## Exercise 5c: Utilizing CLEARANCE with a Variable Gap

This exercise demonstrates using the CLEARANCE contact parameter with a variable gap part set. The model is a pair of blocks with sliding contact modeled with pressure loading on the outer face. The material modelling including the property, the applied loading, and the load step are already created. The user must create the contact definition, alter the clearance value, and review the analysis results.



## **Problem Setup**

You should copy this file: variablegap.fem

## Step 1: Import the file variablegap.fem into HyperMesh Desktop

## Step 2: Define the contact surfaces and contact using Auto Contact tools

1. In the drop-down menu, click on *View > Browsers > HyperMesh > Contact* to bring up the **Contact** browser.

Session	Mask	Model	Contact 🗙			
Enter Searc	ch String					Q ~ *
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Entities			ID 💊 📦 S	State Per	netration E	xport Status
🕀 🍣 Cor	mponents	(2)				
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Entities ID	State Pen	etration Ex	port Status 1	Type Slav	ve Master	Property Frict

2. Right-click in the **Contact Browser** area and select **Auto Contact**. This brings up the **Create AutoContact** dialog.

🛆 Create AutoContact		×
Name	Value	
Pick application region	0 Components	
Parameters		
Contact tolerance type	Vicinity tolerance	
Vicinity tolerance	1.0	
Reverse angle	15.0	
Consolidate contact pairs		
Contact type	Touch	
Master entity type	Set of elements	
Slave entity type	Set of nodes	
Contact property		
Property option	Property Type	
Property type	SLIDE	
Contact Detector Options		
Run penetration check before contact creation and auto adjust penetrating elements		
	Create	Close

3. Click on the *Components* entity selector to bring up the Select Components dialog. Select the TOP and BOT components.

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Enter Search St	Q, ~	
Name TOP Ø BOT	1D 1 2	Color
↓ <b>v</b> ↓= <b>v è</b>	OK	2 selected. Cancel

- 4. In the **Create AutoContact** browser, set the *Vicinity tolerance* to 0.5.
- 5. Set the Property Option to Use Existing Property Id and set Select existing contact property to NONE (2).

💪 Create AutoContact	×		
Name	Value		
Pick application region	2 Components		
Parameters			
Contact tolerance type	Vicinity tolerance		
Vicinity tolerance	0.5		
Reverse angle	15.0		
Consolidate contact pairs			
Contact type	Touch		
Master entity type	Set of elements		
Slave entity type	Set of nodes		
Contact property			
Property option	Use Existing Property Id		
Select existing contact property	NONE (2)		
Contact Detector Options			
Run penetration check before contact creation and auto adjust penetrating elements			
	Create Close		

6. *Create* the Auto Contact.

7. In the **Model Browser**, expand the **Properties** section of the model tree and change the name of the contact property NONE to AutoContact. Edit the **CLEARANCE** on the contact property to 0.1.

Name	Value
Solver Keyword	PCONT
Name	AutoContact
ID	2
Color	
Include File	[Master Model]
Defined	
Card Image	PCONT
User Comments	Do Not Export
GPAD_OPT	
GPAD	
STIFF_REAL_VAL	
STIFF	AUTO
MU1 Options	Real Value
MU1	
MU2	
CLEARANCE	0.1
SEPARATION	
FRICESL_opts	
FRICESL	
STFEXP	
STFQDR	
PCONTX	
PCONTHT	

Step 4: Run this model as variablegap\_0.1.fem and review the results in HyperView



A contour plot of the Contact Force (v) on the elements of the contact interface for subcase 1

Step 5: Return to HyperMesh, reset the *CLEARANCE* to 0.07, run this model as variablegap\_0.07.fem and review the results in HyperView

Step 6: Return to HyperMesh, reset the CLEARANCE to 0.0, run this model as variablegap\_0.0.fem and review the results in HyperView



A contour plot showing Contact Force, Element Stresses (2D & 3D) (Pressure), and Displacement (Mag) for each of the clearance levels: 0.1 (first column), 0.07 (second column), and 0.00 (final column)