Items to Consider when using GKs

There are a number of items that should be considered when selecting and applying Guided Keepers. Here are some helpful tips and usage guidelines.

Base / Bushing

Bushing Length - pg 2

• SL recommends using the longest bushing possible in the available space. Longer bushings provide significant value in production by improving the guidance condition along with extending the performance life of the assembly.

Base Styles - pg 3

• The "N" Base is recommended for most applications. It provides the latest features, most options, and greatest design flexibility.

Bushing Type - pgs 4-5

 The PTFE / Bronze Bushing(TB) is recommended for most applications. In our experience, using longer bushing lengths with this more economical bushing style will achieve excellent results in most applications. The Bronze / Graphite Plugged Bushing(BP) has advantages in specific applications.

Guide Pin

Guide Pin Length - pg 6

• Length of the guide pin should be considered in relation to the pin diameter and the bushing length.

Guide Pin Diameters and Series - pg 7

 SL recommends using the largest (within reason) diameter guide pin that will fit in your application. A larger diameter pin allows for more and/or larger fasteners that increases robustness.

Application

Qty and Positioning of Units - pgs 8-9

- It is important to design tools with an adequate number of Guided Keeper units based on the application. It's always the most cost effective to start with a quality tool design up front.
- On larger pads add GK's in the middle of the pad to support the weight and prevent flex.
- On narrow pads stagger the location of the GK's so they are not in-line with each other when possible.

Pad Tipping - pg 10

- Use stand offs and enough spring force to keep the Pad/Lifter balanced and flat with or without stock present.
- Add heel blocks in applications when significant side load is expected or likely.

Machining / Tolerances

• Be sure the designed machining matches SL machining prints and requirements.



Bushing Length

We recommend using the longest bushing possible in the available space. Longer bushings provide significant value in production by improving the guidance condition along with extending the performance life of the assembly.





The goal is to apply the longest bushing possible by utilizing the space available in both directions based on die conditions.

The "N" style base provides the most configuration options to maximize bushing length. The "tall" option on the "N" base adds 1.00" toward the back of the pad which utilizes the free space in this area to achieve a better die condition.

Pro Tip: If the amount of space available is slightly less than what is needed to use the taller option, pocket the base.

The bushing diameter-to-length ratio is important. If this ratio is too low the amount of movement in the guide pin increases and the life cycle decreases. A minimum ratio of 1.6 is recommended.

Example: 3" Long Bushing 1.75" Diameter has a ratio of 1.7

(3 / 1.75 = 1.7)



Over the last 10+ years SL has shipped replacements equal to only 3% of units shipped for new tooling. This is already a very low replacement rate for a wearing component, but bases that had a ratio of at least 1.6 reflect 30% less replacements compared to bases with less than 1.6 ratio.

This concept is not theory, it's proven!



Base Style

SL offers two main base styles. The "N" Base is recommended for most applications. The "N" base was built on a similar platform as the popular "L" base but with improvements. It offers the latest features, most options, and greatest design flexibility. Below are some of the additional features and options of the "N" base.

Tall base option to improve guidance and longevity

This option adds 1.00" toward the back of the pad utilizing any free space in to achieve a better die condition. If space is tight, pocket the base to allow for the taller option to fit.

Two bushing options that use the same size housing and footprint

The PTFE / Bronze Bushing(TB) is recommended for most applications. Using longer bushing lengths with this more economical bushing style will achieve excellent results in most applications. The Bronze / Graphite Plugged Bushing(BP) has advantages in specific applications.

The same "N" base housing is used for both bushing types so if desired they may be easily changed in production without any machining required.

Machining of the locating bore is easily accomplished even on the long bushing bases

The base is designed to make the machining of the mounting bore easier, allowing for a short 1.25" long endmill to be used. This makes it easier to machine to diameter and with a straight wall.

Less taps required for some diameters

1.00" and 1.25" diameters are engineered so the connection strength of the base-to-shoe pairs appropriately with the connection strength of the guide pin-to-pad.

Better surface condition for the dampener

The dampening washer only contacts the steel base housing (not the bushing). This provides for a robust/flat surface for the dampener to hit on.

Common height/depths

The dimensions from the mounting surface to the top/bottom of the bases are the same across all diameters.



1.25" - L Base









Locating

Bore

Clearance





Bushing Type

There are 2 bushing types available, PTFE / Bronze(TB) and Bronze / Graphite Plugged(BP) The PTFE / Bronze Bushing(TB) is the recommended type for most applications.

The bushing type plays a role in three main aspects of the Guided Keeper.

- 1. How much movement is allowed in the pad/lifter bar assembly
- 2. How long the bushing will last
- 3. Cost of assembly

How much movement is allowed in the pad/lifter bar assembly		How long will the bushing last		Typically the length of bushing and the
Гв	BP	Гв	BP	distance from the Pad/Lifter Rail has a greater affect
New	New	History has shown	This type of bushing	than the bushing
a healthy bushing length you will have very little, if any, movement in the Pad. Especially if you have 4-6 of them tied together on a Pad. During Production It will depend on how much of the PTFE layer has worn. The shorter the bushing, and the greater the side/tip forces subjected on the bushing, the faster	a healthy bushing length you will feel very little movement at the end of the Guide Pin. Especially once you tie 2 of them together on a Pad or Lifter Rail. During Production The greater the side/tip forces subjected on the bushing, the faster it will wear. If applied well the bushing should maintain close to its starting fit for a	extremely well in production. Over the last 10+ years SL has shipped replacements equal to only 3% of units shipped for new tooling. This bushing style has an incredibly low replacement rate for a wearing item. End of L	industry for years. SL performed tests that exceeded 12 million linear inches run through the bushing successfully. Life expectancy is based on how "loose" the bushing is allowed to get in the application, but should be similar to other products when applied correctly. ife Cycle	amount of movement in the assembly
it will wear.	healthy amount of use.	Application will de movement is acce making ge		

The TB style bushing is more economical. For example, a 1.25 diameter x 3" long base is \$21 less. A 1.75 diameter x 3" long base is \$25 less.

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Pro Tin.

SL

Bushing Type

The Bronze / Graphite Plugged bushing option has advantages in high demand applications where the amount of movement in the pad or lifter rail needs to remain tighter longer. Specific applications where this bushing option may be beneficial:

1. When GK's are in-line with each other

Lifters

*especially those with high travel

00

2. Pads where a greater degree of precision is desired/preferred

Consider that when using more than two Bronze / Graphite Plugged bushings on a single application you may experience a more challenging assembly. This is due to variations in machining tolerances between the shoe/pad.

When more than two units are required, we recommend using Bronze / Graphite Plugged bushings in opposite corners and using PTFE / Bronze style bushings in all other locations.

Bronze / Graphite Plugged Bushings do not have a "wring" fit between the Bushing and Pin as they are designed to be a running slip fit when attaching multiple units to a Pad/Lifter Rail. If you have a specialty application that requires a near 1-to-1 fit then a traditional Pin and Bushing set is likely a better fit.

Both bushing styles use the same "N" base housing/footprint. This allows seamless interchanging of either bushing style in production if it would help address die conditions that were unforeseen in the design stage.











Guide Pin Length

It is important to take into account the length of the guide pin in relation to the pin diameter and the bushing length. If an application requires a longer than average guide pin to be used, then a proper length bushing should be paired with it. If using the longest length bushing still does not provide a healthy ratio then a larger diameter guide pin should be considered. Although it is difficult for SL to make a recommendation on what configuration to use for every application, the below matrix provides a guideline. It is based on the length of guide pin between the bushing and the pad not exceeding five times its diameter OR two times the bushing length, whichever is less.

Max Recommended Guide Pin Lengths

Guide Pin Diameter / Series (available in .125" increments)							
	.75″	1.00"	1.25"		1.50"	1.75"	2.00"
	GK75	GK105	GK120	GK122	GK152	GK180	GK205
	Î						
2″	6.250"	6.625"	6.625"	7.000"			
3″		8.625"	9.625"	10.000"	10.125"	9.625"	
4"			10.875"	11.250"	12.625"	12.625"	13.125"
5 ″						14.375"	15.000"

Longer lengths are available, contact SL for information

Please use this information, along with your discretion, to determine the best configuration to use in your specific application.



Guide Pin Diameter

SL recommends using the largest(within reason) diameter guide pin that will fit in the application. This helps ensure an overbuilt application rather than an under engineered one, and the cost to upsize is incremental compared to the production value and confidence it provides Stampers.

	Guide Pin Diameter / Series						
	.75″	1.00"	1.25"		1.50"	1.75″	2.00"
	GK75	GK105	GK120	GK122	GK152	GK180	GK205
	Î						
Fasteners	1 M10 (3/8")	1 M12 (1/2")	M10	2 (3/8")	2 M12 (1/2")	3 M12 (1/2")	3 M16 (5/8")
Added Cost to move up one diameter size		\$13.95 (from GK75)	\$13.45 (from GK105)	\$11.25 (from GK105)	\$14.56 (from GK122)	\$8.70 (from GK152)	\$34.14 (from GK180)
Added Strength of Fasteners		45% Stronger	38% Stronger		45% Stronger	50% Stronger	87% Stronger

Pin Location Vs Pin Support

The end of the guide pin is pocketed in the pad to provide location. For the GK122 and GK152 if the pin is pocketed by 1/2 the diameter of the Pin, it also provides "support" for the Pin as well.

When a significant tip condition occurs the screws will start to stretch but the body of the guide pin will make contact with the sides of the pocket and it will limit the amount of stretch/force subjected on the fasteners.

The GK Locking Collar Accessory prevents screws from possibly coming loose and falling into the tool during operation.

Available for GK180 and GK205 Series Guide Pins

- The GK122 requires a minimum 1.235" thick pad or lifter rail for the guide pin to be pocketed 1/2 of the diameter



- The GK152 requires a minimum 1.485" thick pad or lifter bar for the guide pin to be pocketed 1/2 of the diameter





Number of Units

It is important to design your tools with an adequate number of Guided Keeper units based on the application. It's always more cost effective to start with a quality tool design rather than re-engineer later on. If a Stamper needs to add a GK Unit to an under engineered condition it costs them 3-4 times as much as if the die was built with it originally. Although it is difficult for SL to make a recommendation on the number of GK Units to use for every application, the below matrix provides a general guideline based on what are "typical max" conditions. Please use this information, along with your discretion, to determine the number of GK Units to use in your specific application.

Guide Pin Series	Pad Travel	Recommended Max Limits - Per GK Unit (Lesser of the two items below)				
		Pad Weight	Pad Area			
GK75	< 1.5"	9 lbs	6" x 6" surface area / 36 sq lp			
Ĩ	1.5"- 2.25"	8 lbs				
	> 2.25"	6 lbs	(Ex: 4 units up to a 9" x 16" Pad)			
GK105	< 2"	21 lbs	8" x 8" surface area / 61 sq lp			
Î	2"- 3"	18 lbs				
	> 3″	14 lbs	(Ex: 4 units up to a 12" x 21" Pad)			
GK122	< 2.5"	49 lbs	11" x 11" surface area / 121 so in			
	2.5"- 3.75"	43 lbs				
	> 3.75″	32 lbs	(Ex: 4 units up to a 17" x 28" Pad)			
GK152	< 3"	69 lbs	12" x 12" surface area / 160 sq.lp			
	3"- 4.5"	60 lbs				
	> 4.5"	45 lbs	(Ex: 4 units up to a 20" x 35" Pad)			
GK180	< 3.5"	109 lbs	15" x 15" surface area / 225 so in			
	3.5"- 5.25"	95 lbs				
	> 5.25"	71 lbs	(Ex: 4 units up to a 23" x 39" Pad)			
GK205	< 4"	184 lbs	18" x 18" surface area / 27 / so in			
	4"- 6"	160 lbs				
	> 6"	120 lbs	(Ex: 4 units up to a 27" x 48" Pad)			

This is only a Guide - Discretion must be used based on each die application in regards to the number of units to design in. It's your responsibility to design a die that is adequately engineered. If there is known side load that will be subjected on the Pad, we recommend adding heel blocks.



Positioning of Units

Use a minimum of three Guided Keepers per Pad and position them to not be in-line with each other when space allows. The Pad is less prone to tipping, the bushings will last longer, and the assembly is stronger in a miss-hit situation.







Offset one Guided Keeper location or use a different diameter pin as methods to fool-proof the assembly.



Preventing Pad Tipping

Pad tipping breaks screws, wears out pins/ bushings, and gas springs. Apply stand-offs for pads & lifters to maintain parallel "flat" travel when starting the stock. Also to ensure the Pad/Lifter does not tip during the working stroke, apply enough pressure to keep the pad balanced and flat. Applying pressure in a balanced pattern will also help safeguard the pad from tipping.



