450	3.450
SIT	4.560	4.560	4.560	4.560	4.560	4.560
AMET	5.670	5.670	5.670	5.670	5.670	5.670

Table description big lorem ipsum dolor am, consectetur adipiscing elit. Crasek bibendum vehicula arcu. Sed qui massa. Nulla facilisi. Curabitur at nunc.



EXAMPLES

COMPARISON OF PRODUCT STRENGTHS

66

Fields of use	Sika Product A	Sika Product B	Sika Product C
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Lorem ipsum dolor sit amet, consectetur adipiscing			
Lorem ipsum dolor sit amet, consectetur adipiscing			
Lorem ipsum dolor sit amet, consectetur adipiscing			
Lorem ipsum dolor sit amet, consectetur adipiscing			

Optimal Solution

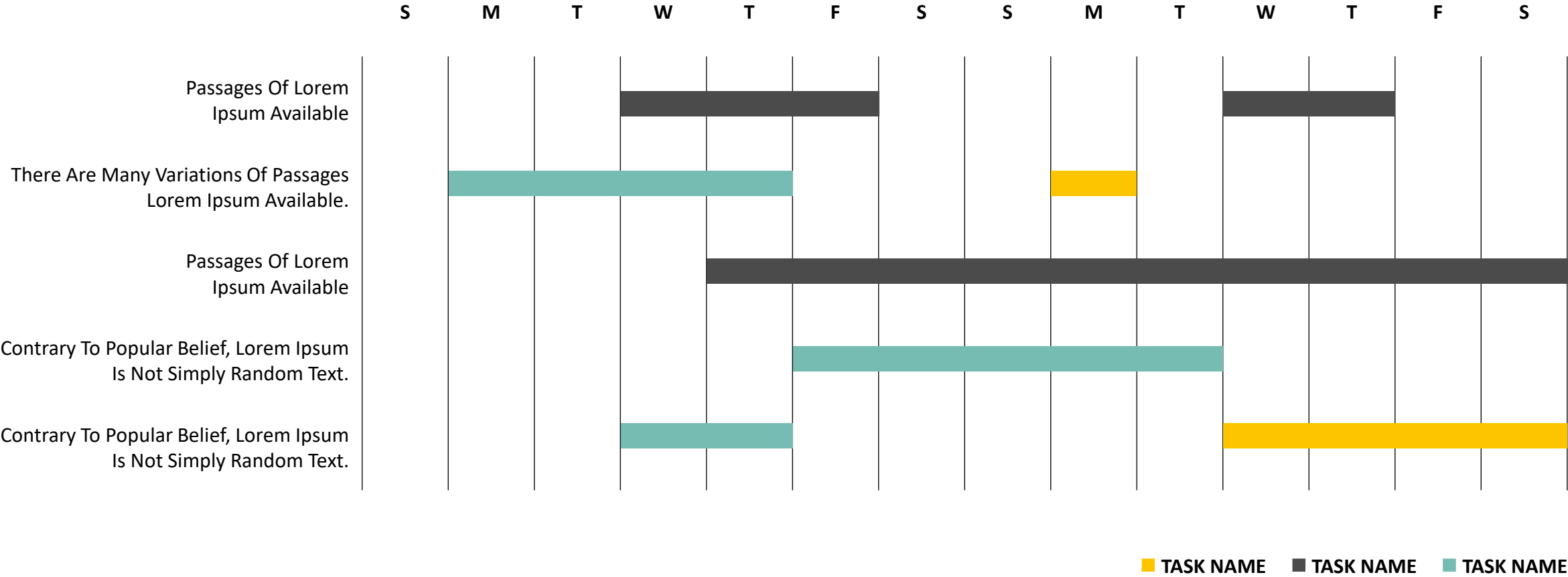
Feasible

Feasible but there's something better

Solution not possible

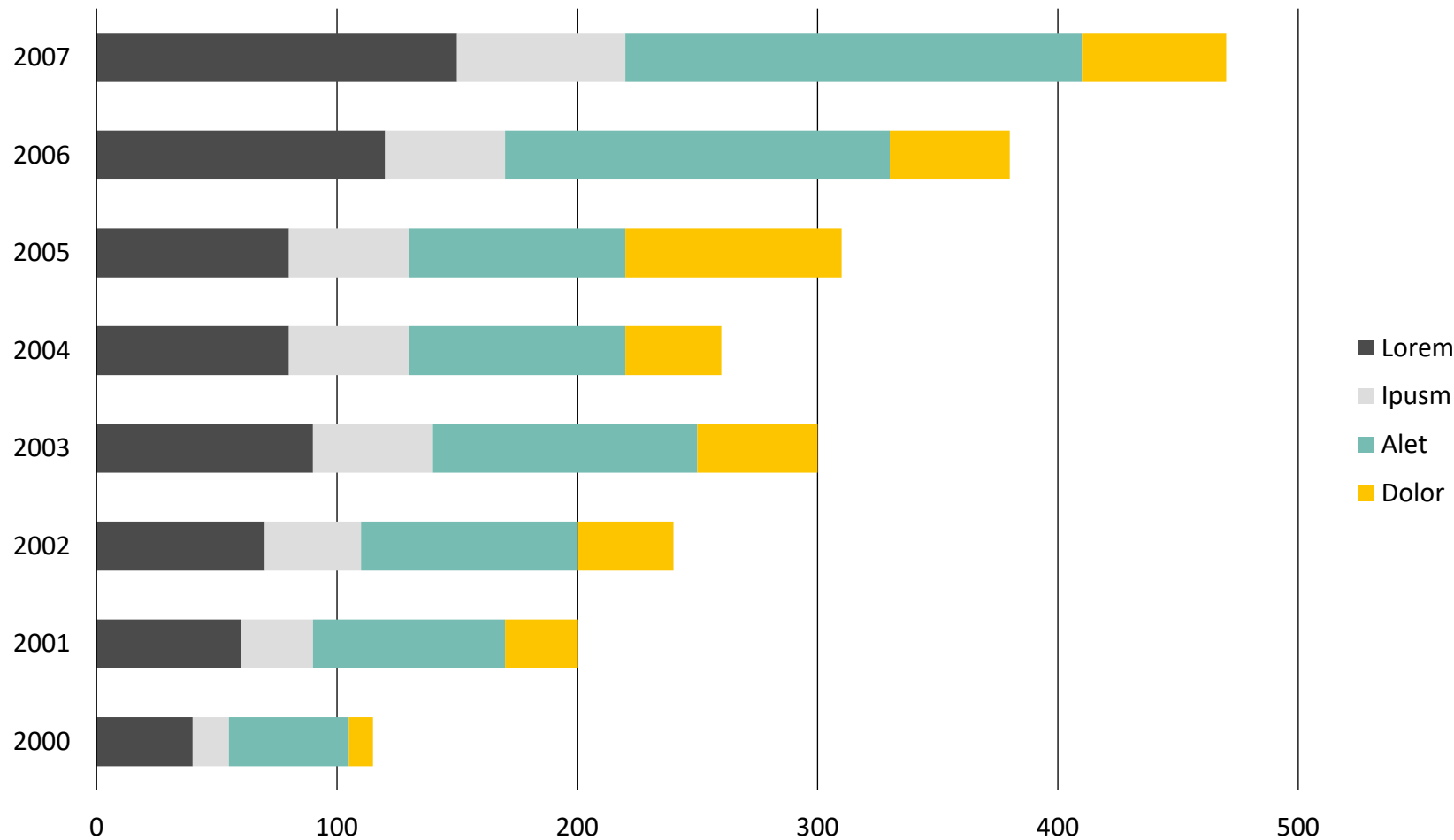


IMPLEMENTATION PROGRESS



EXAMPLE

BAR DIAGRAM (STACKED)

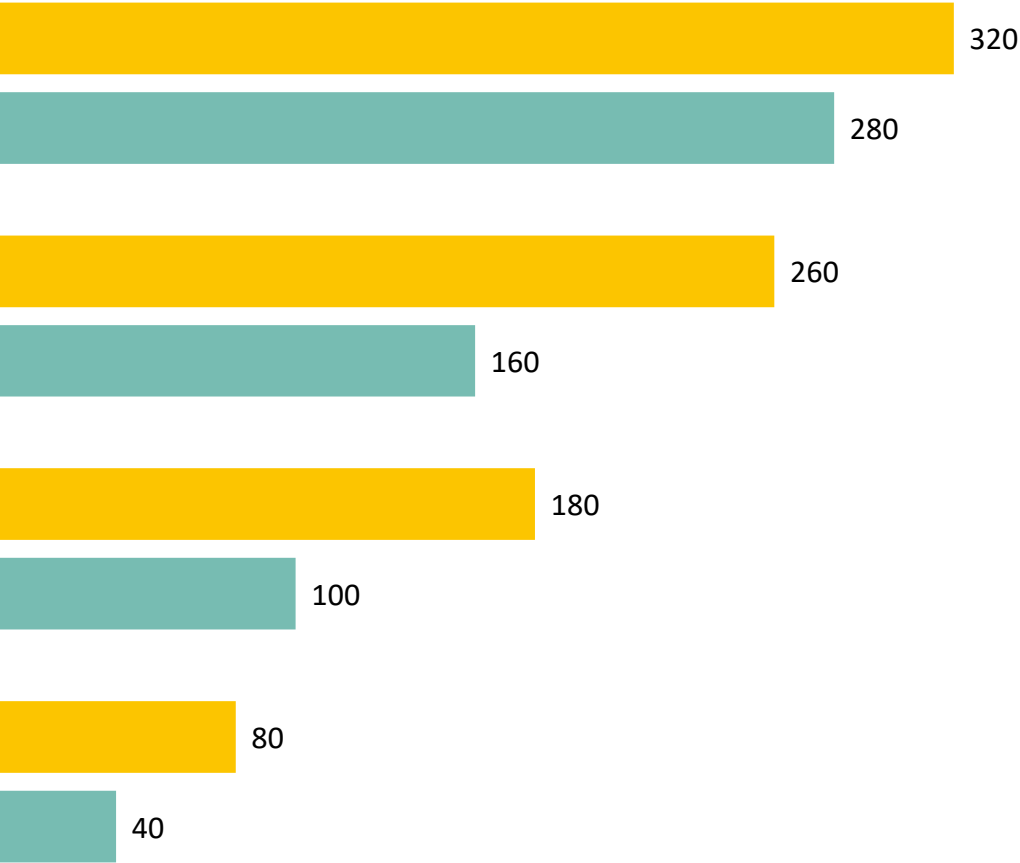


Caption
Lorem ipsum dolor am, consectetur adipiscing elit. Crasek bibendum vehicula arcu. Sed qui massa. Nulla facilisi. Curabitur at nunc.



EXAMPLE

BAR DIAGRAM (GROUPED)



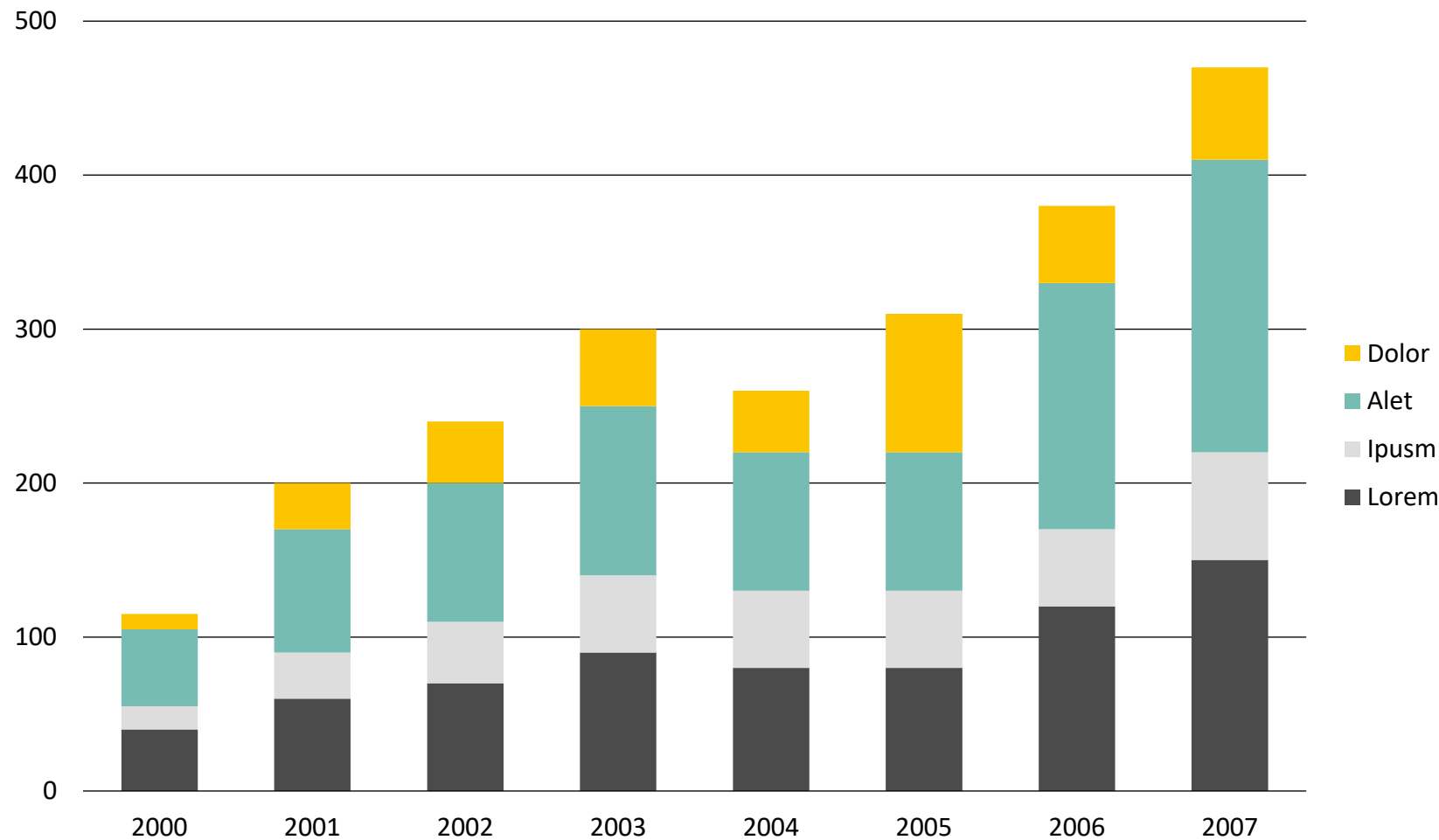
Caption
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Ipusm
Lorem



EXAMPLE

COLUMN DIAGRAM (STACKED)



Caption
Lorem ipsum dolor am, consectetur adipiscing elit. Crasek bibendum vehicula arcu. Sed qui massa. Nulla facilisi. Curabitur at nunc.

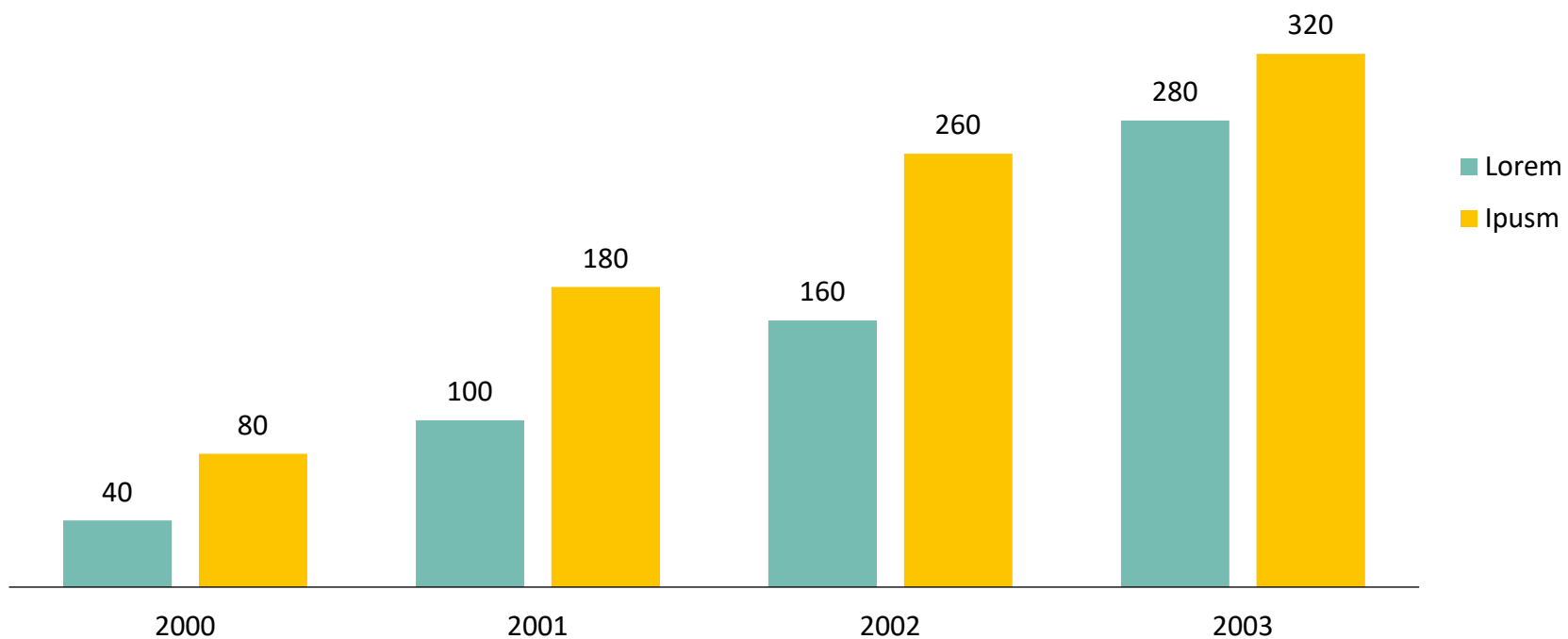


EXAMPLE

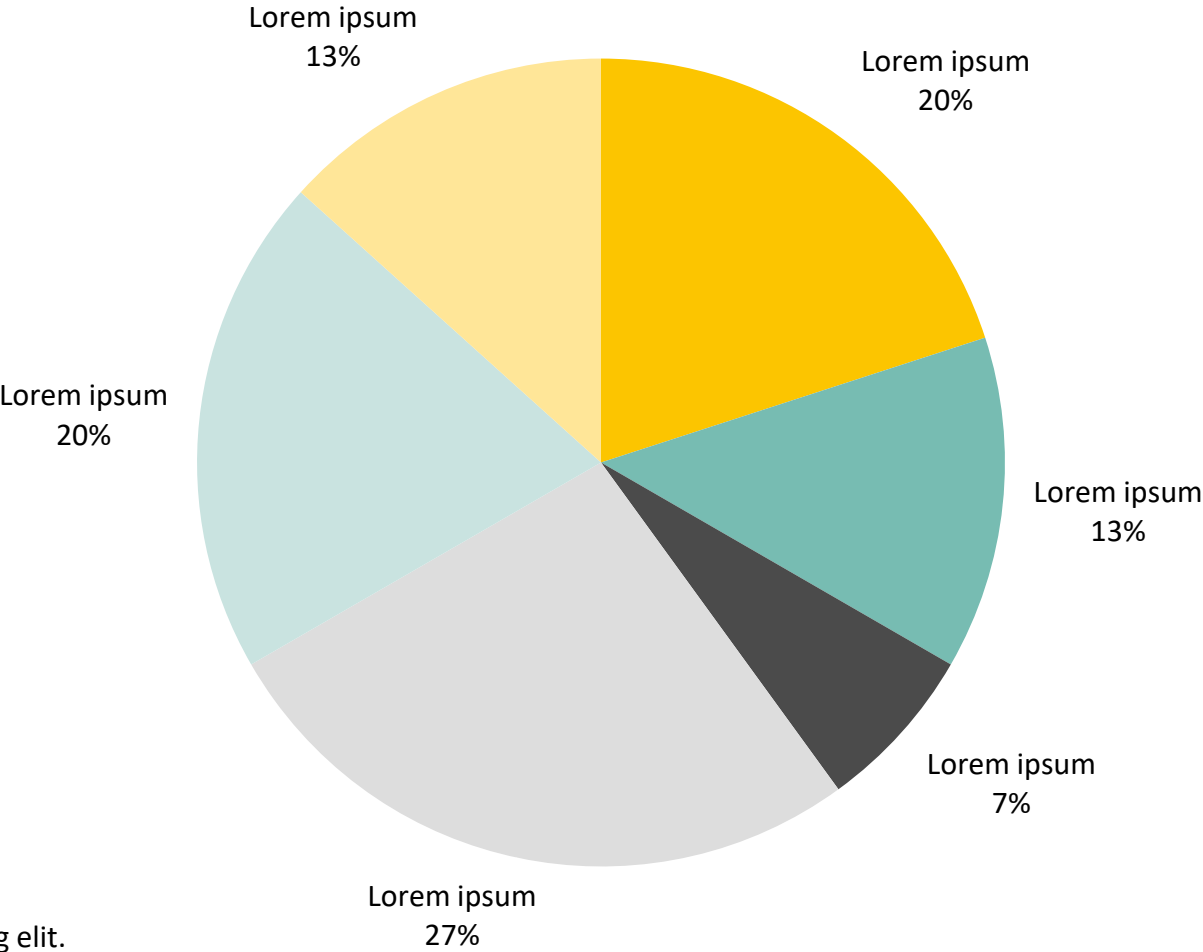
COLUMN DIAGRAM (GROUPED)

Caption

Lorem ipsum dolor am, consectetur adipiscing elit. Crasek bibendum vehicula arcu. Sed qui massa. Nulla facilisi. Curabitur at nunc.



EXAMPLE PIE CHART



Caption
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Crasek bibendum vehicula arcu. Sed qui massa.
Nulla facilisi. Curabitur at nunc.



EXAMPLE CIRCLE DIAGRAM



Caption
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Crasek bibendum vehicula arcu. Sed qui massa.
Nulla facilisi. Curabitur at nunc.



EXAMPLE PIE CHART



Caption
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Crasek bibendum vehicula arcu. Sed qui massa.
Nulla facilisi. Curabitur at nunc.



EXAMPLE PIE CHART

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Caption

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HEADLINES FOR CATEGORIES

SUBHEADLINE LOREM IPSUM



Category 1



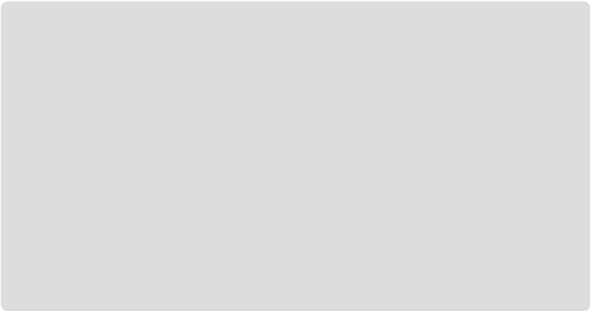
Category 2



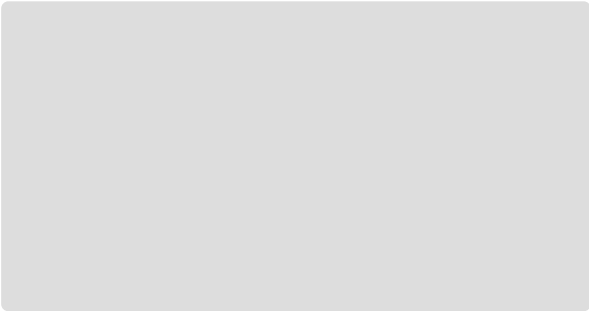
Category 3



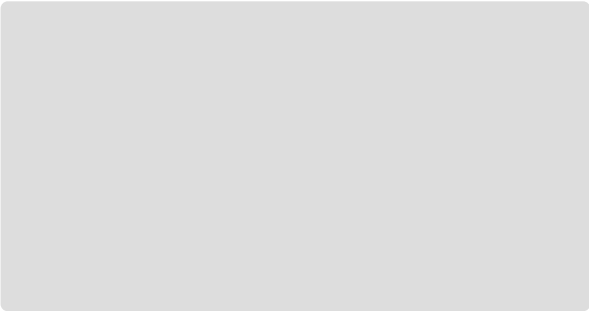
Category 4



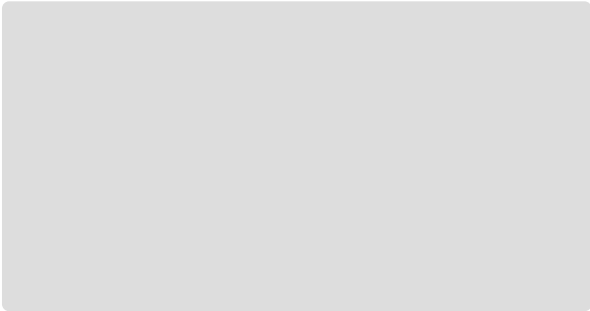
Category 5



Category 6



Category 7

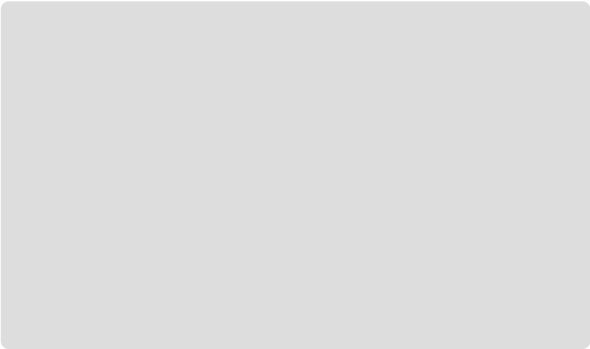


Category 8



HEADLINE E. G. FOR PRODUCTS

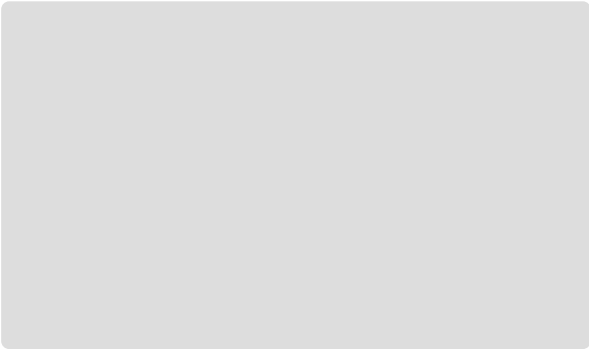
SUBHEADLINE LOREM IPSUM



Material A

- Lorem ipsum dolor
- Lorem ipsum dolor
- Lorem ipsum dolor

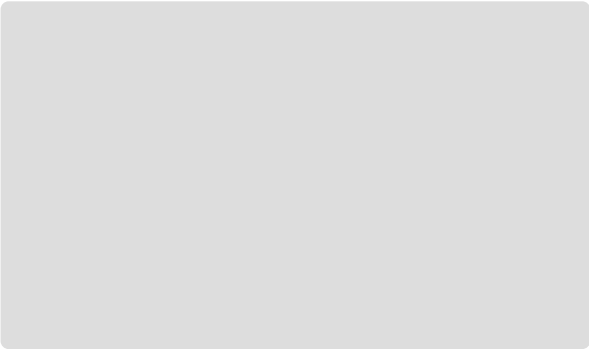
Lorem ipsum dolor
Product A



Material B

- Lorem ipsum dolor
- Lorem ipsum dolor
- Lorem ipsum dolor
- Lorem ipsum dolor

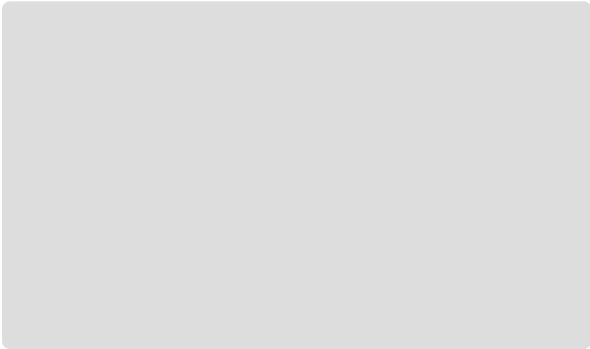
Lorem ipsum dolor
Product B



Material C

- Lorem ipsum dolor
- Lorem ipsum dolor

Lorem ipsum dolor
Product C



Material D

- Lorem ipsum dolor
- Lorem ipsum dolor
- Lorem ipsum dolor
- Lorem ipsum dolor

Lorem ipsum dolor
Product D



HEADLINE LOREM IPSUM

SUBHEADLINE LOREM IPSUM

Product A–D

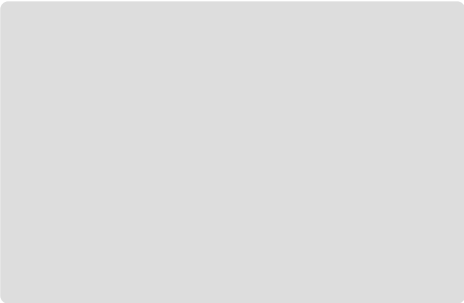
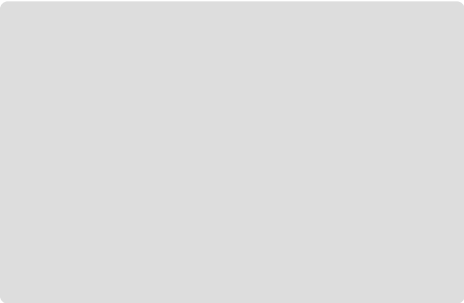
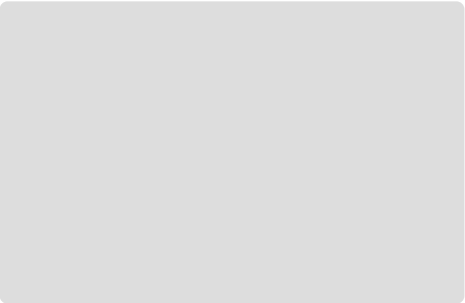
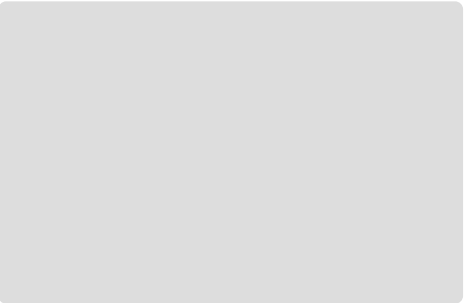
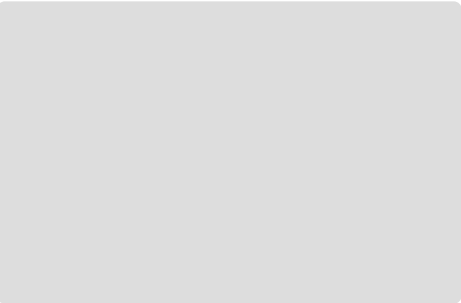
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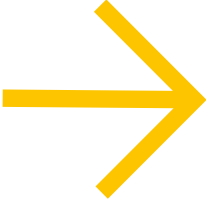
HEADLINES FOR CATEGORIES WITH DESCRIPTION

SUBHEADLINE LOREM IPSUM

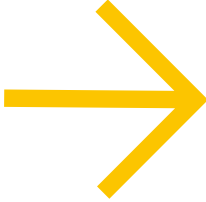
Products max. 2 lines?	Products	Products	Products	Products
				
Lorem ipsum dolor sit ameta quat dener suum	Lorem ipsum dolor sit ameta quat dener suum	Lorem ipsum dolor sit ameta quat dener suum	Lorem ipsum dolor sit ameta quat dener suum	Lorem ipsum dolor sit ameta quat dener suum
Solution	Solution	Sika Waterbar®, SikaFuko® Swell-1, SikaInject®	Solution	Solution



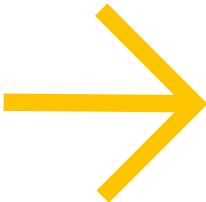
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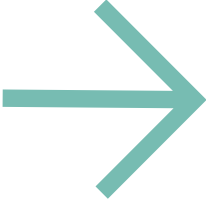


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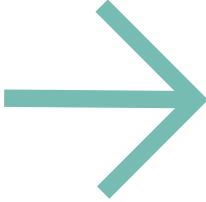


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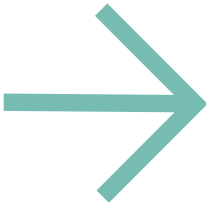
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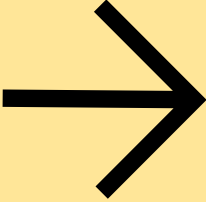
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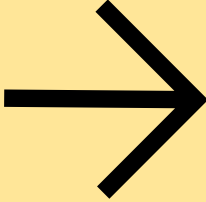
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PROCESS OVERVIEW

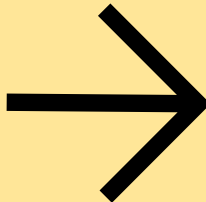
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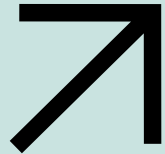
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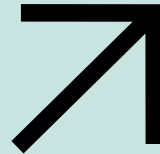
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PROCESS OVERVIEW

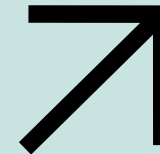
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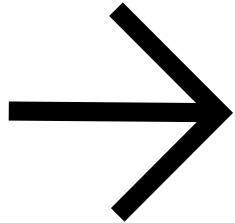
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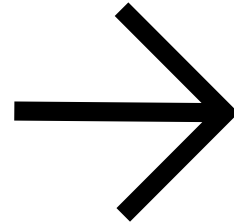
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rem iste natus

PROCESS OVERVIEW

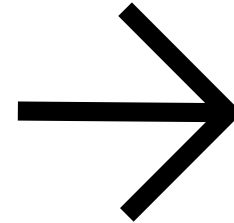
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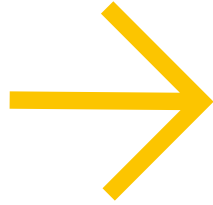
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PROCESS OVERVIEW

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Keyword Lorem

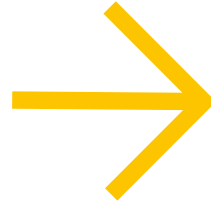
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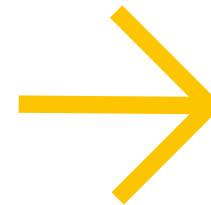
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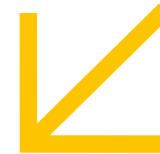
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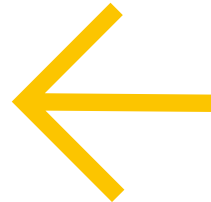
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Keyword Lorem

Sed ut perspiciatis unde omnis iste natus error voluptatem accusantium rem iste natus



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Sed ut perspiciatis unde omnis iste natus error voluptatem accusantium rem iste natus